

Article

A Bibliometric Analysis of International Competitiveness (1983–2017)

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Abstract: The objective of this paper is to determine the current state of scientific production regarding “competitiveness” in the international context through a bibliometric analysis. This study presents a review of 2293 documents published about competitiveness in the international context from the Scopus database (1983–2017). Two different processing software applications were used, Vosviewer and Scimat. Although very recent bibliometric analyses of the topic exist, the methodology applied in the search term is restricted due to the separate use of a single search combination “national competitiveness” or “international competitiveness”. For this work, three combinations of words with logical operators were used, TITLE-ABS-KEY (“international competitiveness”) OR (“national competitiveness”) OR (“export competitiveness”), thus managing to span the concept of competitiveness in the international context in a broader sense. Our results show that competitive research is in a period of high production. The most productive authors and journals are not the most cited on competitiveness. Only three countries stand out with the largest scientific production about this topic. The trend of the most recent research points to knowledge areas in environmental sciences. The most researched geographical areas in international competitiveness encompass the whole world and especially Southeast Asia.

Keywords: international competitiveness; national competitiveness; export competitiveness; Scopus

1. Introduction

In a globalized world, there is growing concern about economic growth, and more often the concept of competitiveness is used to analyze economic development. Despite being a recurring concept, there is no consensus concerning its definition. In the conclusions of the report by the Organization for Economic Co-operation and Development (OECD) on competitiveness in the agricultural and food sectors, it is indicated that: “Competitiveness can be defined as the ability to face competition and to be successful when facing competition. Competitiveness would then be the ability to sell products that meet demand requirements (price, quality, quantity) and, at the same time, ensure profits over time that enable the firm to thrive. Competition may be within domestic markets (in which case firms, or sectors, in the same country are compared with each other) or international (in this case, comparisons are made between countries). Competitiveness is therefore a relative measure. It is, however, a broad concept and there is no agreement on how to define it and how to measure it precisely” [1]. On an official level, the concept of competitiveness was used for the first time, at the start of the 80’s, in the report by the Treasury H.M.S. (1983) [2] “International competitiveness means the ability of a country’s producers to compete successfully in world markets and with imports in its own domestic market. Competitiveness is generally measured by the shares which a country attains in its markets, due allowance being made for its size and stage of development. Competitiveness in this very general sense comes to being synonymous with

overall performance". It is worth noting the later definition included in the report by the President's Commission for Industrial Competitiveness in the United States of America (1984) [3], in which public functions were added to the definition, thereby taking citizens into consideration. Similarly, other authors included the role of government function in their description of the term competitiveness [4–6]. Although it is not until the definition given by European Commission in [7] that the sustainable basis is incorporated in the definition. In this sense, not only does the concept include an international or organizational dimension, the sustainability perspective is then taken into consideration as it is in other works [8–10]. The contribution to the concept on the part of the World Competitiveness Center is also noteworthy [11], stating that the concept is the *"ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people; or to put it shortly, competitiveness refers to the way in which a country manages the totality of its resources and competencies to increase the prosperity of its people"*.

To deal with this new perspective, the concept of competitiveness should be expanded to that of *"sustainable development"*, based on the idea that current competitiveness should not be targeted without a commitment to future competitiveness [12], and should encompass high-quality growth elements, resource management, social equality, human development, and wellbeing. In this vein, sustainable competitiveness is defined as the combination of institutions, policies, and factors that make a nation productive over time, while ensuring social and environmental sustainability [13].

Despite becoming an interesting and burgeoning field and the existing large volume of literature, we have found few bibliometric studies that have analyzed the dynamics of worldwide research on competitiveness in the international context. To the best of our knowledge, only two studies are based on a bibliometric analysis [14,15] but they focused on a single combination of words, resulting with exclusion bias.

