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# Trends and patterns in sustainable entrepreneurship research: A bibliometric review and research agenda

Amitabh Anand [a,*], Padmaja Argade [b], Ralf Barkemeyer [b], Fanny Salignac [b]

[a] SKEMA Business School, Université Côte d'Azur, GREDEG, 157, Rue Albert Einstein, 06560 Valbonne, France
[b] KEDGE Business School, 680, Cours de la Libération, 33405 Talence Cedex, France

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ABSTRACT

Sustainable entrepreneurship (SE) has attracted significant scholarly attention over the last decade. Given its rapid development and its multidisciplinary character, the SE literature is increasingly difficult to navigate. We combine two bibliometric approaches (i.e. co-citation analysis of references and bibliographic coupling of documents) with manual coding of documents to take stock of progress within the field, mapping out focal points as well as blind spots in the SE research agenda. We show how distinct subfields have formed around key ideas expressed in subsets of seminal papers, shedding light on the relational nature of knowledge creation – uncovering the characteristics, evolution and future trajectories of these subfields. We develop a future research agenda based on the developments of the overall field as well as the subfields of SE.

## 1. Introduction

Traditionally, entrepreneurial activities have been motivated by the creation of financial value (Schumpeter, 1934). However, an increasing awareness of global social and environmental issues has meant that the role of entrepreneurship has shifted to incorporating social and environmental missions alongside core business activities. Hart and Milstein (1999) were among the first to bring together the concepts of entrepreneurship and sustainable development, arguing that the notion of sustainable development is a significant opportunity for 'entrepreneurs' and 'innovators'. Entrepreneurs are now seen to make efforts towards reducing their negative impacts on the environment (Choi and Gray, 2008), and to incorporate pro socio-environmental values into their core business activities (Muñoz et al., 2018; Gast et al., 2017; Cohen and Winn, 2007; Dean and McMullen, 2007).

The phenomenon of entrepreneurship combined with a sustainability perspective is commonly referred to as sustainable entrepreneurship (SE) (Shepherd and Patzelt, 2011) – an increasingly important subfield of entrepreneurship research (Muñoz et al., 2018; Gast et al., 2017). SE is seen as a means to achieve a more sustainable future (Hall et al., 2010; Pacheco et al., 2010; Cohen and Winn, 2007), and to address complex social and environmental issues through the implementation of innovative solutions (Schaltegger et al., 2018). While profit generation – to varying degrees – remains an integral component of SE, other aspects such as creating value for the planet (Hanohov and Baldacchino, 2017), generating employment as well as improving people's lives (Sarango-Lalangui et al., 2018), also feature as primary objectives.

* Corresponding author.
*E-mail addresses:* amitabh.anand@skema.edu (A. Anand), padmaja.argade02@kedgebs.com (P. Argade), ralf.barkemeyer@kedgebs.com (R. Barkemeyer), fanny.salignac@kedgebs.com (F. Salignac).

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SE spans various disciplines, such as politics, environmental sciences, sociology, and economics (Muñoz and Cohen, 2018b; Belz and Binder, 2015; Schaefer et al., 2015). Given its multidisciplinary nature, SE can also be seen as a multiplicity of academic discourses rather than one coherent construct. SE is shaped by these disciplines and their underlying assumptions, by the institutional contexts in which SE is researched, by the types of organizations that are chosen as empirical bases, and not least by the individuals who conduct SE research and their own perspectives on the phenomenon. In this study, we use bibliometric analysis to explore this relational nature of knowledge creation in the field of SE. Our findings explore seminal works and how they continue to shape different parts of the current field of SE research. Based on these bibliometric techniques, we identify different subfields of SE, and characterize them in relation to their underlying assumptions, research design, contributions to the field and future research trajectories.

Our contribution is twofold. First, as a methodological contribution, we use a novel approach to research the SE literature. Although bibliometric methods have been used in recent years to understand the evolution of the field, its emerging trends and future avenues for research (e.g. Terán-Yépez et al., 2020; Sarango-Lalangui et al., 2018), their application has remained limited to traditional bibliometric indicators (e.g. citation counts, keywords and leading authors). In this paper, we put forward an augmented bibliometric approach by combining two relational techniques: 1) Co-Citation Analysis of Reference (CCA-R), and 2) Bibliographic Coupling of Publications (BCA-D) as well as a thematic analysis approach. This allows us to better understand how the field of SE research is structured, and how distinct subfields have formed around the key ideas developed in seminal SE papers. While the two bibliometric techniques have frequently been applied in information and management research (e.g. Walsh and Kalika, 2018; Walsh and Renaud, 2017; van Oorschot et al., 2018), they have rarely been used together and, to the best of our knowledge, have not been applied to the field of SE.

Second, we contribute to extant SE research by uncovering the internal structure of the field, exploring trends, patterns and trajectories, culminating in a future research agenda. At the level of the overall field, we put forward an organizing framework allowing us to take stock of progress, mapping out focal points and blind spots. While we find a number of very encouraging developments within the SE literature, most notably its proliferation across various levels of analysis as well the diversity of research questions that have been addressed, a number of under-researched areas remain. Among others, and similar to related research fields (e.g. Aguinis and Glavas, 2012; Walls et al., 2012), SE research has yet to find ways to more meaningfully capture the sustainability outcomes of SE activity. Furthermore, it will need to move beyond its Northern (and primarily European) bias in theorizing and empirical analysis (Muñoz and Cohen, 2018b), and to capture the longer-term, systems-level impacts linked to the emergence and uptake of SE.

At the level of SE subfields, we show how distinct research trajectories, each with different characteristics, have formed around core ideas expressed by subsets of seminal papers. Most notably, different subfields have formed around the idea of sustainable entrepreneurs as change agents or norm entrepreneurs (Muñoz and Dimov, 2015; Pacheco et al., 2010; Parrish, 2010); seminal research largely focusing on the SE process (Cohen, 2006; Patzelt and Shepherd, 2011; Schaltegger and Wagner, 2011); as well as around a set of earlier, foundational papers (Dean and McMullen, 2007; Cohen and Winn, 2007; Shane and Venkataraman, 2000). To varying degrees, clear dividing lines can be identified between these co-existing subfields.

The remainder of this paper is organized as follows. First, we present our research context highlighting previous reviews conducted in the field of SE. Subsequently, we describe and justify the research methods applied in this study. We then present our findings structured around our organizing framework of SE. Before concluding, we discuss the main trends and patterns derived from our analysis, both at the level of the overall field as well as its subfields, and present a future research agenda.

## 2. Research context

### *2.1. Extant reviews on SE*

Over the last decade, an increasing number of literature reviews have been published with the aim to better understand SE as well as the evolution of the field and providing directions for future research (Bischoff and Volkmann, 2018; Sarango-Lalangui et al., 2018; Muñoz and Cohen, 2018b; Gast et al., 2017; Schaefer et al., 2015; Shepherd and Patzelt, 2011; Thompson et al., 2011; Dean and McMullen, 2007) (see Appendix A for a summary of these studies).

Early literature reviews largely focused on defining SE, for example, by differentiating the field from other types of responsible entrepreneurship (i.e. social entrepreneurship and environmental entrepreneurship) (e.g. Thompson et al., 2011); and by better understanding its 'components' (i.e. triple-bottom-line) and the relationship between them (e.g. Pacheco et al., 2010). SE is now widely acknowledged as a distinct research domain (Sarango-Lalangui et al., 2018; Muñoz and Cohen, 2018b), itself further contributing to developing the mainstream entrepreneurship literature – for example, with regards to how entrepreneurship can contribute to a more sustainable society (Schaefer et al., 2015).

As the field of SE develops, authors have started focusing on its evolution, disentangling main research themes and directions for future research (Terán-Yépez et al., 2020; Ramírez et al., 2019; Sarango-Lalangui et al., 2018) as well as investigating different types of factors and mechanisms characterizing SE (Johnson and Schaltegger, 2019; Konys, 2019). We find that, while some suggestions for future research are specific to SE (e.g. better understanding trade-offs and conceptualizing sustainable innovation as a solution to better sustainable development), many remain a reflection of mainstream entrepreneurship (e.g. better understanding the individual entrepreneurs through studying the entrepreneur's motivations, the entrepreneurial opportunity recognition process, the context in which entrepreneurs evolve as well as their interaction with the institutional environment).

### 2.2. An augmented bibliometric approach

Literature reviews are important as they enable identifying knowledge gaps (Tranfield et al., 2003) as well as understanding the evolution of a field (Cassell et al., 2006). In the field of SE, they have been important milestones, which have used various methods: systematic literature reviews (Konys, 2019; Bischoff and Volkmann, 2018; Gast et al., 2017), critical literature reviews (Muñoz and Cohen, 2018b; Levinsohn, 2013), exploratory literature reviews (Thompson et al., 2011) and bibliometric reviews (Terán-Yépez et al., 2020; Sarango-Lalangui et al., 2018). While these methods have enabled researchers to work towards theorizing and conceptualizing SE (Tarnanidis et al., 2016), as well as better understanding the distribution of publications in the field (Ramírez et al., 2019; Muñoz and Cohen, 2018b; Binder and Belz, 2015), we find a lack of transparency around methodological protocols. For example, some authors provide little detail with regards to data collection (e.g. rationale around database selected), sample selection (e.g. inclusion and exclusion criteria) (e.g. Ramírez et al., 2019; Sarango-Lalangui et al., 2018; Muñoz and Cohen, 2018b; Shepherd and Patzelt, 2011) as well as data analysis (e.g. Sarango-Lalangui et al., 2018). We also find a lack of 'sense-making' – i.e. application of bibliometric methods remains limited to traditional indicators such as citation counts, keywords and leading authors.

To address this gap, we put forward an 'augmented' bibliometric methodology by integrating two relational techniques: 1) Co-Citation Analysis of Reference (CCA-R), and 2) Bibliographic Coupling of Publications (BCA-D), as well as manual coding. The combination of manual coding and bibliometric analysis allows us to further characterize the field – it enables us to identify the overall field's structure and emerging subfields as well as explain how these subfields have formed and how they relate to and differ from each other. This augmented bibliometric methodology, thus, enables is to better understand the relationships between authors and research streams, providing us with a more holistic overview of the field.

## 3. Methods

In this paper, we put forward an augmented bibliometric approach by integrating together two relational techniques: 1) Co-Citation Analysis of Reference (CCA-R), and 2) Bibliographic Coupling of Publications (BCA-D). We further develop our approach by adding a qualitative layer to our analysis and conduct a thematic analysis using our BCA-D sample, allowing us to provide a more holistic overview of the field.

Bibliometric analysis is especially useful to track theory and research streams development (Mariani and Borghi, 2019; Walsh and Renaud, 2017; Garg and Tripathi, 2017; Zupic and Čater, 2015) as well as identify core journals' contributions to a field (Albort-Morant and Ribeiro-Soriano, 2016). Bibliometric methods are often used in complement to traditional structured reviews (e.g. meta-reviews and systematic literature reviews) as it provides a quantifiable way of exploring current and upcoming research trends and performance (Anand et al., 2020; de Oliveira et al., 2019; Jiang et al., 2017; Zupic and Čater, 2015). In recent years, bibliometric techniques combined with science mapping software (e.g. Sarango-Lalangui et al., 2018; Terán-Yépez et al., 2020) have enabled researchers to work towards theorizing and conceptualizing the field of SE (Tarnanidis et al., 2016) as well as better understanding the distribution of publications (Muñoz and Cohen, 2018b; Binder and Belz, 2015).

Following the bibliometric methodologies of several authors (Anand et al., 2020; Maucuer and Renaud, 2019; Renaud and Maucuer, 2018; Walsh and Renaud, 2017), we adopted a 3-step process: 1) data search and collection, 2) definition of inclusion and exclusion criteria, 3) data analysis (see Fig. 1 for a summary of the methodology followed).

### 3.1. Data search and collection

We began our data search by selecting a database to collect articles. The Scopus database was selected as our sample as it provides access to a higher number of indexed journals compared to other databases such as Web of Science, it is also a robust database allowing for various sorting, ranking and refining options (Terán-Yépez et al., 2020; Harzing and Alakangas, 2017). We limited the selection of articles to SE's three main literature streams: 1) business, management and accounting, 2) economics and 3) social sciences (e.g. Muñoz et al., 2018; Mair and Marti, 2006; Schaltegger, 2002; Keogh and Polonsky, 1998), as well as to journal articles (as opposed to e.g. editorials). We used the following keyword: 'sustainable entrepreneur*' and used an asterisk[1] for our search to ensure we did not leave out any articles of interest. In this paper, as our focus was on the keyword 'sustainable', we decided to omit further keywords such as social, environmental and ecological as SE is considered to be a distinct research domain that encompasses social and environmental values (e.g. Terán-Yépez et al., 2020). Table 1 summarizes our final search, which resulted in 299 articles over an 18-year time-period (from 2002 to 2020).

