



Bibliometric maps and co-word analysis of the literature on international cooperation on migration

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Abstract

This paper uses bibliometrics to analyze the articles published in scholarly journals, indexed in Science Citation Index through Web of Science, issued on the topic of international cooperation on migration. The analysis of the 178 identified articles followed a framework that embodies a four-stage process (*Search, Appraisal, Synthesis, and Analysis*). The findings indicate that the annual publications in this research field have increased rapidly since 2000. The articles came from 48 different countries and the most productive researchers were from the USA, the UK, and Germany. The co-authorship network is composed of 233 authors organized into 68 clusters. Finally, the co-word analysis indicated that the most frequent keywords are, in descending order of appearance: ‘European Union’; ‘foreign policy’; ‘migrant’; ‘refugee’; ‘health’; ‘diplomacy’; ‘control’; ‘movement’; ‘conflict’; ‘power’; ‘relationship’; and ‘immigrant’.

Keywords International cooperation on migration · Bibliometric analysis · Citation analysis · Co-word analysis · Network maps

1 Introduction

For a very long time, cooperation between countries was limited to economic cooperation and some other ‘non-sensitive areas’ where the costs of defection are manageable such as science and technology, environment, social development, control of drugs and narcotics, and civil services (Collins 2013). Conspicuously absent from this list was international cooperation on migration (Paoletti 2011). Thus, immigration restrictions are ubiquitous in a large majority of countries, notably in the developed ones. More often than not, national governments of destination countries have handled issues arising from international migration in a unilateral way. Indeed, migration policies and border control have always been a task that falls primarily on national governments and are directly associated with the sovereignty of the state. This explains the sensitivity of the subject and, consequently, the lack

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of multilateral cooperation for the management of international human mobility (Citrin and Sides 2008; Sykes 2013).

However, more and more, international migration is recognized as an important political issue, with implications for policy and international relations (Horvath et al. 2017). The irreversible changes that have taken place in the international migration system in terms of trends, immigrant characteristics, and the complexity of the issues arising from international migration, have resulted in an intensification of cooperation initiatives to control and regulate it (Duncan 2012; Kunzy and Maisenbacherz 2013).

The control and management of international migration have thus become a fundamental political issue affecting interstate relations and of high concern to most governmental and non-governmental actors, as well as researchers in international relations in general, and cooperation on migration in particular. For these researchers, the unprecedented evolution of international migration and its related issues provide them with a great opportunity to advance knowledge, enlighten policy-makers about challenges related to this new reality, and help them identify potential solutions to deal with these challenges more effectively (Adamson 2006; Koslowski 2009; Graeme 2010; Ip 2019).

1.1 Bibliometric analyses of migration issues

Even though we did not identify in the literature any study that used bibliometric analysis to investigate research contributions related specifically to international cooperation on migration (ICM), there are several prior studies that have resorted to bibliometric to appraise a plethora of migration issues and challenges. As an overview of these contributions, we can mention the study of Moed and Halevi (2014) that used a bibliometric approach to explore and track international scientific migration based on the affiliation countries of authors publishing in peer-reviewed journals indexed in Scopus. The results of their study confirm the conclusion drawn in prior studies that author affiliation data is a valuable proxy of international scientific migration. Likewise, Sweileh (2017) used bibliometric analysis to shed light on the quantity and impact of medicine-related publications on refugees, asylum seekers and internally displaced people. The results of this study showed that research publications on refugees, asylum seekers and internally displaced people have been increasing dramatically and articles are being published in high-impact scholarly journals, not only in general medicine and public health, but also in mental health and psychology journals. As for Gonzalez et al. (2020), they used bibliometric analyses to examine whether the nexus between organ trafficking and migration has been sufficiently addressed by the academic literature. The results of their investigation indicate that research exploring this link is relatively scarce. Moreover, most empirical studies on organ trafficking and migration lack representation within the social sciences and humanities. For their part, Sweileh et al. (2018) resorted to bibliometric to analyse global migration health in peer-reviewed literature. Their study showed that despite the ever-growing prominence of human mobility throughout the world, research output on migrants' health is not consistent with the global migration pattern. Maretti et al. (2019) used bibliometric analyses to assess the effect that climate change exerts on human migration. The results set out a critical snapshot of the development of the scientific literature that paid attention to the relationship between climate change and human mobility. More specifically, the co-word analysis conducted in this study, amongst other, highlighted, that the subject matter of the selected articles is part of the current debate over the recognition of the status of climate-environmental refugee, vulnerability, adaptability and resilience of migrants, and the human rights and climate justice.

Finally, with the help of bibliometric tools, Schmiz et al. (2020) scrutinized the overlapping field of urban studies and migration studies. The analysis enabled detecting a clear dominance of research about the Global North, the places of migrant arrival, and larger cities. It also illustrated how and why current research practices portray migration movements and cities in a biased way.

1.2 Contributions of the paper

This research is original in many respects. Firstly, to our knowledge, this is the first bibliometric analysis on international cooperation on migration (ICM). ICM literature has evolved into a rich, multifaceted body of knowledge over the last decades. Indeed, a number of review articles have periodically examined and associated ICM to various issues (e.g., William 2007: South-South international migration; Laczko and Gozdziaik 2005: ICM and human trafficking; Gammeltoft-Hansen 2018: ICM and refugee law; Martin 2011: ICM and the UN System; Tilly 2011: Impact of the economic crisis on ICM; Gheasi and Nijkamp 2017: Motives and impacts of international migration). Though such studies of the ICM are critical to the field's development, a bibliometric examination is complementary to previous reviews. The use of such approaches has been encouraged in the literature (e.g. Leonidou et al. 2010) as they provide valuable information for the advancement of the ICM literature. In contrast to traditional literature reviews, the bibliometric analyses used in our study enables to more objectively examine the knowledge base that serves as the foundation of the ICM literature. At least three advantages might be invoked to our approach comparatively to traditional literature reviews: (1) the transparency and absence of subjectivity in process leading to the emergent evidence-based results; (2) the wide coverage and inclusiveness of a very significant proportion of electronically available published works (the multidisciplinary coverage of the Web of Science data base used in our study encompasses about 12,000 high impact journals); and (3) the ability to include and process large amounts of data (Archambault and Gagné 2004). Secondly, our study is timely as the quantity of publications regarding ICM never ceases to grow. Thus, it is fruitful to step back and take stock of the influences that have contributed shape the field over the last decades. Thirdly, our study aims to uncover the knowledge structure within the ICM literature to understand and appraise the formation of its building blocks. An examination of these building blocks, based notably on co-citation and co-word-analyses, can reveal the structure of knowledge within the broader field (Garfield 1979; Muñoz-Leiva et al. 2012).

It will also enables us to identify key research areas which may not have received sufficient attention to date and offer the potential to further enrich and advance the research on the ICM. Indeed, as the field has matured, interest and the foci have shifted to address a wide range of new and more complex operational and strategic issues, notably the non-traditional security challenges related to international migration (e.g., terrorism; poverty and refugee flows; piracy; human trafficking; narcotics; infectious disease, etc.). Finally, this study might help researches and decision-makers by providing them with information about the landscape of current ICM research activity. Using publications of research findings as a proxy indicator, we can look at the most significant contributions in the field, the most prolific researchers and institutions, the geographical distribution of ICM research activity, its uncovered research áreas that should be targeted, etc.

