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The research field of Social Innovation: Deriving an updated view on the field through a co-citation analysis

Andreas Fazekas, Daniel J. Kruse & Cornelius Herstatt

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Hamburg University of Technology (TUHH)

Institute for Technology and Innovation Management

Am Schwarzenberg-Campus 4
D-21073 Hamburg

Tel.: +49 40 42878 3777
Fax: +49 40 42878 2867

andreas.fazekas@tuhh.de
www.tuhh.de/tim

Abstract

This paper presents a thorough analysis of the research field of Social Innovation (SI). It seeks to contribute to the understanding of how this dynamic research field has developed since the early 2000s by addressing three main topics. First, an analysis of the current intellectual structure of the field derived through a co-citation analysis of 1.184 relevant scientific documents is presented. Second, the role of public institutions for SI is discussed. Third, the theoretically established link between Open Innovation and Social Innovation is examined. The results show that four main cluster exist defining the research field of SI. These clusters are: Social Entrepreneurship, Partnerships and Interaction, Theoretical Foundation and Change and Transition Management. The analysis indicates that a unifying literature body has been established and is commonly accepted in academia. Moreover, the results confirm the strong link to the practice and highlight the relevance of SI for various stakeholder. Based on these results it can be concluded that the research field of SI has developed from being a small and not independent area to a complex, mature, established and independent research field within the last two decades.

Keywords: Social Innovation, Co-Citation Analysis, Intellectual Structure, Social Innovation Definition, Business Innovation, Literature Review, Social Entrepreneurship, Bibliometrics

1 Introduction

Social Innovation (SI) looks back at a fluctuating history. Both academia and practitioners (such as policymakers, social innovators, etc.) contributed to establish certain anchor points providing a base for a mutual understanding of SI. Starting rather as a side note in management literature, authors like Drucker (1987) or Barley and Tolbert (1997) fleshed out a distinct view on SI. As a result of the increasing interest in and literature on SI, the research field moved on from being a sub-field of conventional management theory to become a more and more independent research field of its own (Moulaert, 2013; Phills, Deiglmeier and T. Miller, 2008). Although not undisputed, this development has been gaining traction since the early 2000s, when authors like Mulgan (2006), Howaldt and Schwarz (2010), Murray, Caulier-Grice and Mulgan (2010), Neumeier (2012), Chalmers (2013), Cajaiba-Santana (2014) and others started to provide SI dedicated theorical and empirical input. Apart from this, the field has also benefitted from increased attention from public institutions, for instance the European Commission (1995, 2013b) or the World Economic Forum (WEF) (2013, 2019) and its focus on SI as an incubator for regional development and economic growth.

The increased interest in SI is strongly linked to the characteristics of SI processes and outcomes. SI aims at addressing social needs by applying an inclusive approach that invites all stakeholders to actively contribute to SI (Moulaert, 2013; Mulgan *et al.*, 2007). Thus, it is regarded as a formidable tool to address complex social challenges on a local, regional and global level. In times of "growing tension among societies, governments and the market […]" (Unceta, Castro-Spila and García Fronti, 2017, p. 406) in an ever more complex and globalized world, SI is thus perfectly equipped

to play an important role in solving multi-stakeholder challenges, enabling engagement and cooperation and thereby affecting multiple regions and generations around the globe not only economically, but also socially.

Nevertheless, SI has until recently still been regarded as a volatile and young research field (van der Have and Rubalcaba, 2016). Therefore, this paper aims to provide an overview of the status quo of SI as an (independent) research area and seeks to create an understanding about the major schools of thought within it. Based on a thorough review of the current SI literature, a co-citation analysis is performed to create a view on the current intellectual structure of the research field. Findings of this analysis point towards the conclusion that SI should finally be regarded as an established research field and show that the reach and relevance of SI has increased to entrepreneurship, business literature, public institution research and other relevant fields. More specifically, four clusters with a total of 11 sub-streams have been identified showing that the research field has increased in complexity and coverage. Conclusions drawn from this analysis can positively impact both the academic work on SI as well as applied SI in practice.

2 Theoretical background and research questions

Social innovation (SI) has been defining our way of living for the last centuries and is similarly attributed an ever-growing importance to cope with global and regional challenges of our time (Cajaiba-Santana, 2014; Drucker, 1987; Mulgan *et al.*, 2007). The reason for this is – expressed in simple terms – that SI aims at creating solutions to problems that cannot or so far have not been addressed through private or public organizations (National Endowment for Science, Technology and the Arts, 2008). The relevance and importance of SI is thus becoming clear to politicians, researchers and entrepreneurs who often operate in more and more complex environments in which traditional policy intervention or market solutions proof to be less effective (Moulaert, 2013). A look back in history shows that SI is attributed to progress in various fields, such as promoting labor rights with the creation of unions, revolutionizing child care with kindergartens or, more recently, providing improved funding opportunities to the Global South through microcredits (Moulaert, 2013).

SI has been gaining attention in academia from the late 20th century onwards (Drucker, 1987). It has though often been described as not completely equipped with neither a sound and holistic scientific base nor commonly accepted frameworks (Phills, Deiglmeier and T. Miller, 2008; Pol and Ville, 2009). Especially when compared to the much more elaborated field of 'business innovation' (BI), social innovation has a „relatively young and unsettled history, in which different approaches coexist" (van der Have and Rubalcaba, 2016, p. 1932).

Therefore, the aim of this literature review is to provide a holistic understanding of what SI is, how it can be defined, which sub-streams exist

within SI and how it is connected to other research fields.

2.1 Defining SI

First, an overview of nine definitions of SI from academia and institutional actors is presented and discussed. Second, the insight generated in this process leads to a unifying definition of SI that will be further used as main definition in this paper.

Table 1 presents a variety of definitions within the research field. They are selected based on their status as commonly used definitions within the research field. Additionally, two definitions by institutional thought leaders, namely the European Commission as well as the WEF (Milligan and others, 2013) are included to show whether and how they differ from SI definitions used within academia. The definitions highlight similarities and differences in thinking about SI and thereby support the achievement of one of the goals of this literature review, i.e. sharpen the view on a unifying, general understanding of SI (Baregheh, Rowley and Sambrook, 2009; Edwards-Schachter and Wallace, 2017).

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Criteria for definition of SI	Cossetta and Palumbo 2014	Pol and Ville 2009	Phills et al. 2008	Moulaert et al. 2013a	Murray et al. 2010	Milligan and others 2013	European Comm. 2020	Mulgan et al. 2007	Unceta et al. 2017
1. Defines the input									✓
2. Defines the output	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.1. Defines output as "new"	✓	✓	✓		✓	✓	✓	✓	✓
2.2. Defines output as "improvement"		✓	✓	✓			✓		
3. Defines the actors							✓	✓	✓
3.1. Society as actor							✓		✓
3.2. Organizations as actor							✓	✓	✓
3.3. Individuals as actor							✓		
4. Defines the goal	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.1. Address / solve social problems			✓			✓	✓		✓
4.2. Meet social needs	✓	✓[2]			✓			✓	
4.3. Create relationships / communication	✓			✓	✓				
5. Defines specific target sectors / groups [1]						✓			✓
6. Defines society as main value recipient			✓	✓	✓				
7. Defines non-profit threshold								✓	

1: sectors (e.g. social sector, education), groups (e.g. underserved population) 2: "improve quality or quantity of life"

Table 1: Analysis of SI definitions and identification of main elements (table by the author)

2.2 A unifying definition of SI

In this section, the working definition for SI used in this paper is presented. It neither claims to be a more accurate nor significantly different definition for the research field but rather summarizes the main points described above into one formula, thereby also drawing on conclusions from a systematic definition review by Edwards-Schachter and Wallace (2017). The main goal of creating this unifying definition is to provide the boundaries within which this paper is working. The working definition used in this paper is the following:

> Social innovation describes any novel tangible (e.g. products) or intangible (e.g. ideas, policies, services) output leading to an improvement of the status quo of

its target group. It addresses social needs and provides a positive net benefit to society.

The working definition of this paper covers the main points similarly covered by the definitions summarized in table 1. It addresses the output and the goal of social innovation. Additionally, it states that "a positive net benefit" should be provided to society. This phrase was included to cover the in other definitions explicitly or implicitly mentioned idea that SI should provide more to society than to a certain individual.

Based on this overview of definitions and the presentation of a common definition, the next sections aims at contributing to a deeper understanding of current discussion topics of SI.

2.3 The inside perspective on social innovation

In this section, the literature review highlights current topics discussed in the research field of SI. It should provide an answer to the question which topics are driving the research field and thereby provide an insight into the "intellectual structure" (McCain, 1986) of the field.

To provide a concise yet satisfying overview over the ongoing discussions within SI, the insights are built around an analysis of the intellectual structure of the research field by van der Have and Rubalcaba (2016). In their paper "Social innovation research: An emerging area of innovation studies?", they performed a bibliometric analysis of 157 documents published between 1986 and 2013 within the SI literature. Based on this analysis, they stipulated that four different streams of current discussions exist within SI, namely 1. "Community Psychology", 2. "Creativity research", 3. "Social and societal challenges" and 4. "Local development" (van der Have and Rubalcaba, 2016, p. 1927).

2.3.1 "Community Psychology" in SI

This first established cluster gathers literature that discusses complex and global change processes within society that are introduced and driven by social innovation initiatives. According to van der Have and Rubalcaba (2016), most documents within this cluster are directly or indirectly referring to a specific type of SI framework, the "Experimental Social Innovation and Dissemination" model. The framework describes a method to introduce SI into a social system, thereby creating positive change in the target group. It points out the importance of community actions and interplay between different stakeholders.

In general, the community aspect is a key element for SI (Mulgan *et al.*, 2007). As SI highlights the importance of inclusion of all relevant stakeholders and, by definition, addresses social needs, it also becomes an advocate of bottom-up approaches and community involvement (Murray, Caulier-Grice and Mulgan, 2010). This is also confirmed in other SI literature, for example by Unceta, Castro-Spila and García Fronti (2017), stating that the great challenges society has to tackle need community input due to their complexity

and require buy-in from vast parts of the society. Additionally, Lawrence, Dover and Gallagher (2014) write that "social problems are socially constructed by interested sets of actors including those afflicted, those working to address them, those in the community they affect directly or indirectly, and a potential, diverse network of actors who influence the social construction process […]" (p. 326). This shows the complex interaction patterns within SI and highlights the importance of understanding how community communication and interactions work.