For the abovementioned reason, the research objective in this paper is a qualitative and quantitative analysis of the dynamics of global research in the last 34 years (from 1983 to 2017) to determinate the current state of scientific production about *"competitiveness"* in the context of international trade. In order to achieve this aim, bibliometric methods were employed. Bibliometric analyses allow the main elements of a research topic to be identified, organized, and analyzed. Moreover, it makes it possible to detect the most productive agents in the research field, authors, institutions, or countries, which may help to identify the agents that are the main driving force behind a field of research. Thus, this study contributes to the literature in several ways. First, the main trends in competitiveness research are identified, showing the evolution of the term. Second, the connection of the concept with environmental issues and sustainability are highlighted, proposing future research initiatives. We present a theoretical overview of the main approaches of the concept of competitiveness, as detailed in the next section. Subsequently, we explain the bibliometric methodology carried out. After that, the main results are presented and analyzed. Finally, discussion and conclusion sections are presented.

2. Theoretical Background

The most influential theories associated with competitiveness (Figure 1), according to its evolution over time, indicate that we are dealing with a concept that has been evolving from the Theory of Comparative Advantages by David Ricardo in the 19th century, to The Theory of Competitive Advantages by Michael Porter (1990) [16], and The Theory of Systemic Competitiveness developed by Esser, Hillebrand, Messner, and Mayer-Stammer (1996) [17], which arose as a challenge to the neo-liberal view of competitiveness focused on isolated companies and macroeconomic determinants.

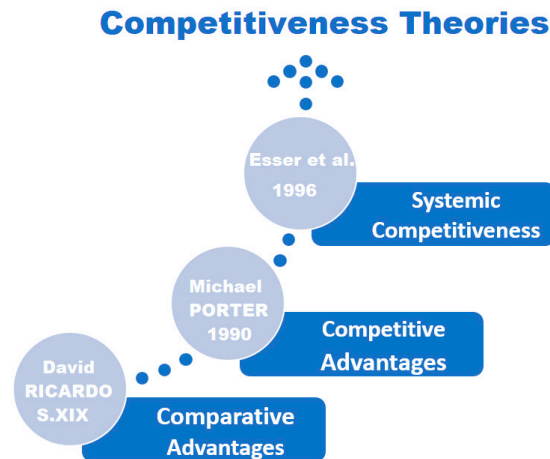


Figure 1. Competitiveness theories. Source: own elaboration.

According to Latruffe (2010) [1], several schools of thought have proposed their own definitions of competitiveness, such as the international–commercial economy corresponding to the macroeconomic level and the school of strategic administration on a microeconomic level. From the beginnings of the definition of competitiveness, the concept became stratified on different levels (Figure 2), considering the capacity of a country to compete on an international level or to guarantee high profitability for the companies that make up the business fabric of a country both in its internal as well as external markets, or to gain market share on a worldwide level, or in determined natural markets or otherwise, through Regional Commercial Agreements (RCA) underwritten by the World Trade Organization (WTO). The Theory of Systemic Competitiveness postulates the impossibility of companies being able to compete and raise productivity (generate competitive advantages) without an innovative environment created by the actions of companies, business associations, the State, and other social actors. According to Bianco (2006) [18], not only do companies compete in the international market along with other actors, but they also come up against productive systems, institutional schemes, and social bodies, in which the company constitutes an important element, but is integrated in a network of links with the educational system, the technological infrastructure, management–workforce relationships, public and private institutional apparatus, the financial system, among others. However, this theory is in opposition with a scientific current that opposes the existence of competitiveness on a national level, led by Krugman (1994) [5], who sustains that competitiveness is a concept only applicable on a company level. This author deems that concerns about competitiveness on a national level are almost totally unfounded from an empirical point of view, and are dangerous in terms of the policies implemented to improve it. Initially, between the macroeconomic and the microeconomic focus, Cook and Bredahl (1991) [19] proposed three levels of competition, instead of two, international markets, the domestic market for products and the domestic market for resources. Subsequently, Esser et al. (1996) [17] proposed that competitiveness is based on the interaction between four levels: meta, macro, meso, and micro. The meso level implies the sociocultural aspects, value scales, traditions, and the patterns of social organization. The macro level refers to the political system, via the different policies implemented, both social and economic, including environmental orientation. The meso level includes the relationships established between public and private sector institutions, and third-party sectors for the development of competitiveness. The micro level is made up of a country's companies, its capacity for innovation, its management capacity, its business strategies, the incorporation of technology, production improvement practices, and business logistics. Adaptation between macro and micro levels are very relevant for specifying associative projects and local development policies.