The present study uses a bibliometric approach to analyze a based-criteria selection of publications in journals indexed in Science Citation Index through Web of Science®.

dealing with international cooperation on migration. It attempts to provide a detailed overview on key issues related to literature on international cooperation on migration topics, such as the publication and citation structure of cooperation on migration literature, the most cited articles, the leading authors, the countries of origin of authors, the most prolific institutions, the networks of citations, co-authorship, and co-words. To our knowledge, there is no study that has resorted to bibliometric indicators to achieve such investigation.

There are numerous journal-ranking systems (Dougherty et al. 2011; Mantzoukas 2009). However, Thompson Reuters, through its Journal Citation Reports (JCR®), enjoys high credibility in academia and is considered by many authors as the “gold standard” of journals’ classification (Hunt et al. 2012; Polit and Northam 2011). Journals indexed in Web of Science are thought to be the most well-respected, high-impact journals available (Porter et al. 2008).

It is worth noting that only those documents indexed in the Web of Science database could be part of the results of a general search. Nevertheless, records in Web of Science contain information on the author, journal, subject category, and all cited references. Thus, references to any source, including non-Web of Science journals, books, monographs, professional journals, etc., are available for analysis. Consequently, the publication data for each author represent only a sample of said author’s published contributions, but we can examine references from articles published in Web of Science from other sources (Heberger et al. 2010).

The rest of the paper is organized as follows. Section 2 introduces the analysis methodology. Section 3 describes and discusses the achieved results. Finally, Sect. 4 highlights some key findings, implications, and limitations.

2 Methodology: bibliometric analysis

Bibliometrics is a quantitative method that uses statistical techniques to analyze scientific publications and their properties (Broadus 1987; Gingras 2016; Gu et al. 2017; Mas-Tur et al. 2019; Dominko and Verbič 2019). As contended by Hook and Börner (2005: 194), it can “provide a global view of a particular domain, the structural details of a domain, the salient characteristics of domains (its dynamics, most cited authors and papers, bursting concepts, etc.)”. Bibliometrics can help guide researchers toward specific areas and niches of research with promising research opportunities (Khan et al. 2016; Li et al. 2009; Wang et al. 2014). It was initially used in the library and information science fields, but has spread to other fields, especially quantitative assessments of academic outputs (Mao et al. 2015).

The quality of a bibliometric analysis is very dependent on the quality of the input data set. Therefore, to minimize the analysis bias of the literature dedicated to cooperation on migration, this article used the SALSA framework proposed by Booth et al. (2013). This framework embodies a four-stage process (*Search, Appraisal, Synthesis, and Analysis*), summarized by the mnemonic SALSA. These four stages formed the methodological process used in this article and are described in the following paragraphs.

Regarding the first stage, Search, Booth et al. (2013) advocated that any literature search risks missing relevant items, given the inclusion and exclusion criteria used to conduct the search. To alleviate this problem, the search stage was conducted using the broadest possible terms related to cooperation on migration. The research was conducted on 17 June 2019 in the Web of Science Core Collection database on SCI-EXPANDED and SSCI. It is

based on the title, abstract, and keywords, which should well uncover and delineate contributions dedicated to this topic from several perspectives (De Rezende et al. 2018).

The search strategy included the combination of the three main theoretical concepts, namely *Migrant* (1,139,771 articles), *Policy* (5,302,943 articles) and *Cooperation* (15,034 articles). More specifically, the keywords chain used was (TS=(**migrant** OR *Refugee** OR *Asylum seek** OR *"Internally displaced people"* OR *displaced OR seekers OR asylum OR foreign OR ethnic OR movements OR refuge* OR deported* OR "Human* movement*"* OR *borderland OR *migrator* OR *migration* OR statelessness* OR "stateless person*"* OR *IDP OR repatriation* OR resettlement* OR smuggling* OR "human* traffick*"* OR *"human* mobilite*"*)) AND (TS=(*governance* OR "human* right*"* OR *"*migration* governance"* OR *"Mobilite* Partnership*"* OR *police* OR "politic* of law*"* OR *"*national refugee* law*"* OR *"*migration* control*"* OR *"strategic* litigation*"* OR *"*disciplinar* approach*"* OR *recommendation* OR "border* law*"* OR *law* OR politic* OR govern* OR practice* OR institution* OR diplomacy OR dynamic* OR regulation* OR programm* OR legislation*")) AND (TS=(*"*national* cooperat*"* OR *"*national* collaborat*"* OR *"external relation*"* OR *"europe* cooperat*"* OR *"europe* collaborat*"* OR *"asian cooperat*"* OR *"asian collaborat*"* OR *"local cooperat*"* OR *"local collaborat*"* OR *"count* cooperat*"* OR *"countr* collaborat*"* OR *"global* cooperat*"* OR *"global* collaborat*"* OR *"mobilite* cooperat*"* OR *"mobilite* collaborat*"* OR *"region* cooperat*"* OR *"region* collaborat*"* OR *"state* cooperat*"* OR *"state collaborat*"* OR *"*america* cooperat*"* OR *"*america* collaborat*"* OR *"north* america* cooperat*"* OR *"north* america* collaborat*"*)).*

The Search stage generated 768 documents. In the second stage (Appraisal), we started by cleaning up the results obtained. Thereby, we checked for unknown data and duplicate records and we standardized the names of the authors to avoid spelling errors in the names and initials. We tackled the issue of synonyms or homonyms in authors' names by using other specific fields, such as 'author address' (Jensen et al. 2008). When the addresses of all co-authors were not listed in the WoS database, an additional search was undertaken through Google. If the author's institution of affiliation was changed, the most current one was chosen. Thereafter, all the identified articles were subjected to a double screening. A first sorting of the articles' titles and abstracts allowed us to exclude 255 papers which did not meet the inclusion criteria. The second sorting based on the thorough reading of the full text of the remaining 590 potential articles allowed us to exclude another 355 articles. This left a total of 178 articles that match all the inclusion criteria. Consequently, the final sample of the study consisted of 178 articles from Web of Science, ranging from the dates 1969 to 2019. These articles formed the input data.

The third stage (Synthesis) enables to identify patterns in the research field. During this stage, the 178 articles selected in the second stage were used as the input data set and processed using the following programs: Hiscite (version 2012.03.17; HistCite Software LLC, New York, USA), Bibexcel (version 2016.02.20; Olle Persson, Umeå University, Umeå, SWE), Pajek (version 5.06, 2013.11.12; Batagelj and Mrvar, University of Ljubljana, Ljubljana, Slovenia), and Vosviewer (version 1.6.9; Eck and Waltman 2014, Leiden University, the Netherlands).

The Hiscite program (version 2012.03.17) allows for the identification of significant articles in searches by topics on Web of Science, contributing to the bibliometric analysis. The Global Citation Scores (GCS) and the GCS per year (GCS/t) were acquired by using HistCite. The visualization of the different bibliometric maps was done thanks to Bibexcel (version 2016.02.20) in combination with Pajek (version 5.06) and Vosviewer (version 1.6.9).

The bibliometric analysis links together all articles from the input data set and the articles cited by them. This creates a citation network representing the most relevant articles used by researchers working on the topic of cooperation on migration. This citation network ‘helps form the intellectual base, research front, and research-focus terms and clusters in the field.’ (De Rezende et al. 2018: 43). The intellectual base corresponds to the contributions cited by researchers and reflects the foundation upon which researchers build, whilst the research front is formed by the citing articles and represents the leading understanding of the topic in the covered period. A co-occurrence network of keywords was also created to reveal the most relevant research keywords used by researchers.