2.3.2 "Creativity research" in SI

Documents within this cluster are highlighting various process steps of SI and connect the research field to main frameworks of creativity research which is seen as a basis for a successful innovation process (Oliveira and Breda-Vazquez, 2012; Phills, Deiglmeier and T. Miller, 2008). Specifically, van der Have and Rubalcaba (2016) point out that the cluster is orbiting around a central paper by Mumford (2002) published in the "creativity research journal" where the author is describing the strong influence of creativity on the innovation process in general and, in a second step, draws explicit conclusion for creativity in social innovation.

Independent from the papers examined by van der Have and Rubalcaba (2016) within this cluster, a literature review of SI clearly shows that discussions with respect to the creation of SI, or more nuanced the processes involved in starting SI as well as the forces driving SI are a main topic within the field (Cajaiba-Santana, 2014; Mulgan, 2006; Mulgan *et al.*, 2007; Murray, Caulier-Grice and Mulgan, 2010). Although approaches differ and process frameworks sometimes include or exclude certain steps (e.g. while Mulgan *et al.* (2007) explicitly include "diffusion" in their process, it is not specifically mentioned by other authors), some process steps are likely to be found in a vast majority of SI process description. The following steps can be considered most relevant and commonly agreed on within the SI literature (to be noted: some are overlapping with the explicit process steps discussed by Mumford (2002)): 1. Identification of a social need or problem, 2. Clear problem definition, 3. Inclusion and involvement of all stakeholders, 4. Piloting and prototyping, 5. Continuous evaluation and scale up.

2.3.3 "Social and societal challenges" in SI

According to the authors, this "cluster is formed by articles concerned with SI as innovative solutions to social (-technical) challenges" (van der Have and Rubalcaba, 2016, p. 1928). The documents within this cluster primarily aim at environmental issues, sustainability and health care. Compared to the first cluster established by the authors, the documents in this cluster are less focused on theoretical discussions of frameworks to tackle societal challenges but rather dive into case study driven analysis of SI movements connected to social and societal challenges. For instance, Seyfang and Smith (2007) are key authors in this cluster by describing grassroots movements and their impact and success in driving sustainable development. Apart from grassroots

movements, this cluster also includes and establishes links to social entrepreneurship research (Weerawardena and Mort, 2012) showing how SI and social entrepreneurship can be considered communicating vessels when it comes to addressing social needs.

Indeed, when it comes to discussing where SI should be applied and which challenges can be tackled by SI, the literature review shows that a strong link to the "defining issues of our time" (United Nations, 2016), for instance climate change, has been established. Literature here covers various topics in the common sphere of climate change and SI. In general, SI is often described as well suited to tackle climate change due to its on inclusion focused approach (Mulgan *et al.*, 2007) as partly described in cluster 1. Topics like climate change are often also discussed under another umbrella term, "sustainable development" (Mehmood and Parra, 2013), yet still strongly linked to SI. This confirms that social and societal challenges are a key sub-stream within the SI research field.

2.3.4 "Local development" in SI

This cluster focuses on the impact of SI on local and regional development. It includes literature on both rural and urban development and discusses both theoretical approaches as well as case studies showing the methods and results of SI initiatives in a local setting. A central document in this cluster according to van der Have and Rubalcaba (2016) promotes SI as "alternative model for local innovation" from a theoretical perspective (Moulaert *et al.*, 2005). Other documents that can be attributed to this cluster discuss specific SI initiatives and how those case studies played out, thereby providing insights to SI initiatives and experiences. For instance, a case study from Porto Alegre where participatory budgeting was introduced is discussed as an example for applied SI in the context of local development and citizen participation (Novy and Leubolt, 2005).

Another relevant sub-stream of SI is present in this cluster, namely governance and public institutions and their links to SI. Based in the discussion of local and regional development, numerous documents highlight the interplay with and importance of governance and public institutions for SI. In general, SI literature sheds light on the important role of public institutions in accelerating SI. The fact that public institutions and governing bodies have recognized SI as a key instrument to achieve certain policy goals has been reflected in several publications by those institutions (European Commission, 2013a, 2014; World Economic Forum, 2019). Interestingly, their approach reflects what was already stipulated decades ago in academia. Public institutions thrift away from a historic role of social innovators to become social innovation enablers through governance and provision of resources (Drucker, 1987; Jankel, 2011; Phills, Deiglmeier and T. Miller, 2008; Unceta, Castro-Spila and García Fronti, 2017).

Discussing the historic role of governments as social innovators and how this role has changed

in recent decades, Phills, Deiglmeier and T. Miller (2008) present the example of government driven social innovation during the 1930s in the US when public pressure led to the introduction of several new social policies under the New Deal: "These social innovations were driven by a more expansive and direct role of government in solving social problems […]" (p.39). Going on in their analysis, they point out that this almost government monopoly on SI has faded and instead "nonprofits, governments and businesses […]" are "[…] joining forces to tackle the social problems that affect us all" (p.40). The role of governments as innovation enablers is also confirmed by the case studies mentioned in the last paragraph which depict the involved public institutions rather as an innovation enabling force than an innovating force itself.

Nevertheless, a challenge for both academia and public institutions is to formalize and systematize a public institution approach towards SI. This includes (not exhaustively) strategies on policies, governance and public financing schemes for SI. As Mulgan *et al.* (2007, p. 7) put it a decade ago; "not one country has a serious strategy for social innovation that is remotely comparable to the strategies for innovation in business and technology […]". Eleven years later, the analysis looked somewhat brighter as "we're beginning to see serious national policies around social innovation" (Mulgan, 2018, p. 197). Still, recognizing that significant public spending is reality in SI relevant fields such as healthcare or education (Grimm *et al.*, 2013), as well as that some public institutions like the European Commission or national governments introduce SI specific funding (Mulgan, 2018), the focus on public institutions within the research field remains highly significant.

2.4 The outside perspective on social innovation

A variety of research fields is directly or indirectly linked to SI (e.g. health care, public management / policy, etc.). Due to space limitations, only its connections to management literature is further exemplarily discussed below. Within this research field, three main sub-streams are selected due to their frequent appearance in connection to SI, namely social entrepreneurship, corporate social responsibility and open innovation.

The interlinkages between social entrepreneurship and SI are strong and flow in both directions (Phillips *et al.*, 2015) as the following examples show. Within the social entrepreneurship literature, SI is often used to describe or further detail certain approaches of social entrepreneurs. Additionally, it is also taken into consideration when the non-profit element of some social entrepreneurships leads to an exclusion of other relevant theories and frameworks (Mair and Marti, 2006; Short, Moss and Lumpkin, 2009). Other approaches link social entrepreneurship and SI due to the fact that societal transformation is a main element for both fields (Alvord, Brown and Letts, 2004). Other than that, authors rather attributed to the SI research field actively involve social entrepreneurship mechanisms in the toolkit of

promoting, applying and disseminating social innovations (Milligan and others, 2013; Mulgan *et al.*, 2007).

When it comes to corporate social responsibility, SI is considered by some authors in the field as a method to increase the understanding of and capability for companies to foster their social profile (Mirvis *et al.*, 2016). It thereby connects the nature of a profit-orientated company with SI characteristics, creating a specific form of corporate social innovation. Phillips *et al.* (2015) note that "growing disillusionment of for-profit business models has drawn attention to […] social innovation to ease social issues" (p.428). Thus, a company is inspired by SI, especially the understanding of social needs and stakeholder involvement, to improve its own social footprint and to add social value beyond its primary task of creating investor / shareholder value.

Another relevant connection between research fields is the proposed linkage of SI with the methods of open innovation. Authors like Chesbrough and Di Minin (2014) or Martins and Bermejo (2015) started to look into and combining the fields of SI and Open Innovation (OI), establishing the theory that certain overlaps do exist between the areas and that open innovation methods could potentially increase the positive impact of SI. Defined by Chesbrough (2003), open innovation is

> "a paradigm that assumes that firms can and should use external and internal ideas, and internal and external paths to market. Open innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model. The business model utilizes both external and internal ideas to create value, while defining internal mechanisms to claim some portion of the value" (p. xxiv).

Thus, open innovation stipulates that innovation should be an open process benefitting from the use of internal and external input throughout the same. This includes for instance innovation sources (e.g. knowledge, skills, etc.), production methods, distribution models or financing (Chesbrough, Vanhaverbeke and West, 2006). This is in strong contradiction to the traditional innovation model that avoids any transfer (or spillover) of innovation both from internal to external and vice versa (Almirall and Casadesus-Masanell, 2010; Herzog and Leker, 2010). Chesbrough (2006) uses examples from innovation focused companies such as Xerox to explain why organizations relying on a closed innovation model left out on many promising innovations that only proofed to be successful after their innovators left the closed boundaries of the company-owned innovation laboratories. "If they had stayed inside Xerox […] the value of these spin-offs likely never would have materialized" (Chesbrough, 2006, p. 8).

Referring to the earlier mentioned high complexity and stakeholder involvement of SI, an innovation method that proposes an "open"

approach seems like a tool that can positively contribute to SI initiatives in different ways. Surprisingly, although both research fields have gained attention and traction in the last decade, "their relationship with each other has been neglected in the literature" (Martins and Bermejo, 2015, p. 144). Similarly, other authors have recognized the "gap" in the intersection of the two research fields (Chesbrough and Di Minin, 2014, p. 301). Therefore, the model of open social innovation (OSI) is suggested as an "application of either inbound or outbound open innovation strategies, along with innovations in the associated business model of the organization, to social challenges" (Chesbrough and Di Minin, 2014, p. 302). It offers an interesting approach to increasing the impact of SI and thus adds to the examples of research fields influencing or being influenced by SI.

Based on the presented literature review materializing in the inside and outside perspective of SI, the next section will elaborate on the research questions that steer the following parts of this paper.