### 3.2. Definition of inclusion and exclusion criteria

We then proceeded to defining our inclusion and exclusion criteria and used the mapping software 'VOS Viewer' to do so (Van Eck and Waltman, 2017; Waltman et al., 2010). VOS Viewer maps the citation trends, keywords and document links in each bibliographic dataset (Walsh and Renaud, 2017; Jiang et al., 2017; Zupic and Čater, 2015). To further help us refine our sample, we used two relational techniques to understand the relationships between authors and research streams: 1) Co-Citation Analysis of Reference

[1] An asterisk (*) can substitute for the absence of a character, a single character, or multiple characters, anywhere in a word e.g. entrepreneur, entrepreneurs, entrepreneurial, entrepreneurship etc.

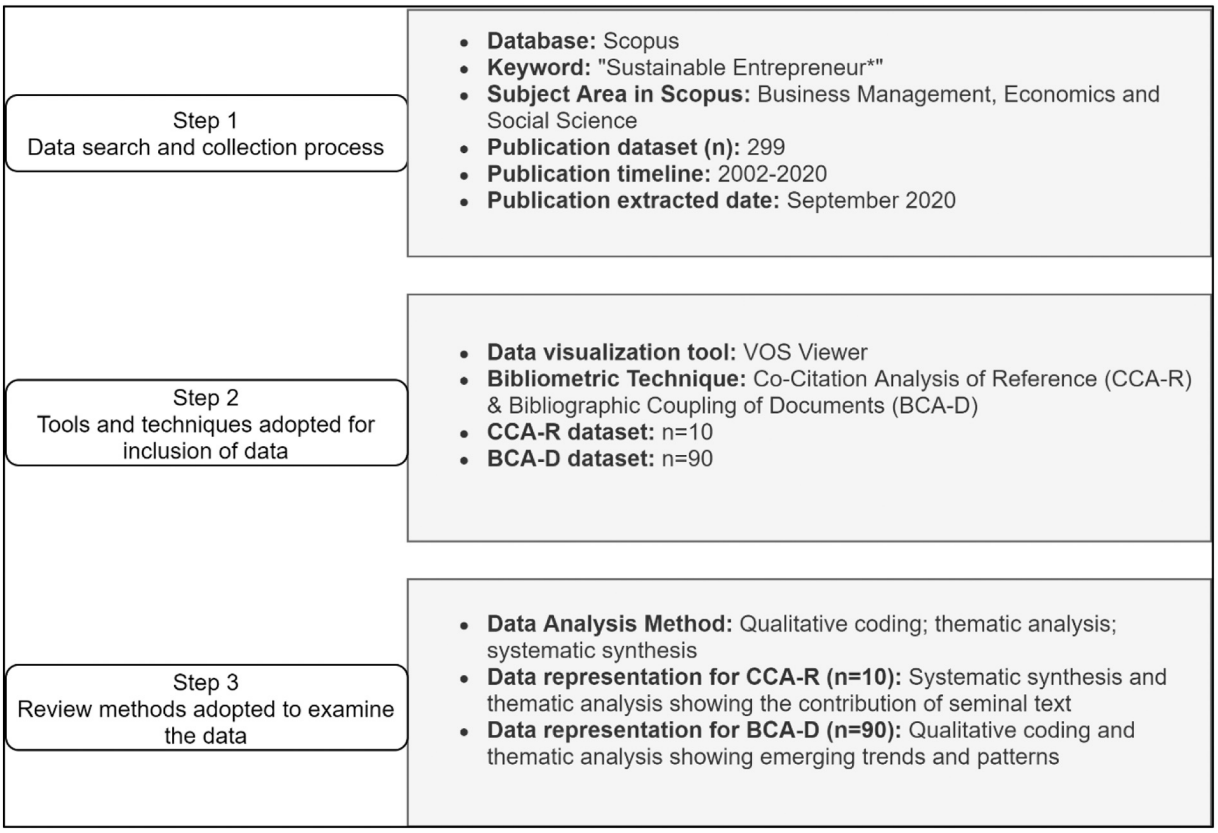



**Fig. 1.** Summary of methodology.

**Table 1**
Keyword Protocol applied in Scopus for extracting articles.

| Keyword search | Articles extracted |
|---|---|
| TITLE-ABS-KEY ("Sustainable Entrepreneur*") AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "ECON")) AND (LIMIT-TO (SRCTYPE, "j")) | 299 |

(CCA-R), and 2) Bibliographic Coupling of Documents (BCA-D).

CCA-R provides us with the 'proximities' of two references (e.g., Walsh and Renaud, 2017; Renaud et al., 2016; Córdoba et al., 2012; Raghuram et al., 2010). It allows us to identify the foundations of a field, explore relationships between authors or identify schools of thought by looking at the similarity of citations that have been discussed in the past (e.g. Belussi et al., 2019; Walsh and Kalika, 2018) – i.e. the more an article is cited, the more it influences the construction of a field (Maucuer and Renaud, 2019).

By feeding our 299 articles into VOS Viewer, we identified a total of 19,427 cited references. To better deal with such a high amount of references, we proceeded to: 1) manually cleaning of our data – i.e. checking for inconsistencies or overlaps in the references such as name, publication year, journal volume, issue number, page etc. (Mariani and Borghi, 2019; Walsh and Kalika, 2018); and 2) refining our sample by identifying the most cited documents in VOS Viewer (e.g. Maucuer and Renaud, 2019). Refining our sample of 19,427 cited references involved defining a frequency of citations that indicated an article was part of the 'intellectual core' of the SE literature – which is, in itself, a trial and error process based on relevance and significance of resulting data (Renaud et al., 2016; Maucuer and Renaud, 2019). Accordingly, we decided to set the threshold in VOS Viewer to a minimum of 10 cited references. From the resulting data, we further applied a 'total link strength' of 10 (i.e. the number of links of an item with other items and therefore, the total strength of the co-citation links of a given reference with other references). This provided us with the 10 most cited papers in the field of SE. The decision to select 10 articles as our cut-off point was an arbitrary one – we based our decision on the 'total link strength' between our articles, the total link strength being high between articles 1 to 10 and lower from article 11 onwards. For each of these selected publications, VOS calculated the number of co-citation links and the cited references with the largest weight and assembled them into groups, thus, helping us to better understand the structure of the field (Nettle and Frankenhuis, 2019). The results of CCA-R and VOS map are presented in the findings section.

BCA-D enables us to study the emerging trends of a field while enabling a shift in "the focus of analysis from past traditions to current trends" (Vogel and Güttel, 2013, p. 426). Bibliographic coupling links two papers that cite the same articles. For instance, if papers A and B both cite paper C they may be said to be related, even though they do not directly cite each other (Ferreira, 2018). The more papers they both cite, the more likely these two publications are to cover the same research theme (Walsh and Renaud, 2017). As our primary interest for using BCA-D is to identify recent developments in the field of SE, a timeframe needed to be set (Zupic and Čater, 2015; Glänzel and Thijs, 2012). Extant literature on bibliographic analysis recommends that bibliographic coupling be performed within a limited timeframe as citation habits change and isolating influential publications from others can be difficult (Glänzel and Thijs, 2011; Walsh and Renaud, 2017) – Fonteyn et al. (2020) recommend a time span of five to ten years. Based on this, we decided on a time span of 10 years: from 2010 to 2020. This time span further enabled us to limit potential issues arising from unsystematic coverage (e.g. Gurzki and Woisetschläger, 2017) as well as to limit bias (Walsh and Kalika, 2018). Out of our pool of 299 articles (from 2002 to 2020), our sample was thus reduced to 278 articles from 2010 to 2020.

In bibliometric methods, bibliographic coupling outcomes depend on the thresholds established in coupling and clustering procedures (Walsh and Renaud, 2017). As there are no standardized methods, researchers have adopted numerous different thresholds helping them to reduce large amounts of data and associated complexity into more parsimonious and manageable sets of information (e.g. Walsh and Renaud, 2017; Belussi et al., 2019; Vogel et al., 2020). Following the guidelines of Van Eck and Waltman (2017), Renaud and Maucuer (2018) and Vogel et al. (2020), we used two thresholds to reduce and select the most relevant publications from our sample of 278 articles. First, bibliometric coupling includes recent publications that have not yet been cited – in VOS, we decided to select a threshold of 1 citation minimum, reducing our sample to 200 publications. Second, following Mura et al. (2018), we selected the top 90 publications based on 'total link strength' to avoid the overlapping of articles already obtained in the CCA-R (cf. Shah et al., 2019; Renaud and Maucuer, 2018).

Overall, our CCA-R sample of 10 publications and BCA-D sample of 90 publications is justified by several authors (see Walsh and Renaud, 2017; Walsh and Kalika, 2018) who argue that, depending on the degree of detail desired, the number of publications to study the evolution and trends in a field may be limited to 50–100. Together, our CCA-R and BCA-D samples total 100 publications.

### 3.3. Thematic analysis

To understand the evolution of the field in further depth, we conducted a qualitative coding and thematic analysis using our BCA-D sample (n = 90). We began by adopting a 'theory-led' approach (Locke, 2001), shaped by the literature and specifically focusing on our sample of ten seminal papers. We coded to, for example, Muñoz and Dimov's (2015) characterization of insurgent and conformist SE configurations as well as empirical characteristics such as organizational form and size, level of analysis and geographical context (see Appendix A for more details). Subsequent analytic coding involved creating further conceptual categories and abstracting from the data, and was an on-going, iterative process (Strauss and Corbin, 1998). We, thus, combined axial and open codes, which involved looking for initial themes to theoretically inform categories before further refining our coding from which further categories could be developed (Strauss and Corbin, 1998), thus allowing analysis of the existing areas of focus and the emergence of new themes.

## 4. Findings

We report the findings in three steps. First, we start by identifying and characterizing a set of seminal SE papers – i.e. articles that are often referred to as pivotal or landmark studies and that are regularly cited and referred to in a field (Bloomberg and Volpe, 2008), so as to get a preliminary understanding of main trends in the literature (Section 4.1). We then present our entire sample and further conceptualise it in the form of an organizing framework allowing us to pinpoint general trends and patterns (Section 4.2). Combining our findings from those first two sections, we finish by presenting subfields emerging from the SE literature (Section 4.3).

### 4.1. Identification and characterization of seminal texts

The co-citation analysis (CCA-R) enabled us to identify a set of 10 seminal papers (see Table 2). A first look at this sample reveals that the *Journal of Business Venturing* has been the primary outlet for leading SE research, accounting for six out of the ten most widely

**Table 2**
Top 10 seminal texts.

| No. | Citation | Journal | Group | Citations |
|---|---|---|---|---|
| 1 | Cohen and Winn (2007) | Journal of Business Venturing | RED | 69 |
| 2 | Schaltegger and Wagner (2011) | Business Strategy and the Environment | GREEN | 61 |
| 3 | Dean and McMullen (2007) | Journal of Business Venturing | RED | 59 |
| 4 | Hall et al. (2010) | Journal of Business Venturing | BLUE | 33 |
| 5 | Parrish (2010) | Journal of Business Venturing | BLUE | 21 |
| 6 | Pacheco et al. (2010) | Journal of Business Venturing | BLUE | 19 |
| 7 | Patzelt and Shepherd (2011) | Entrepreneurship Theory and Practice | GREEN | 16 |
| 8 | Shane and Venkataraman (2000) | Academy of Management Review | RED | 14 |
| 9 | Muñoz and Dimov (2015) | Journal of Business Venturing | BLUE | 14 |
| 10 | Cohen (2006) | Business Strategy and the Environment | GREEN | 13 |

cited publications on the topic. Interestingly, only two *Journal of Business Venturing* issues account for five of these seminal papers: Cohen and Winn (2007) as well as Dean and McMullen (2007) were published in the same issue; and Parrish (2010) as well as Pacheco et al. (2010) were published in the Special Issue that Hall et al. (2010) provided the editorial for. Another general pattern is that early SE research is largely associated with North American authors, whereas European authors have published more recent seminal SE papers.