Finally, the fourth stage (Analysis) is deemed to understand the meaning of the patterns and data revealed during the synthesis stage. The sensemaking and interpretation of the data and patterns of the citation and co-occurrence networks enable to identify the literature that played a central role in introducing and nurturing a concept in an academic field, as well as understanding how concepts, research interests, and research questions have evolved over time and what will tend to be the focus in the future (Gilbert 1977; Paisley 1989).

More specifically, in the following section, after drawing a succinct portrait based on basic bibliometric indicators of the set of papers selected in this study, four network analyses will be undertaken. We first examine the local citation network that refers to the number of citations to the papers within the collection (i.e., the set of the 178 articles selected in the Search stage) (Wilson and Tenopir 2008). Secondly, we investigate the co-authorship network which is a tangible form of scientific collaboration that reliably enables to track many aspects of scientific collaboration among scholars, thanks to bibliometric methods (Glänzel and Schubert 2004; Koseoglu 2016). Thirdly, we undertake a co-citation analysis to quantitatively ascertain the structural patterns and research streams of the academic discourse about cooperation on migration. This analysis is based on the underlying assumption that closely related works are frequently cited together (Hoffman and Holbrook 1993; Tahai and Meyer 1999) and it is used to identify the most influential publications, authors, journals, and keywords, and to analyze relational links between them. In this study, we employed the Document Co-citation Analysis (DCA) rather than the Author Co-citation Analysis (ACA). The latter does not allow the identification of central topics and their relationships (Teichert and Shehu 2010), because many authors have contributed different thoughts and ideas to the cooperation on migration discourse, but they have also made contributions to other research fields. Using documents as the unit of analysis provides a more specific theme-related focus and precision about a research field than the author-level analysis (Pilkington and Meredith 2008). The downside of using the document co-citation analysis method is that a great amount of effort is necessary to identify accurate articles. Because of the different journal policies or even misspellings, the database shows several entries for the same publication. As mentioned previously, all articles of the final selection of this study were carefully checked for these inconsistencies. Finally, a co-word analysis is performed. Co-word analysis is a kind of content analysis that uses quantitative description to analyze the content of scientific articles or other types of documents (Muñoz-Leiva et al. 2012). This method is also useful to ascertain trends (Williams and Plouffe 2007) and to identify topics and prevailing methodological approaches in different research fields (Helgeson et al. 1984). It is a powerful technique to reduce a space of descriptors (or keywords) to a set of network graphs that effectively illustrate the strongest associations between descriptors (Coulter et al. 1998). Therefore, in our study, co-word analysis enables to map the strength of association between information items in textual data (Coulter et al. 1998). In so doing, the obtained maps will provide a new insight into the structure of the

cooperation in the migration field, showing the division of the field into several subfields and the relationships between these subfields (Muñoz-Leiva et al. 2012).

3 Results and discussion

As mentioned previously, the bibliometric analysis and construction of the bibliometric maps were carried out using four software: Histcite, Bibexcel, Pajek, and Vosviewer. The analysis was conducted in two steps: (1) calculation of basic bibliometric indicators; and (2) mapping of networks of local citations, co-authoring, co-citations, and c-words contained in titles and abstracts.

3.1 Basic bibliometric indicators

With regard to field evolution, the first article was published in 1969. From that year to the year 2000, the growth is more significant. For the last full year (2018), 30 articles were published while 9 were published in 2019 (till 17 June). Articles published by year ranged from 1 to 30 with a mean of 6.32 and a standard deviation (SD) of 7.31. The global citation scores per year (GCS/t) range between 0 and 365 (Mean=71.36, SD=94.23); 2009 was the year with the highest number of citations (GCS=365), followed by 2004 (GCS=264) and 2000 (GCS=222) (Table 1, Figs. 1 and 2).

The number of articles published per journal varies between 1 to 9, with a mean of 1.41 (SD 0.99). *International Migration* was the most productive journal (9 articles), followed by *Journal of Ethnic and Migration Studies* (5 articles) and *International Politics* and *Journal of European Public Policy* (4 articles each). The rest of the journals published 3 or less articles related to international cooperation on migration during the considered period. The number of citations ranged from 0 to 330, with a mean of 15.86 (SD 45.30). The results indicate higher values for *International Migration* (GCS=330), followed by *Perspectives on Politics* (GCS=274), *Bulletin of the World Health Organization* (GCS=219), and *International Affairs* (GCS=109). The rest of the journals received 88 or less citations. The GCS per year (GCS/t) range from 0 to 25 (Mean 1.55; SD 3.35) (Table 2).

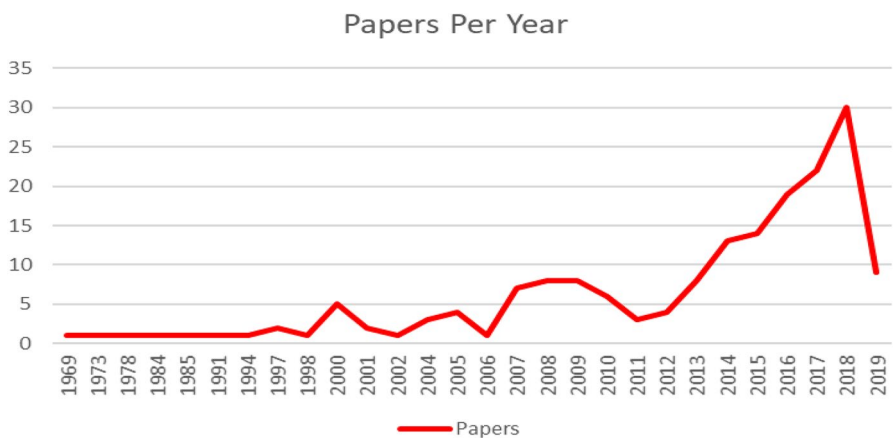
The articles came from 48 different countries (Table 3, Fig. 3). The number of articles published in the different countries ranges from 1 to 46, with an average of 4.81 (SD 7.92). The most productive countries were the USA (N=46) and the UK (N=30), followed by Germany (N=14), Australia and the Netherlands (N=12 each), Switzerland (N=11), Canada (N=9), Spain (N=8), France and Italy (N=6 each) and Finland, Norway, People's Republic of China, and Sweden (N=5 each). The rest of the countries published four articles or less related to the field under-study. Likewise, the GCS range between 0 and 888 (Mean 48.27; SD 140.25). The highest values are recorded in the USA (GCS=888), the UK (GCS=371), Switzerland (GCS=231), and Australia (GCS=157) (Table 3). As can be seen in Fig. 3, publications are concentrated in Europe and North America. Likewise, when observing the origin of the researchers from the different research groups, it can be seen that most of the groups are international.