2.5 From literature review to defining research questions

The definition of research questions is a central process within a paper and the foundation of its quality (Alvesson and Sandberg, 2011). Different approaches can be chosen to create research questions based on the status quo of existing scientific literature. Nevertheless, all approaches conclude that the aim of creating and elaborating on a research question should be to ultimately contribute to the knowledge of a research field. With this in mind, the three research questions presented in this paper are rooted within the literature review above and follow the blend of a "gap-identification" and "problematization" method to generate research questions (Sandberg and Alvesson, 2011).

As a result, the following research questions are established:

1.) What is the current status and intellectual structure of the research field of SI?
2.) How are public institutions embedded in the intellectual structure of the research field of SI?
3.) Does a systematic literature review support the theoretically established overlap between SI and OI (Chesbrough and Di Minin, 2014; Martins and Bermejo, 2015)?

3 Methodology

In order to answer the research questions, an approach based on the techniques of bibliometric analysis will be applied. A general definition states that "bibliometrics is the quantitative study of physical published units, or of bibliographic units, or of the surrogates for either" (Broadus, 1987, p. 376). Bibliometric analysis techniques have been a longstanding and integral part of the production process of scientific literature. Although ranging in complexity from simple statistical analysis to complex algorithms, it is the first and foremost

goal of bibliometrics to clear the view on and enhance the understanding of a research field or community (Aria and Cuccurullo, 2017; Brookes, 1969). Within the last years, bibliometric analysis has increased in its importance for mapping a current scientific status quo of a research field (Aria and Cuccurullo, 2017; Zupic and Čater, 2015). It can proof especially useful for research fields that have a constantly evolving and fragmented research focus area as well as "young" research fields that are still volatile in terms of output, topics and research trends (Broadus, 1987).

Given that it is goal of this paper to understand and examine the current status and intellectual structure of the research field of social innovation (SI), a bibliometric approach should be considered an appropriate tool. Not only is SI quite young as an independent research field, it has also gained strong traction in recent years (Sharra and Nyssens, 2010; van der Have and Rubalcaba, 2016), resulting in a significant increase in research production in SI as will be shown in the results section.

The methodological approach for this bibliometric exercise follows a standard design for scientific mapping postulated by Zupic and Čater (2015) and extended or detailed in various pieces of literature on bibliometrics (Aria and Cuccurullo, 2017; Verbeek *et al.*, 2002). It generally consists of the four following stages:

1. Study design
2. Data collection
3. Data analysis and visualization
4. Discussion and Interpretation

While steps 3 and 4 are further explained in the results section of this paper, a short overview of points 1 and 2 will be provided below.

3.1 Study design

Within this first step, the goal is to define the research questions. In this paper, this step has already been accomplished within the literature review. Apart from that, the appropriate tools within the bibliometrics toolkit should be selected here. Additionally, initial boundaries in terms of years to be covered can be set. Yet as the approach of the paper is to create a holistic picture of the research field, the author will refrain from setting a time span already at this stage. To answer the research questions of this paper, a three-step approach based on the bibliometric toolkit is used as depicted in figure 1.

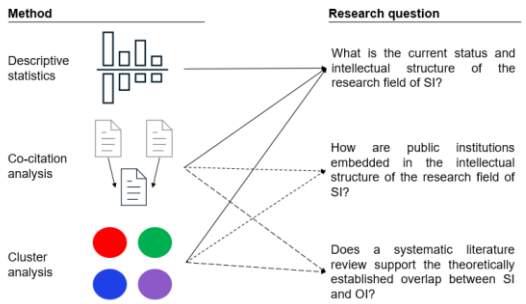

Figure 1: Linking method and research questions (Illustration by the author)

3.1.1 Descriptive statistics

A first understanding of volume, scientific production, relevant authors and journals etc. can be created by focusing on the descriptive statistics of the examined research field (Pritchard and others, 1969). This not only creates the first layer of information on the research field but also provides relevant

information for the interpretation of further, more detailed results that will follow in the analysis. Thereby, the descriptive statistics produces vital information that subsequently can be used to set the results of the analysis into context (Holcomb, 2016):

3.1.2 Co-citation analysis

Most generally speaking, citation analysis, regardless of focusing on the author, the document or the journal, is an analysis performed to identify the most prominent and important among the given dataset (Gmür, 2003; Small, 1973). In the specific case of a co-citation analysis, it also allows for a deeper understanding of the knowledge base or intellectual base of a certain research field (Persson, 1994). How this intellectual base is organized, whether one or many research clusters exist as well as tracking and manually analyzing the most influential documents in the dataset creates a big picture of the research field – the so-called intellectual structure. As the research questions of this paper orbit around the intellectual structure of the research field, the analysis will focus on the co-citation of available documents in the research field.

The co-citation analysis was first introduced by Small (1973) as a new measure to define the relationship between at least two documents. The basic supposition of a co-citation analysis is that a paper (A) can be regarded as co-cited if at least two other papers (B and C) used paper A as a reference for their own research as shown in figure 2. Assuming that the respective citations do not differ in its significance for the citing paper (Verbeek *et al.*, 2002), two main assumptions can be made based on this analysis: First, the relevance of a paper (in this example paper A) increases accordingly to the times it is co-cited in the selected documents of a predefined dataset. Second, a relationship between the citing papers (in this example paper B and C) is established. The strength of this relationship represented through the number of co-citations can also be calculated and interpreted as "proximity" between the respective papers (Gmür, 2003). Therefore, it allows for a two-dimensional mapping representing the research field and interlinkages based on the co-citation between documents (Di Guardo and Harrigan, 2012). The validity of the established intellectual structure through co-citation analysis is supported by various research on the perception of a research field by its members confirming the outcomes of co-citation analyses (McCain, 1986).

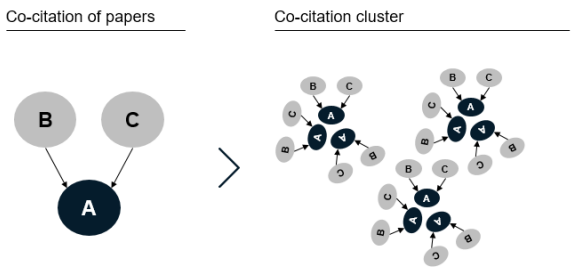

Figure 2: Simplified illustration showing co-citation and citation cluster formation (illustration by the author)

Different approaches exist to calculate a co-citation value of a specific dataset. In small

datasets, a manual approach consists of following steps:

a. Extraction of all references within the given dataset
b. Retrieval of all co-citations
c. Calculation of a co-citation value

Within the last step (c), an approach presented by Gmür (2003) has shown high robustness as it "reduces the influence of the citation relation between two co-cited references" (p.40). It is calculated as follows:

$$CoCit_{AB} = \frac{(co - citation_{AB})^2}{minimum\ (citation_A;\ citation_B)\ \times mean\ (citation_A; citation_B)}$$

To reduce the likelihood of calculation errors and increase the speed of analysis, co-citation analysis of bigger datasets is often performed through bibliometric mapping software such as "bibliometrix" (Aria and Cuccurullo, 2017).

3.1.3 Analysis of emerging clusters

Given that the research field of SI has been growing significantly within the last decade, it can also be assumed that one or more different sub-research fields or streams can be presented as a result of the co-citation analysis. Depending on the parameters selected to set the boundaries of a cluster (e.g. distance to central documents, number of analyzed documents, etc.) the number of clusters can be de- or inflated. According to Boyack and Klavans (2010), the initial result will only show different streams or cluster within a research field yet will not answer what differentiates those streams from each other. To understand how the clusters are distinguishable, a manual content analysis has to be performed. As the goal of any co-citation analysis is to create a realistic and fair big picture of a research field, this is a crucial part of the bibliometric approach as it connects the calculated results with the knowledge and content analysis of the respective documents.

3.2 Data collection

Without having a clear view on the expected result of the analysis, an efficient data analysis is hardly possible (Aria and Cuccurullo, 2017; Broadus, 1987). Some bibliometric analyses are targeting a very specific sub-sector of a research field and thus demand for a sophisticated collection pattern (e.g. in terms of key words to search for, etc.). Others, looking at a whole research field, can be performed in a broader manner. In both cases, the data collection needs to ensure that the main goal, a realistic view on the research field, is achieved (Aria and Cuccurullo, 2017). In the case of this paper, the latter case in terms of a broader approach is selected as it aims to cover the research field of SI in its whole complexity. Nevertheless, a high standard for data collection is ensured through the following two steps, namely 1. Selection of data sources and data conversion and 2. Data cleaning.

3.2.1 Selection of data sources and conversion

Selecting one or more data sources has a significant influence on the results of the bibliometric analysis as the sources differ in quality, timespan, coverage and various other parameters (Zupic and Čater, 2015). If the selection of the sources is not an indifferent decision, the underlying rational needs to follow

a justifiable and transparent logic. In the case of this paper, the rational is guided by the two aforementioned principles: covering the whole research field and achieving a realistic big picture of the same. Led by these principles, the choice was made to use the Web of Science core collection (clarivate.com, 2020) as sole source. Due to the advantages of Web of Science and its core collection (Falagas *et al.*, 2008), various authors in different research fields have been using the database as source for bibliometric analysis, confirming the selection approach of this paper (Astrom, 2011; Xie, 2015; Yu and Xu, 2017).

After selecting the data source, the choice of search terms or keywords is central for the quest of bibliometric analysis. To cover the research fields in a broad manner, the search term "social innovation" was used. Based on the chosen settings, this keyword was used in a "topic" related search. This search pattern covers titles, abstracts, author keywords and keywords plus of a document. The search yielded 2.199 results (before the data cleaning was performed).

3.2.2 Data cleaning

This second step of the data collection process focuses on cleaning the data from any documents that could distort the results in a way that no realistic big picture of the research field is presented. As the decision was made to select only one source for the dataset, the effort linked with this step was already significantly reduced (e.g. no need for cleaning of double entries etc.). Nevertheless, certain steps described in the following paragraph and depicted in figure 3 are still necessary to ensure a valid result.