The co-citation analysis also allowed us to examine the extent to which these seminal texts have been referred to in conjunction with each other, revealing three distinct groups of articles (see Fig. 2). While the red and green group each contains three papers published in two different outlets (i.e. *Academy of Management Review* and *Journal of Business Venturing* for the red group and *Business Strategy and the Environment* and *Entrepreneurship Theory and Practice* for the green group), the blue group consists of four papers that have exclusively been published in the *Journal of Business Venturing*. We present each group in turn.

#### *4.1.1. The pioneer group*

Papers in the red group are pioneers in the field of SE, early movers whose work was foundational in its conceptualisation. While the earliest piece published in this Pioneer Group is not specific to SE, Shane and Venkataraman's (2000) work on enhancing the field of entrepreneurship's legitimacy by focusing on the existence, discovery and exploitation of opportunities through to the process of firm creation, was foundational to the early development of the field of SE. The next two papers in this Pioneer Group, Dean and McMullen (2007) as well as Cohen and Winn (2007), both published in volume 22, issue 1, of the *Journal of Business Venturing*, both explored environmental degradation brought on by market failures as entrepreneurial opportunities and the exploitation of these opportunities as enhancing ecological sustainability. In Dean and McMullen's (2007: 50) words, environmental degradation "may turn out to be the biggest opportunity for enterprise and invention the industrial world has ever seen" – while Cohen and Winn (2007: 30) refer to it as "the next industrial revolution".

At this early stage, the field of SE is very closely linked to that of environmental entrepreneurship with authors aiming to "begin the process of understanding the concept and domain of sustainable entrepreneurship through more specific theoretical development of the concept of environmental entrepreneurship" (Dean and McMullen, 2007: 51). Specifically building on Shane and Venkataraman (2000), Dean and McMullen (2007: 51) conceptualise environmental entrepreneurship as a subset of sustainable entrepreneurship itself defined "by its alleviation of environmentally relevant market failures through the exploitation of potentially profitable opportunities". While Cohen and Winn (2007) do not directly build on Shane and Venkataraman's (2000) paper, they draw from Venkataraman's (1997) earlier work. Specifically, Venkataraman (1997) suggests that the consequences of entrepreneurship can be economic, psychological, and social – Cohen and Winn (2007) add a fourth category 'environmental consequences' as the basis of their definition of sustainable entrepreneurship.

#### *4.1.2. The process group*

Papers in the green group predominantly focus on the process of SE – i.e. 'how' new SE ventures are created, and their particular contribution to sustainable development goals. More specifically, papers in this group investigate the opportunity recognition process in the field of SE (Patzelt and Shepherd, 2011), how sustainable innovation and SE emerge simultaneously within firms (Schaltegger and Wagner, 2011) and how sustainable entrepreneurship ecosystems are created (Cohen, 2006). Patzelt and Shepherd (2011), for example, put forward a framework enabling to better understand the opportunity recognition process specific to the field of SE. They show that individual-level factors, such as sustainable entrepreneurs' knowledge of the "natural and communal environment" (Patzelt and Shepherd, 2011: 631) as well as altruism, are crucial in the SE opportunity recognition process.

Another theme that emerges from this group of green papers is how sustainable innovation fosters the SE development process. Schaltegger and Wagner (2011) provide a framework linking sustainable innovation and sustainable entrepreneurship and shed light on how and under what conditions sustainable innovation and sustainable entrepreneurship can arise simultaneously. Along similar lines, Cohen (2006) explores how sustainable entrepreneurial ecosystems can be created. Specifically, Cohen (2006) investigates how elements such as formal and informal networks, infrastructures, universities, governments, entrepreneurial support, financial capital and talent pools create a conducive sustainable ecosystem to encourage entrepreneurs to start new SE ventures. The papers in this group thereby focus on the process of SE. They explain how, at an individual level, entrepreneurs recognize opportunities for SE as well as the role of innovation and sustainable entrepreneurial ecosystems in pursuing and propagating SE at a systems level.

#### *4.1.3. The insurgent group*

An overarching theme within the blue group is the idea of an insurgent approach to SE. A common denominator across this group of insurgents is the conceptualization of sustainable entrepreneurs as change agents who do not passively operate within a given institutional environment, but actively try to create an institutional environment that is 'sustainability fit'. Even though the notion of an insurgent pathway was only coined relatively recently by Muñoz and Dimov (2015), earlier papers in this group very much align with the idea of SE as active change agents. Muñoz and Dimov (ibid) observe insurgent sustainable entrepreneurs work towards changing the social context they are embedded in – with this mind-set transcending all stages of the SE process, therefore representing a pathway that is fundamentally different from that of conformist, business case-driven sustainable entrepreneurs.

Pacheco et al. (2010) explicitly engage with this insurgent paradigm by conceptualizing SE as a form of institutional entrepreneurship or norm entrepreneurship, actively confronting institutional barriers to sustainability. Parrish (2010), while formulating general organizational design principles for SE, bases his conceptual framework on a set of sustainability-driven entrepreneurs whose primary motivation is not the business case, but alignment with a set of core sustainability-informed values. As a consequence, questions regarding trade-offs between economic, social and environmental goals as well as the hybrid nature of these ventures also

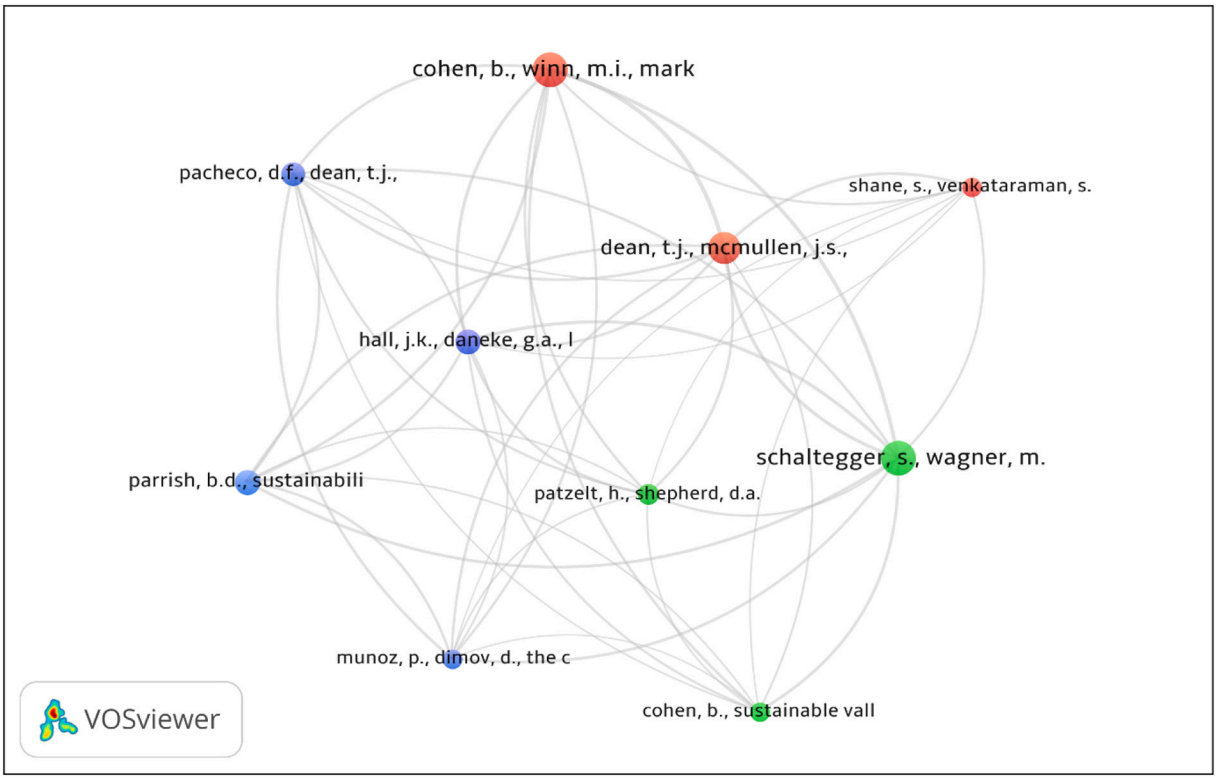



**Fig. 2.** Co-citation analysis of reference map.

feature prominently among the design principles Parrish (2010) develops. To a certain extent, the fourth seminal paper within this Insurgent Group breaks out of this very clear pattern. Hall et al. (2010) author the editorial to the *Journal of Business Venturing* Special Issue that both Pacheco et al. (2010) and Parrish (2010) are part of. They set the scene for this Special Issue by summarizing SE as an emerging field and indicate avenues for future research. As such, they engage with ideas that are explicitly insurgent in nature, but are broader in scope than the other papers in this group.

The co-citation analysis has enabled us to identify and characterize a set of seminal SE papers and therefore get a preliminary understanding of the main trends in the field. We now turn to our entire sample of SE papers. Using manual coding, we present our sample and further conceptualise it in the form of an organizing framework allowing us to pinpoint general trends and patterns in the field.

### *4.2. Towards an organizing framework of SE*

A first look at the sample reveals a healthy mix of research designs, with a relatively balanced distribution of conceptual (15), qualitative (27), quantitative (31), and mixed methods research (9) as well as a number of review articles (8). Across the sample, there is a clear dominance of research focusing on for-profit organizations, whereas roughly one third of the sample at least partially addresses hybrid organizations. One of the clearest patterns across the sample is that the vast majority of SE research is concerned with small organizations. Only very few papers specifically focus on large organizations (e.g. Gasbarro et al., 2017; Atiq and Karatas-Ozkan, 2013), even though a limited number of papers include larger organizations in their samples (e.g. Schaltegger et al., 2016). To varying degrees, a number of conceptual pieces are also applicable to larger firms (e.g. Hockerts and Wüstenhagen, 2010). A good balance can be observed with regard to levels of analysis, with individual, organizational and systems level perspectives receiving roughly similar levels of attention. An overwhelming share of empirical studies focus on North American and in particular continental European contexts (53 out of 70) (cf. Muñoz and Cohen, 2018b). Nevertheless, pockets of SE research have also explored non-Western contexts such as Malaysia (Ahmad et al., 2020), Uganda (Kimuli et al., 2020; Gregori et al., 2019), Pakistan (Wahga et al., 2018), Latin America (Muñoz et al., 2018), Korea (Sung and Park, 2018), Iran (Jahanshahi et al., 2017), Samoa (Gray et al., 2014), and Zambia (Choongo et al., 2016). Almost two thirds of the papers (66 out of 90) reflect a triple-bottom-line perspective, whereas the remaining papers are more firmly embedded in the environmental tradition of SE research (cf. Niemann et al., 2020).

Furthermore, the sample reflects a diverse portfolio of contributions. Following Schaltegger et al. (2018), we distinguish between

research focusing on (a) how external/contextual factors influence the uptake of SE; (b) attempts to take stock of the current state of SE research and practice; (c) the SE process; and (d) specific outcomes of SE.[2] We map these contributions onto the three general levels of analysis reflected by extant SE research: (1) individual level, (2) organizational level and (3) systems level of analysis. On this basis, we put forward an organizing framework allowing us to track progress within the field, mapping out focal points and blind spots of the SE agenda (see Table 3).

#### 4.2.1. Factors affecting SE uptake

*Internal:* One of the central components of sustainable entrepreneurship research is the individual sustainable entrepreneur. The primary focus when studying sustainable entrepreneurship is on the factors that encourage individuals to pursue sustainability-oriented activities (Vuorio et al., 2018). For studying individual sustainable entrepreneurs, 'intent' is recognized as one of the key determinants of the likelihood to start an entrepreneurial venture (e.g. Kimuli et al., 2020; Midderman et al., 2020; Wagner, 2011; Kuckertz and Wagner, 2010). Vuorio et al. (2018) suggest that attitudes and perceived entrepreneurial desirability shapes sustainability-oriented entrepreneurial intent. They argue that altruistic notions of individuals shape their attitudes while intrinsic and extrinsic rewards initiate perceived entrepreneurial desirability. In the same vein, Ploum et al. (2018), study the role of moral antecedents of sustainable entrepreneurs in the sustainable development opportunity-recognition process, while Jahanshahi et al. (2018) explore the role of values, beliefs and orientations of individuals in steering the enterprise towards sustainability. In identifying the traits of sustainable entrepreneurs, Obrecht (2011) explores the capabilities of individuals, whereas Mupfasoni et al. (2018) look at their prior knowledge. Some of the key themes associated with individuals undertaking SE ventures are their motivations (Mupfasoni et al., 2018; Castellano et al., 2017; Spence et al., 2011), intent (Kuckertz and Wagner, 2010), moral cognition, self-efficacy and sustainability orientation (Kuckertz and Wagner, 2010; Vuorio et al., 2018; Muñoz et al., 2018). The factors relating to identifying sustainability-oriented opportunities (Eller et al., 2020; O'Shea et al., 2019; Sung and Park, 2018; Ceptureanu et al., 2017) and that can lead towards sustainable development take up a central place in SE research.