The results also indicate that, in total, authors of the selected papers are affiliated to 245 institutions. The number of articles published by the different institutions ranges from 1 to 5, with a mean of 1.20 (SD 0.60). The most prolific institutions are The University of Oslo (Norway) and the University of Amsterdam (N=5 each), University College London (UK), Johns Hopkins University (USA) and European University Institute

Table 1 Field evolution from 1969 to 2019

Publication year	Papers	%	GCS
1969	1	0.6	0
1973	1	0.6	0
1978	1	0.6	0
1984	1	0.6	0
1985	1	0.6	1
1991	1	0.6	3
1994	1	0.6	0
1997	2	1.1	180
1998	1	0.6	1
2000	5	2.8	222
2001	2	1.1	8
2002	1	0.6	51
2004	3	1.7	264
2005	4	2.3	80
2006	1	0.6	0
2007	7	4.0	107
2008	8	4.5	168
2009	8	4.5	365
2010	6	3.4	132
2011	3	1.7	14
2012	4	2.3	48
2013	8	4.5	60
2014	13	7.3	131
2015	14	7.9	50
2016	19	10.7	57
2017	22	12.4	50
2018	30	16.9	5
2019	9	5.1	1

GCS Global Citation Score of the ISI's database Web of Science

**Fig. 1** Production evolution of the field from 1969 to 2019

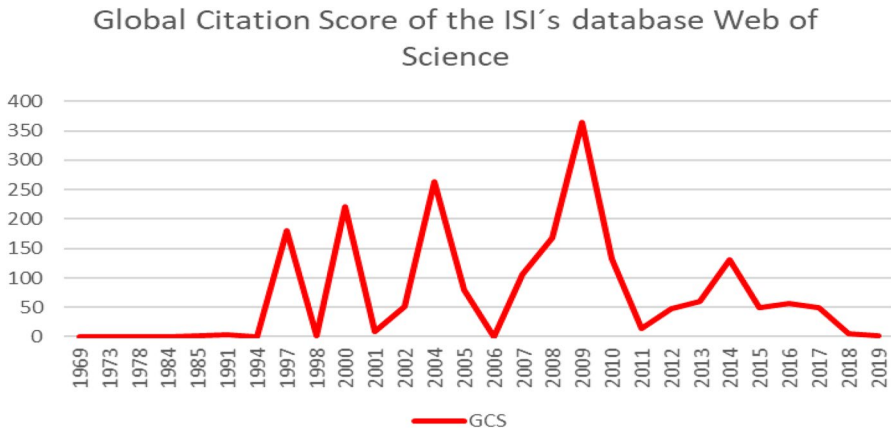


Fig. 2 GCS evolution of the field from 1969 to 2019. *Note:* GCS=Global Citation Score of the ISI's database Web of Science

(European Union) (N=4 each), University of California San Diego (USA), University of Helsinki (Sweden) and Maastricht University (the Netherlands) (N=3 each). The rest of the institutions published two or less articles related to the topic under study. Regarding the most cited institutions, the number of citations ranges from 0 to 283, with an average of 11.78 (SD 31.78). The four most cited institutions are Princeton University (USA) (GCS=283), Northwestern University (USA) (GCS=248), World Health Organization (GCS=183), and University College London (UK) (GCS=178). The rest of the institutions count 88 or less citations (Tables 4 and 5).

The 178 selected articles were produced by 336 researchers (Mean=1.02; SD=0.13). Only six authors produced 2 articles, whereas the others produced only one article.

The six most productive authors are: Meunier S.; Betts A.; Thomas D.C.; van Ewijk E.; Wallace W., and Efrat A.

Finally, the authors' citations count ranges between 0 and 283 (Mean=12.64; SD=35.65). The 10 most frequently cited authors are Meunier S. (GCS=283; GCS/t=28.38), Alter K.J. (GCS=248; GCS/t=22.55), Adams O., Dal Poz M., Diallo K., Stilwell B., Vujicic M., and Zurn P. (GCS=181; GCS/t=11.31 each), Salt J. and Stein J. (GCS=174; GCS/t=7.57 each) (Tables 6 and 7).

The 10 most frequently cited articles are reported in Table 8.

3.2 Network analyses of authors' activities

3.2.1 Local citations network

By looking at the local citation map that refers to citations related to the set of 178 articles selected in this study (Figs. 4 and 5), it can be observed that the most cited authors are Hampshire (2016) and Koser (2010). Specifically, 12 differential networks are observed, 2 of them formed by 3 authors and another 10 formed by 2 authors.

Table 2 Journals (≥ 2 papers), number of articles, % and GCS

Journal	Papers	%	GCS
International Migration	9	5.1	330
Journal of Ethnic And Migration Studies	5	2.8	70
International Politics	4	2.3	33
Journal of European Public Policy	4	2.3	88
European Journal of Migration And Law	3	1.7	8
International and Comparative Law Quarterly	3	1.7	5
International Interactions	3	1.7	1
International Relations of The Asia–Pacific	3	1.7	6
Journal of European Integration	3	1.7	15
Netherlands Quarterly of Human Rights	3	1.7	6
Bulletin of the World Health Organization	2	1.1	219
Cambridge Review of International Affairs	2	1.1	13
Contemporary European History	2	1.1	1
Cooperation and Conflict	2	1.1	26
European Constitutional Law Review	2	1.1	4
European Journal of International Relations	2	1.1	62
European Law Review	2	1.1	7
European Planning Studies	2	1.1	15
Foreign Policy Analysis	2	1.1	5
Global Governance	2	1.1	40
Global Policy	2	1.1	1
International Affairs	2	1.1	109
International Organization	2	1.1	3
Jcms-Journal of Common Market Studies	2	1.1	21
Journal of Conflict Resolution	2	1.1	10
Journal of Immigrant And Minority Health	2	1.1	10
Perspectives On Politics	2	1.1	274
Revista Brasileira De Politica Internacional	2	1.1	27
Revista De Derecho Comunitario Europeo	2	1.1	1
Sustainability	2	1.1	1
West European Politics	2	1.1	21

GCS Global Citation Score of the ISI's database Web of Science

3.2.1.1 Co-authorship network The network of co-authors is composed of 233 authors organized into 68 groups or clusters. The largest group counts 20 members, whilst the most common groups are made up of 2 authors ($n=40$), 3 authors ($n=9$) or 4 authors ($n=8$). In this sense, it seems that the usual practice in the discipline is to research-publish in groups of two. The network of co-authorship is presented in Fig. 5.

For the largest groups (of 5 or more authors), the largest group of researchers is made up of 20: Aakvaag H.F., Rosner R., Cloitre M., Dyb G.A., Lueger-Schuster B., Lanza J., Oe M., Le Brocque R., Brewer D., Frewen P., Bisson J.I., Bakker A., Ajdukovic D., Mwititi G.K., Olf M., Shigemura J., Wu K., Shafer I., Schnyder U., and Schellong J. The composition of this group is international, with researchers from Switzerland, Germany, Norway, Croatia, Netherlands, Wales, Australia, USA, Canada, Argentina, Kenya, Japan and Peoples R China This working group analyses various topics related

Table 3 Production by country

Country	Papers	GCS	Country	Papers	GCS
USA	46	888	India	2	0
UK	30	371	Nigeria	2	7
Germany	14	70	Singapore	2	13
Australia	12	157	South Africa	2	1
Netherlands	12	68	Argentina	1	3
Switzerland	11	231	Bhutan	1	0
Canada	9	91	Colombia	1	3
Spain	8	18	Croatia	1	3
France	6	52	Egypt	1	0
Italy	6	45	Guiana	1	2
Finland	5	31	Greece	1	1
Norway	5	44	Indonesia	1	0
China	5	4	Japan	1	3
Sweden	5	20	Kenya	1	3
Brazil	4	27	Maldives	1	0
Austria	3	5	Palestine	1	16
Belgium	3	1	Poland	1	0
Denmark	3	55	Saudi Arabia	1	1
Ireland	3	33	Slovenia	1	6
Israel	3	15	South Korea	1	0
Mexico	3	13	Surinam	1	2
Chile	2	0	Taiwan	1	0
Cyprus	2	8	Thailand	1	0
Czech Republic	2	6	Turkey	2	0