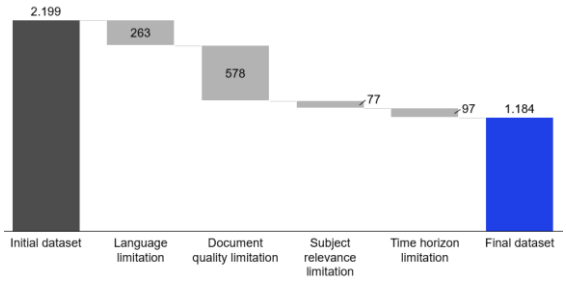

Figure 3: Data cleaning steps and resulting reduction of dataset (Illustration by the author)

The final dataset used for the following analysis contains 1.184 documents, a reduction by 46.2 percent of the initial dataset.

4 Results

In this section, the three-step approach outlined above (1. Descriptive statistics, 2. Co-citation analysis and 3. Analysis of emerging clusters) is presented.

4.1 Descriptive statistics

At first, a look at the main information of the dataset as presented in table 2 shows that 2.507 authors have worked on the 1.184 documents examined. 320 documents show only one author while most of the dataset has been published by multiple authors indicating a high collaboration effort in the research field. 568 sources (e.g. journals, books, etc.) have contributed to the dataset and 45.994 cited references can be used as input for the co-citation analysis, averaging 39 citations per document.

Parameter	Result
Documents in dataset	1.184 (thereof 979 articles, 192 book chapters and 13 books)
Sources	568
Authors	2.507
Cited references	45.994

Table 2: Main information on dataset

Having a look at figure 4 showing the annual scientific production, it is eminent that the research field of SI has experienced a stark spike within the last 10 years. However, it should also be noted that, although the selected timeline begins in 2000, there have not been any publications related to SI in the years 2000 or 2001. Concerning the increase of scientific production, an especially significant surge is displayed in 2013 when scientific production more than doubled within a year. Although the reason for this boost cannot be derived through the given dataset, a brief look at research production multipliers such as increase in publicity or publishing of groundbreaking documents could deliver further insights. Indeed, important institutions (e.g. in terms of funding or topic setting) such as the European Commission (2013a) as well as the World Economic Forum (Milligan and others, 2013) put SI on top of their agenda in early 2013, possible sparking this increase. Additionally, one central piece of literature on SI (Moulaert, 2013) was published in 2013. Thus, the combination of institutional focus and research field defining literature could be a logical explanation for the increase, not only in but starting from 2013 onwards.

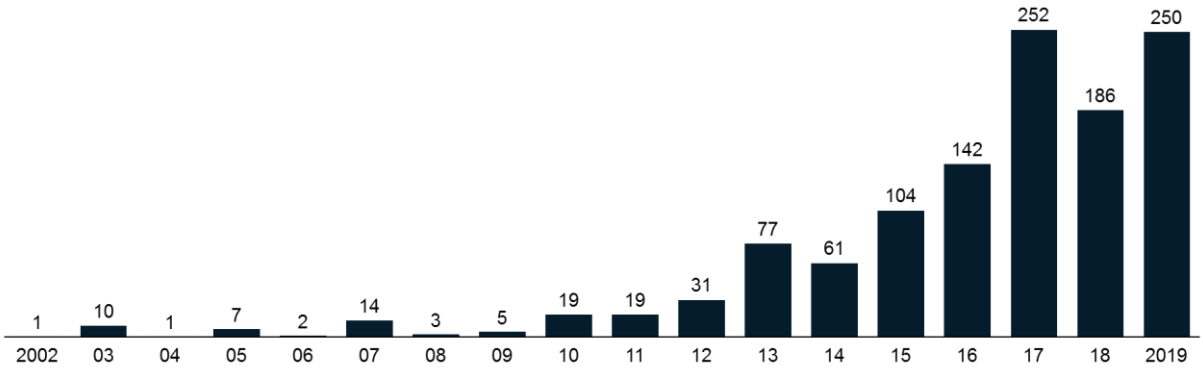

Figure 4: Annual scientific production in research field social innovation (Illustration by the author)

Following the focus on sources and documents, an analysis of the most frequent keyword plus in the dataset is presented in figure 5. This word cloud shows the 10 most frequent words found in the keywords plus and thereby provides a brief overview of the topics covered in the field. The font size represents the respective ranking of the word. Looking at this analysis, keywords like "innovation" or SI are not surprisingly found in the top 10 ranking. More interesting though is that some words may already indicate the formation of certain sub-streams within the

field. For instance, "governance" (ranked 1st, with a frequency of 96) and "policy" (ranked 5th, 70) could indicate that a specific sub-stream within the research field focuses on the interplay between SI concepts and political or economic institutions and organizations. Another example is the appearance of "entrepreneurship" (2nd, 83) and "management" (4th, 73). Both indicate that a significant part of literature covers the business aspect of SI and how it can be integrated into the economic cycle. Lastly, the appearance of "knowledge" (9th, 41) and "model" (7th, 44) may also indicate the creation of research within SI focusing on the codification of experiences and knowledge linked to SI and their implications for future SI application. Thus, the top keywords represent a great way to get a feeling for the topics within the research field while the co-citation analysis following in the next chapter will shed more profound light on these possible sub-streams.

Figure 5: 10 most occurring "keyword plus" in style of a word cloud (Illustration by the author)

4.2 Co-citation analysis

As discussed in chapter 1, the co-citation analysis of this dataset is performed by using the statistics software R (r-project.org, 2020) as well as the R-based applications RStudio (rstudio.com, 2020) and Bibliometrix (Aria and Cuccurullo, 2017). The already described dataset including all available references are used as input source. Two further variables are defined to shape and refine the result. The number of edges (number of ci-citations) is set at a minimum of 2. Additionally, the number of nodes (co-cited documents in the analysis) should represent a holistic picture of the research field. Therefore, the parameter nodes was set to create the maximum number of nodes.

In a first step, the co-citations in the dataset are analyzed without the usage of an additional clustering algorithm. The result, depicted in figure 6, show 426 nodes (co-cited documents) that can be derived from the available references in the dataset.

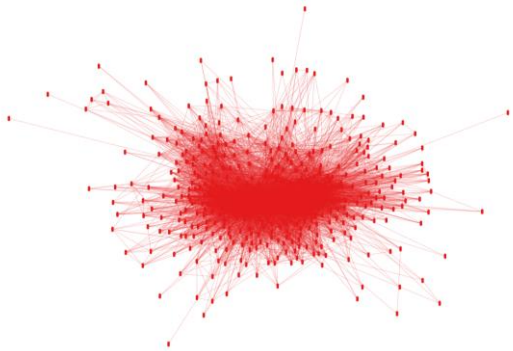

Figure 6: Co-citation analysis of SI dataset (Illustration by the author)

The density and centrality of the created co-citation network show an expectable result compared to similar analysis in different fields (Boyack and Klavans, 2010; Di Guardo and Harrigan, 2012). The fact that most of the nodes are orbiting around the center leads to the conclusion that a set of narrative defining papers positioned in the center strongly influences the remaining papers which are trending towards

the center of the network. Nevertheless, this illustration also already indicates that certain sub-streams exist as nodes are spreading into various directions from the center. Usually, these topics still show a certain connection to the center but have emerged by setting independent sub-topics that have become the center of their own sub-stream.

To gain a further look into this, another co-citation analysis including the application of an cluster algorithm is performed as a second step. Out of various available algorithms, the "Louvain algorithm" (Blondel *et al.*, 2008) for community detection is selected. Given that more than 45.000 references are included in the dataset, this algorithm is used as it has proofed to deliver stable and reliable results in large networks. The method used by this algorithm assumes that nodes are more densely linked to each other if they are part of the same community. By going through the different nodes in a circular and hierarchical order, it first allocates every note to a small community network. By repeating this step, it then allocates these small communities to bigger communities which, when the optimized network is created, results in a final number of communities or clusters (Blondel *et al.*, 2008; Lu, Halappanavar and Kalyanaraman, 2015).

Performing this analysis leads to the formation of five different clusters. However, only four of them will be considered (see figure 7) for further analysis as cluster number 5 only consists of 2 co-cited documents. Another indicator allowing us to understand the presented network is the so-called betweenness centrality. It helps to identify important nodes in a network by calculating how much they contribute to the shortest connection within a network between two other nodes. Subsequently, if a node has a high betweenness centrality, it can be considered an important broker between two other nodes that are not linked directly (Golbeck, 2013).

Cluster	**Number of documents**	**Average btw. centrality**
1	142	188,38
2	60	70,64
3	130	405,95
4	92	147,55
5	2	0

Table 3: Main information on co-citation network

Table 3 shows the main information of the co-citation network. It consists of two bigger clusters (1 and 3) and two slightly smaller cluster (2 and 4). The average between centrality is significantly higher for cluster 3. Following the above described interpretation of this parameter, it can be assumed that documents in cluster 3 have a much higher linking effect between documents of other clusters, turning them into a common ground of documents connecting the research field.

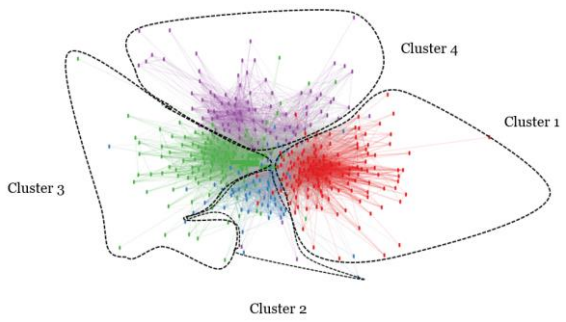

Figure 7: Co-citation analysis (with cluster algorithm "Louvain") of SI dataset and numbering of clusters (Illustration by the author)

4.3 Cluster analysis

In this section, the clusters are analyzed and labelled to create an understanding of thematic focus and prominent literature in every cluster. To comprehend which documents are connected and what their common ground is, the content of the 424 nodes in the 4-cluster network was analyzed based on title and abstract. Subsequently, a thematic cluster map was created for each cluster, showing the common denominator of the cluster (colored in the respective cluster color), certain sub-streams within the cluster that help to structure the content as well as exemplary documents within the cluster. This approach first aims at providing an intuitive overview of the intellectual structure of a cluster, second should enhance the comparability with similar analysis approaches (e.g. (van der Have and Rubalcaba, 2016) and third provides a transparent method to answer the stipulated research questions. Figure 8 to 11 show the thematic cluster map of each cluster. Based on this analysis, the four clusters are labelled as followed: 1. Social Entrepreneurship, 2. Partnerships and Interaction, 3. Theoretical foundation and 4. Change and Transition Management.

