

Review

Mapping Social Impact: A Bibliometric Analysis

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Abstract: Social dimension is a fundamental element in the evaluation of initiatives and policies that are demanded and promoted by public and private organizations as well as society as a whole. Thus, there is a thriving interest in social impact research, especially from the point of view of its measurement and valuation. In this work, we explored the rising attention on the concept of social impact to identify salient agents in the field and categorize the conceptual structure of research. To achieve this, we used evaluative and relational techniques combining traditional bibliometric analysis using VOSviewer and a text mining analysis based on natural processing language (NLP) to search for documents with the term “social impact” in the title. The documents were extracted from the database Web of Science (WoS) for the period of 1938–2020. As a result, we mapped the concept of social impact from up to 1677 documents, providing an overview of the topics in which the concept was used (e.g., health, finance, environment and development, etc.) and the trends of research. This work seeks to serve as a roadmap that reflects not only the evolution of social impact but also future lines of research that require attention.

Keywords: social impact; bibliometrics; scientometrics; social impact assessment; bibliometric analysis; natural processing language; NLP; research; review

1. Introduction

The concept of social impact can be found in press, reports, and social networks, and it can be seen that the concept varies greatly depending on the field of research considered. To refrain from turning this concept into a buzzword, it is important to take some time along the way and reflect on the past and future of this increasingly meaningful concept of social impact.

Civil society is beginning to be aware of the importance of measuring social impact, and thus many initiatives, institutions, and programs have arisen in order to explore the social approach of a given policy, project, or investment. In academia, however, the concept of social impact is broader, and as we will see, it has evolved over the years. It is a multidisciplinary concept since it has been studied in various scientific areas such as finance, entrepreneurship, psychology, health, and sustainable development. Due to the interest aroused by its quantification, heterogeneous measurement techniques have also emerged. For this reason, it is necessary to map the territory, identifying not only subareas of interest in research but also the more commonly used connections and structures. In this context, a bibliometric analysis that allows for identifying the main researchers on the topic, the areas in which the study of social impact has been salient, the main keywords related to the concept, as well as other lexical and relational structures, will be essential for future researchers who wish to deepen this topic.

Bibliometric analysis in the field of social issues is not new, and several authors have contributed with studies on corporate social responsibility and corporate social performance [1], sustainability [2,3], or social entrepreneurship [4,5]. However, the few previous bibliometric analyses on social impact have

focused on specific areas of knowledge. Broccardo et al. (2020) [6] conducted a bibliometric analysis of social impact bonds in finance with 257 studies from 2010 to 2019, while Ramos Huarachi et al. (2020) [7] analyzed 190 articles on social life cycle assessment with the purpose of conducting a bibliometric analysis of social impact focusing on environmental issues. In addition, we can find the conference paper by Dhamija et al. (2019) [8] showing a bibliometric analysis of 10 studies in technology. Most previous works have limited their reviews to a few years or to a field of research, which helps in gaining in-depth knowledge but sacrifices a more extensive analysis of the term from its origins to the present.

On the other hand, during the last few years, new techniques to conduct a bibliometric analysis have emerged. Because of artificial intelligence and technological software, it is possible to comprehensively and extensively analyze a concept without limiting the study area. Traditionally, bibliometrics has relied on citation analysis to measure activity, knowledge domains, and journal impact [9] as it contributes “to assess the influence of different journals, to consider scientific impact, to obtain an overall view of the intellectual structure of a field or to suggest how a field might move forward” [1]. However, at present, the new information and communication technologies allow researchers to get maximum value from those analyses and even to collect hidden information, going beyond traditional variables, such as the research areas, years, countries, and languages, in order to yield the greatest research output or the most relevant research, journals, and authors [4]. In this regard, the use of different techniques of machine learning and text mining allows for showing the varied types of relationships among articles, network structures, and the most common keywords and language combinations, thereby allowing us to discover information that did not exist explicitly in any bibliographic database. Among them stands out the use of different natural language processing (NLP) methods, which covers “any kind of manipulation of natural language” [10] for tasks such as text retrieval, question answering, categorization and clustering, information extraction, summarization, classification, categorization, and indexing [11]. All this follows the same path as the increasing number of research studies in which NLP is encouraged to be used in bibliometrics, as in Yaghtin et al. (2019) [12], and it has even been used to predict scientific impact [9].

Considering the above, this work aims to map the concept of social impact in a broad and nonexclusive sense by identifying influential authors, salient relationships, and research trends. To do this, we conduct a bibliometric analysis combining evaluative and relational techniques in 1677 documents with the comma-delimited term of “social impact” in the title, obtained from the database Web of Science in the period of 1938–2020. Research findings from this contribution will help researchers, providing them a better understanding of the discipline of social impact and their processes of knowledge flow, and identifying influential articles and authors as well as research areas.

The present research is carried out in the structure that is detailed as follows. After explaining different techniques to conduct a bibliometric analysis, Section 2 introduces the concepts of social impact. Section 3 explains the techniques employed in the analysis. Section 4 shows the results obtained with the different metrics considered. Finally, Section 5 contains the discussion and conclusions of this study.

Bibliometric Analysis

The use of bibliometric analysis is very useful for researchers, as well as for journal editors and reviewers, as it converts qualitative information into quantitative information that allows conclusions to be drawn about the magnitude of studies that may exist on a specific line of research or topic. It provides a complete vision of the scientific areas that have received attention on a certain topic, the assumed paradigms, or currents of thought.

Bibliometric analysis can be conducted through a combination of techniques, each with its advantages and disadvantages [13]. Previous studies about bibliometrics have mentioned three categories of techniques: review techniques, evaluative techniques, and relational techniques [14] (see Table 1).

Table 1. Techniques for a bibliometric analysis. Source: Adapted from [14].

Types of Analysis	Techniques
Review techniques	Systematic literature review Meta-analysis Qualitative studies
Evaluative techniques	Measures of productivity Impact metrics Hybrid metrics
Relational techniques	Co-citation analysis Bibliographic coupling Co-authorship analysis Co-word analysis Word cloud Topic modelling

Zupic and Čater (2015) [15] stated that “traditional methods of review and evaluation of scientific literature are the meta-analysis and the structured literature review”. In addition, qualitative studies belong to this category. The objective of literature reviews is “to map and evaluate the body of literature to identify potential research gaps and highlight the boundaries of knowledge” [16]. Although the literature review can indeed provide an understanding of the context and the hypotheses studied in depth, its main disadvantage is that it is a time-consuming technique, and so the number of papers included in this type of analysis is very limited. Meta-analysis and qualitative studies are useful for delving into the studies and for classifying the results obtained among variables in the literature (positive, negative, or inconclusive). Both techniques have the same pitfall as the literature review. We believe that these techniques are appropriate for exploring a specific area of research, as this was previously limited by evaluative and relational techniques. Social impact is a transversal and multidisciplinary topic, so we have decided not to use review techniques in this article to map the concept of social impact.