GCS Global Citation Score of the ISI's database Web of Science

**Fig. 3** Publications by geographic area

Table 4 Most productive institutions (≥ 2 papers)

Institution	Papers	GCS
University of Amsterdam	5	38
University of Oslo	5	44
European University Institute	4	44
Johns Hopkins University	4	70
University College London	4	178
Maastricht University	3	25
University of California San Diego	3	40
University of Helsinki	3	26
Australian National University	2	22
Columbia University	2	6
Interdisciplinary Center Herzliya (Israel)	2	8
King's College London	2	0
Leiden University	2	18
McMaster University	2	38
Michigan State University	2	8
New York University	2	9
Princeton University	2	283
Technical University of Dresden	2	38
University of Adelaide	2	0
University College Dublin	2	33
University of Essex (UK)	2	22
University of Ghent (Belgium)	2	1
University of London	2	47
University of Macau (Macau)	2	1
University of Manchester	2	2
University of Minnesota	2	1
University of Queensland (Australia)	2	5
University of Vienna	2	4
University of Washington	2	0
University of Zurich (Switzerland)	2	4
Uppsala University (Sweden)	2	2
World Health Organization	2	183

GCS Global Citation Score of the ISI's database Web of Science

to post-traumatic stress for refugees and immigrants, all of which have a single article in common called "The global collaboration on traumatic stress". There is also another group made up of 11 authors (Aldridge R.W., Zenner D., Jonsson J., Erkens C., Matteelli A., Hergens M.P., Lonnroth K., Marchese V., Ohd J.N., Abubakar I., Menezes D.). As was the case with the previous group, the members of the group are so because of their areas of interest rather than their geographical location, as they come from different nationalities, with researchers from Sweden, England, Netherlands, Italy. This group has a common article entitled "Building a European database to gather multi-country evidence on active and latent TB screening for migrants". Another of the largest groups is made up of 10 authors (Salway S.M., Higginbottom G., Reime B., Bharj K.K., Chowbey P., Foster C., Friedrich J., Gerrish K., Mumtaz Z., O'Brien B). The

Table 5 Most cited institutions (GCS ≥ 25)

Institution	Papers	GCS
Princeton University	2	283
Northwestern University	1	248
World Health Organization	2	183
University College London	4	178
Wellesley College	1	88
World Bank	1	84
University of Newcastle	1	83
University of Wollongong (Australia)	1	83
Johns Hopkins University	4	70
Georgia State University	1	60
International Development Research Center	1	51
University of London	2	47
University of Oslo	5	44
European University Institute	4	44
University of California San Diego	3	40
University Oxford	2	39
Univ of Amsterdam	5	38
McMaster University	2	38
Technical University of Dresden	2	38
Migration Health Consultants Inc	1	38
European Union Program	1	35
University of British Columbia	2	34
University of Salford (UK)	1	34
University College Dublin	2	33
Carleton University	1	28
International Labour Office	1	28
University of Paris	1	28
Brookings Institution	1	27
Geneva Centre for Security Policy	1	27
Graduate Institute of International and Development Studies	1	27
Rio de Janeiro State University	1	27
University of Helsinki	3	26
Maastricht University	3	25

GCS Global Citation Score of the ISI's database Web of Science

composition of this group is also international, with researchers from England, Canada and Germany. This group focused on analysing migration, ethnicity and health. In this bibliometric analysis a common article has been observed for this group: "Contributions and challenges of cross-national comparative research in migration, ethnicity and health: insights from a preliminary study of maternal health in Germany, Canada and the UK". Next, there is another group made up of 9 researchers (Jaries R., Vantilcke V., Clevenbergh P., Adoissi J., Boukhari R., Misslin C., Nacher M., Vreden S., Jolivet A.). The composition of this group is mostly from French Guiana, a researcher from France

Table 6 Most productive authors (≥ 2 papers)

AUTHOR	PAPERS	%	GCS	GCS/T
Betts A	2	1.1	39	3.447
Efrat A	2	1.1	10	2.150
Meunier S	2	1.1	283	28.379
Thomas DC	2	1.1	33	3.000
van Ewijk E	2	1.1	21	2.227
Wallace W	2	1.1	21	1.400

GCS Global Citation Score of the ISI's database Web of Science, *GCS/T* GCS per year

Table 7 Most cited authors ($GCS \geq 30$)

Author	Papers	%	GCS	GCS/T
Meunier S	2	1.1	283	28.379
Alter KJ	1	0.6	248	22.545
Adams O	1	0.6	181	11.312
Dal Poz M	1	0.6	181	11.312
Diallo K	1	0.6	181	11.312
Stilwell B	1	0.6	181	11.312
Vujicic M	1	0.6	181	11.312
Zurn P	1	0.6	181	11.312
Salt J	1	0.6	174	7.565
Stein J	1	0.6	174	7.565
Murphy CN	1	0.6	88	4.400
Mattoo A	1	0.6	84	7.000
Neagu IC	1	0.6	84	7.000
Ozden C	1	0.6	84	7.00
Castles S	1	0.6	83	4.150
Smith ME	1	0.6	60	3.750
Engberg-Pedersen P	1	0.6	51	2.833
Nyberg-Sorensen N	1	0.6	51	2.833
Van Hear N	1	0.6	51	2.833
Feldbaum H	1	0.6	44	4.400
Lee K	1	0.6	44	4.400
Michaud J	1	0.6	44	4.400
Betts A	2	1.1	39	3.445
Batora J	1	0.6	38	2.533
Gushulak BD	1	0.6	38	2.923
Macdonald L	1	0.6	38	2.923
MacPherson DW	1	0.6	38	2.923
da Conceicao-Heldt E	1	0.6	35	5.833
Kaunert C	1	0.6	34	3.400
Thomas DC	2	1.1	33	3.000
Ellermann A	1	0.6	33	2.750
Wong TK	1	0.6	31	3.875

GCS Global Citation Score of the ISI's database Web of Science, *GCS/T* GCS per year

Table 8 The 10 most cited papers

Papers	GCS	GCS/T
1. Alter KJ and Meunier S (2009) The Politics of International Regime Complexity. <i>Perspectives on Politics</i> 7 (1): 13–24	248	22.55
2. Stilwell B, Diallo K, Zurn P, Vujicic M and Adams O (2004) Migration of health-care workers from developing countries: strategic approaches to its management. <i>Bulletin of the World Health Organization</i> 82 (8): 595–600	181	11.31
3. Salt J and Stein J (1997) Migration as a business: The case of trafficking. <i>International Migration</i> 35 (4): 467–494	174	7.57
4. Murphy CN (2000) Global governance: poorly done and poorly understood. <i>International Affairs</i> 76 (4): 789–803	88	4.40
5. Mattoo A, Neagu IC and Ozden C (2008) Brain waste? Educated immigrants in the US labor market. <i>Journal of Development Economics</i> 87 (2): 255–269	84	7
6. Castles S (2000) International migration at the beginning of the twenty-first century: global trends and issues. <i>International Social Science Journal</i> 52 (165): 269–281	83	4.15
7. Smith ME (2004) Institutionalization. Policy adaptation and European foreign policy cooperation. <i>European Journal Of International Relations</i> 10 (1): 95–136	60	3.75
8. Nyberg-Sorensen N, Van Hear N and Engberg-Pedersen P (2002) The migration-development nexus: Evidence and policy options. <i>International Migration</i> 40 (5): 49–73	51	2.83
9. Feldbaum H, Lee K and Michaud J (2010) Global Health and Foreign Policy. <i>Epidemiologic Reviews</i> 32 (1): 82–92	44	4.40
10. Batora J (2005) Does the European Union transform the institution of diplomacy? <i>Journal of European Public Policy</i> 12 (1): 44–66	38	2.53