Figure 2. Conceptualization levels in competitiveness. Source: own elaboration.

Subsequently, Bianco (2006) [18] extended the proposal to five levels of stratification for analyzing competitiveness, depending on the subject being studied, competitiveness on a company level (Krugman, 1994) [5], industrial (Ferraz et al., 1995) [20], sectorial (Chudnovsky and Porta, 1990) [21], regional or economic regional (Huggins et al., 2006) [22] or national (Scott and Lodge, 1985; CEPII, 1998) [23,24] level can be mentioned. Furthermore, this same author related microeconomic and macroeconomic focuses to internal and external markets. Thus, he determined four quadrants of levels for defining competitiveness (Figure 3). On a microeconomic level, companies participate in the domestic market by importing factors and in external markets by exporting their production. He called this competitiveness “commercial microeconomic competitiveness” (Quadrant A). He also considered a “microeconomic competitiveness of wellbeing” which implies not only gaining a larger share of the market but also an improvement in the profits of the companies associated with the increased share (Quadrant D), which may not only be through the efforts of the company itself (product differentiation, greater capital and labor productivity, the introduction of innovations in the cost reduction process, et cetera), but also in transfers obtained from the State (subsidies, tax relief, preferential interest rates, etc.), which, although they may imply an improvement in profitability, do not imply a sustainable improvement in their competitiveness. Macroeconomic, by contrast, he distinguished as being the scope of a country, according to a more restricted concept mainly related to international trade, or a broader one that also takes into consideration the objective of raising the public’s standard of living. Therefore, a country’s competitiveness can be expressed merely as its participation in the world market, which he called “commercial macroeconomic competitiveness” (Quadrant B), or commercial performance on a worldwide level added to the improvement in a nation’s income or the quality of life of its people, called the “macroeconomic competitiveness of wellbeing” (Quadrant C). Bianco (2006) [18] argued that commercial macroeconomic competitiveness can be seen as the sum of the individual commercial competitiveness of the companies operating in it as it is the capacity of the national market to place their products on the international market, being nothing more than a mere extension of the concept of commercial microeconomic competitiveness to the national sphere. However, in this case we are dealing with a very limited definition of competitiveness as a phenomenon of national reach, whilst countries are not necessarily subject to the same type of competition as companies and it may be the case that the growth of some is not detrimental to others as usually happens on the microeconomic level. In this sense, if we set aside the “competitive focus”

implicit in the previous definition and move towards a “co-operative focus”, competitiveness can be seen as a set of conditions that are propitious for growth on which public action can have a positive influence, not only on the country that applies it, but can also generate externalities for other national spheres. Finally, Latruffe [1] presents a classification of the concept of competitiveness ex ante or ex post as recommended by some authors [25,26]. Ex post competitiveness measures the result of competence while ex ante measurement reflects potential competitiveness. Ex-post measurements are components based on commercial data (Revealed Comparative Advantage (RCA), Constant Market Share (CMS), etc.). By contrast, a company’s performance indicators (measures of costs, productivity, profitability) are ex ante measurements since they show its capacity to compete. Based on this latter classification, economic literature that investigates competitiveness on a country, region, sector, industry, or company level proposes many different measurements to evaluate it, whether through commercial or performance indicators. Alvarez and Duran Lima [27] compiled most of said indicators in the “Manual of external trade, and commercial policy. Basic notions, classifications, and indicators of position and dynamism edited by the Economic Commission for Latin America (CEPAL) and the Spanish Ministry of Foreign Affairs and Co-operation.



Figure 3. Relationship between microeconomic and macroeconomic approaches with internal and external markets. Source: modified data from Bianco (2006) [18].

Analysis of scientific publications is an essential component in the research process, being a useful tool for analyzing the process of generation and evolution of knowledge, evaluating scientific quality and the impact on the academic world [28]. Bibliometric analysis examines scientific material in an objective, quantitative way, being useful for organizing information in a specific thematic field [29]. Therefore, a bibliometric analysis of competitiveness in the international context should take into consideration the different words or expressions used by the researchers. The term “International competitiveness” is a concept widely used in the current discussion to refer to the performance of a firm, an industry or a country in the international economy [20]. As it relates to the competitiveness of a country in the international market, the expression “national competitiveness” is also used by Scott and Lodge [23], Krugman [5], Majerova and Nevima [30], etc. Finally, the concept of international competitiveness is often used in analyzing countries’ macroeconomic performance [31], and export performance is an ex-post measure of international competitiveness which measures the extent to which countries gain or lose market share in external markets [32]. For the foregoing, many researchers

such as Jambor et al. [33], Bojnec and Ferto [34], Stojcic et al. [35], etc., use the additional expression “export competitiveness” to refer to competitiveness in the international context.