From an organizational standpoint, studies indicate that firms find viability in seeking sustainable entrepreneurial opportunities as it means satisfying stakeholder demands and therefore financially benefiting from sustainability-oriented activities. Hooi et al. (2016) highlight the importance of firms' response to sustainability challenges in the context of increased customer awareness and demand as well as stricter environmental regulations. Moreover, Criado-Gomis et al., (2017) focus on strategic benefits as a motivation for firms to take up SE. Similarly, Abdullahi et al. (2018) highlight the role of leadership culture in higher management in emphasizing the firm's contribution towards sustainable development.

*External:* Studies in the field of SE were also found to mainly focus on the interactions of individual entrepreneurs and sustainable enterprises with their external environment. Mainly building from institutional theory, the SE literature engages with the discussion of normative, regulative and cognitive pillars of institutional theory (Gasbarro et al., 2018; Nikolaou et al., 2018; Vlasov et al., 2018; Spence et al., 2011; Shepherd and Patzelt, 2011; Pacheco et al., 2010). Factors like institutional barriers, as well as adaptive responses from entrepreneurs and enterprises to drive institutional change have mainly been addressed within these studies. The role of context is emphasized by some studies, for example, Ceptreneu et al. (2017) who discuss the relationship between local embeddedness and opportunity recognition. By placing the notions of sustainable development and sustainability transformation in focus, studies call on the important role of stakeholder management, strategic partnerships, alliances and collaborations with local communities (Muhammad Auwal et al., 2020; Bischoff and Volkmann, 2018; Schaltegger et al., 2018; Juma et al., 2017). Furthermore, the role of industry networks and how universities can combine entrepreneurship studies with sustainability issues are addressed in SE research (Halberstadt et al., 2019; Volkmann et al., 2019; Tiemann et al., 2018; Lans et al., 2014) – though SE is studied from a rather limited industry context of energy solutions (Gasbarro et al., 2018), ethical clothing (Poldner et al., 2017), agriculture (Long et al., 2019; Mupfasoni et al., 2018), food (Tarnanidis et al., 2019), and leather (Wahga et al., 2018).

#### 4.2.2. Taking stock of the field

Over the last decade, several studies aiming at developing an understanding of SE have emerged. While some studies focus on defining the construct of SE (e.g. Shepherd and Patzelt, 2011), others focus on distinguishing SE from other forms of entrepreneurship (Ramírez et al., Schaefer et al., 2015; Schaltegger and Wagner, 2011). Moreover, extant research provides several typologies aimed at better understanding the sustainable entrepreneurs: e.g. their motivations (Nhemachena and Murimbika, 2018) and entrepreneurial capabilities (Obrecht, 2011). As the field develops, recent studies focus on providing holistic overviews of these advancements (Terán-Yépez et al., 2020; Konys, 2019). The role of business models, purposeful organizing and entrepreneurial investment decisions in enabling and facilitating SE is explored by several authors (Kraus et al., 2018; Muñoz and Cohen, 2018b). While Hahn et al. (2018) develop a classification of business model designs with regards to integrating the triple-bottom-line, Lüdeke-Freund (2020) provides a framework for developing business models specific to sustainability innovation. Others also contribute to developing our conceptual understanding of SE from a sustainable ecosystems perspective (Pankov et al., 2019; Volkmann et al., 2019). While others yet investigate the transformation of markets at a system level – for example, Hockerts and Wüstenhagen (2010) emphasize the role of incumbents and new entrants in driving sustainability transformations. Similarly, Johnson and Schaltegger (2019) and Schaltegger et al. (2018) look at how SE can contribute to transitions towards sustainable development.

[2] Please note that Schaltegger et al. (2018) refer to 'classifications' and 'motivations'. With regard to the former, we widen out this category to encompass research that takes stock of corporate practice (classifications) as well as extant research (review studies), respectively. With regard to the latter, we consider both internal and external factors that influence the uptake of SE.

**Table 3**
Organizing framework of SE.

| | | Factors affecting SE uptake | Process | Outcome | Taking stock |
|---|---|---|---|---|---|
| | | *Internal:*<br>Entrepreneurs' traits - motivations, moral antecedents, drivers, personal values & beliefs, sustainability orientation; intent; attitude; prior knowledge; cognitive factors; capabilities<br>*External:*<br>Institutional context - cultural, normative & legal environment<br>Support system<br>Stakeholder management | Opportunity identification<br>Innovation<br>Trade offs<br>Decision making<br>Business models<br>Funding<br>Susainable ecosystems<br>Scaling<br>Education | Financial performance<br>Environmental performance<br>Social performance<br>Sustanability performance<br>Sustainability impact | Understanding the field.<br>(Literature reviews and classification studiew) |
| Level of analysis | Individual | **Internal:** Eller, Gielnik, Wimmer, Thölke, Holzapfel, Tegtmeier and Halberstadt (2020)[a]; Kimuli, Orobia, Sabi and Tsuma (2020); Fors and Lennerfors (2019); Hoogendoorn, van der Zwan and Thurik (2019)[a]; Fishcher, Mauer and Bretel (2018)[a]; Muñoz et al. (2018)[a]; Mupfasoni, Kessler and Lans (2018)[a]; Neumeyer and Santos (2018)[a]; Ploum, Blok, Lans and Omta (2018); Soo Sung and Park (2018)[a]; Thompson and Eijkemans (2018)[a]; Vuorio, Puumalainen and Fellnhofer (2018)[a]; Castellano, Khelladi and Menvielle (2017)[a]; Jahanshahi, Brem and Bhattacharjee (2017); Choongo, Van Burg, Paas and Masurel (2016)[a]; Hooi, Ahmad, Amran and Rahman (2016)[a]; Obrecht (2011)[a]; Wagner (2011)[a]; Kuckertz and Wagner (2010)[a]<br><br>**External**: Middermann, Kratzer and Perner (2020)[a]; Bischoff (2019)[a]; Gregori, Wdowiak, Schwarz and Holzmann (2019)[a]; Pankov, Velamuri and Schneckenberg (2019)[a]; Emami and Khajeheian (2018); Neumeyer and Santos (2018)[a]; Ceptureanu, Ceptureanu, Orzan, Bordean and Radulescu (2017); Hooi, Ahmad, Amran and Rahman (2016)[a] | Eller, Gielnik, Wimmer, Thölke, Holzapfel, Tegtmeier and Halberstadt (2020)[a]; Middermann, Kratzer and Perner (2020)[a]; Bischoff (2019)[a]; Fors and Lennerfors (2019); Gregori, Wdowiak, Schwarz and Holzmann (2019)[a]; O'Shea, Farny and Hakala (2019)[a]; Pankov, Velamuri and Schneckenberg (2019)[a]; Tarnanidis, Papathanasiou and Subeniotis (2019)[a]; Criado-Gomis, Iniesta-Bonillo and Cervera-Taulet (2018)[a]; Dai, Xue, Jiang, Zhang and Zhang (2018)[a]; Muñoz, Cacciotti, and Cohen (2018)[a]; Mupfasoni, Kessler and Lans (2018)[a]; Neumeyer and Santos (2018)[a]; Muñoz and Cohen (2018a)[a]; Ploum, Blok, Lans and Omta (2018); Vuorio, Puumalainen and Fellnhofer (2018)[a]; Belz and Binder (2017)[a]; Ceptureanu, Ceptureanu, Orzan, Bordean and Radulescu (2017); DiVito and Bohnsack (2017)[a]; Kraus, Burtscher, Niemand, Roig-Tierno and Syrjä (2017)[a]; Poldner, Shrivastava and Branzei (2017)[a]; Choongo, Van Burg, Paas and Masurel (2016)[a]; Bocken (2015)[a]; Shepherd Patzelt and Baron (2013); Kuckertz and Wagner (2010)[a] | Bischoff (2019); Criado-Gomis, Iniesta-Bonillo and Cervera-Taulet (2018)[a]; Muñoz, Cacciotti and Cohen (2018)[a]; Soo Sung and Park (2018)[a]; Hernández-Perlines and Rung-Hoch (2017)[a]; Kraus, Burtscher, Niemand, Roig-Tierno and Syrjä (2017)[a]; Bocken (2015)[a]; Schaltegger and Wagner (2011)[a] | Terán-Yépez, Marín-Carrillo, Casado-Belmonte and Capobianco-Uriarte (2020)[a]; Hahn, Spieth and Ince (2018)[a]; Hockerts and Wüstenhagen (2010)[a]; Lüdeke-Freund (2020)[a]; Johnson and Schaltegger (2019)[a]; Konys (2019)[a]; Pankov, Velamuri and Schneckenberg (2019)[a]; Ramírez, Sánchez-Cañizares and Fuentes-García (2019)[a]; Tarnanidis, Papathanasiou and Subeniotis (2019)[a]; Volkmann, Fichter, Klofsten and Audretsch (2019)[a]; Bischoff and Volkmann (2018)[a]; Breuer, Fichter, Lüdeke-Freund and Tiemann (2018)[a]; Kraus, Burtscher, Vallaster and Angerer (2018)[a]; Muñoz and Cohen (2018a)[a]; Muñoz and Cohen (2018b)[a]; Nhemachena and Murimbika (2018)[a]; Nikolaou, Tasopoulou and Tsagarakis (2018); Sarango-Lalangui, Santos and Hormiga (2018); Schaltegger, Beckmann and Hockerts (2018); Vlasov, Bonnedahl and Vincze (2018)[a]; Criado-Gomis, Cervera-Taulet and Iniesta-Bonill (2017)[a]; Schaltegger, Lüdeke-Freund and Hansen (2016)[a]; Schaefer, Corner and Kearins (2015)[a]; Obrecht (2011)[a]; |
| | Organizational | **Internal:** Fors and Lennerfors (2019); Kuckertz, Berger and Gaudig (2019); Abdullahi, Mohamed, Shamsudin, Sharifuddin and Ali (2018)[a]; Mupfasoni, Kessler and Lans (2018)[a]; Neumeyer and Santos (2018)[a]; Criado-Gomis, Cervera-Taulet and Iniesta-Bonill (2017)[a]; Dickel (2017); Fellnhofer (2017)[a]; Manesh and Rialp-Criado (2017); Hooi, Ahmad, Amran and Rahman (2016); Obrecht (2011)[a]<br><br>**External:** Muhammad Auwal, Mohamed, Nasir Shamsudin, Sharifuddin and Ali (2020)[a]; Gregori, Wdowiak, Schwarz and Holzmann (2019)[a]; Kuckertz, Berger and Gaudig (2019); | Andersén, Jansson and Ljungkvist (2020); Lüdeke-Freund (2020)[a]; Niemann, Dickel and Eckardt (2020); Fors and Lennerfors (2019); Gregori, Wdowiak, Schwarz and Holzmann (2019)[a]; Kuckertz A., Berger E.S.C., Gaudig A. (2019); Tarnanidis, Papathanasiou and Subeniotis (2019)[a]; Abdullahi, Mohamed, Shamsudin, Sharifuddin and Ali (2018)[a]; Criado-Gomis, Iniesta-Bonillo and Cervera-Taulet (2018)[a]; Davies and Chambers (2018)[a]; Muñoz, Cacciotti and Cohen (2018)[a]; Mupfasoni, Kessler and Lans (2018)[a]; Neumeyer and Santos (2018)[a]; Belz and Binder (2017)[a]; DiVito and Bohnsack (2017)[a]; Kraus, | Muhammad Auwal, Mohamed, Nasir Shamsudin, Sharifuddin and Ali (2020)[a]; Andersén, Jansson and Ljungkvist (2020); Niemann Dickel and Eckardt (2020); Criado-Gomis, Iniesta-Bonillo and Cervera-Taulet (2018)[a]; Hernández-Perlines and Cisneros (2018); Muñoz, Cacciotti and Cohen (2018)[a]; Nhemachena and Murimbika (2018)[a]; Dickel (2017); Fellnhofer (2017)[a]; Hernández-Perlines and Rung-Hoch (2017)[a]; Kraus, Burtscher, Niemand, Roig-Tierno, Syrjä (2017)[a]; Djupdal and Westhead | |