Furthermore, considering the development of research databases (such as Scopus or Web of Science), information has now been homogenized and standardized (keywords, citations, authors, origin, etc.), which enhances data processing. Consequently, the possibilities to perform bibliometric analyses with evaluative and relational techniques that allow a greater number of studies to be covered have increased.

Evaluative techniques relate to activity indicators that address the representativeness of the concept analyzed and the development in the field [1]. They include measures of productivity (the number of papers published across time, the language, the journal, the most prominent authors, and the nature of research) [1], impact metrics (number and evolution of citations, citations per author or journal), and hybrid metrics, such as the H index or the Lotka’s law [17]. This type of performance metrics allows for the identification of networks among authors [16]. In the results of this paper, we use the metrics of the number of citations and the number of publications as an indicator of the influence of social impact studies and the evolution of interest aroused by this topic in journals, institutions, and countries.

When the purpose of the bibliometric analysis is to know whether there are connections among scholars, relational techniques are used. This article uses relational techniques to learn about the intellectual and social structures generated by the study of social impact. Relational techniques explore the relationship between units of analysis (journals, scholars, documents) [14] and include co-citation analysis, bibliographic coupling, co-authorship analysis, and co-word analysis.

- Co-citation analysis counts those items that appear in two studies, indicating the existence of similarity between them. There are different metrics that can be indicative of similarity between studies, such as the most widely used author co-citation analysis (ACA), i.e., when two studies cite the same author, and the document co-citation analysis (DCA), i.e., when two studies cite the

same document. ACA allows connections to be traced among researchers and fields [17], and DCA shows the relationship between documents that are usually cited together.

- Bibliographic coupling measures the similarities between papers based on their references. The greater the number of matching references between two papers, the greater the similarity and therefore the connection between them. The biggest advantage of this technique is that the references do not change over time, while the number of citations can vary, which could modify the influence measurement.
- Co-authorship analysis allows us to know the networks between researchers according to their collaboration to produce publications, as well as the relationship between institutions. The strongest relationship will be found between those authors that most frequently appear together in their research.
- Finally, the co-word analysis considers the words that appear most frequently in the analyzed studies. This technique allows us to know the lexicon used in each research area, which leads to the homogenization of the terminology. This comparison of words can be performed in the title, keywords, abstracts, or the full text. The main problem of this technique can appear in old publications when the information was not previously provided.

2. Conceptualizing Social Impact

Finding a definition of social impact is not easy, since the use that authors make of this term is often implicitly understood and, in most cases, it appears to form other terms such as social impact assessment, social impact bonds, social impact measurement, or social impact investment. The first definitions of social impact appear in the 1980s. From the individual point of view, Bibb Latané (1981) considers social impact as the effect of other people on the individual [18]. In 1987, Dietz proposed the first definition of social impact from an organizational point of view, as “a significant improvement or deterioration in people’s well-being or a significant change in an aspect of community concern” [19]. A few decades later, when the focus of the analysis was extended, Vanclay determined that social impacts are “impacts actually experienced by humans (at individual and higher aggregation levels) in either a corporeal (physical) or cognitive (perceptual) sense” [20]. It is not until years later that attention began to focus on organizations, and accordingly Epstein and Yuthas (2014) [21] defined social impacts as “the societal and environmental changes created by activities and investments”. These changes, as stated by Dietz (1987) [19], can be positive or negative or can be both intended or unintended [22]. One of the broadest definitions of social impact can be found in Hadad and Gauca (2014) [23] as “a function of strength (influence, power, [psychological effects] or intensity the target perceives that the source has), immediacy (how recent is the assessment correlated with the moment when the action took place) and number of people (the number of sources acting on the target)”. The reason behind the increased attention for social impact, as in no longer from an individual perspective but from the point of view of an organization (or a project, initiative, or event, by extension), may come from the conceptual debate about the idea of success, the purpose, and the generation of resources by organizations [21,24]. Therefore, from defining objectives based on outputs or results, organizations are moving to define their objectives based on outcomes, impacts, or values. Even so, the concept and treatment of social impact are still volatile [23], and so this paradigm shift makes it more necessary to identify the evolution of this concept in the academic literature and how it is being approached.

3. Materials and Methods

3.1. Data

We accessed the ISI Web of Knowledge in September 2020, searching for all the documents related to social impact published until that moment (15 September). We limited the search process to the documents that include the term “social impact” in the title and available in the Web of Science Core Collection Database. We used inverted commas around the search term to find the exact concept,

not the individual words. As we wanted to map the territory of social impact regardless of the field of approach, we did not perform any additional filter. With these search criteria, a sample of 1677 documents was extracted from the database for us to examine in depth the research on social impact. In this way, all the bibliographic metadata associated with those documents included in the analysis were exported into an Excel file, including the full record (authors, title, source, abstract, etc.) and the cited references.

It should be noted that we carried out a number of analyses on all documents, and these analyses are detailed in the subsection to follow; however, there are some missing values (in keywords, affiliation, country, abstract, etc.) that could not be included in the analysis. For example, as will be specified in the results, some of the oldest articles do not have an abstract, so they cannot be analyzed.

3.2. Data Analysis Techniques

New data analysis and artificial intelligence techniques have considerably enhanced all the bibliometric techniques in recent years. This can be explained mainly due to the substantial increase in the speed and capacity when analyzing large numbers of complex and detailed scientific publications. Thus, as additions to the original area of the study of bibliometrics, new quantitative approaches have emerged such as informetrics, webometrics, or altmetrics [25].

In this regard, the present work used the following methodologies and tools with the aim not only to describe the composition of the analyzed sample but also to map the evolution and intellectual structure of the selected topic.

Firstly, we used Python to efficiently carry out the evaluative and descriptive analysis. This allows us to automatically collect, record, and perform the aforementioned analyses for as many documents as are needed to assess the representativeness and development of the selected concept. In addition, we also used it to start the relational analysis, applying text mining techniques that, in conjunction with other machine learning methods, make it possible to discover the core topics and organize the document corpus into a meaningful cluster hierarchy (topic modelling).