4.3.1 Cluster 1 – Social Entrepreneurship

Cluster 1 – the biggest cluster in the analysis with 142 nodes – orbits around social entrepreneurship showing that this specific topic has a strong influence on the intellectual structure of SI. Based on the examined nodes within this cluster, two different aspects of social entrepreneurship are covered.

First, examples and experience from case studies in the field of SI are reported and examined. The combination of a business spirit with social cause is the main focus of social entrepreneurship and has already been practiced long before an official term or classification was introduced (Mair and Marti, 2006). Thus, the existence and importance of case studies in this field is not neglectable, especially as it allows a direct validation and evolution of the theoretical frameworks. The coverage of examples and experiences in this sub-stream of cluster 1 ranges from individual or sector specific observations (Battilana and Dorado, 2010) to broad meta – analysis of available case studies (Alvord, Brown and Letts, 2004) synthesizing the available information to stimulate the discussion of social entrepreneurship in practice and research.

Second, a more elaborated and prominent sub-stream is focusing on theory input on SI. Within this stream, a smaller fraction of documents covers the theoretical framework for codifying knowledge from case studies. The highest

number of documents within this category contributes to frameworks supporting the common understanding of social entrepreneurship. Papers like "Research in social entrepreneurship […]" (Short, Moss and Lumpkin, 2009) or "social entrepreneurship research […]" (Mair and Marti, 2006) have the main goal of creating and evolving the frameworks that researchers and practitioners in social entrepreneurship work with. Additionally, they enhance the definition of social entrepreneurship by differentiating it from other business research fields as well by setting boundaries to other topics within the SI sphere.

The existence of this cluster within the SI literature confirms a strong link of ideas between SI concepts and the understanding of social entrepreneurship. Nevertheless, it should be noted that literature within this cluster implicitly or explicitly relies on the assumption that a for-profit organization or incentive steers the positive impact on the social cause of the operations of an organization. This is in somewhat contrast to definitions of SI as seen in the literature review above. However it implies that SI and social entrepreneurship have various parameters in common and that the non-monetary incentive should not be a conditio sine qua non for the definition of SI actions.

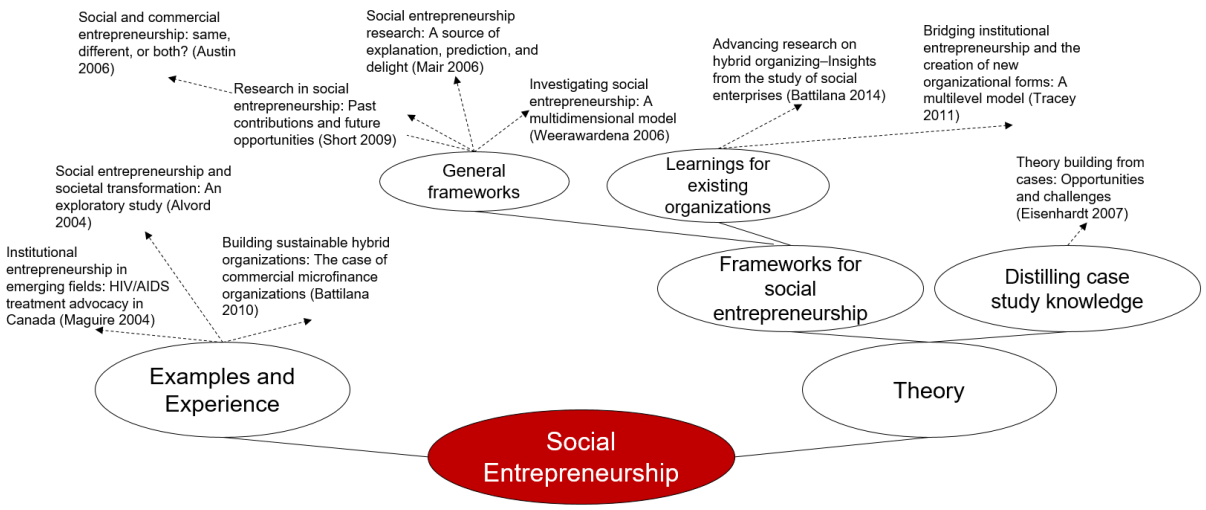

Figure 8: Intellectual structure Cluster 1 Social Entrepreneurship (Illustration by the author)

4.3.2 Cluster 2 – Partnerships and Interaction

Cluster 2 is, with respect to the number of documents, the smallest of the four established cluster with 60 nodes in the network. Based on the analysis of these documents, one overarching topic can be established within this cluster: the benefits of partnerships and interaction. While this could be interpreted in many different ways, one important aspect regarding this cluster should improve the clarity of the chosen name. Partnerships and Interaction does not primarily refer to a bottom up movement or grassroots movements within a community (see cluster 4 instead). It rather refers

to a top-down approach of partnerships and interaction either from organizations to the community or between organizations (thus partnerships and interaction within e.g. a business community). In both cases, the goal of this interaction is to gain knowledge about and from the other part and apply this to improve a given social impact. Additionally, in both cases a business view is applied when discussing SI.

Looking at the different sub-streams lays out the thinking for defining the umbrella term of this cluster. First, similar to the other clusters observed, cluster 2 comes with a specific theoretical foundation that focuses on formalizing the main themes of the cluster. Compared to the specific theory in cluster 1 and 4 as a well as the generic theory in cluster 3, documents providing theoretic frameworks for the cluster tend to analyze how to improve and strengthen an interaction based view and promote it as a way to increase reach and relevance of SI (Christensen *et al.*, 2006). They also discuss SI from a more business-leaning perspective by integrating SI into a given status quo of the corporate world (Dawson and Daniel, 2010). Improving the understanding of partnerships between organizations in different industries and sectors and thereby promoting SI topics is another key theme (Selsky and Parker, 2005). Apart from this general theory input for partnerships and interaction within SI, this cluster focuses on two specific methods or ideas to foster interaction with or within a community. The first, communication with a community from a business perspective, is covered with a significant part of Corporate Social Responsibility (CSR) literature. Authors like Mirvis *et al.* (2016) who are using the term "corporate SI" to describe a desired outcome of CSR or Porter and Kramer (2006) present their understanding of CSR as a main driver of SI through established organizations. This also describes a stark difference to the social entrepreneurship literature that rather highlights the entrepreneurial spirit of creating something new in the light of social aspects than incorporating them into an already created organization. A link between CSR and "open SI" is formed by Lettice and Parekh (2010). In their paper, they lay out ways and means to improve an interaction focus similar to the ideals of CSR (referred to in this paper as "engaging a new customer base") by adopting methods of open innovation ("referred to in this paper as "leveraging peer support"). Given that the social cause is a main topic in the paper, open innovation turns into Open Social Innovation (OSI). Considering the strong presence of OSI authors and documents in this cluster, it builds the third sub-stream of this cluster. Most of the literature in this sub-stream elaborates on ideas and methods of open SI as well as how to apply it in practice (Chalmers, 2013; Chesbrough, 2003).

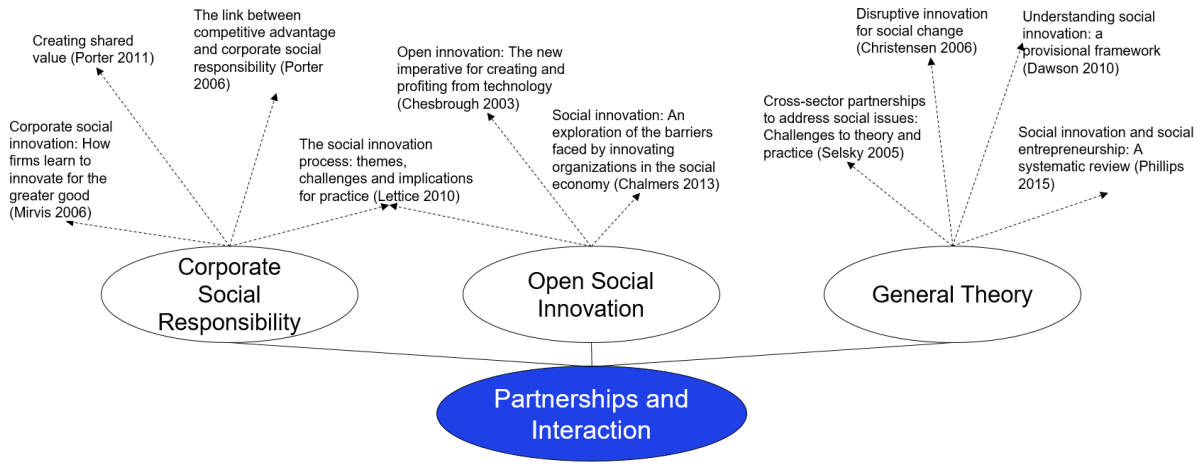

Figure 9: Intellectual structure Cluster 2 Partnerships and Interaction (Illustration by the author)

4.3.3 Cluster 3 – Theoretical Foundation

Cluster 3 is the second biggest cluster with 130 documents and, as already pointed out, the most central cluster in the network as the average between centrality of almost 406 shows. Analyzing the documents in this cluster revealed that it is a network consisting of the theoretical foundations of the research field. Therefore, cluster 3 was named to reflect this finding. As results in the descriptive statistics sections as well as the most cited documents within the co-citation network indicated, a broadly accepted literature foundation is the key to the central role of this cluster within the network.