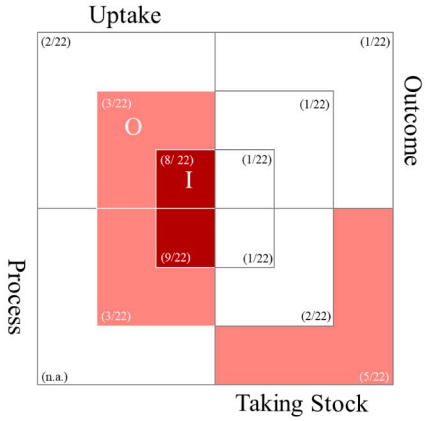
(*continued on next page*)

**Table 3** (*continued*)

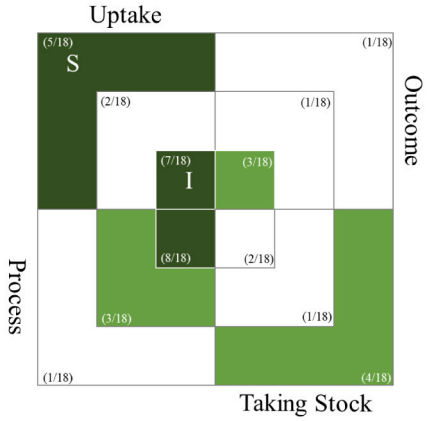
| | Factors affecting SE uptake | Process | Outcome | Taking stock |
|---|---|---|---|---|
| | *Internal:*<br>Entrepreneurs' traits - motivations, moral antecedents, drivers, personal values & beliefs, sustainability orientation; intent; attitude; prior knowledge; cognitive factors; capabilities<br>*External:*<br>Institutional context - cultural, normative & legal environment<br>Support system<br>Stakeholder management | Opportunity identification<br>Innovation<br>Trade offs<br>Decision making<br>Business models<br>Funding<br>Susainable ecosystems<br>Scaling<br>Education | Financial performance<br>Environmental performance<br>Social performance<br>Sustanability performance<br>Sustainability impact | Understanding the field.<br>(Literature reviews and classification studiew) |
| | Hernández-Perlines and Cisneros (2018); Neumeyer and Santos (2018)[a]; Dickel (2017); Hooi, Ahmad, Amran and Rahman (2016)[a]; Djupdal and Westhead (2015) | Burtscher, Niemand, Roig-Tierno and Syrjä (2017)[a]; Atiq, Karatas-Ozkan (2013)[a] | (2015); Schaltegger and Wagner (2011) | Schaltegger and Wagner (2011)[a]; Shepherd and Patzelt (2011)[a] |
| System | **Internal:** Ahmad, Rahman, Afendi Rajendran and Halim (2020)[a]; Kuckertz, Berger and Gaudig (2019); Breuer, Fichter, Lüdeke-Freund and Tiemann (2018)[a]; Juma, James and Kwesiga (2017)[a]; Gray, Duncan, Kirkwood and Walton (2014)[a]; Wagner (2011)<br><br>**External:** Muhammad Auwal, Mohamed, Nasir Shamsudin, Sharifuddin and Ali (2020)[a]; Ahmad, Rahman, Afendi Rajendran and Halim (2020)[a]; Moya-Clemente, Ribes-Giner and Pantoja-Díaz (2020); de Lange (2019); Halberstadt, Schank, Euler and Harms (2019)[a]; Kuckertz, Berger and Gaudig (2019); Long, Blok and Coninx (2019)[a]; Sánchez-Hernández and Maldonado-Briegas (2019)[a]; Testa, Nielsen, Bogers and Cincotti (2019)[a]; Wagner, Schaltegger, Hansen and Fichter (2019); Wagner, Schaltegger, Hansen, Fichter (2019)[a]; Bischoff and Volkmann (2018)[a]; Gasbarro, Rizzi and Frey (2018); Thompson (2018); Tiemann, Fichter and Geier (2018)[a]; Vlasov, Bonnedahl and Vincze (2018)[a]; Wahga, Blundel and Schaefer (2018); de Lange (2017)[a]; Gasbarro, Annunziata, Rizzi and Frey (2017); Juma, James and Kwesiga (2017)[a]; Lans, Blok and Wesselink (2014)[a]; Spence, Gherib and Biwolé (2011)[a]; Hockerts and Wüstenhagen (2010)[a] | Lüdeke-Freund (2020)[a]; de Lange (2019); Johnson and Schaltegger (2019)[a]; Kuckertz, Berger and Gaudig (2019); Long, Blok and Coninx (2019)[a]; Kraus, Burtscher, Vallaster and Angerer (2018)[a]; Bocken (2015)[a] | Muhammad Auwal, Mohamed, Nasir Shamsudin, Sharifuddin and Ali (2020)[a]; Ahmad, Rahman, Afendi Rajendran, Halim (2020)[a]; Moya-Clemente, Ribes-Giner and Pantoja-Díaz (2020); Breuer, Fichter, Lüdeke-Freund and Tiemann (2018)[a]; Schaltegger, Beckmann and Hockerts (2018); Schaltegger, Lüdeke-Freund and Hansen (2016)[a]; Bocken (2015)[a]; Schaefer, Corner and Kearins (2015)[a] | |

[a] Indicates a triple-bottom-line orientation.

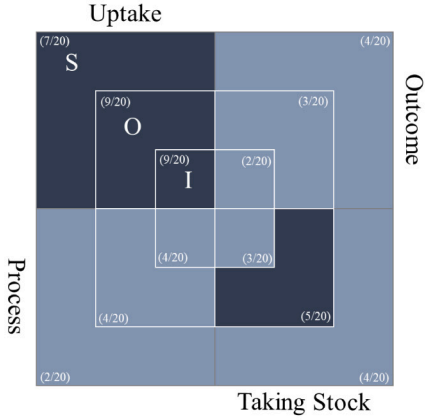
**a) PIONEER GROUP**



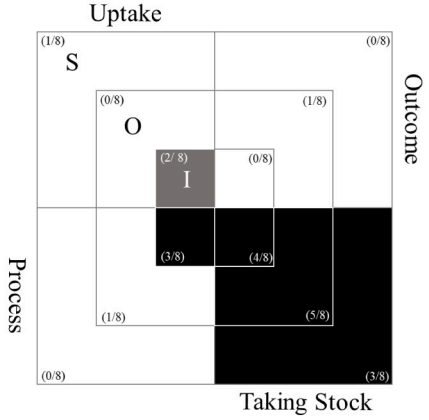

**b) PROCESS GROUP**




**c) INSURGENT GROUP**




**d) TRACKING THE FIELD GROUP**




**e) PERIPHERY GROUP**

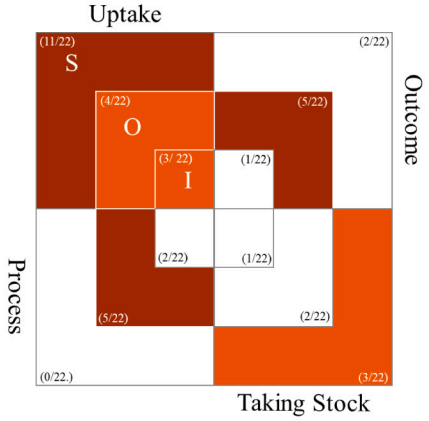



**Fig. 3.** SE subfield profiles.

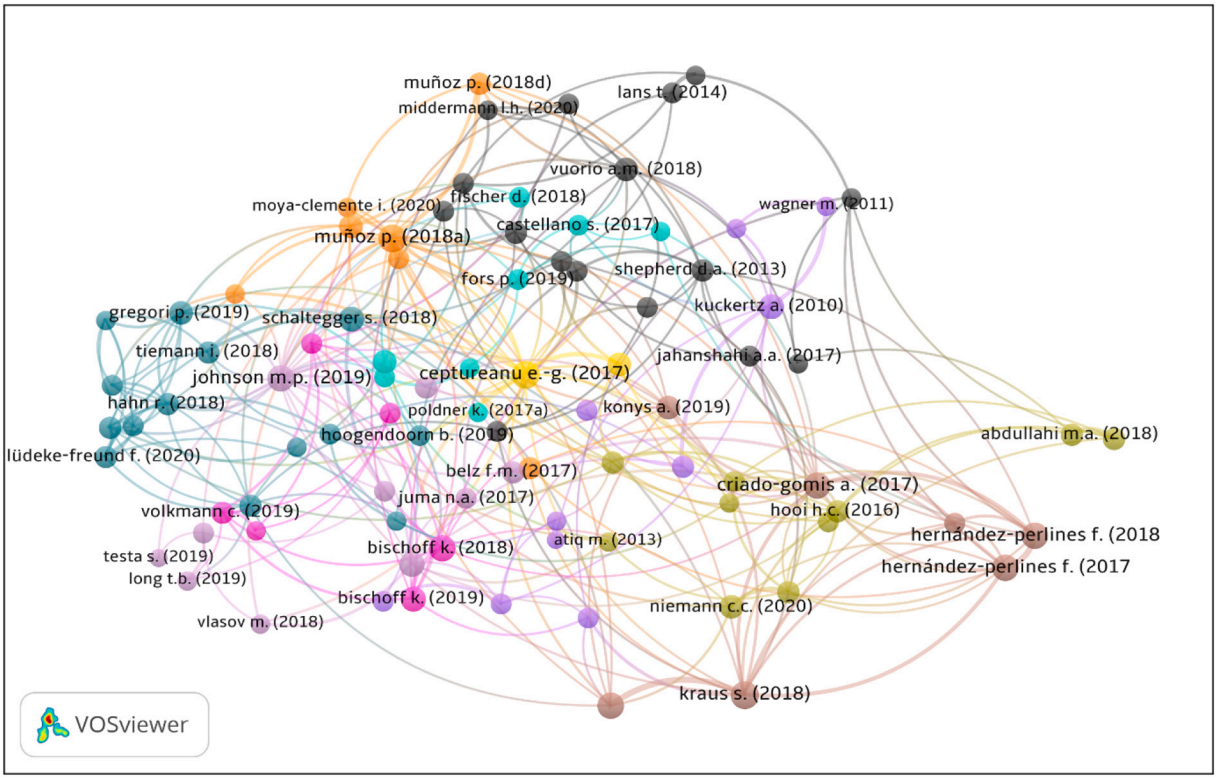



**Fig. 4.** Bibliographic coupling of documents map.

#### 4.2.3. *Process*

As a core step in the SE process, opportunity recognition is an important topic of inquiry (Eller et al., 2020; Choongo et al., 2016; Shepherd et al., 2013), and so is access to funding (de Lange, 2017; Djupdal and Westhead, 2015). While start-ups and SMEs remain the focal points of these studies, Schaltegger et al. (2016) shed light on co-evolutionary business model development for sustainable niche pioneers and conventional mass market players aiming at sustainability transformation of markets.

With the pursuit of social, environmental and economic goals, strategic approaches towards the triple-bottom-line have been a topic of interest within the SE literature – with notions of 'hybrid business models' (Davies and Chambers, 2018), 'business models that transform markets' (Hahn et al., 2018; Belz and Binder, 2017; Schaltegger et al., 2016), 'sustainability-oriented business models' (Breuer et al., 2018) and 'business models for sustainability innovation' (Lüdeke-Freund, 2020), emerging from the discussion. At the core of the debate are the supposedly opposing ideas of sustainability versus profitability (Kraus et al., 2018, DiVito and Bohnsack, 2017; Poldner et al., 2017; Hooi et al., 2016; Pacheco et al., 2010) – i.e. trade-offs with regards to the triple-bottom-line (e.g. Davies and Chambers, 2018; Poldner et al., 2017) and the hybrid nature of enterprises. Research on this topic looks at conceptualizing and organizing the sustainable decision-making process so as to avoid trade-offs (e.g. Johnson and Schaltegger, 2019; Belz & Binder, 2017; DiVito and Bohnsack, 2017). Moving beyond the boundaries of the firm, further studies explore the process of creating and nurturing sustainable ecosystems to foster new SE ventures (O'Shea et al., 2019; Volkmann et al., 2019).