Text mining techniques stand out for their capacity to transform unstructured texts into normalized and structured data, which allow researchers to collect new information that did not exist explicitly in any bibliographic database. In these new approaches, natural language processing (NLP) is gaining special relevance based on its ability to incorporate the qualitative approach to the quantitative approach. Natural language processing is “a theory-motivated range of computational techniques for the automatic analysis and representation of human language” [26], and it has provided “new tools and techniques to explore research problems in bibliometrics” [27]. In this way, it is possible to obtain word clouds on common words, adapt keywords based on the number of words, obtain more repeated pairs of words, or use different unsupervised learning approaches to cluster documents by its topic.

Regarding topic modelling tasks, we tested two approaches, namely LDA (latent Dirichlet analysis) and NMF (nonnegative matrix factorization). In this case, NMF was chosen since it performed better, in line with some previous studies [28], leading to simpler and more consistent and interpretable clusters. NMF has already been proven to be a successful method for modeling the generation of directly observable visible variables from hidden variables and, especially, for the semantic analysis of text documents [29]. In this way, it captures the base topics of a set of documents and assigns each document to the topic with which it has the largest projection value [30], furthermore showing the words that better represent each topic.

Lastly, the rest of the bibliometric analysis based on relational techniques was carried out using the VOSviewer software 1.6.15 [31]. This software was developed at the Centre for Science and Technology Studies (Leiden University, Leiden, the Netherlands) to facilitate the main tasks of bibliometric mapping. In the present work, we used it to develop different co-citation analyses, bibliographic coupling, co-authorship analyses, and co-word analyses.

4. Results

The results of the bibliometric analysis are presented according to four different sections: (1) broad trends in social impact literature; (2) analysis of influential journals, authors, and publications; (3) intellectual and social structure; and (4) clusters and topics on social impact. The first two correspond to evaluative techniques, while the latter two correspond to relational techniques.

4.1. Broad Trends in Social Impact Literature

Web of Science database goes back beyond the 1950s, and the first papers included in the dataset refer to social impact related to health (“On the Social Impact of Assessment of Skull and Brain Injury” [32] and “The social impact of alcoholism” [33]). Although the database recognizes some papers related to social impact since the 1940s, it is not until the 1980s that social impact research began to be conducted, increasing in the 2000s (Figure 1). Since 2005, publications related to social impact have potentially increased from 22 publications in 2005 to 135 publications in 2019 (117 publications until September 2020). Regarding the document type (Figure 2), 50.33% of the research is released in research articles, contributing to 79.31% of citations. Conference papers and reviews follow with 19.26% and 15.62% of publications and 3.01% and 3.92% of citations, respectively. Book chapters account for 7.16% of publications and 6.01% of citations.

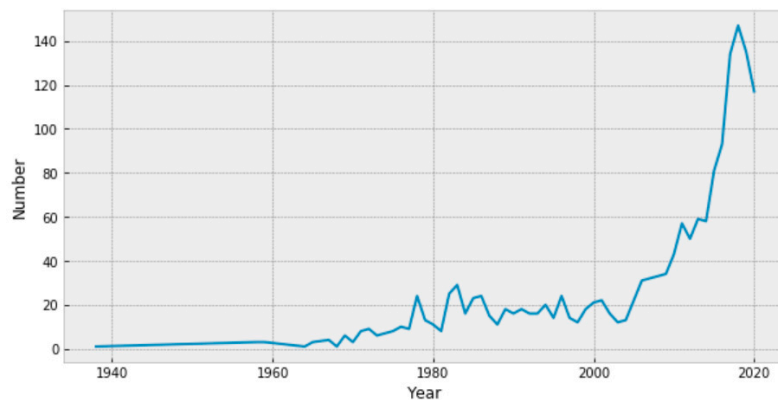


Figure 1. Evolution of publications on social impact literature.

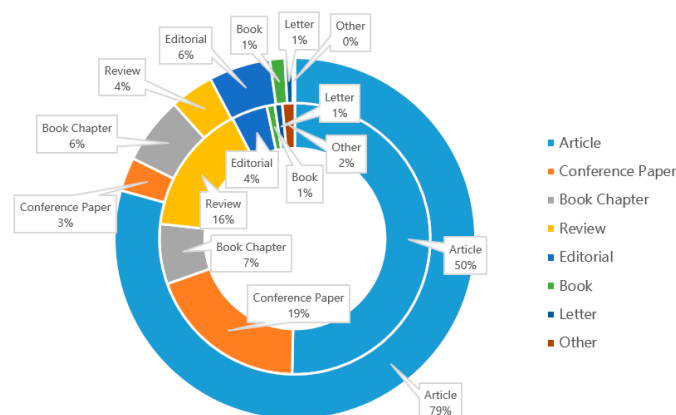


Figure 2. Distribution of publications on social impact (inner circle) and citations (outer circle) by document type.

Citations flow is irregular along the period considered, with an average of fewer than 120 citations from 1938 to 1981, which increased to an average of more than 500 citations per year in the last decade (Figure 3). It is necessary to highlight the number of citations of an article released in 1981 by Bibb Latané on “The Psychology of Social impact” [18].

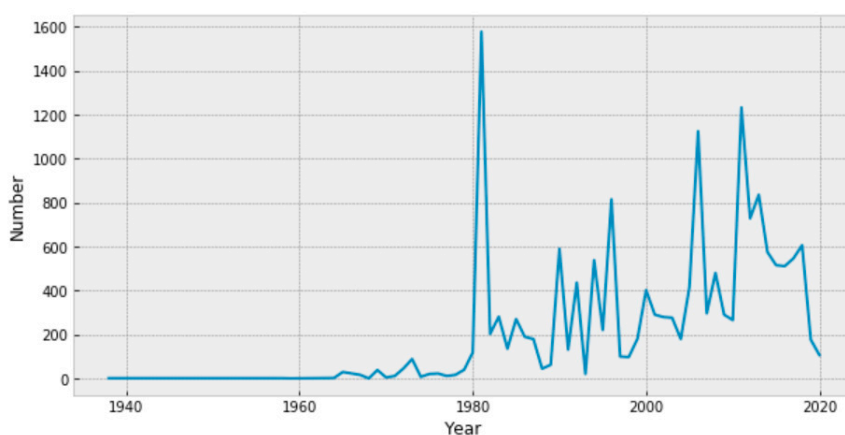


Figure 3. Number of citations of publications on social impact by year of publication.

Regarding the language, 91.65% of publications are written in English, followed by Spanish (75 publications), French (22 publications), and German (19 publications). Most papers were written by authors from the United States, followed by authors from England, Australia, Spain, Italy, and Canada (see Table 2). These are, precisely, the countries of the affiliations with a higher number of publications (University of California, University of London, University of Groningen, University of Barcelona) (Table 3).