GCS Global Citation Score of the ISI's database Web of Science, GCS/n GCS per year

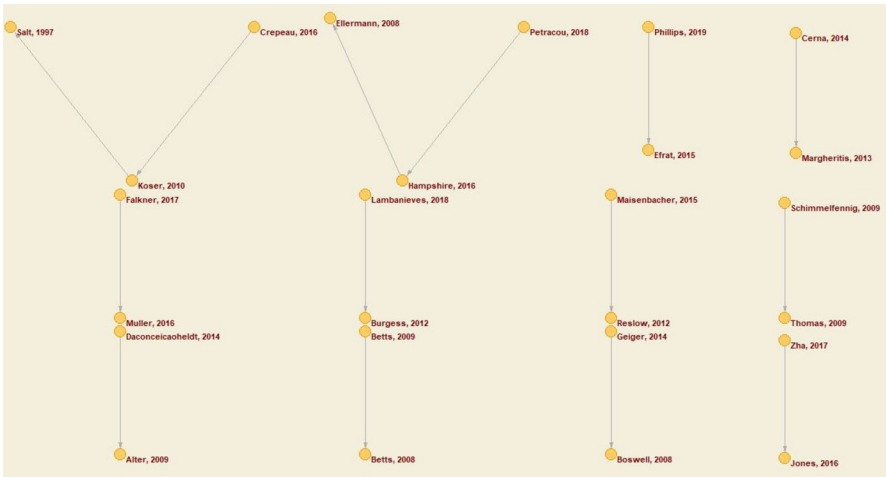


Fig. 4 Local citations network



Fig. 5 Co-authorship network

and another from Surinam. This group seems to focus its efforts on analysing great challenges to control epidemics in border areas of migration. In this line, we can mention the article entitled “Population movements and the HIV cascade in recently diagnosed patients at the French Guiana-Surinam border”. Likewise, there is another group composed of 8 authors (Porta C.M., Bloomquist M.L., Garcia-Huidobro D., Gutierrez R.,

Vega L., Balch R., Yu X.H., Cooper D.K.,) and another of 7 (Angcharoensathien V., Travis P., Tancarino A.S., Sawaengdee K., Chhoedon Y., Hassan S., Pudpong N.). These two last groups have published two articles entitled, respectively, “Bi-National Cross-Validation of an Evidence-Based Conduct Problem Prevention Model” and “Managing In- and Out-Migration of Health Workforce in Selected Countries in South East Asia Region”. The 8 authors group is mostly from USA, a researcher from Chile and another from Mexico, while the other is mostly from Thailand, with a researcher from India, Indonesia, Buthan and Maldives. There are also four groups of six authors (Group 1: Stilwell B., Diallo K., Zurn P., Vujicic M., Adams O., Dal Poz M. all from Switzerland; Group 2: Nakash O., Langer B., Nagar M., Shoham S., Lurie I., Davidovitch N. most of all from Israel and one researcher from Canada; Group 3: Zuniga M.L., Fischer P.L., Cornelius D, Cornelius W., Goldenberg S., Keyes D. most of all from USA and one researcher from Mexico; and Group 4: Martins P., de Aguiar A.S.W., Mesquita C.A.M., Alexandrino F.J.R., da Silva N.C.F., Moreno M.D. all from Brazil). These groups have published respectively the following four articles: “Migration of health-care workers from developing countries: strategic approaches to its management”, “Exposure to Traumatic Experiences Among Asylum Seekers from Eritrea and Sudan During Migration to Israel”, “A Transnational Approach to Understanding Indicators of Mental Health, Alcohol Use and Reproductive Health Among Indigenous Mexican Migrants”, and “Global health diplomacy: conceptual framework proposal”. Finally, we observed 1 group made up of 5 authors (Chinchilla-Rodriguez Z., Bu Y., Robinson-Garcia N., Costas R., Sugimoto C.R.). Researchers are from Spain, USA, Netherlands and South Africa. This group published an article focussing on the exchange of knowledge between countries in order to inform evidence-based science policy: “Travel bans and scientific mobility: utility of asymmetry and affinity indexes to inform science policy”.

In general, it seems that the general tendency in the discipline is to work in groups made up of researchers from different countries who are linked by a common theme rather than by their geographical location.

The most collaborative authors are Rosner R., Lueger-Schuester B., Mwititi G.K., Ajdukovic D., and Schellon J. All of them belonged to the largest group. Their institutions of affiliation and countries, in the same order of appearance, are: The Catholic University of Eichstätt-Ingolstadt, Department of Psychology, Eichstatt, Germany (Rosner R.); The University of Vienna, Faculty of Psychology, Vienna, Austria (Lueger-Schuester B.); The Oasis Africa Center for Transformational Psychology, Nairobi, Kenya (Mwititi G.K.); The University of Zagreb, Faculty of Humanities and Social Sciences (Ajdukovic D.); The Technical University of Dresden, Department of Psychotherapy and Psychosomatic Medicine, Dresden, Germany (Schellon J.).

3.2.1.2 Co-citations network In the co-citations network, a threshold of two or more citations was set (Figs. 6 and 7). Based on this criterion, 14 papers were identified. The authors of these papers are grouped into two separate networks. The first one is composed of Wendt A. 1994, Moravsik A. 1997, Smith A. 1995, Kydd Andrew H. 2005, Fearon J.D. 1998, Jervis R. 1978, Leeds B.A. 2003, Signorino C.S. 1999, Lai B. 2000, Kelley J. 2007, Leeds B.A. 2002, and Mattes M. 2010, with Jervis R. 1978 as the focal point of the network with 8 relationships, followed by Fearon J.D. 1998 and Lai B. 2000 (6 relationships), and Leeds B.A. 2002 (5 relationships). The rest of the vertices of the network have 4 or less links with the rest of the authors (papers). The second network is composed of two papers (Alesina A. 2000 and Thacker S.C. 1999).