For instance, the co-citation network shows that various of the analyzed documents use literature from cluster 3 to provide a general view of the field before embarking to their own research focus. This literature is mainly covered in the sub-stream Literature Review that groups general theoretical foundations of SI. All documents in this sub-stream provide a view on the history of SI, how it emerged and why it should be considered an important contemporary research stream. Linked to this, many of the authors in this field either create certain definitions of SI to set boundaries to other research fields or suggest frameworks to classify SI (Cajaiba-Santana, 2014; Mulgan *et al.*, 2007; Phills, Deiglmeier and T. Miller, 2008). Apart from that, it also includes the literature that gives an overview over the field based on research and bibliometric analysis (van der Have and Rubalcaba, 2016).

A smaller but still significant part of literature in this cluster, represented by authors like Moulaert *et al.* (2007) focuses on Governance of SI. It acknowledges the steering influence of public institutions (financially, organizationally and logistically) on SI and tries to shed light on how governance supports SI by setting the stage right.

Linking Governance and the third sub-stream in the cluster, Regional / Local Development is work like a paper by Novy and Leubolt (2005) as

it brings together experience from applied SI in a local context with learning for governance activities. Given that SI concepts have strong influence on regional and local development, a relevant number of documents describe the theoretical background of this unique link of method and region. The documents in this cluster claim that SI is one of the main variables to boost rural development (Neumeier, 2012) and discuss frameworks and ideas to increase the usage and efficacy of SI in a specific regional or local setting.

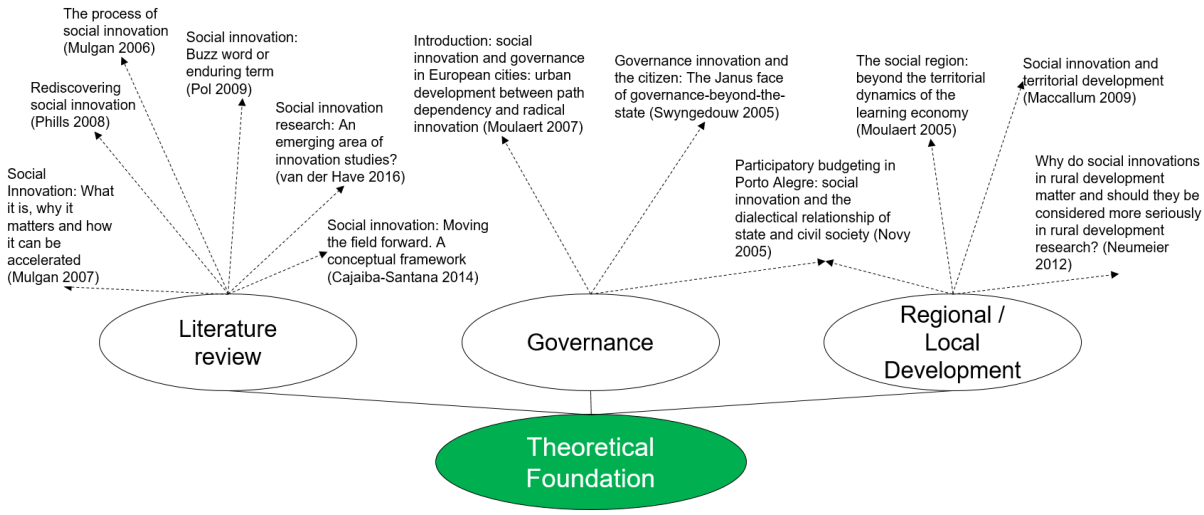

Figure 10: Intellectual structure Cluster 3 Theoretical foundation (Illustration by the author)

4.3.4 Cluster 4 – Change and Transition Management

Cluster 4 is the second smallest cluster in the co-citation network with 92 nodes. The content analysis of the documents within this cluster shows that the general topic linking the contents of the documents within the cluster is Change and Transition Management. Although SI and innovation in general is always set to demand or create change, the documents in this cluster refer to change as hard to be realized goal due to either the scale of the to be changed topic or the existence of already established systems.

In the sub-stream General Transition Theory, authors like Geels and Schot (2007) look at already existing literature on change and transition, create overviews over the evaluation of these topics and formulate conceptual frameworks showing methods to create change and transition management. Also the concept of "power to change" is discussed contributing to the toolkit used to create change.

This links to contributions from authors like Biggs, Westley and Carpenter (2010) addressing environmental issues stating that the arguably biggest change societies in the 21st century will be created by the Sustainability Challenge. Documents on this issue are tackling a unique challenge as it aims at changing multi-dimensional and complex networks and environmental systems on a global scale. Therefore, a certain set of literature has been established around this topic, building the second sub-stream in the cluster. The documents

point out that SI is a central element to tackle this sustainability challenge as it empowers various communities and stakeholder in this complex system and thereby ignites change. Moreover, SI should also be understood as a method to inspire grassroot innovations necessary to drive this change (Seyfang and Smith, 2007). This sub-stream shows that the relevance of ecological questions is strongly linked to the research field of SI.

Compared to the focus on a specific topic to be changed in the last sub-stream, the Institutional Change stream within this cluster discusses why institutional change is important for SI and how it should be understood. The documents point out that various factors such as agency, resources, etc. are necessary to create institutional change (Dorado, 2005). Based on this, authors like Seo and Creed (2002) present frameworks describing and formalizing the variables of institutional change as well as the interaction patterns that lead to it.

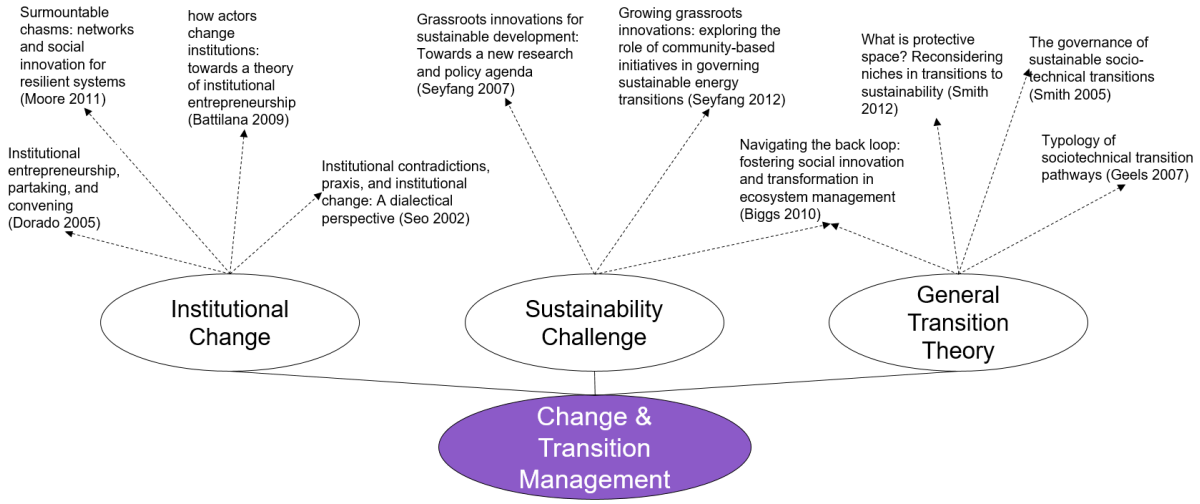

Figure 11: Intellectual structure Cluster 4 Change and Transition Management (Illustration by the author)

5 Discussion

After presenting the literature review, method and analysis of this paper, the outcomes of the analysis will be discussed in light of the stipulated research questions. This section is split into three parts. First, the status quo and intellectual structure of the field; second, how public institutions are embedded in the research field; and third, whether or not the link between SI and OI is reflected in the outcomes is discussed. Additionally, it will be highlighted which aspects are missing or not sufficiently covered that could further contribute to the development of the field.

5.1 Status quo and current intellectual structure of the field

As a first assessment, it should be noted that the main drivers of the field, the mission and vision of SI, have not significantly changed within the last years. The research field of SI is still aiming at providing academic thinking around the main

goal of SI, namely meeting social needs (Mulgan *et al.*, 2007; Mulgan, 2018; Murray, Caulier-Grice and Mulgan, 2010). Apart from that, the multi-actor involvement of SI, spanning from individuals, businesses, entrepreneurs to governments and public institutions (European Commission, 2013a; Martins and Bermejo, 2015; Mulgan *et al.*, 2007) is still a common denominator of SI as a research field. It is thus still seen as main focus point of SI to provide valuable input at the crossroad of social issues and complexity (e.g. due to involvement of various stakeholder, etc.), claiming that SI is in a unique position to tackle the main challenges of our life time (Seyfang and Smith, 2007; Unceta, Castro-Spila and García Fronti, 2017). Nevertheless, there is still a variety of evolvements observable that will be discussed below.

Compared to the most recent co-citation analysis of SI as a research field (van der Have and Rubalcaba, 2016) built upon scientific literature until 2013, the above presented analysis shows a different, more complex, more mature and more established research field has evolved six years later. This is a logical development seeing that the research field has been growing significantly in terms of produced literature (i.e. less than 200 documents available for analysis by van der Have and Rubalcaba (2016) compared to more than 1.100 documents analyzed in this paper) and rightfully already anticipated as the authors stated that "because SI is such a growing literature, our empirical results may not hold far into the future" (van der Have and Rubalcaba, 2016, p. 1933).

The following paragraphs aim to discuss in which sense the intellectual structure of SI has become more complex, more mature and more established. Specifically, a set of observations is presented supporting this conclusion, namely the appearance of wider reaching clusters with subordinated streams, the establishment of a theory body and a stronger practice focus within the field.

A look at the co-citation analysis presented in this paper reveals that the structure of SI has become more complex and more detailed than in earlier analyses (Moulaert, 2013; Mulgan *et al.*, 2007; van der Have and Rubalcaba, 2016) of the field. Based on this analysis, the four defined clusters (Social Entrepreneurship, Partnerships and Interaction, Theory foundation and Change and Transition Management) hence cover broader areas of the research field of SI and have themselves additional sub-streams developing within the clusters. This development displays a stark difference to the examination of the research field by van der Have and Rubalcaba (2016). For instance, the "community psychology" cluster defined by the aforementioned authors contains of 14 papers, all of them orbiting around one specific model on "innovative social and behavioral change" (p. 1928). While the data input until 2013 demanded for creating this very narrowly defined clusters, the vast increase in academic literature since then led to an increase in topics and issues

covered within SI and thereby increased the complexity of it. This increase in complexity of the research field mirrors not only the increase in quantity (i.e. production of scientific documents) but also indicates an increase in quality and diversity (e.g. topics covered, links to other research fields) within SI. Considering the increase in quality and diversity, both an expansion of SI to new research fields (by e.g. creating new linkages between SI and another research field) as well as a further deepening and detailing of already established connections is observed.