Table 2. Number of publications by country of the participating authors.

Country	Number of Publications
United States	482
England	171
Australia	130
Spain	91
Italy	70
Canada	68
Netherlands	51
Germany	50
China	44
France	38

Table 3. Geographic distribution of papers published on social impact (>10 papers).

Affiliation	Number of Publications
University of California	29
University of London	28
University of Groningen	25
University of Barcelona	21
State University of Florida	17
Harvard University	16
University of Manchester	16
University of Wisconsin	15
Florida Atlantic University	13
University of Oxford	13

Publications on social impact are categorized primarily in environmental studies and environmental sciences (222 publications), followed by business (136 publications), social sciences (113 publications), economics (104 publications), and management (91 publications) (Figure 4).

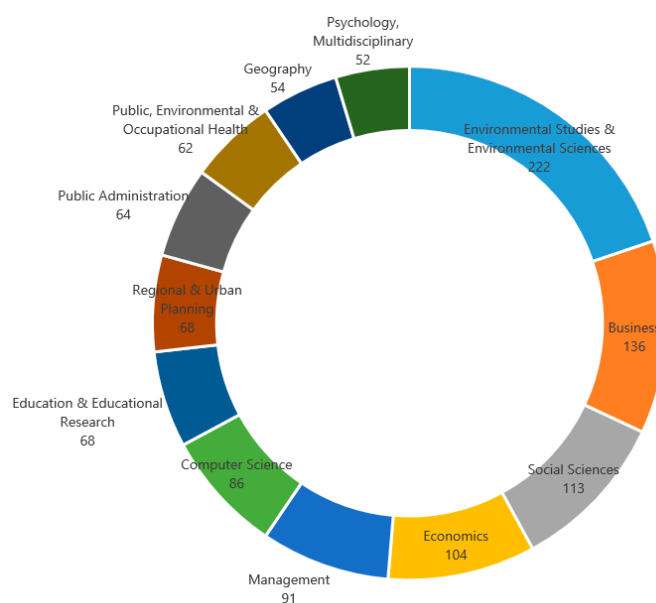


Figure 4. Number of papers published on social impact by research area. (Note: Only those research areas with more than 50 papers are shown.)

4.2. Analysis of Influential Journals, Authors, and Publications

This section includes the most influential journals and publications in the social impact literature. The *Environmental Impact Assessment Review* and *Impact Assessment And Project Appraisal* are the two journals with the highest number of publications, followed by *Sustainability* and *Public Money & Management* (Table 4). However, the number of citations per publication is very low. This means that the field of social impact assessment has recently emerged, and thus those articles have not received many citations yet. On the contrary, social impact in the field of psychology reflects a higher significance, with a much higher relative number of citations in one or two publications (Table 5). When developing journal, author, or publication rankings, it should be noted that some metrics, such as the number of citations, are highly influenced by the publication year and the field of research, so they necessitate consideration and, sometimes, normalization [34]. Since the present study is focused on identifying influential authors and journal and research trends over time, we estimated a normalized citation score (NCS) by dividing the citations of each paper by the average citations of the year in which it was published. In this way, the research quality of different publications can be properly compared across time.

Professor Frank Vanclay, from the University of Groningen, and the social psychologist Bibb Latané stand out in their contribution to social impact research—the first author due to the number of articles (21) with an average number of citations of 35.57, and the second for the high impact of his seminal work, with an average of 178.20 citations per article (Table 6).

Based on previous studies [35], a higher number of authors might be related to lower initial reject in editorial processes and higher positive editorial decisions. In this sense, there has been collaboration of two or more authors in 58.07% of the documents about social impact, representing 89.89% of total citations. This percentage of publications with collaboration among two or more authors has increased in the last twenty years, a trend that other authors have already pointed out [36] (Figure 5), and only three out of the ten most cited articles in the social impact literature has been written by one author (Table 7).

Table 4. Rank order of the most influential journals by number of publications.

Journal	P	C	CPD	NCS
<i>Environmental Impact Assessment Review</i>	30	780	26.00	83.61
<i>Impact Assessment And Project Appraisal Sustainability</i>	25	404	16.16	45.34
<i>Public Money & Management</i>	22	48	2.18	23.27
<i>Assessing the Social Impact of Development Projects</i>	15	24	1.60	19.75
<i>Frontiers in Psychology</i>	12	9	0.75	1.63
<i>Journal of Social Entrepreneurship</i>	9	4	0.44	4.85
<i>Technological Forecasting and Social Change</i>	8	23	2.87	5.63
<i>Social Science & Medicine</i>	8	121	15.12	19.12
<i>Rural Sociology</i>	8	228	28.50	17.27
	8	55	6.87	2.01

Note: P = Number of publications, C = Number of citations; CPD = Citations per document; NCS = Normalized citation score.

Table 5. Rank order of the most influential journals by number of times cited.

Journal	P	C	CPD	NCS
<i>American Psychologist</i>	2	1333	666.50	8.72
<i>Environmental Impact Assessment Review</i>	30	780	26.00	83.61
<i>Psychological Review</i>	2	728	364.00	14.31
<i>Annual Review of Anthropologie</i>	1	709	709.00	19.53
<i>Journal of Medical Internet Research</i>	2	499	249.50	23.06
<i>Impact Assessment and Project Appraisal</i>	25	404	16.16	45.34
<i>American Journal of Public Health</i>	6	303	50.50	21.22
<i>Journal of Communication</i>	7	271	38.71	7.98
<i>Social Science & Medicine</i>	8	228	28.50	17.27
<i>Disability and Rehabilitation</i>	1	198	198.00	10.34

Note: P = Number of publications, C = Number of citations; CPD = Citations per document; NCS = Normalized citation score.

Table 6. Most highly cited authors writing on social impact.

Author	University Affiliation	Country	P	C	CPD	NCS
Latane, B.	Florida Atlantic University	USA	15	2673	178.20	47.30
Nowak, A.	University of Warsaw	Poland	3	759	253.00	27.49
Igoe, J.	University of Colorado	USA	1	709	709.00	19.53
Brockington, D.	University of Colorado	USA	1	709	709.00	19.53
West, P.	University of Colorado	USA	1	709	709.00	19.53
Vanclay, F.	University of Groningen	Netherlands	21	684	32.57	62.77
Eysenbach, G.	University of Toronto	Canada	2	499	249.50	23.06
Szamrej, J.	University of Warsaw	Poland	1	482	482.00	13.07
Esteves, A.M.	Community Insights Group	Singapore	4	363	90.75	26.57
Spencer, A.J.	University of Adelaide	Australia	5	325	65.00	11.73

Note: P = Number of publications, C = Number of citations; CPD = Citations per document; NCS = Normalized citation score.