#### 4.2.4. *Outcomes*

SE outcomes refer to the performance of sustainable enterprises with regards to the triple-bottom-line. Individual-level factors such as moral cognition, prior knowledge, values and attitudes are studied in reference to socio-environmental impacts and financial performance (e.g. Jahanshahi et al., 2017). Numerous studies further investigate success factors – for example, Mupfasoni et al. (2018) and Kraus et al. (2017) highlight the importance of alignment across identifying problems and orienting organizational goals and strategy accordingly; while others explore barriers (Hoogendoorn et al., 2019; Thompson 2018). Other studies explore the role of organizational structures (Niemann et al., 2020; Davies and Chambers, 2018; Muños et al., 2018), crowdfunding (Testa et al., 2019), investor interest (Bocken, 2015) and the education system (Volkmann et al., 2019; Tiemann et al., 2018; Lans et al., 2014) in driving and scaling sustainability impact. While the environmental bias in terms of assessing SE impact is observed to a certain degree (e.g. Dickel et al., 2017; Djupdal and Westhead 2015), recent trends show a triple-bottom-line orientation in assessing SE outcomes (e.g. Gregori et al., 2019; Tardaninis et al., 2019). However, concerns regarding 'how to measure sustainability' emerge as one of the major challenges.

Manual coding of our entire sample of 90 SE papers has enabled us to develop and apply an organizing framework and thus to pinpoint general trends and patterns across the sample, with an emphasis on the contributions made by these studies to the SE

literature. In the following section, we supplement this manual coding by combining two types of bibliometric analyses (i.e. co-citation of reference and bibliographic coupling of publications analyses) to better understand the relationships between authors and research streams, as well as tracing and characterizing subfields within the SE literature.

### 4.3. Emerging subfields

Using the co-citation analysis, and hence the number of co-citation links and cited references with the largest weight, the overall sample of 90 SE papers can, to varying degrees, be traced back to the three groups of seminal papers identified in Section 4.1. Our findings indicate that 22 papers predominantly cite the red group of seminal papers – i.e. the Pioneer Group; 18 papers predominantly cite the green group of seminal papers – i.e. the Process Group; and 20 papers predominantly cite the blue group of seminal papers – i.e. the Insurgent Group. In addition, a black group of eight papers with high citation levels of all three groups (red, blue and green) can be identified – i.e. the 'Tracking the Field Group'; as well as an orange group of 22 papers referring to either very few or none of the three groups of seminal papers – i.e. our 'Periphery Group'. When we compare and contrast these five groups, it becomes clear that each of them are relatively distinct, revealing specific characteristics that the other groups do not necessarily share. In other words, distinct subfields have formed around the different sets of seminal papers.

Out of the 22 papers predominantly citing the red Pioneer Group of seminal papers, a clear emphasis emerges around the individual and (to a lesser degree) organizational levels of analysis (Fig. 3a). Research in this group is primarily concerned with questions regarding the uptake of SE as well as the SE process. Only a set of (typically older) literature reviews and conceptual papers break out of this pattern, addressing the systems level of analysis within the Pioneer Group.

Out of the 18 papers predominantly citing the green group of seminal papers, a clear emphasis emerges around the process of SE (Fig. 3b). Research within this Process Group predominantly explores the opportunity recognition process as well as the role of moral antecedents for SE within that. At a systems level, the research in this group explains how ecosystems for SE can be better developed and which factors foster sustainable ecosystems.

Out of the 20 papers predominantly citing the blue group of seminal papers, the insurgent pathway (Muñoz and Dimov, 2015) appears as a common denominator, with the majority of these papers researching insurgent, often hybrid sustainable entrepreneurs (Fig. 3c). Research within this Insurgent Group also appears more varied than in the Pioneer and Process Groups – we find a wide range of different angles to be explored linked to the insurgent character of SE, spanning all three levels of analysis as well as the uptake, process and outcome dimension and taking stock of the subfield. A notable number of papers within this group also engage with questions regarding sustainability performance and overall impact of SE activity, setting this group of papers apart from the other groups.

The black 'Tracking the Field Group', frequently engages with all three groups of seminal papers (Fig. 3d). This group contains a large number of review studies taking stock of SE more generally and across all three levels of analysis. Finally, the orange 'Periphery Group' addresses topics that are positioned at the margins of SE research, typically bordering other fields of research (Fig. 3e). For example, research in this group addresses questions such as the configuration of higher education systems that are conducive for the uptake of SE, or the role of crowd-funding and other types of funding structures in the context of SE. Consequently, very few of the red, green or blue seminal papers identified earlier inform this subfield of research. Research within this group is relatively varied but emphasizes the uptake of SE. In addition, a notable number of papers explores the outcome dimension (e.g. Nhemachena and Murimbika, 2018).

A complementary way of illustrating patterns and trajectories within the SE literature is through the results of the bibliographic coupling of documents (BCA-D), enabling us to identify the extent to which papers share common references and resulting in clusters of research with similar characteristics. The BCA-D analysis shows that patterns within the overall sample do not merely fall neatly into three camps informed by the three sets of seminal papers. Instead, other factors potentially shaping different subfields of SE could include specific academic outlets, disciplinary boundaries, geographical and language barriers, different epistemic communities or even highly published individuals in the field, as illustrated by Fig. 4 below (see also Appendix A).

Here, the overall sample falls into ten clusters of different sizes. Some of these more directly map onto the three groups of seminal papers: for example, Cluster 1 mostly consists of articles from the Pioneer Group (7 out of 10) and, accordingly, contains research focusing on the individual level of analysis and employ quantitative methods. Pioneer Group papers also dominate in clusters 2 and 8, but without equally clear research priorities. A number of clusters mostly contain a combination of Process Group and Insurgent Group papers (clusters 3, 4, 5, 9). Among these, research in cluster 4 typically takes a macro perspective and explores other elements of the wider system that SE is part of, e.g. higher education or funding structures to promote the uptake of SE. A common denominator in cluster 9 is the insurgent character of sustainable entrepreneurs that are examined, all of which are based in Western Europe.

Interestingly, while Insurgent Group and Process Group research frequently combines in individual BCA-D clusters, they hardly mix with research associated with the Pioneer Group of seminal papers. This shows how the groups of seminal papers identified in the co-citation analysis continue to shape different parts of the SE field. One possible explanation in this context might be geography, with European authors dominating the Insurgent Group and Process Group, whereas the Pioneer Group of papers is more North American in nature. Along similar lines, a recurring feature is that different works of individual authors are typically based in the same BCA-D cluster: e.g. work co-authored by Shepherd is largely positioned in cluster 1, Muñoz in cluster 5, Hernández-Perlines in cluster 7, or Bischoff in cluster 8. Yet, a limited number of highly active researchers can be identified who break out of this pattern, most notably Schaltegger and Wagner (both present in clusters 2–4).

## 5. Discussion

A wealth of trends and patterns have emerged from our systematic analysis of recent SE publications, both at the level of the overall field as well as at the level of different subfields. In this section, we spell out the most pertinent of these trends and patterns, before developing a future-oriented SE research agenda.

### 5.1. Overarching trends and patterns

Building on the organizing framework of SE research presented in Table 3, an encouraging finding is that pockets of research can be identified to populate each domain of the framework. Likewise, the field of SE generally shows a healthy balance of quantitative, qualitative and conceptual research. Significant progress has been made within a short time-span, and an impressive portfolio of contributions has developed at various levels of analysis. At the same time, it becomes clear that even though some areas have become heavily researched, a number of blind spots remain. Both the SE process and the uptake of SE continue to represent a key theme in the field (e.g. Ploum et al., 2018; Vuorio et al., 2018; Schaltegger et al., 2016; Pacheco et al., 2010). In contrast, research into SE performance and the impact of SE activity remains relatively limited, even though progress has been made in more recent years. Systems-level impacts of SE, i.e. research exploring the contribution of SE to sustainable development, remains particularly sparse. Yet, even here a modest number of starting-points can be identified, e.g. proposing to use planetary boundaries (Schaltegger et al., 2016) or the Earth's physical carrying capacity (Schaefer et al., 2015) as yardsticks to evaluate impacts. Nevertheless, all of these studies are conceptual in nature, therefore leaving sustainability impacts at the systems level yet to be explored empirically.

Even though SE continues to be influenced by its strong environmental legacy (Gasbarro et al., 2017), the triple-bottom-line perspective plays an increasingly important role in SE research. In this context, Belz and Binder (2017) argue that the integration of the triple-bottom-line is sequential rather than simultaneous. In other words, environmental entrepreneurs may develop into sustainable entrepreneurs over time. At the same time, another overarching impression is that research into the social dimension of entrepreneurial activity remains more embryonic *within*, and more mature *outside* of the SE literature (as a more salient theme within the social entrepreneurship literature, e.g. Santos, 2012). Clear patterns also exist with regard to the organizational forms of sustainable enterprises. A significant number of empirical studies focus on for-profit SMEs that integrate socio-environmental dimensions within the organization. Although interest in hybrid organizations has markedly increased, the for-profit focus appears dominant and an important feature of SE research. In addition, the SE literature continues to very much focus on very small organizations, even though notable exceptions can be identified (Hockerts and Wüstenhagen, 2010; Schaltegger and Wagner, 2011; Gasbarro et al., 2017). Furthermore, a clear Northern bias can be observed in both conceptual and empirical research into SE, echoing the findings of previous reviews of the field (Terán-Yépez et al., 2020; Bischoff and Volkmann, 2018; Muñoz and Cohen, 2018b). North American and especially European authors, institutions and datasets continue to dominate SE research.

### 5.2. Subfields of SE research

Crucially, the bibliometric methods applied in our study allow us to uncover the relational nature of knowledge creation in the field of SE. An in-built characteristic of SE research is its multi-disciplinary nature, spanning across various disciplinary boundaries. Therefore, it does not come as a surprise that the research field is somewhat heterogeneous, with multiple subfields emerging, each with different characteristics and trajectories. For example, our bibliometric analysis has shown that different clusters of SE research, building on different sets of seminal papers, have placed emphasis on different parts of our organizing framework. In other words, separate research trajectories have formed around key ideas developed in different sets of seminal papers, and continue to shape distinct trajectories within the SE literature.

A prime example is the Insurgent Group of SE research that has formed around the key idea of sustainable entrepreneurs as change agents and institutional entrepreneurs (Muñoz and Dimov, 2015; Pacheco et al., 2010), and share a set of characteristics that sets this group apart from other subfields within the SE literature. In general terms, research within the Insurgent Group emerges as more diverse when compared to other groups, exploring the insurgent pathway in various different contexts, with regard to different organizational forms, at different analytical levels, and emphasizing different aspects of the entrepreneurial process. In contrast, the Pioneer Group and the Process Group are somewhat more homogeneous: the Pioneer Group emphasizes the individual level of analysis, exploring why and how individuals become sustainable entrepreneurs; and – as the name indicates – the Process Group is particularly strong on the SE process. A common feature of the Pioneer and Process Groups is the absence of research into outcomes of SE.

The BCA-D analysis in particular showed that there is a clearly higher level of interaction between the Insurgent Group and the Process Group, whereas these two hardly interact with the Pioneer Group of SE research. One possible explanation for this pattern is the geographical divide between these groups, with Insurgent and Process Groups being shaped by a relatively small number of European researchers and institutions. Of the two remaining groups, the Periphery Group stands out in that it addresses a number of research questions that are unique to the group but – as the name indicates – are more peripheral to the core SE themes reflected by the other groups. This includes e.g. funding mechanisms (e.g. Testa et al., 2019; de Lange, 2017) or higher education programs (e.g. Halberstadt et al., 2019; Sánchez-Hernández and Maldonado-Briegas, 2019) to support the uptake of SE, but also a number of promising performance and impact measures (e.g. Muhammad Auwal et al., 2020; Criado-Gomis et al., 2018) that are restricted to this group.

### 5.3. Towards a future research agenda

It follows that in terms of avenues for future research, some recommendations are directed towards the entire field of extant SE research, and some are positioned at the level of specific subfields, in particular as represented by the different groups.

**There is a need for SE research to become more geographically inclusive.**

Despite a growing number of (typically case-based) explorations of developing and emerging economy contexts (Ahmad et al., 2020; Kimuli et al., 2020; Gregori et al., 2019; Sung and Park, 2018), the strong bias towards North American and especially European sustainable entrepreneurs prevails. As demonstrated in the international business literature, organizational behaviour is shaped by the institutional contexts an organization is embedded in (Hall and Soskice, 2001; Whitley, 1999). Among others, this also applies to a company's CSR and sustainability engagement (Barkemeyer et al., 2019; Matten and Moon, 2008; Ioannou and Serafeim, 2012). There is no reason to assume that this does not apply in equal manner to sustainable entrepreneurs. Consequently, extant findings regarding the entrepreneurial process, its uptake or outcomes that have been generated in a European or North American setting, may not be generalizable to other parts of the world. In particular, thriving SE communities in countries such as India, and international databases such as Global Entrepreneurship Monitor, Ashoka and Skopai, open up promising avenues for future research that adapt, adjust and refine Northern-centric research perspectives on SE. This is not only restricted to the SE process as such, but also extends to the wider institutional contexts in which sustainable entrepreneurs are embedded, including the education system (Sánchez-Hernández and Maldonado-Briegas, 2019), questions around attracting qualified talent (Thompson and Eijkemans, 2018), or funding structures that are conducive to SE (de Lange, 2019), all of which may look quite different in emerging and developing economy contexts.