The sub-stream Corporate Social Responsibility (CSR) stands as an example for the expansion of SI. While CSR has not or only loosely been linked to SI in previous analyses (Mulgan *et al.*, 2007; van der Have and Rubalcaba, 2016), the emergence of this sub-stream within the Partnership and Interaction cluster clearly shows that scientific documents covering SI topics are increasingly considering CSR as a use case for SI. As already highlighted in the results section, SI is more and more seen as an instrument that organizations and companies can use in order to reach certain goals that blend company responsibility with social needs of the community the respective organization is based in (Mirvis *et al.*, 2016; Porter and Kramer, 2006). Likewise, the sub-streams Institutional Change and Sustainability Challenge can be considered as examples for the expansion of SI. Although both have been defined as impacted by SI before, the emergence of both topics as developing sub-streams points at a further expansion into these topics.

The latter case of increase in quality and diversity is a result of the deepening in and detailing of a specific topic within SI. Theory on research field evaluation states that an evolution and deepening of a topic is defined by developing from being a sub-topic within a research field to emerging as a central topic that itself inspires the creation of further sub-topics (Cobo *et al.*, 2011; Courtial and Michelet, 1990). This development is illustrated by the formation of cluster 1 Social Entrepreneurship. Linking elements of SI and social entrepreneurship implicitly or explicitly has a long history in academic literature (Alvord, Brown and Letts, 2004; Mulgan *et al.*, 2007; Schildt, Zahra and Sillanpää, 2006; Schumpeter, 1934). Although van der Have and Rubalcaba (2016) state that already within their dataset "the most recent surge in SI publications is found in the Journal of Social Entrepreneurship" (p. 1928), the then available data only led to defining social entrepreneurship as a sub-topic within the cluster social and societal challenges. Just recently the mutual influence of both fields and the amount of scientific documents linking both topics increased in a manner that allows for defining Social Entrepreneurship as individual cluster within SI. Within this cluster, sub-streams with several focus topics have been emerging, showing the above described evolution of sub-topics within a research field. Thus, it can be concluded that publications in SI have been drawing stronger links to social

entrepreneurship both from a theory as well as a case study perspective (represented by both sub-streams within cluster 1) and hence increased the depth and detail of this topic within SI.

The second claim of the analysis of the intellectual structure of the research field, namely that SI has become more mature as a research field, is strongly connected to cluster 3 (Theoretical Foundation). Debates on SI have until recently often been connected to the idea that SI does not have a commonly accepted and well-founded theory body but rather relies on borrowing concepts from management literature and other research fields. Many of the authors making this argument then provided theoretical frameworks for SI in a second step to contribute to a clear theory body for SI (Cajaiba-Santana, 2014; Mulgan, 2006; Phills, Deiglmeier and T. Miller, 2008). The analysis presented in this paper suggests that a new phase of SI as a mature research field has indeed started and that the aforementioned authors succeeded in their quest to complete the groundwork for an independent research field.

According to the analysis, the establishment of cluster 3 allows the field to grow based on a commonly accepted collection of theoretical foundations. As it was already mentioned in the descriptive statistics section (see table 3), the average between centrality of cluster 3 is significantly higher than the comparable number of the other clusters. It suggests that papers within this cluster are connecting other academic literature within the SI research field that otherwise would not be directly connected to each other. For instance, documents from cluster 1 discussing social entrepreneurship as well as literature in cluster 4 discussing the sustainability challenge refer to documents from cluster 3. This shows that the general theory on SI is currently provided by a specific field of authors and a specific set of academic literature. However, it does not indicate that there are no difference in their approaches. Likewise shown in the review of SI definitions in the literature review section, authors in cluster 3 are still differentiating themselves from colleagues by applying various points of view and tailored approaches to the vast amount of SI initiatives (Cajaiba-Santana, 2014; Moulaert *et al.*, 2005; Mulgan *et al.*, 2007; Phills, Deiglmeier and T. Miller, 2008; Pol and Ville, 2009). Nevertheless, the various approaches show common elements (e.g. the quest of SI to address social needs, the multi-stakeholder involvement, etc.) that led to the commonly referred set of literature that builds cluster 3. As a result, the claim that SI does not provide a solid and commonly accepted theory framework should be rejected and the view on the research field updated.

The third claim that is made based on the analysis presented in this paper is that SI is a more established research field than it was described in earlier literature (Chalmers, 2013; Howaldt and Schwarz, 2010; van der Have and Rubalcaba, 2016). The Cambridge Dictionary (2020) defines to be established as "to cause something or someone to be accepted in or familiar with a place, position, etc.". As the

assessment of the analysis shows, the here established clusters have a much stronger practice focus than previous views on the research field anticipated. Therefore, the argument is made that SI has further increased its acceptance amongst both academia and practitioners related to its applicability in real-world scenarios and thus becoming a more established research field.

The co-citation analysis as well as the resulting clusters show a strong practice influence on SI as a research field that has not been reflected likewise in earlier analyses (Mulgan, 2018; van der Have and Rubalcaba, 2016). All created clusters have at least a sub-stream dedicated to the practical application of SI (e.g. Regional / Local Development within cluster 3) while cluster 1 (Social Entrepreneurship) and cluster 2 (Partnerships and Interaction) are primarily focusing on the practical application of SI. The strong influence of social entrepreneurship as well as CSR provides support for the already established argument that SI does not necessarily ask for a non-profit approach of the respective SI actor. Acknowledging that SI and social business approaches and even traditional for-profit companies are not understood as excluding but as related and cooperating factors strengthens and widens the influence of SI as a research field. It makes the case that benefit for the society can be created by traditional market players as well as non-profit social innovators. Based on the here provided analysis, the still discussed idea of SI as a solely non-profit sector approach (see Mulgan *et al.* (2007) in literature review, section overview of definitions) can be rejected and SI thus regarded as a more established, practice focused research field.

5.2 Public institutions within the SI research field

As illustrated in the literature review, public institutions have a key role within SI, historically as main SI actor (Phills, Deiglmeier and T. Miller, 2008) and today as innovation enabler (Mulgan, 2018). By providing resources and governance (Drucker, 1987; Grimm *et al.*, 2013; Jankel, 2011; Phills, Deiglmeier and T. Miller, 2008), public innovations are incentivized and pushing SI.

The analysis in this paper confirms that public institutions play a significant role in SI. Within cluster 3, Governance is a sub-stream dedicated to the role of public institutions in SI. Additionally, certain overlaps are observable with another sub-stream in cluster 3, namely Regional / Local Development. The analysis also provides information on how the public institutions are embedded within SI. Both the theoretical role of public institutions are explained as well as examples of public institutions as innovation enabler provided (Moulaert *et al.*, 2007; Novy and Leubolt, 2005; Swyngedouw, 2005).

Nevertheless, comparing the results with the role of public institutions described in the literature review indicates that documents on public institutions, their role and their influence are currently underrepresented in the literature. This is further outlined in the next paragraphs.

Grimm *et al.* (2013) point at the fact that public institutions are a main funding vehicle for SI, both in traditional SI areas (such as healthcare, education, etc.) as well as in newly emerging sectors (e.g. support from social entrepreneurs through start-up friendly legislation and financial support). Mulgan (2018) also concludes that public institutions, by creating more and more SI specific strategies, are steering the development of SI by presenting preferred goals and approaches. However, the role of public institutions as strategic funding and goal-setting element is not adequately reflected in current SI literature. Analysis of public institution funding strategies hardly exist beyond few exceptions. However, even these exceptions either only provide a high-level view on possible SI funding instruments within the public institution funding toolkit (Murray, Mulgan and Caulier-Grice, 2008) or focus on local or regional examples (Phillips, Laforest and Graham, 2010) instead of using a stronger macro perspective (e.g. comparison on country strategies, international organization approaches, etc.). Similarly, it has been shown that a variety of international public institutions (e.g. European Commission, UN, WEF, etc.) are identifying SI as main tool to combat several global challenges and thus allocate funding and resources respectively. Yet also the role of these organizations, their approach, understanding and strategies with respect to SI is not covered in current literature. Recognizing that public institutions around the world look at SI as a new tool and billions are spent each year by public institutions on SI, their funding approach and SI strategies still remain a black box in academia.

Similarly, two specific roles of public institutions are not covered by the current research field as anticipated.

Seeing that social entrepreneurship has been defined as one of the four clusters due to its importance for and connection to SI as a research field, the lack of the specific view on public institutions on the intersection of SI and social entrepreneurship is striking. To increase the efficiency and effectiveness of public institutions as innovation enabler in this area, various specific topics should not be left uncovered by academia. For instance, social entrepreneurship is commonly understood as the new creation of a business (or project) (Mair and Marti, 2006; Short, Moss and Lumpkin, 2009). The fact that social entrepreneurs are starting from scratch requires a specific understanding about support that should be provided by public institutions. Based on the resources of public institutions, their role as angel investor should be further highlighted and understood. How can public institutions provide the most effective blend of funding tools, become best practice disseminators (e.g. an intuitive and easy accessible way of collecting and sharing experience of social entrepreneurs) and provide useful network access to social entrepreneurs? Additionally, examining already existing cooperation between public institutions and social entrepreneurs with an academic lens

could potentially create a better understanding of this multi-actor partnership.