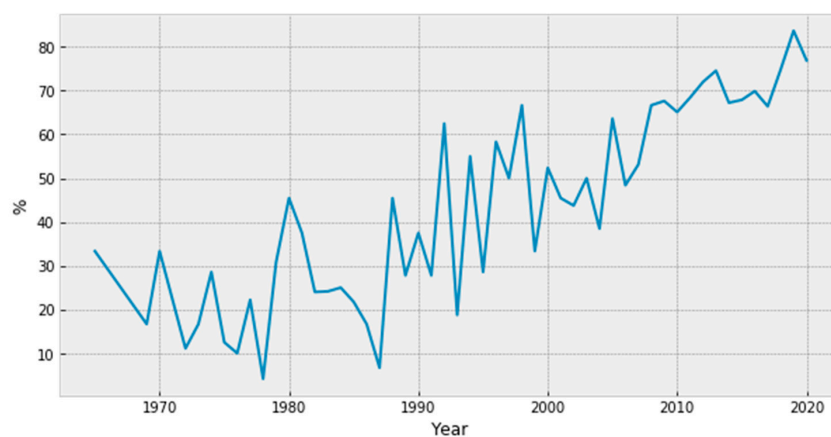
**Figure 5.** Percentage of publications with collaboration of two or more authors.

Table 7. Ten most cited articles in the social impact literature.

Rank	Author(s)	Title	Journal	Year	Citations
1	Latane, B.	The Psychology of Social Impact	<i>American Psychologist</i>	1981	1313
2	West, P., Igoe, J., Brockington, D.	Parks and Peoples: The Social Impact of Protected Areas	<i>Annual Review of Anthropologie</i>	2006	709
3	Eysenbach, G.	Can Tweets Predict Citations? Metrics of Social Impact Based on Twitter and Correlation with Traditional Metrics of Scientific Impact	<i>Journal of Medical Internet Research</i>	2011	499
4	Nowak, A., Szamrej, J., Latane, B.	From Private Attitude to Public Opinion: A Dynamic Theory of Social Impact	<i>Psychological Review</i>	1990	482
5	Esteves, A., Franks, D., Vanclay, F.	Social impact assessment: the state of the art	<i>Impact Assessment and Project Appraisal</i>	2012	248
6	Latane, B., Wolf, S.	The Social Impact of Majorities and Minorities	<i>Psychological Review</i>	1981	246
7	Gift, H.C., Reisine, S.T., Larach, D.C.	The Social Impact of Dental Problems and Visits	<i>American Journal of Public Health</i>	1992	198
8	Hakim, E.A., Bakheit, A., Bryant, T., Roberts, M.	The social impact of multiple sclerosis—a study of 305 patients and their relatives	<i>Disability and Rehabilitation</i>	2000	198
9	Newcomb, A., Bukowski, W.	Social Impact and Social Preference as Determinants of Children's Peer Group Status	<i>Developmental Psychology</i>	1983	196
10	Latane, B.	Dynamic Social Impact: The Creation of Culture by Communication	<i>Journal of Communication</i>	1996	173

4.3. Intellectual and Social Structure

This section shows the results provided by relational techniques. In order to map similarities in the literature, we applied the author co-citation analysis (ACA) approach. Figure 6 shows the 68 most highly co-cited authors (with a threshold of minimum 20 citations) in the co-citation network. Each node represents one author, and the size of the node represents the times cited. VOSviewer identified four groups, and from this network, Bibb Latané, Frank Vanclay, Alex Nicholls, and the World Bank institution stand out.

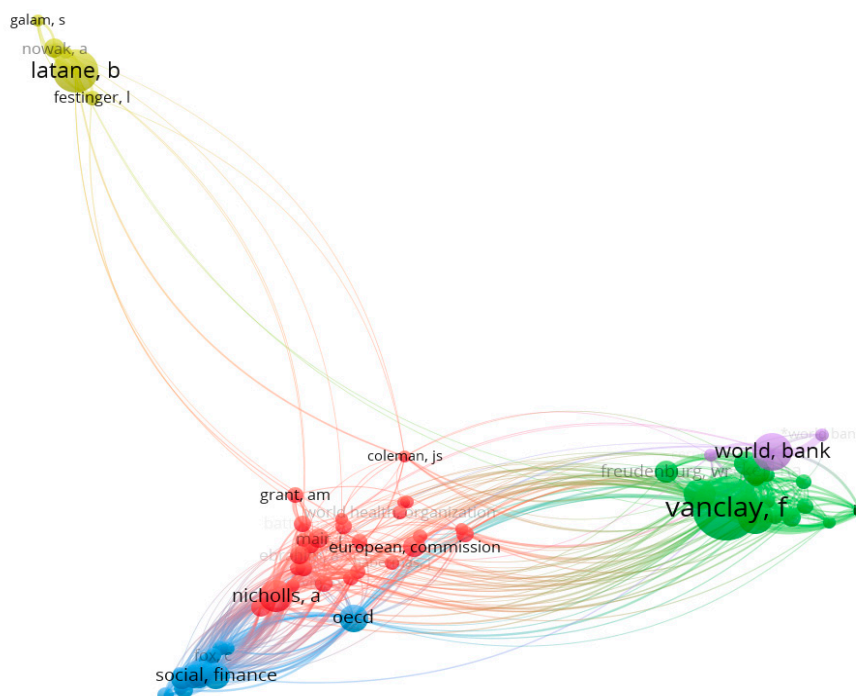


Figure 6. Author co-citation analysis of the social impact literature (threshold 20 citations, displaying 68 authors).

The document co-citation analysis (DCA) endorses previous results and also shows different groups (Figure 7). First, documents in dark blue represent social impact in the field of finance; documents in green represent social impact in the field of business and entrepreneurship; documents

in yellow represent social impact from a psychological perspective, together with documents related to the impact of tourism and events that can be found in the light blue documents; and finally, documents in red and purple are related to social impact approached from an environmental perspective.