Only two bibliometric studies on competitiveness have been published so far in the International context (Scheme 1). Both bibliometric studies have addressed the search with a single combination of words linked to competitiveness in the international context. Olczyk’s study [14] used TITLE-ABS-KEY (“International competitiveness”) as a search formula and a study by Acevedo et al. [15] applied TITLE-ABS-KEY (“National competitiveness”), so both studies turned out to have exclusion bias.

Title	A systematic retrieval of international competitiveness literature. A bibliometric study	Bibliometric analysis of publications on national competitiveness in the Scopus database	Lack for “competitiveness” in international context
Authors (year) Journal	Olczyk (2016) [14] Euroasian Economic Review	Acevedo et al. (2017) [15] Espacios	
Search formula TITLE-ABS-KEY	“international competitiveness”	“national competitiveness”	“international competitiveness” OR “national competitiveness” OR “export competitiveness”
Number of scientific documents analyzed	1174	447	2293
Period analyzed	1945–2014	1985–2015	1983–2017
Database	Scopus-WOS- Google scholar	Scopus	
Methodology and indexes	Network citation Key-router path Term-co-occurrence	Quality index Quantity index Structure index	

Source: own elaboration.

Scheme 1. Bibliometric studies on international competitiveness. Source: own elaboration.

3. Materials and Methods

For this bibliometric analyses on competitiveness in the international context, the Scopus database was used given that it is the best database for peer-reviewed quotations and bibliography summaries. Containing 20,000 journals reviewed by peers, 370 book series, and 5.5 million academic papers [36]. Furthermore, bibliometric analyses in other knowledge areas highlight the fact that there are a greater number of journals and quotations in Scopus compared to Web of Science [37,38], indicating that Scopus better represents the final sample of scientific studies in a topic of interest. In addition, while 84% of the titles indexed in WoS can be found in Scopus, only 54% of the publications indexed in Scopus can be found in WoS [39].

Although relatively recent bibliometric analysis studies on the topic exist, Acevedo et al. [15] and Olczyk [14], the methodology applied in the search terms was limited, through the use of a single search combination TITLE-ABS-KEY “national competitiveness” or “international competitiveness”, respectively. The searches encompassed 447 and 1174 scientific documents during 1985–2015 and 1945–2014. For this reason, in this study, a search parameter was employed with three combinations of words linked together with logical operators (Figure 4), TITLE-ABS-KEY (“international competitiveness” OR “national competitiveness” OR “export competitiveness”) in order to extend the concept of competitiveness in the context of international trade. The search was limited in time to the period comprising 1983–2017, making the first year of the search coincide with

the first official appearance of the concept of competitiveness and 2017 is the last complete calendar year published, to ensure the reproduction of the bibliometric study. The sample selection of articles analyzed in this bibliometric analysis was undertaken in November 2018. The search was limited to scientific articles and bibliographic reviews, including open access and non-open access documents. With this selection, a total of 2293 scientific documents were analyzed, of which 93.8% were scientific articles and 6.2% were bibliographic reviews. Three types of approaches will be used in this analysis. The quantity approach measures productivity in terms of number of publications. The quality approach measures the impact of a publication in relation to the number of appointments it receives. Finally, the structure approach measures the relationships between the publications (authors, keywords, or other common elements). The reach of this bibliometric study encompasses the analysis provided by the Scopus database itself along with a structural analysis that measures the relationships between the publications, through common key words, authors and institutions [40]. The analysis of scientific production, from the quantitative as well as the qualitative approach, was implemented through the use of Scimat software (v1.1.04, Universidad de Granada, Granada, Spain). Subsequently, the structural analysis was completed with network maps using the VOSviewer processing software (v1.6.9., Leiden University, Leiden, The Netherlands). In keywords network maps, two words were eliminated, “competitiveness” for its generality, and the word “article”. Scopus provides an initial bibliometric analysis quantitatively analyzing the documents, languages, countries, authors, academic institutions, knowledge areas, and keywords found to obtain a global perspective of the evolution of research on competitiveness in an international context. The network maps show international collaboration between different authors, countries, institutions, and keywords. VOSviewer analyzes the relations between highly cited references and productive authors as well as the creation of the knowledge maps of cited references and keywords related to a research topic [41]. This software is a widely used tool for processing keywords [42], for undertaking cluster analysis by means of the visualization of topographical network maps through a coincidence matrix, which enables clustering by co-authorship and by co-occurrence [43], and the depiction of maps of worldwide scientific collaboration [44]. This software also allows clusters of keywords to be obtained for observing their natural clustering, detecting trends and hot research topics [45].