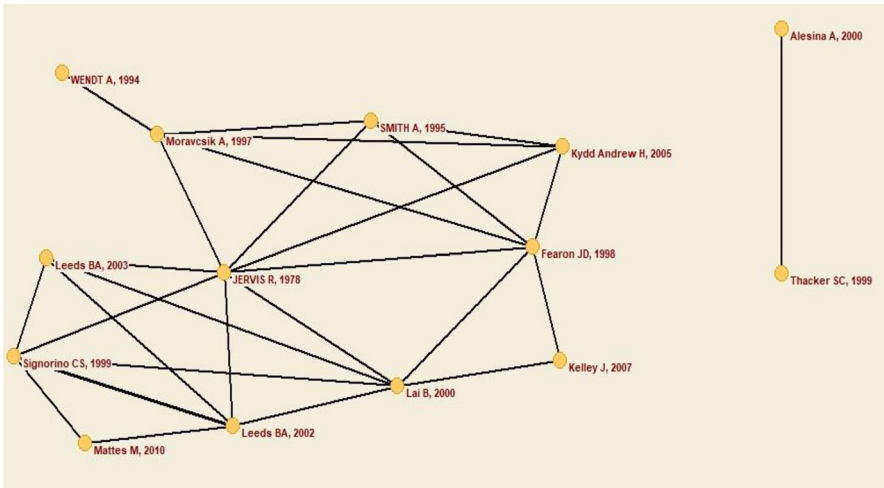


Fig. 6 Co-citations network (≥ 2 co-citations of publications)

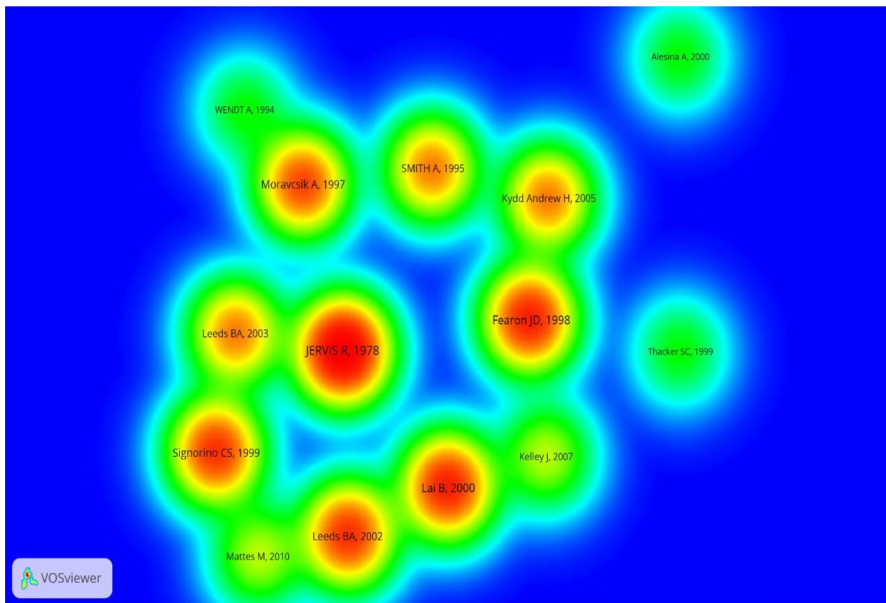


Fig. 7 Density of co-citations network (≥ 2 co-citations of publications)

The authors with the highest number of co-citations are Jervis R. (1978), Fearon J.D. (1998), and Lai B. (2000). These authors are the ones who quote most their respective works.

3.2.1.3 Co-word analysis Identifying the frequency distributions of keywords could uncover promising opportunities for future research. Indeed, keywords can succinctly sum-

marize the content of the reviewed articles' main elements and their relevance for research on international cooperation on migration (Kevork and Vrechopoulos 2009).

In the co-word analysis conducted in this article, 4 720 different terms appeared in the titles and abstracts, which we attempted to group by category. The inclusion criterion was binary counting and a frequency of occurrence of ≥ 6 was fixed, which gives a total of 234 terms (After checking different cut-off points, this value was established as it allowed a level of balance between the terms obtained and the possible information lost). The 60% most relevant terms result in 140 items (Giménez-Espert and Prado-Gascó 2019). From them, the terms referring to the design or methodology of the research were withdrawn. Moreover, the terms were filtered to group together those that were synonyms as well as those that appeared in singular and plural or with different genders. At the end, we obtained a total of 107 terms grouped in four clusters. These four groups of themes were the most studied and cited themes by the community of researchers interested by topics related to international cooperation on migration.

In descending order of appearance, the following terms stand out: "European Union"; "foreign policy"; "migrant"; "refugee"; "health"; "diplomacy"; "control"; "movement"; "conflict"; "power"; "relationship"; and "immigrant". These terms receive the highest number of citations. As seen in Fig. 8, four groups with different themes and their associated terms are clearly observed: (1) aspects related to European Union, foreign policy, diplomacy and security, identified with red; (2) aspects related to migrants' control, identified with blue; (3) aspects related to trust, immigrant, and Africa, identified with green; and (4) aspects related to refugees, education, solidarity, conflict and opportunity, identified with yellow.

In addition, we generated a density map of titles, abstracts, and keywords of the papers with VOSviewer (Fig. 9). This analysis enables to track co-occurrence of authors' keywords used in publications. The co-occurrence indicates the frequency that a keyword appeared with other keywords. The colour of each point on the map represents the density