Another missing link is observable between public institutions and academic literature on the Sustainability Challenge sub-stream in cluster 4. As already pointed out, it is exactly public institutions, and especially international public institutions like the UN or the European Commission, that are at the forefront of gathering global support to address those problems that are also addressed by SI literature within the Sustainability Challenge sub-stream. Yet authors in this field (Biggs, Westley and Carpenter, 2010; Seyfang and Smith, 2007) are discussing these challenges mostly from a micro perspective (e.g. SI promoting environmental issues on a local / regional level) instead from a macro perspective. As a result, combining these SI approaches towards sustainable societies with the global actions taken by public institutions is not discussed in academic literature. Shedding light on this cooperation and creating a holistic picture explaining how bottom-up local sustainability SI is connected and both influenced by and influencing top-down decision making on global actions (e.g. the Paris Climate Agreement) could significantly improve the impact of SI actions with respect to a sustainable world.

5.3 Linking SI and OI

The concept of open social innovation, connecting social innovation with tools used in open innovation approaches, has been presented as a recently developed theoretical concept within the SI academic literature (Chesbrough and Di Minin, 2014; Martins and Bermejo, 2015; Murray, Caulier-Grice and Mulgan, 2010). As already pointed out in the literature review section, combining SI and OI can positively contribute to the effectiveness and efficiency of SI initiatives. However it has not been clear, whether this concept has inspired SI authors to take over OI instruments and thus whether the link of both theories has led to an increase in OSI literature within the research field of SI.

Based on the here presented analysis, it can be reasoned that OSI has indeed been established as another sub-stream within SI literature. More precisely, within cluster 2 Partnerships and Interaction the formation of the sub-stream Open Social Innovation can be observed. Although still a rather small sub-stream within the smallest of the four clusters, the gathering of the analyzed documents around the core literature of OSI (Chalmers, 2013; Chesbrough, 2003; Chesbrough and Di Minin, 2014; Lettice and Parekh, 2010) leads to the conclusion that OSI has become a central element for at least some authors within the SI community.

Looking into the documents citing the OSI core literature, various indications of how OSI could be applied within the SI context emerge. For instance, as also shown in cluster 2, a link between CSR and OSI seems to be fostered by some authors (Osburg, 2013). The main thinking behind this connection is that corporates can achieve their CSR goals better if actors from outside are invited to contribute to an

innovation process developing their CSR strategy and execution. Another use case of OSI is identified and examined by Randhawa, Wilden and West (2019) bringing together OI, SI and public institutions. The authors discuss crowdsourcing in cases where government entities are seekers for funding of SI initiatives. As crowdsourcing is classified as OI method whereby "organizations (seekers) engage with an external crowd of potential solvers" (p. 298), it is a perfect example of how OSI is applied in a new and innovative setting. A third key element of OSI literature describes and evaluates the role of living labs in which (mostly) public institutions invite citizens and other regional stakeholder to collaborate regarding the usage of novel technologies or ideas within a city or region (Battisti, 2014; Cossetta and Palumbo, 2014; Gascó, 2017).

Similarly to public institutions, although OSI has been established as useful concept within SI it still demands for a stronger and more holistic focus that is not yet covered in SI literature. Analyzing the OSI literature within the SI research field, it can be argued that a theoretical frameworks as well as the description and observation of certain use cases are already somewhat well covered. However main elements that would further contribute to the understanding and usage of OSI are still missing.

For instance, the questions who could benefit from OSI and which situations demand for an OSI approach are not holistically covered yet. Presenting cases that demand for an OSI approach vs. the traditional SI approach and providing a rational for this classification would support academia and practitioners to refine the thinking about OSI. Likewise, the question who could steer and incentivize further OSI development is currently not answered in the literature. Creating an understanding of what OSI needs (e.g. cooperation frameworks, methods to ensure distribution of rights and duties of the involved stakeholder, etc.) in order to be an approach available & understandable for all SI actors would strengthen the position of OSI as a useable and intuitive approach for SI actors.

In terms of cluster connections, a stronger link of OSI to applied SI streams should be established. Improving the available knowledge on OSI in Local / Regional development or the contribution to the Sustainability Challenge could further fill the currently existing gaps between OSI theory and practice.

6 Conclusion

6.1 Summary of findings

Since the early 2000s, the research field of SI has developed from being a small and not independent area to a complex, mature, established and independent research field with an yearly increase in scientific publications of more than 38 percent since 2002. The co-citation analysis presented in this paper, based on 1.184 scientific documents from more than 2.500

authors published between 2002 and 2019, leads to novel insights into the research field.

Four cluster, namely Social Entrepreneurship, Partnerships and Interactions, Theoretical Foundations and Change & Transition Management have been established as current intellectual structure of SI. The fact that Theoretical Foundations build their own cluster that is not only the second biggest cluster in the analysis but also the most central one for the field (pointing at the key significance of documents within the cluster) leads to the conclusion that the research field of SI has settled on a common understanding and a widely accepted theory framework of SI. Subsequently, discussions around a missing theoretical foundation of the field (Cajaiba-Santana, 2014; Mulgan *et al.*, 2007) can be rejected. Instead, the current intellectual structure of the field indicates that SI not only contains of a solid theoretical foundation but also increases it outreach to relevant application areas in business, public institutions, non-profit organizations and any type of citizen projects. Thereby, it aims to address the social needs of its predefined target group, ranging from local initiatives (Novy and Leubolt, 2005) to global challenges such as climate change (United Nations, 2016; World Economic Forum, 2019).

Furthermore, this paper has taken a first step to defining the role of public institutions within SI based on the co-citation network. The results show that the role of public institutions as an innovation enabler is established within the research field (see cluster 3). Nevertheless, considering the importance of public institutions in terms of provision of resources and strategic leadership, the role of public institutions is assumed to be underrepresented.

Lastly, a concept relevant for increasing the efficiency and effectiveness of SI, namely open social innovation, has been discussed in depth. A special focus has been put on examining whether the theoretical established concept of OSI (Chesbrough and Di Minin, 2014; Martins and Bermejo, 2015) led to an application of this concept within the SI research field. Indeed, it has been shown that a sub-stream within cluster 2 has emerged that orbits around OSI. However, OSI has not yet been examined holistically within SI and links to relevant topics in local / regional development as well as the application of SI in a business context are currently a blank spot.

6.2 Practical applications

Given that the goal of this paper was to provide an overview over SI literature and describe the current intellectual structure of the research field of SI, the practical implications of it are limited. Nevertheless, based on the conclusion that SI has become a more complex, mature and established research field, certain elements can be considered.

First, within academia this paper contributes to the discussion about SI as a research field and makes a strong argument to relocate scientific resources from defining the field towards deepening and further expanding the

established research field. Second, for practitioners, this paper provides an overview of available literature and where to find it within the research field. This knowledge can positively contribute to designing and executing SI approaches in local / regional and global settings. Third, with respect to the various definitions of SI within international public institutions (European Commission, 2013a; United Nations, 2016; World Economic Forum, 2019), this paper makes the case that a unifying SI definition should be applied be these organizations. Hence, certain limitations observed in these definitions (e.g. of SI actors, SI beneficiaries, etc.) should be refrained from to align public institution definitions with definitions seen in academia and thereby increase the action range of these institutions in SI. Fourth, the paper highlights that the concept of OSI has been established and its application is spreading to various SI use cases. This could further incentivize SI actors to consider OSI as an approach to realize their goal and adequately address social needs.

6.3 Implications for future research

Implications for future research have already been highlighted in the discussion section of this paper pointing at missing elements and research gaps within SI. Thus, only a brief summary of three main elements is presented below.

First, future research should increase the focus on public institutions as innovation enablers (Mulgan *et al.*, 2007; National Endowment for Science, Technology and the Arts, 2008). Further examining their key role in the provision of resources as well as defining and execution SI strategies could improve the understanding of the interplay of SI actors with these institutions and contribute to a better use of resources as well as higher impact of SI initiatives.

Second, acknowledging the fact that social entrepreneurship and SI are strongly linked and many social entrepreneurs contribute to the main goal of SI, namely addressing social needs, a better understanding of their specific business requirements could positively influence the realization of SI focused social entrepreneurships (Mair and Marti, 2006; Phillips *et al.*, 2015). Although a difficult task, literature has not yet fully observed differences in founding and funding social entrepreneurships with a main SI focus. Providing insights on how this group of SI actors seeks and receives resources could show new ways for social entrepreneurs and innovation enablers (e.g. public institutions, philanthropist, etc.) to enhance their cooperation.

Third, it has been shown that OSI emerges as an increasingly important field within SI (Cossetta and Palumbo, 2014; Gascó, 2017). Nevertheless, a more holistic view on the specific advantages and disadvantages of this approach is needed to fully understand its potential and specify its relevance for SI. To achieve this, both the theoretical foundations need to be improved as well as observations of case studies (e.g. living labs) collected to increase the knowledge about OSI in theory and practice.

6.4 Limitations and Outlook

Certain limitations need to be considered with respect to this paper. First of all, SI is still a rapidly developing and evolving research field. Therefore, the intellectual structure of the research field may change and further develop in a mid- to long-term perspective. Second, although the selection of WoS as the data source and the approach for data cleaning used for this paper is well founded in the academic literature, it may impact the representation of the research field. Third, the decision to use social innovation as only keyword for gathering the data on available literature was made in order to ensure that the entirety of the research field is covered. Nonetheless, more complex approaches towards the search term definition could possibly lead to a variation in the results. Fourth, the clustering exercise and, more significantly, defining certain cluster names (e.g. Social Entrepreneurship) may lead to a superficial view on the research field. There is indeed more nuance and variety to both the research field as well as the clusters. However, these nuances are not holistically reflected in this paper due to space constraints. Fifth, this paper concludes that the interest in the research field of SI has been constantly increasing based on the analysis of produced literature. Nevertheless it should be noted that this does not automatically lead to the assumption that the relevance of SI has similarly increased in practice. This needs to be further examined (e.g. based on a quantitative analysis of public funding for SI).

In terms of outlook for the research field of SI, this paper has shown that a well-established and stable intellectual structure is observable. Based on this status quo, it can be expected that the research field will further increase its reach and relevance by increasing its research space (e.g. focusing on SI funding and SI evaluation as novel elements to SI research). Besides that, as this paper was mainly written during the SARS-CoV-2 pandemic which has led to a creation of various SI initiatives around the world, it can be expected that the role of SI as approach to crisis mitigation and local / regional recovery programs will be highlighted and strengthened both in academia and practice.

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