**There is a need for increased cross-pollination of research between SE subfields.**

From the identification of different research trajectories within the SE literature, with distinct characteristics, research priorities and underlying assumptions, it follows that increased interaction between them will benefit the overall field. To take one example, a notable divide has emerged between the Pioneer Group on the one hand, and the Insurgent and Process Groups on the other hand, possibly as a result of a geographical divide between them. This entails the risk that promising ideas and new developments in one subfield of SE do not travel to other subfields, the duplication of research and, ultimately, a delay in knowledge generation across the overall field.

**There is a need for cross-pollination of research between SE and related literatures.**

Beyond the engagement with international comparative CSR studies or the National Business Systems literature, there are other fields that are well-suited to inform SE research. The environmental legacy of SE in particular makes increased interaction with the social entrepreneurship literature a promising avenue for future research. Even though SE research has increasingly moved away from its environmental origins and towards a triple-bottom-line orientation, social entrepreneurship research has the potential to inform SE as its more recent sibling with regard to the evaluation and management of the social dimension of entrepreneurial activities. Along similar lines, cross-fertilization with the social entrepreneurship literature would be beneficial given that the latter has addressed the issue of hybridity and hybrid tensions in greater depth (Battilana, 2018; Battilana and Lee, 2014; Doherty et al., 2014; Pache and Santos, 2013).

**There is a need to engage more closely with the outcomes of SE activity.**

As has been demonstrated in the context of larger organizations, the triple-bottom-line performance and wider societal impacts of SE activity are difficult to capture and to evaluate (e.g. Aguinis and Glavas, 2012; Walls et al., 2012). Unfortunately, the inability to adequately discriminate between good and bad performers, and between positive and negative wider sustainability impacts, opens the door for symbolism and organized hypocrisy (Lim and Tsutsui, 2012; Bansal and Clelland, 2004). If the continued uptake of SE is to support the transition towards a more sustainable society, then this also means that credible sustainable entrepreneurs with a positive (or less negative) sustainability impact need to be protected from those sustainable entrepreneurs who merely intend to be perceived as sustainable without being backed up by a sustainable business model. Hence, research that enables sustainable entrepreneurs and their stakeholders to more precisely capture their sustainability performance and impacts has the potential to significantly advance SE practices.

**There is a need for engagement with the systems-level implications of SE.**

Sustainable entrepreneurs form parts of wider systems of economic and social activity, and interact with other types of organizations and societal stakeholder groups. It follows that the interplay with these other types of actors deserves more attention. Research exploring the distinct roles and interplay of large and small organizations in the transition towards more sustainable societies (Hockerts and Wüstenhagen, 2010) is an important stepping stone in this context. Yet, it will also be important to explore the longer-term dynamics of these relationships in order to capture the multiple impacts SE might have. To take one example, Holt (2011) explored a sample of pioneering eco-preneurs two decades into their existence, and found very few of them to be operating in the same

fashion as in their initial stages. Over time, sustainable entrepreneurs may grow or may fail. Promising ventures might be taken over by larger companies, and their initial sustainability mission and vision might either be diluted, or it might influence the larger enterprise in a positive way. Ultimately, any of these scenarios will fundamentally shape the sustainable entrepreneurs' effectiveness and longer-term sustainability impact, and thus require scholarly attention.

Our bibliometric analysis has, among others, illustrated the developmental and agenda-setting impact that one Special Issue in a high-impact journal can have within a research field. In the case of the Insurgent Group of SE research, a well-developed subfield of SE research has formed around a small set of seminal articles, three of which were published in the same Special Issue (*Journal of Business Venturing* 25(5)). Consequently, this could also be an effective means to reinforce cross-fertilization between different SE research trajectories or with other research fields, as indicated above.

## 6. Conclusion

Over the last decade, research on sustainable entrepreneurship has gained significant attention. While some studies have taken stock of this literature, a review demonstrating the relational nature of knowledge creation given the nascent, evolving and multi-disciplinary nature of sustainable entrepreneurship has been missing. In this study, we have applied a combination of two bibliometric techniques: i.e. co-citation analysis (CCA-R) and bibliographic coupling of documents (BCA-D) as well as manual coding to conduct a thematic analysis of the SE literature.

Our study makes two main contributions. First, at a methodological level, our augmented bibliometric approach has allowed us to better understand the relationships between ideas, authors and research streams and how the field is structured. Second, at the level of SE research, the application of bibliometric techniques has allowed us to tease out subfields within the SE literature and to characterize them on the basis of the seminal papers they build on, dominant research designs, types of empirical enquiries they tend to engage in, and assumptions that underlie their research. Bibliometric approaches were particularly useful given the multi-disciplinary and heterogeneous nature of SE, spanning over various natural and social science disciplines. We have showed that distinct trajectories have formed around specific ideas developed in subsets of seminal papers within the field. The identification of field-level and subfield-level trends, patterns and trajectories has informed the development of a future SE research agenda.

We acknowledge a number of limitations linked to our research design. While the two bibliometric approaches have provided us with robust, transparent and replicable methods to systematic literature reviews, choices had to be made in relation to sampling and keywords. The cut-off points we defined in order to reduce the datasets in CCA-R and BCA-D also carry the risk that certain field-level developments are not examined by this type of approach. These types of bibliometric techniques may not necessarily give sufficient consideration to innovative outliers positioned at the margins of a field. Rather, they allow us to capture the general directions towards which the main parts of the field are gravitating. Thus, they provide us with powerful tools to characterize the field, understand its internal structure, highlight existing blind spots in the SE research agenda and carve out promising avenues for future SE research.

Future research building on our study could be positioned at the intersection of SE and social entrepreneurship, or between SE and conventional entrepreneurship. Based on the same research design, possibly in combination with automated text mining techniques, it would be possible to explore how these different fields inform each other, converge or diverge.

## CRediT authorship contribution statement

As the corresponding author of the article, I hereby list the responsibility of each authors and their contributions.

**Amitabh Anand:** conceptualization, formal analysis, investigation, writing – original draft, writing – review & editing, methodology, data curation, validation.

**Padmaja Argade:** conceptualization, formal analysis, investigation, writing – original draft, writing – review & editing, resources, validation.

**Ralf Barkemeyer:** formal analysis, investigation, writing – original draft, writing – review & editing, validation.

**Fanny Salignac:** formal analysis, investigation, writing – original draft, writing – review & editing, validation.

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## Appendix A. Thematic coding of BCA-D sample

| ID | Authors | Year | Outlet[a] | Type | Contribution[b] | Geo. focus | Org. form | Size | Level of analysis | Configuration | CCA-R cluster | BCA-D cluster |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Dai et al | 2018 | Sustainability | Mixed methods | Proc | China | Hybrid | Micro | Individual | Conformist | Red | 1 |
| 2 | Emami & Khajeheian | 2018 | Sustainability | Quantitative | UptExt | Iran | n.a. | n.a. | Individual | Conformist | Red | 1 |
| 3 | Hoogendoorn et al | 2019 | Journal of Business Ethics | Quantitative | UptInt, UptExt | Various Europe | For-profit | Micro | Individual | Insurgent | Red | 1 |
| 4 | Kimuli et al | 2020 | WJEMSD | Quantitative | UptInt | Uganda | For-profit | SME | Individual | Conformist | Green | 1 |
| 5 | Middermann et al | 2020 | Sustainability | Quantitative | UptExt, Proc | International | n.a. | n.a. | Individual | Conformist | Orange | 1 |
| 6 | Obrecht | 2011 | IJESB | Conceptual | TakStoc, UptInt | n.a. | For-profit | SME | Indiv. & Org. | Conformist | Orange | 1 |
| 7 | Ramírez et al | 2019 | Sustainability | Literature review | TakStoc | n.a. | n.a. | n.a. | n.a. | n.a. | Red | 1 |
| 8 | Shepherd et al | 2013 | Academy of Management Journal | Quantitative | Proc | Germany | For-profit | Micro | Individual | Conformist | Red | 1 |
| 9 | Shepherd & Patzelt | 2011 | Entrepreneurship Theory and Practice | Conceptual | TakStoc | n.a. | Hybrid | n.a. | System | Conformist | Red | 1 |
| 10 | Vuorio et al | 2018 | IJEBR | Quantitative | UptInt, Proc | Austria & Finland | n.a. | n.a. | Individual | n.a. | Red | 1 |
| 11 | Belz & Binder | 2017 | Business Strategy & the Environment | Qualitative | Proc | Germany & Finland | Hybrid | Small SME | Indiv. & Org. | Both | Green | 2 |
| 12 | Castellano et al | 2017 | IJESB | Qualitative | UptInt | France | For-profit | Various | Individual | Conformist | Orange | 2 |
| 13 | Choongo et al | 2016 | Sustainability | Quantitative | UptInt, Proc | Zambia | For-profit | SME | Individual | Conformist | Black | 2 |
| 14 | de Lange | 2019 | Journal of Cleaner Production | Quantitative | UptExt, Proc | Mainly USA | Other | Various | Macro | Conformist | Orange | 2 |
| 15 | de Lange | 2017 | Journal of Cleaner Production | Quantitative | UptExt | International | Mixed Sample | SME | System | Both | Orange | 2 |
| 16 | Fischer et al | 2018 | IJEBR | Qualitative | UptInt | Germany | Hybrid | Micro | Individual | Insurgent | Blue | 2 |
| 17 | Fors & Lennerfors | 2019 | Sustainability | Conceptual | UptInt, Proc | Sweden | For-profit | Micro | Individual | Insurgent | Red | 2 |
| 18 | Juma et al | 2017 | JSBE | Qualitative | UptInt, UptExt | Sub-Saharan Africa | Hybrid | SME | Indiv., Org. & System | Insurgent | Blue | 2 |
| 19 | Kuckertz et al | 2019 | Journal of Cleaner Production | Qualitative | UptInt, UptExt, Proc | USA | For-profit | Micro | Org. & System | Conformist | Red | 2 |
| 20 | Mupfasoni et al | 2018 | JSBED | Mixed methods | UptInt, Proc | Burundi | For-profit | Micro | Individual | Conformist | Red | 2 |
| 21 | Nhemachena & Murimbika | 2018 | Business Strategy & the Environment | Quantitative | TakStoc, Outcome | South Africa | Hybrid | Various | Organizational | Conformist | Black | 2 |
| 22 | Sarango-Lalangui et al | 2018 | Sustainability | Literature review | TakStoc | n.a. | n.a. | n.a. | n.a. | Conformist | Black | 2 |
| 23 | Schaltegger et al | 2018b | IJEV | Conceptual | TakStoc, Outcome | n.a. | For-profit | n.a. | System | Insurgent | Red | 2 |
| 24 | Spence et al | 2011 | Journal of Business Ethics | Qualitative | UptExt | Canada, Tunisia & Cameroon | Hybrid | SME | System | Both | Orange | 2 |
| 25 | Tarnanidis et al | 2019 | Journal of Business Ethics | Mixed methods | TakStoc, Proc | Greece | Hybrid | SME | Indiv. & Org. | Conformist | Black | 2 |
| 26 | Wagner | 2011 | IJESB | Quantitative | UptInt, Proc | Germany & France | Other | n.a. | Individual | Insurgent | Red | 2 |
| 27 | Breuer et al | 2018 | IJEV | Conceptual | TakStoc, UptInt | n.a. | n.a. | n.a. | System | n.a. | Orange | 3 |
| 28 | Davies & Chambers | 2018 | Journal of Cleaner Production | Qualitative | Proc | Western Europe | Hybrid | Micro | Organizational | Conformist | Orange | 3 |
| 29 | Eller et al | 2020 | Business Strategy & the Environment | Quantitative | UptInt, Proc | Germany | Other | n.a. | Individual | Conformist | Green | 3 |
| 30 | Gasbarro et al | 2017 | Organization & Environment | Qualitative | TakStoc, UptExt | Western Europe | Mixed Sample | Large | Indiv., Org. & System | Conformist | Blue | 3 |
| 31 | Gregori et al | 2019 | Sustainability | Qualitative | UptExt, Proc | Uganda | Hybrid | Micro | Indiv. & Org. | Insurgent | Blue | 3 |
| 32 | Hahn et al | 2018 | Journal of Cleaner Production | Qualitative | TakStoc | Germany | Hybrid | SME | Organizational | Both | Blue | 3 |
| 33 | Johnson & Schaltegger | 2019 | Entrepreneurship Theory and Practice | Literature review | TakStoc, Proc | n.a. | n.a. | n.a. | System | n.a. | Green | 3 |