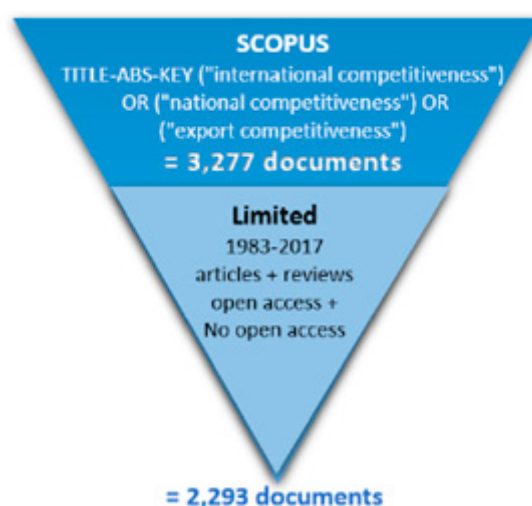


Figure 4. Selection of documents in bibliometric analyses. Source: own elaboration.

4. Results

4.1. Evolution of Scientific Production

The evolution of the number of published articles related to the search is shown in Table 1, as well as some of their main characteristics, such as citations, journals, and countries. The number of articles published on competitiveness has increased from 15 in 1983 to 146 in 2017, but reached the

maximum point of annual publication in 2013 with 148 articles. It should also be noted that 50% of articles have been published in the last 10 years (2008–2017). Figure 5 shows in general that despite some decreases, this field has undergone exponential growth throughout the study period.

Table 1. Evolution of the main characteristics of the published articles related to competitiveness in an international context (1983–2017).

Year	ApY	CpY	Cpy/Apy	JpY	CopY
1983	15	57	3.80	13	3
1984	16	140	6.35	14	3
1985	10	18	5.24	10	3
1986	18	254	7.95	17	5
1987	25	249	8.55	21	8
1988	26	941	15.08	19	8
1989	27	207	13.62	24	6
1990	35	221	12.13	29	10
1991	27	295	11.97	25	7
1992	36	183	10.91	33	8
1993	40	658	11.72	38	7
1994	55	1540	14.43	52	12
1995	43	269	13.49	43	9
1996	51	484	13.01	42	14
1997	54	602	12.80	49	18
1998	75	1061	12.98	67	24
1999	51	1015	13.57	48	19
2000	54	709	13.53	51	19
2001	65	1325	14.15	60	22
2002	68	1387	14.68	66	28
2003	50	815	14.78	48	21
2004	62	1164	15.05	56	33
2005	65	699	14.77	60	25
2006	74	1167	14.84	68	29
2007	93	1238	14.71	87	37
2008	96	1151	14.50	92	38
2009	77	777	14.24	73	38
2010	91	767	13.86	84	36
2011	114	803	13.35	99	37
2012	96	984	13.16	87	35
2013	148	857	12.54	126	34
2014	132	731	12.05	117	44
2015	128	499	11.54	114	45
2016	130	330	10.99	118	55
2017	146	182	10.37	126	55

ApY: Number of articles published per year; CpY: Number of citations per year; Cpy/Apy: Average number of citations per article (citation total since 1983/total of articles since 1983); JpY: Number of journals that published at least 1 article in a specific year; CopY: Number of countries that published at least 1 article in a specific year. Source: own elaboration based on Scopus 2018.