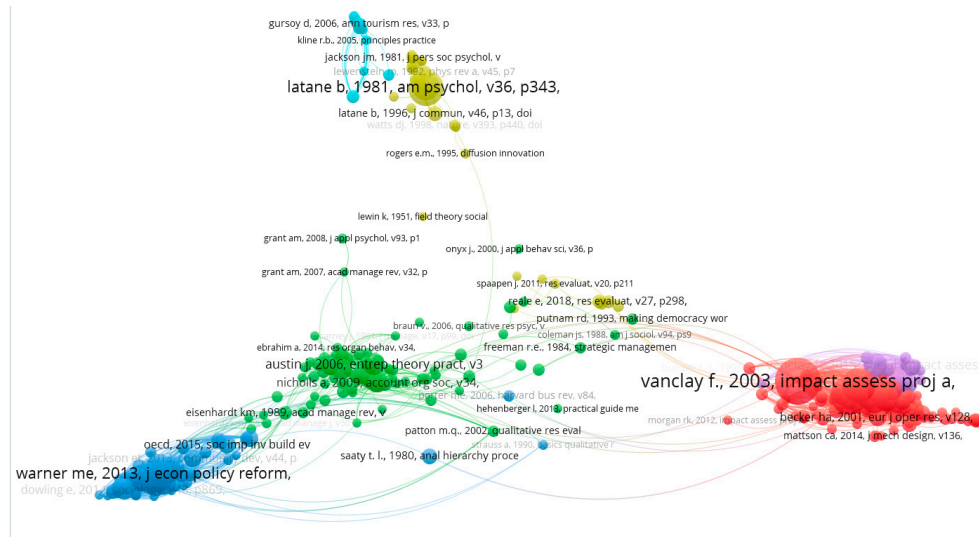


Figure 7. Documents co-citation analysis of the social impact literature (threshold 5 citations, displaying 344 documents).

Following the pattern observed in the ACA and DCA, the lack of relationship between groups is more clearly observed in the co-authorship analysis so that it is the authors dedicated to one specific topic who collaborate with each other. Figure 8 represents the co-authorship map obtained, where separated and unrelated groups can be seen.

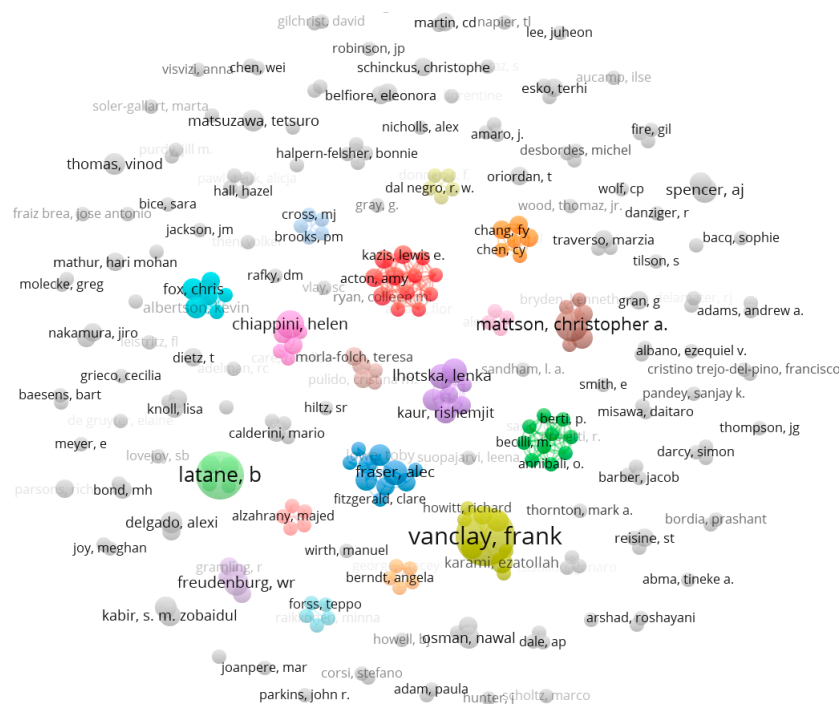


Figure 8. Author co-authorship analysis of the social impact literature (minimum number of citations: 0; minimum number of documents: 2; displaying 272 authors).

4.4. Clusters and Topics on Social Impact

The analysis of the evolution of the keywords used in recent decades provides interesting insight. In the 1990s, an interest in environmental impact and sustainability began to be observed with the appearance of concepts such as social impact assessment (SIA), which came to stay in the 2000s together with the idea of an environmental impact assessment (EIA). In the last decade, research on social impact assessment has matured, and its study in other fields such as finance has emerged (with social impact bonds and impact investing). It is in this decade that interest in social impact was also observed in the field of social entrepreneurship and social enterprises (Table 8).

Table 8. Evolution of keywords by decade.

Decade 1991–2000	Decade 2001–2010	Decade 2011–2020
Social impact (5)	Social impact assessment (16)	Social impact (118)
Social impact assessment (5)	Social impact (12)	Social impact assessment (53)
Oral health (3)	Quality of life (4)	Social impact bonds (26)
Public policy issues (2)	Environmental impact Assessment (3)	Social entrepreneurship (17)
Resource development (2)	Stigma (3)	Evaluation (16)
Planning (2)	Sustainability (3)	Social enterprise (15)
Computer and information science	Digital divide (2)	Impact (13)
Education (2)	Poverty (2)	Impact investing (12)
Psychology (2)	Computer mediated Communication (2)	Corporate social Responsibility (12)
Social issues (2)	Prevalence (2)	Social (10)
HIV/AIDS (2)		

The most prevalent words in the titles and the keywords of the papers in the sample are contained in Figure 9a,b. As expected, the term “social impact” is the most common, followed by “impact assessment” and “social impact bonds” in both cases, which demonstrates the emergence of research related to quantification and valuation.



Figure 9. Word cloud of most words used in the titles (a) and the keywords (b) in papers published on social impact.

For the keyword co-occurrence analysis or co-word analysis, we used both the co-occurrence map provided by VOSviewer (Figure 10) and the nonnegative matrix factorization (NMF) to capture the base topics of the analyzed documents (Table 9). Analogous results can be drawn from both analysis; from these, we found three main topics, which we have named “health” (red), “finance” (green), and “environment and development” (blue). However, NMF detected a fourth cluster, which we decided to call “miscellaneous”, whose keywords do not allow to be established as an independent group in VOSviewer but in which independent lines of research can be identified (behavior and psychology, tourism and events, research, and social entrepreneurship).