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| ID | Authors | Year | Outlet[a] | Type | Contribution[b] | Geo. focus | Org. form | Size | Level of analysis | Configuration | CCA-R cluster | BCA-D cluster |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | Kuckertz & Wagner | 2010 | Journal of Business Venturing | Quantitative | UptInt, Proc | Germany | Other | n.a. | Individual | Conformist | Red | 3 |
| 35 | Long et al | 2019 | Journal of Cleaner Production | Qualitative | UptExt, Proc | Western & Central Europe | n.a. | n.a. | System | Insurgent | Green | 3 |
| 36 | Lüdeke-Freund | 2020 | Business Strategy & the Environment | Conceptual | TakStoc, Proc | n.a. | Hybrid | n.a. | Org. & System | Both | Orange | 3 |
| 37 | Ploum et al | 2018 | Journal of Cleaner Production | Mixed methods | UptInt, Proc | Netherlands | Other | n.a. | Individual | Conformist | Green | 3 |
| 38 | Schaefer et al | 2015 | Organization & Environment | Literature review | TakStoc, Outcome | n.a. | n.a. | n.a. | System | Insurgent | Blue | 3 |
| 39 | Schaltegger & Wagner | 2011 | Business Strategy & the Environment | Qualitative | TakStoc, Proc | n.a. | n.a. | Various | Indiv. & Org. | Conformist | Red | 3 |
| 40 | Schaltegger et al | 2016 | Organization & Environment | Conceptual | TakStoc, Outcome | Germany | Mixed Sample | Various | Org. & System | Conformist | Blue | 3 |
| 41 | Tiemann et al | 2018 | IJEV | Qualitative | UptExt | US & Germany | Other | n.a. | Macro | Conformist | Black | 3 |
| 42 | Bocken | 2015 | Journal of Cleaner Production | Qualitative | UptExt, Proc, Outcome | Europe & USA | For-profit | Various | Macro | Conformist | Blue | 4 |
| 43 | Halberstadt et al | 2019 | Sustainability | Qualitative | UptExt | Western Europe | Other | n.a. | Macro | n.a. | Orange | 4 |
| 44 | Lans et al | 2014 | Journal of Cleaner Production | Mixed methods | UptExt | Netherlands | Other | n.a. | Macro | Conformist | Orange | 4 |
| 45 | Moya-Clemente et al | 2020 | Sustainable Development | Mixed methods | UptExt, Outcome | International | For-profit | Various | Macro | Conformist | Green | 4 |
| 46 | O'Shea et al | 2019 | Small Business Economics | Qualitative | Proc | Finland | Other | SME | Individual | Insurgent | Green | 4 |
| 47 | Sánchez-Hernández & Maldonado-Briegas | 2019 | Sustainability | Quantitative | UptExt | Spain | Other | n.a. | Macro | n.a. | Orange | 4 |
| 48 | Terán-Yépez et al | 2020 | Journal of Cleaner Production | Literature review | TakStoc | International | Mixed Sample | n.a. | n.a. | n.a. | Black | 4 |
| 49 | Testa et al | 2019 | TFSC | Conceptual | UptExt | n.a. | n.a. | n.a. | Macro | n.a. | Orange | 4 |
| 50 | Volkmann et al | 2019 | Small Business Economics | Conceptual | TakStoc | n.a. | n.a. | n.a. | n.a. | n.a. | Green | 4 |
| 51 | Wagner et al | 2019 | Small Business Economics | Qualitative | UptExt | Germany | n.a. | n.a. | Macro | n.a. | Blue | 4 |
| 52 | Criado-Gomis et al | 2017 | Sustainability | Conceptual | TakStoc, UptInt | n.a. | For-profit | n.a. | Indiv. & Org. | Conformist | Blue | 5 |
| 53 | Criado-Gomis et al | 2018 | IEMJ | Quantitative | Proc, Outcome | Spain | For-profit | Various | Indiv. & Org. | Conformist | Orange | 5 |
| 54 | Hooi et al | 2016 | Management Research Review | Quantitative | UptInt, UptExt | Malaysia | For-profit | SME | Indiv. & Org. | Conformist | Orange | 5 |
| 55 | Jahanshahi et al | 2017 | Sustainability | Quantitative | UptInt | Bangladesh & Iran | For-profit | SME | Individual | Conformist | Red | 5 |
| 56 | Konys | 2019 | Sustainability | Literature review | TakStoc | n.a. | n.a. | n.a. | Org. & System | n.a. | Blue | 5 |
| 57 | Kraus et al | 2018 | Sustainability | Conceptual | TakStoc, Proc | n.a. | n.a. | SME | System | Conformist | Green | 5 |
| 58 | Kraus et al | 2017 | Sustainability | Quantitative | Proc, Outcome | Austria | For-profit | SME | Indiv. & Org. | Conformist | Green | 5 |
| 59 | Muñoz et al | 2018 | Journal of Business Venturing | Qualitative | Proc, Outcome | Latin America | Hybrid | n.a. | Indiv., Org. & System | Insurgent | Blue | 5 |
| 60 | Muñoz | 2018 | IJEBR | Mixed methods | UptInt, Proc | North America | Hybrid | SME | Individual | Both | Blue | 5 |
| 61 | Muñoz & Cohen | 2018a | Journal of Small Business Management | Qualitative | TakStoc, UptInt, Proc | Various | Mixed Sample | Micro | Individual | Both | Blue | 5 |
| 62 | Soo Sung & Park | 2018 | Sustainability | Quantitative | UptInt, Outcome | South Korea | For-profit | Various | Individual | Conformist | Green | 5 |
| 63 | Gasbarro et al | 2018 | IJEBR | Qualitative | UptExt | Italy | For-profit | SME | Indiv., Org. & System | Insurgent | Blue | 6 |
| 64 | Vlasov et al | 2018 | JEC | Conceptual | TakStoc, UptExt | Sweden | Hybrid | Small SME | System | Insurgent | Orange | 6 |
| 65 | Wahga et al | 2018 | IJEBR | Qualitative | UptExt | Pakistan | For-profit | SME | | Conformist | Blue | 6 |

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(*continued*)

| ID | Authors | Year | Outlet[a] | Type | Contribution[b] | Geo. focus | Org. form | Size | Level of analysis | Configuration | CCA-R cluster | BCA-D cluster |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Indiv., Org. & System | | | |
| 66 | Abdullahi et al | 2018 | Business Strategy & the Environment | Quatitative | UptInt, Proc | Malaysia | For-profit | SME | Indiv. & Org. | Conformist | Blue | 7 |
| 67 | Ceptureanu et al | 2017 | Sustainability | Quantitative | UptExt, Proc | Romania | For-profit | SME | Individual | Conformist | Black | 7 |
| 68 | Fellnhofer | 2017 | Journal of Cleaner Production | Quantitative | UptInt, Outcome | Austria | For-profit | SME | Organizational | Conformist | Orange | 7 |
| 69 | Hernández-Perlines & Cisneros | 2018 | Sustainability | Quantitative | UptExt, Outcome | Spain | For-profit | n.a. | Organizational | Conformist | Red | 7 |
| 70 | Hernández-Perlines & Rung-Hoch | 2017 | Sustainability | Quantitative | Outcome | Spain | For-profit | SMEs | Indiv. & Org. | Conformist | Red | 7 |
| 71 | Muhammad Auwal et al | 2020 | JSBE | Quantitative | UptExt, Outcome | Malaysia | For-profit | SME | Org. & System | Conformist | Orange | 7 |
| 72 | Neumeyer & Santos | 2018 | Journal of Cleaner Production | Mixed methods | UptInt, UptExt, Proc | US | Mixed Sample | n.a. | Indiv. & Org. | Conformist | Green | 7 |
| 73 | Ahmad et al | 2020 | WREMSD | Quantitative | UptInt, UptExt, Outcome | Malaysia | For-profit | SME | System | Conformist | Orange | 8 |
| 74 | Atiq & Karatas-Ozkan | 2013 | Entrepreneurship and Innovation | Conceptual | Proc | n.a. | For-profit | Large | Organizational | Insurgent | Red | 8 |
| 75 | Bischoff | 2019 | Small Business Economics | Quantitative | UptExt, Proc, Outcome | Austria & Germany | n.a. | n.a. | Individual | Conformist | Green | 8 |
| 76 | Bischoff & Volkman | 2018 | IJEV | Literature review | TakStoc, UptExt | n.a. | n.a. | n.a. | System | n.a. | Green | 8 |
| 77 | Dickel | 2017 | Corporate Governance | Quantitative | UptInt, UptExt, Outcome | Germany | For-profit | Small SME | Organizational | Conformist | Red | 8 |
| 78 | Niemann et al | 2020 | Business Strategy & the Environment | Quantitative | Proc, Outcome | Germany & Denmark | For-profit | SME | Organizational | Conformist | Orange | 8 |
| 79 | Nikolaou et al | 2018 | The Journal of Entrepreneurship | Conceptual | TakStoc | n.a. | Mixed Sample | SME | Org. & System | Both | Red | 8 |
| 80 | Poldner et al | 2017 | Business & Society | Qualitative | Proc | France & Canada | n.a. | Small SME | Individual | Insurgent | Red | 8 |
| 81 | Andersén et al | 2020 | Business Strategy & the Environment | Quantitative | Proc, Outcome | Sweden | For-profit | Small SME | Organizational | Insurgent | Orange | 9 |
| 82 | DiVito & Bohnsack | 2017 | Journal of Business Venturing | Mixed methods | UptInt, Proc | Western Europe | Hybrid | Micro | Indiv. & Org. | Insurgent | Blue | 9 |
| 83 | Djupdal & Westhead | 2015 | ISBJ | Quantitative | UptExt, Outcome | Norway | For-profit | SME | Organizational | Conformist | Blue | 9 |
| 84 | Muñoz & Cohen | 2018b | Business Strategy & the Environment | Literature review | TakStoc | n.a. | n.a. | n.a. | n.a. | Insurgent | Black | 9 |
| 85 | Pankov et al | 2019 | Small Business Economics | Qualitative | TakStoc, UptExt, Proc | Germany | Hybrid | Micro | Individual | Both | Green | 9 |
| 86 | Thompson | 2018 | Sustainability | Qualitative | UptExt | Netherlands | For-profit | Various | System | Insurgent | Blue | 9 |
| 87 | Thompson & Eijkemans | 2018 | Sustainability | Qualitative | UptInt | Netherlands | Hybrid | SME | Individual | Insurgent | Green | 9 |
| 88 | Gray et al | 2014 | ERD | Qualitative | UptInt | Samoa | Other | Micro | Macro | Conformist | Green | 10 |
| 89 | Hockerts & Wüstenhagen | 2010 | Journal of Business Venturing | Conceptual | TakStoc, UptExt | n.a. | For-profit | Various | System | n.a. | Red | 10 |
| 90 | Manesh & Rialp-Criado | 2017 | Competitiveness Review | Qualitative | UptInt | Spain | For-profit | Various | Organizational | Conformist | Orange | 10 |

[a] **ERD**: Entrepreneurship & Regional Development: An International Journal; **IEMJ**: International Entrepreneurship and Management Journal; **IJEBR**: International Journal of Entrepreneurial Behavior & Research; **IJESB**: International Journal of Entrepreneurship and Small Business; **IJEV**: International Journal of Entrepreneurial Venturing; **JEC**: Journal of Enterprising Communities: People and Places in the Global Economy; **JSBE**: Journal of Small Business & Entrepreneurship; **JSBED**: Journal of Small Business and Enterprise Development; **TFSC**: Technological Forecasting & Social Change; **WJEMSD**: World Journal of Entrepreneurship, Management and Sustainable Development; **ISBJ**: International Small Business Journal.

[b] TakStock: Taking Stock; UpInt: Uptake internal factors; UpExt: Uptake external factors; Proc: Process.

## Appendix B. References for BCA-D sample


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