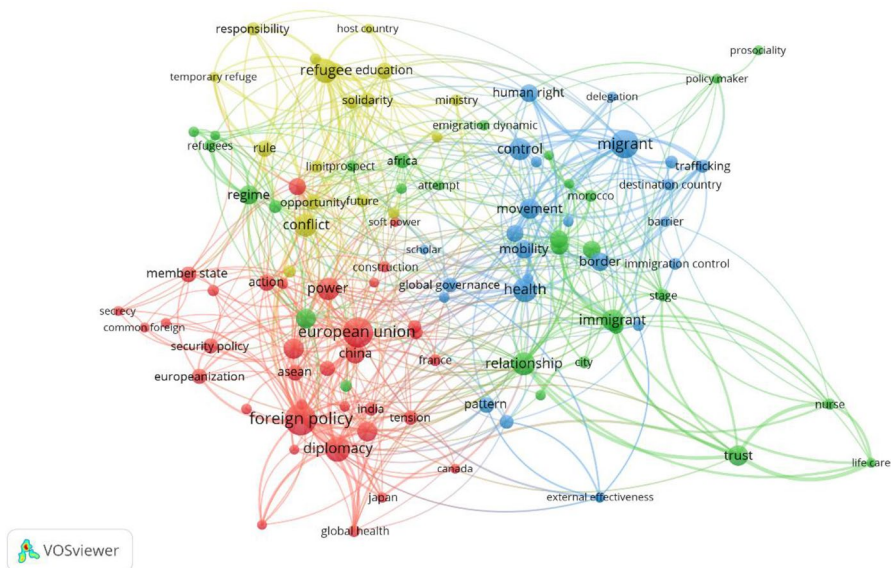


Fig. 8 Abstract and title terms network

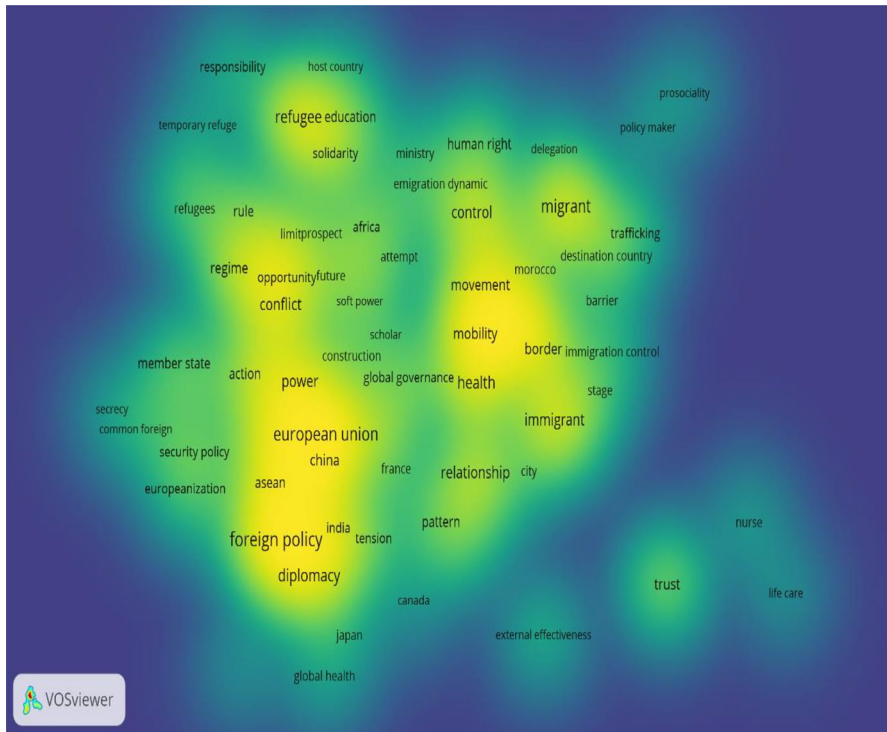


Fig. 9 Density citation map of the Abstracts and titles words

of the term during the period of study (i.e., yellow represents higher density while blue represents lower density). The density of the point on the map was calculated using the number of neighbouring terms and the amount of them (using a Gaussian kernel function) (Van Eck et al. 2010). The larger the number of terms to the proximity of a point and the greater the weight of the terms, the closer it is to yellow. On the contrary, the smaller number of terms to the proximity of a point and the smaller the weight of the terms, the closer they are to blue.

This analysis enables to observe greater density for the term 'European Union', which is directly related to the terms 'foreign policy', 'diplomacy', and 'power'. Likewise, the term 'migrant' has a greater density and it is related to the terms 'trafficking', 'border', 'immigration control', 'destination country', and 'immigrant'.

4 Conclusion, practical implications, and limitations

The bibliometric analysis conducted in this study analyzed 178 articles related to international cooperation on migration. With this analysis, we provide new insights into the research trends and characteristics of the field.

According to this analysis, the annual publications increased rapidly since 2000. The articles came from 48 different countries and the most productive researchers were from the USA (46 articles), the UK (30), Germany (14), and Australia and the Netherlands (12

each). The most prolific institutions are The University of Oslo (Norway) and the University of Amsterdam (5 articles each), and University College London (UK), Johns Hopkins University (USA), and European University Institute (European Union) (4 each). Finally, the 178 selected articles were produced by 336 researchers. Only six authors produced 2 articles, whereas the others produced only one article. The six most productive authors are Meunier S., Betts A., Thomas D.C., van Ewijk E., Wallace W., and Efrat A., and the most frequently cited authors are Meunier S. (283 citations), Alter K.J. (248 citations), Adams O., Dal Poz M., Diallo K., Stilwell B., Vujcic M., and Zurn P. (181 citations each).

With regard to authors' networks, the co-authorship network is composed of 233 authors organized into 68 groups or clusters. The largest group counts 20 members. The most collaborative authors are Rosner R., Lueger-Schuester B., Mwititi G.K., Ajdukovic D., and Schellon J. Likewise, for the co-citations network, the authors with the highest number of co-citations are Jervis R. (1978), Fearon J.D. (1998), and Lai B. (2000). Finally, the co-word analysis indicated that the most frequent keywords are, in descending order of appearance: 'European Union'; 'foreign policy'; 'migrant'; 'refugee'; 'health'; 'diplomacy'; 'control'; 'movement'; 'conflict'; 'power'; 'relationship'; and 'immigrant'. Moreover, the density map of titles and abstracts' terms showed greater density around the term 'European Union', and directly related to it appears the term 'foreign policy', followed by 'diplomacy' and 'power'.

4.1 Study implications

These findings are important for knowledge advancement and decision-making on international cooperation on migration, by portraying the "state-of-the-art" and identifying gaps in the literature, which could guide current trends and future directions of research, and by directing interested stakeholders to publications that are most relevant to the field of interest.

Overall, international cooperation in the migration field is growing and maturing. Significant room still exists for development, given the small number of influential articles and that there are only 178 papers relatively connected. This number should be expected to increase, given the solid foundation provided by the theories of international relations. Opportunities abound for additional research, both conceptually and empirically, on issues related to international cooperation on migration, as a prelude to potential practical lines of actions.

The geographic dispersion of the works did show that Europe and North America stand out with the greatest number of articles. The lack of non-Western, non-North American contributions is problematic. The available literature on international migration has mostly focused on the study of inter-regional migration or south-north migration, whereas, in last decades, movements of migration flows are mostly at the intra-regional level or south-south migration as, for instance, in Southeast Asia (Miller 2002). Without the voices of researchers from less developed countries, this would be a greatly lost opportunity for cutting-edge research on this topic.

Not only is there a relative lack of diversity in the authorship and location of the contributions, the lack of cross-sector efforts limits the "transdisciplinarity" of this field. Indeed, the field is dominated by teams of academic scholars. Practitioners and policy-makers, are almost completely absent within these research teams. Perhaps this explains why much of the research to date has been conceptual and theoretical. Integrating stakeholders, who

stand on the forefront of issues related to cooperation on migration, into academic investigations will likely benefit both practical and theoretical advancement.

For scholars newly tempted by this field of research, this study identified “core” articles that may prove a good starting point. It also identified the more influential authors in the field that may set the stage for future developments. Carefully monitoring their and their co-authors’ contributions can provide some guidelines for further research on familiar themes in the literature that are still relevant [e.g., normative role of the EU in influencing policies of third world countries (Bisong 2019); multi-level governance of migration and integration (Scholten and Penninx 2016); ad hocism of migration management (Pécoud 2015)], as well as emerging themes [e.g., refugee crisis and new destination and transit countries (Czaika and de Haas 2014); re-interpretation of principles of non-refoulement (Slominski and Trauner 2018); Maritime Migration (Itamar 2016); “EU Humanitarian Border and the Securitization of Human Rights” (Violata 2018)].

4.2 Study limitations

The results of this study have limitations that inform the interpretation of its results and suggest further research. Firstly, bibliometric data have limitations including spelling differences, errors, and inconsistencies related to the indexing of subjects, changes to journal titles, multiple ways of presenting authors’ last names and initials, etc. (Heberger et al. 2010). Secondly, the set of articles that have been considered in this study does not fully represent the literature on international cooperation on migration. The coverage in ISI Web of Science is perhaps more reflective of some literature streams than others (Van Leeuwen 2006), and it is incomplete as Web of Science does not include books, journal articles published in languages other than English, and most new Internet-based outlets, which are a significant part of the literature on international cooperation on migration. Future research would benefit from considering other bibliographic databases, enabling a wider analysis. Thirdly, because of the time lag between the publication of an article and its indexation in Web of Science, very recent articles may not be captured in a search. Nevertheless, as Van Leeuwen (2006: 152) so eloquently stated, ‘It is better to know at least something of a small portion of the output, than to have no insight in the impact of these papers at all’. Finally, this paper has required a lengthy and complex process of depuration in keywords, to alleviate their lack of homogenization. It would be interesting and helpful to propose an international thesaurus about different topics that facilitates researchers and other interested users search work (Kevork and Vrechopoulos 2009).

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Compliance with ethical standards

Conflict of interest The authors have no conflict of interest to declare that are relevant to the content of this article.

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