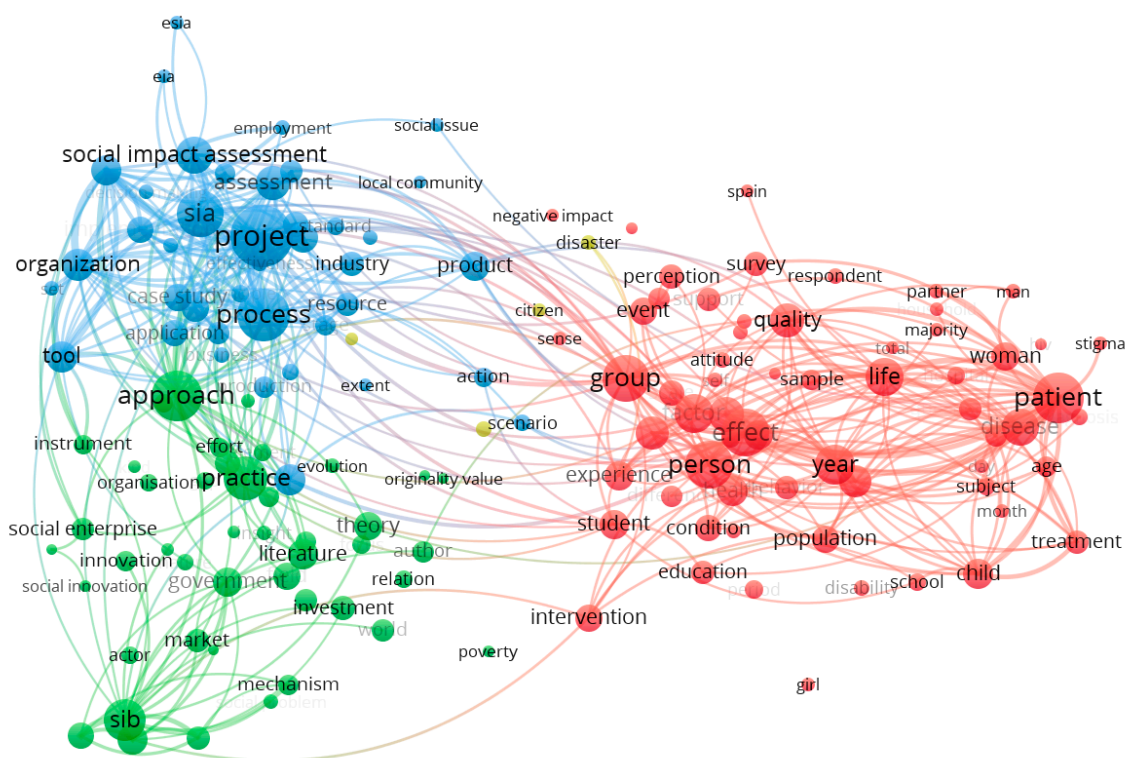


Figure 10. Co-words used in papers published on social impact (abstract) (minimum number of occurrences of a term: 20, only the 60% the most relevant are shown).

Table 9. Co-words obtained in each cluster by NMF.

Clusters	Co-Words
Health	patient, disease, health, cost, life, child, treatment, study, family, care, quality, woman, year, age, group, population, effect, burden, participant, conclusion
Finance	SIB, bond, investor, service, policy, government, outcome, contract, welfare, funding, investment, market, risk, innovation, return, mechanism, paper, sector, financing, partnership
Environment and Development	project, assessment, impact, development, community, process, method, decision, case, stakeholder, management, policy, planning, evaluation, paper, mining, approach, study, practice, energy
Miscellaneous	research, impact, model, datum, study, paper, article, analysis, enterprise, approach, community, technology, product, knowledge, result, science, society, information, student, medium

Health. Social impact publications related to health include those published in specialized journals such as *Disability and Rehabilitation* and *American Journal of Public Health*, and they are mainly concentrated in the decade of the 1990s. In this cluster, social impact was mainly understood as the symptoms, effects, or consequences produced by a certain disease or condition but was approached as “limitations in social functioning or patterns of social discrimination” [37]. The aim of contributions in this cluster was the understanding of nonclinical dimensions (i.e., quality of life, well-being, assistance, comfort/discomfort, relocation for treatments, interpersonal relationships, social plans, work-related activities ...), and “not only the ‘burden of illness’ of individuals of groups” [38]. Thus, it was observed that there was “a shift of interest from clinical aspects of disease to the social impact of disease on daily life” [39]. In this cluster, methodologies to assess social impact include surveys and questionnaires [40,41], adapting the measurements to the type of condition considered (i.e., the Social Impact Scale (SIS) measuring perceived stigmatization). In this cluster, it is common to find the psychological impact added to the social impact, as we found in many documents the psychosocial impact of a certain condition or disease [41–44]. In some cases, social impact was combined with the analysis of economic impact in terms of burdens for the family [45], loss in productivity [46], or lost earnings [47], using methodologies such as the cost benefit analysis.

Finance. This cluster is related to sustainable finance and investment. The main line of research responds to social demands on investment, and thus concepts such as social impact bonds (SIBs) and social impact investing emerged, with most of them from the past ten years. Social impact bonds are “funding mechanisms which invest in social outcomes” [48], being forms of payment that attract private investment to social programs and whose rate of return depends on whether targets are met [49,50]. SIBs arose due to insufficient public funding for social programs [51]. In this cluster, measuring impact and putting a value on the outcomes are essentials to judge the worthiness of the investment. As a variant of venture philanthropy, social impact investment (SII) “operates with the belief that doing well by doing good or, more literally, ‘doing good by doing good business’ is the best approach to solving entrenched social problems” [52]. This recent line of research responds to the changes shown by investors in their investment behavior [53]. For this reason, interest in measuring social impact and social outcomes from the point of view of the organizations began to develop [54,55].

Environment and development. This cluster includes those topics related to the environment and sustainable development, and the flagship journals are *Impact Assessment and Project Appraisal* and *Environmental Impact Assessment Review*. Environment and development are intertwined in documents related to public policies, public participation, community engagement, and governmental decisions. In terms of measurement methodologies, an environmental impact assessment (EIA) represents the preliminary step for the social impact assessment (SIA) methodology, and an integrative approach is observed in many documents [56–58]. Frank Vanclay is the greatest exponent of the social impact assessment (SIA), which is defined as “the process of identifying the future consequences of a current or proposed action which are related to individuals, organizations and social macro-systems” [59]. It is also a broad cluster that examines the effects of natural disasters and natural resource policies [60,61], the analysis of coastal areas and communities [62,63], the integration of agriculture and food systems [64], and the impact of infrastructures [65,66], among others.

Miscellanea. This cluster has to be understood in a very broad sense, as the lines of research could well constitute lines of research of the aforementioned clusters. While there are fewer high-influential articles (in terms of times cited) in the clusters of health, finance, and environment and development, less influence was observed in this miscellanea cluster, but in a greater number of articles. While the salience of certain keywords in the previous clusters was more evident, in this case, several lines of research were identified. Most of them have in common the analysis of the effect that a certain condition or project has on the environment, especially from the perspective of receivers. This condition can be related to technology [67–71], infrastructures [72], or education [73,74].