The average number of citations per article (Cpy/Apy) increased from 3.80 in 1983 to 10.37 in 2017. However, it can be observed that this indicator does not show an exponential growth rate, since it fluctuates throughout the years, reaching the highest peaks in the years 1998, 2004, and 2006. Furthermore, the number of journals (JpY) that published at least one article on competitiveness in a specific year has increased from 13 in 1983 to 126 in 2017, demonstrating that the competitiveness theme is well received in a larger group of journals. Finally, the number of countries (CopY) that published at least one article about competitiveness has increased rapidly over the years, from three in 1983 to 55 in 2017.

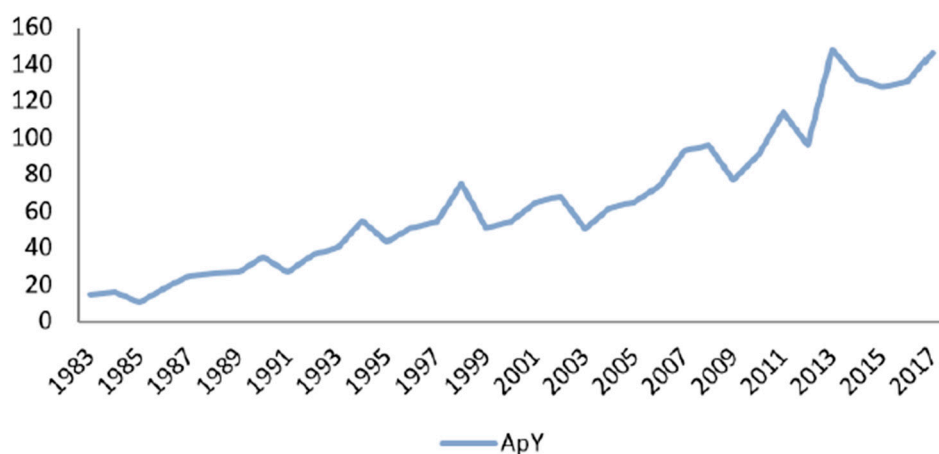


Figure 5. Evolution of published articles per year (ApY) related to competitiveness in international context (1983–2017). Source: modified from Scopus (2018).

4.2. Scientific Production by Knowledge Area and Journals

The scientific documents related to competitiveness in an international context highlight three areas of knowledge (Figure 6) that cover almost 60% of scientific production, these being the social sciences (22%), economics, econometrics and finance (19%), business, management, and accounting (19%). Moreover, the fields of engineering (8%), environmental (7%), agriculture, and biological sciences (5%) are also distinguished, bearing in mind that one article could be classified in more than one area.

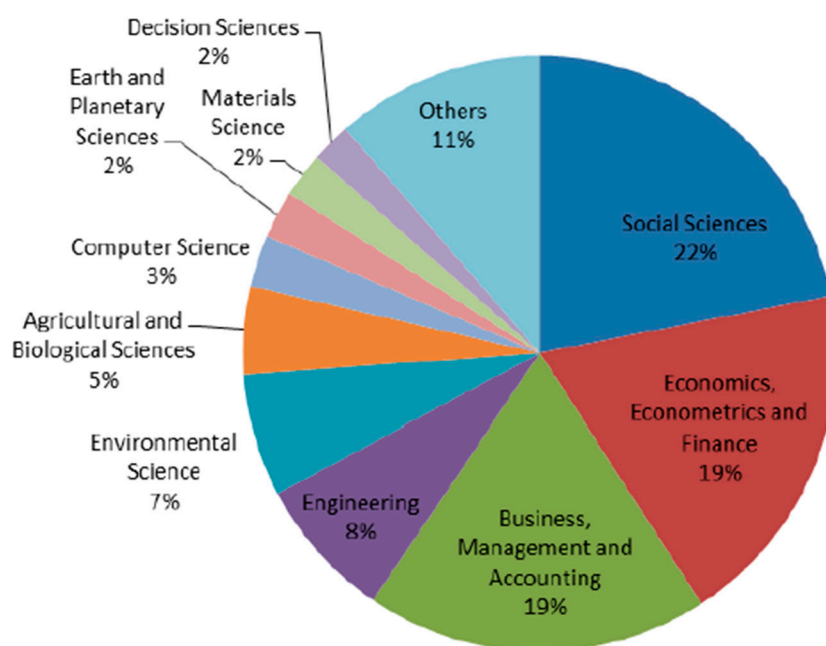


Figure 6. Areas of knowledge that are prominent in the publication of documents (1983–2017). Source: modified from Scopus (2018).

On the other hand, Table 2 shows journals with 10 or more published articles about competitiveness in the international framework from 1983 to 2017. The most productive journal in this field was the *Competitiveness Review* with 24 documents. The first published article (1st A) of this journal about competitiveness was in 1996, and the last published article (Last A) was in 2017. However, within the top five journals with the largest publications on the subject of study, this journal presents the fewest citations per article (C/A) with 5.75 and the lowest h-Index with 6. The second

journal with the largest number of published articles (17) and the one that reached the most citations per article (53.41) and higher h-Index (15) was World Development. Applied Economics also had 17 published articles, but it reached “only” 8.41 citations per article and an h-Index of 8. Science & Public Policy and Technological Forecasting and Social Change complete the top-5 journals with 15 published articles each of them. Actual Problems of Economics also reached 15 publications but received zero citations. It should be noted that it is the most recent journal that publishes articles about the competitiveness theme.

Table 2. Journals with 10 or more published articles from 1983 to 2017.

R	Journal	Countries	A	C	C/A	1st A	Last A	h-Index *
1	Competitiveness Review	United Kingdom	24	138	5.75	1996	2017	6
2	World Development	United Kingdom	17	908	53.41	1984	2014	15
3	Applied Economics	United Kingdom	17	143	8.41	1984	2013	8
4	Science and Public Policy	United Kingdom	15	169	11.27	1988	2015	9
5	Technological Forecasting and Social Change	United Kingdom	15	177	11.80	1993	2017	8
6	Actual Problems of Economics	Ukraine	15	0	0.00	2008	2014	0
7	Research Policy	Netherlands	14	1.723	123.07	1993	2015	12
8	World Economy	United Kingdom	14	139	9.93	1995	2017	6
9	International Trade Journal	Netherlands	14	50	3.57	1989	2017	5
10	Intereconomics	Germany	12	21	1.75	1985	2013	3
11	Energy Policy	United Kingdom	12	362	30.17	1987	2017	10
12	Technovation	United Kingdom	10	395	39.50	1983	2012	7
13	Technology in Society	Netherlands	10	97	9.70	1986	2011	5

* Only sample items. R: ranking; A: number of total articles; C: number of citations for all articles; C/A: average citation per article; 1st A: year of first published article; Last A: year of last published article. Source: own elaboration based on Scopus 2018.

It is interesting to highlight that these journals come from very varied thematic categories, such as development, applied economics, public policy, technology, competitiveness, among others. This diversity lies in the multidisciplinary nature of the study of competitiveness in the field of international trade.

Examining the number of citations reveals the quality of a document (Liao et al., 2018) [45]. Table 3 shows the most cited articles about competitiveness in the international framework from 1983 to 2017. The article by Partha and David [46] ranks first for the number of citations (1159), showing the popularity and influence of this paper in the international competitiveness field [47]. It is also noted, that this article has been published in the journal Research Policy, which is in the ranking of the magazines that have published more articles in this area of research (Table 2). This article studies the strategic importance of science policy issues for national competitiveness and economic security. The second most cited article (336) is a paper by Fagerberg [4], this paper develops and tests a model of differing trends in international competitiveness and economic growth across countries. The paper by Gibb [48] ranks third for the number of citations (330) and explores the political imperative in Europe for the development of the enterprise culture and attributes this mainly to pressures for greater international competitiveness.

In the ranking of the 10 journals that have published more articles on competitiveness in the international context, only 3 have published some of the 10 most cited articles in this area of research, World Development, Research Policy, and Technovation.

Table 3. Top 10 published articles with the most citations about competitiveness in international context from 1983 to 2007.