- **Behavior and psychology.** Bibb Latané considers social impact as “any influence on individual feeling, thoughts, or behavior that is exerted by the real, implied, or imagined presence or actions of others” [18], with the impact being a “multiplicative function of the strength, immediacy, and number of people affecting the individual” [75]. This theory has evolved in the dynamic social impact theory [76], where the influence of individuals on the environment began to be taken into consideration, and thus social impact came to be viewed as “an individual effecting others and getting affected by others” [77]. This theory has served to explain psychological interventions and behavior but also as an optimizer to simulations [77,78].
- **Tourism and events.** Research in this cluster began in the 1980s by analyzing the social impact of tourism from a broad perspective, i.e., resident attitudes or perceptions, quality of life, and destination characteristics [79]. In the last few years, there is a trend in which the social impact of tourism is analyzed from a more specific approach, namely through the influence that certain sport events or cultural events have in the area in which they are held. In this sense, there are studies on events in general [80–82] and specific events such as the Tour de France [83], the Olympics [84], or community/music festivals [85]. A recurring concept in this cluster is the perceived social impact, which is the “perception of intangible benefits accruing to residents of the host community, such as increases in their local price, enthusiasm for the community, and sense of community” [86]. To assess the impact of tourism and events, several methodologies have been used, such as ad hoc

questionnaires, the model of social exchange process [84], and the Social Impact Perception (SIP) Scale [82].

- **Research.** The social impact of research ceases to be a mere cluster of social impact research and even stands as an ethical issue in itself, as it entails numerous economic and social implications. In this sense, the inherent value of research is included in this cluster, along with research funding policies and the gap between the quality of research (that can be highly cited in high impact journals) and how long it takes to affect, if so, society [87]. Bornmann revised several concepts that emerged to define the “societal impact of research”, which are “third-stream activities, societal benefits or societal quality, usefulness, public values, knowledge transfer and societal relevance” [87]. Smith (2001) [88] provided several indicators that might be used to assess the social impact of research, related to content analysis (i.e., professional publications), software (i.e., citation analysis), products, funding of research, publicity, memberships, and teaching.
- **Social entrepreneurship.** This line of research is the one that is lately receiving the most attention concerning social impact, with social impact measurement being one of its key concepts. This increased attention is explained due to the interest that exists to quantify the impact that companies categorized as social organizations have. In this sense, some authors considered the convenience and value of measuring social impact [55,89], the different measures of social impact [90], and the future directions for social entrepreneurship research [91]. In addition, we found documents that attempted to measure social impact and value creation in specific entrepreneurial ecosystems [92], work integration social enterprises [93], and social enterprises in a broader sense [94–97].

5. Discussion and Conclusions

This paper aimed to map the territory of the concept of social impact by defining its research fields and detecting trends. To do this, we conducted a bibliometric analysis using both the VOSviewer software and Python by applying evaluative and relational techniques. We analyzed 1677 documents from the Web of Science Core Collection Database.

Evaluative techniques show a positive trend in the number of documents related to social impact with a much greater increase in the last twenty years, mainly due to the rise in the assessment of environmental and social impacts (EIA and SIA). In any case, it is a relatively young research line that, given its transversal nature, does not have specific journals (in the way as environmental impact or sustainability may have on the *Environmental Impact Assessment Review* and *Sustainability*, respectively) and with relative power of influence in terms of citations. Bibliometric analysis of multidisciplinary concepts such as social impact allows for clarifying and delimiting terms, promoting and enhancing research.

Despite the existence of a few papers in the 1940s, 1950s, and 1960s, it was not until the 1980s that interest in social impact began to take off. In this sense, one of the novel points of this contribution is the evolution of the concept of social impact over the decades, which reflects how the focus has changed. The focus in the 1980s and 1990s was on the individual and their interpersonal relations, with Bibb Latané and his theory of social impact being the most notable representative. Later, the focus on the individual is extended to any occurrence or organization that may have an impact on their closest environment. Thus, it was observed that there was an environmental focus in the 2000s with Frank Vanclay as the highest representative, this being also the precursor of social impact assessment. Finally, a business approach has been observed in recent years. This latter approach arose as a result of the interest in the social economy and the need to quantify the impact that a company has on its environment, driven by trends such as a social impact investment, where investors necessarily require this type of information. For this reason, it is mandatory to continue working on the realization of social impact, something that authors such as Rawhouser et al. (2019) [91] have also noted. In fact, there are not few documents that have the claim of social impact in the title but then, it is succinctly addressed, when not absent. Therefore, a future line of research that requires attention concerns making progress

in common frameworks and measurement methodologies that make it possible to diminish ambiguity and reduce the distrust of stakeholders.

Relational techniques have made it possible to know the intellectual and social structure of social impact. More than 80% of the documents analyzed were written by at least two authors; however, this collaboration is limited to the borders of the topic clusters, something that has been corroborated in the co-authorship analysis. The use of text mining techniques allowed us to perform sophisticated analyses to obtain different clusters. The identification of topics was not easy, since common keywords in papers of different topics made it difficult to categorize them in a single cluster. Thus, despite the multidisciplinary nature of social impact, we identified three very clear clusters (i.e., health, finance, and environment and development), which are also reflected in the keyword co-occurrence analysis, and a broader cluster that we called miscellaneous, which includes many other topics (e.g., psychology, tourism, research, entrepreneurship). The approach of social impact observed in the health cluster, focusing on nonclinical dimensions outside the individual, is repeated in the rest of the clusters, having in common the focus on the effect, on the result, and on the influence that a certain condition (project, event, research, organization, etc.) has on the outside. Thus, relational techniques show progress in the development of social impact but from an intracenter point of view rather than between clusters. Therefore, articles like this help to generate and share knowledge in detecting similarities, and commonalities. Beyond common approaches and their evolution, future attention will have to focus on detecting such similarities (for example, action procedures in each field or analogies in the use of in quantification methodologies).

There will be those who miss the depth in the analysis of associated concepts of social impact. The analyses carried out in this paper to map social impact have a limitation, and that is, that they do not delve into the debates that undoubtedly exist on supplementary concepts such as social impact assessment or social impact measurement [98]. Trends on the salience of these and other concepts have been detected, so future research involves deepening in on literature, having narrowed down the field and the concept, by conducting a meta-analysis or a systematic literature qualitative review.

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