R	Journal	C	Article	Authors	Last A	C/A
1	Research Policy	1159	Toward a new economics of science	Partha, D., David, P.A.	1994	48.29
2	Economic Journal	336	International competitiveness	Fagerberg, J.	1988	21
3	International Journal of Management Reviews	330	In pursuit of a new 'enterprise' and 'entrepreneurship' paradigm for learning: creative destruction, new values, new ways of doing things and new combination of knowledge	Gibb, A.	2002	20.62
4	Technovation	253	Innovative capability and export performance of Chinese firms	Guan, J., Ma, N.	2003	16.86
5	Journal of International Business Studies	211	E-Commerce readiness: Institutional environment and international competitiveness	Oxley, J.E., Yeung, B.	2001	12.41
6	International Marketing Review	192	Rapid internationalisation among entrepreneurial firms in Australia, Canada, Ireland and New Zealand: An extension to the network approach	Loane, S., Bell, J.	2006	16
7	World Development	184	Competitiveness indices and developing countries: An economic evaluation of the global competitiveness report	Lall, S.	2001	11.5
8	Journal of Intellectual Capital	184	The management, measurement and the reporting of intellectual capital	Guthrie, J.	2001	10.82
9	European Management Journal	175	Effective university - Industry interaction: A multi-case evaluation of collaborative R&D projects	Barnes, T., Pashby, I., Gibbons, A.	2002	10.93
10	Journal of Marketing Management	174	Measures of international competitiveness: A critical survey	Buckley, P.J., Pass, C.L., Prescott, K.	1998	8.7

R: Ranking; C: Number of citations for article; Last A: Year of last published article; C/A: Average citation article per year. Source: own elaboration based on Scopus 2018.

4.3. Scientific Production by Authors, Countries, and Institutions

The author with the highest scientific production regarding competitiveness in the international context was Añón J. with eight documents. His first published article (1st A) was in 1990 and his last one (Last A) in 1998. His papers had not received any citation (C) until this research began, so he reached an h-Index of 0. Porter A.L. and Rugman A.M. had seven published papers. Both began publishing about competitiveness in last years of the 20th century. Table 4 shows the 10 most productive authors in competitiveness research from 1983 to 2017. In the case of Porter A.L., his last published work was in 2017 and in total he reached 15.29 citations per article (C/A) and an h-Index of 6. In the case of Rugman A.M, he was the author with the most accumulated citations with 220 (31.43 per article). It should be nuanced that the other seven authors published their first articles in the first decade of the 21st century and more than the half of them (four out of seven) continued publishing in the last two years (2016 and 2017). These results show that this field is in a period of consolidation. Finally, it should be mentioned that the author who reached the highest number of citations per article is Costantini V. with 32. Furthermore, he was the most recent researcher to join this rank, publishing his first paper about competitiveness in 2013 and accumulating five publications in 5 years.

Table 4. The 10 most Productive authors in competitiveness research from 1983 to 2017.

Author	A	C	C/A	1st A	Last A	h-Index *
Añón, J.	8	0	0.00	1990	1998	0
Porter, A.L.	7	107	15.29	1996	2017	6
Rugman, A.M.	7	220	31.43	1987	2014	6
Buturac, G.	6	28	4.67	2008	2017	3
Bojnec, S.	5	28	5.60	2005	2016	3
Costantini, V.	5	160	32.00	2013	2016	5
Deblitz, C.	5	12	2.40	2000	2005	2
Mikulić, D.	5	15	3.00	2008	2017	3
Salvatore, D.	5	15	3.00	2002	2010	2
Bahmani-Oskooee, M.	4	25	6.25	2007	2013	3

* Only sample items. A: Number of total articles; C: Number of citations for all articles; C/A: Average citation per article; 1st A: Year of first published article; Last A: Year of last published article. Source: own elaboration based on Scopus 2018.

Although Añón J. is the principal author on competitiveness, he works alone in Al-Quds University, Palestine, so he does not appear in the network of relationships between authors (Figure 7). By contrast, Porter A.L., who figures in the ranking as the second most productive author in this area of knowledge (Table 4), and belongs to the Georgia Institute of Technology in the United States, works mainly in an international group with Huang Y., Liu Y. (School of Management and Economics, Beijing Institute of Technology in China) and Zhang Y. (Faculty of Engineering and Information Technology, University of Technology, in Australia).

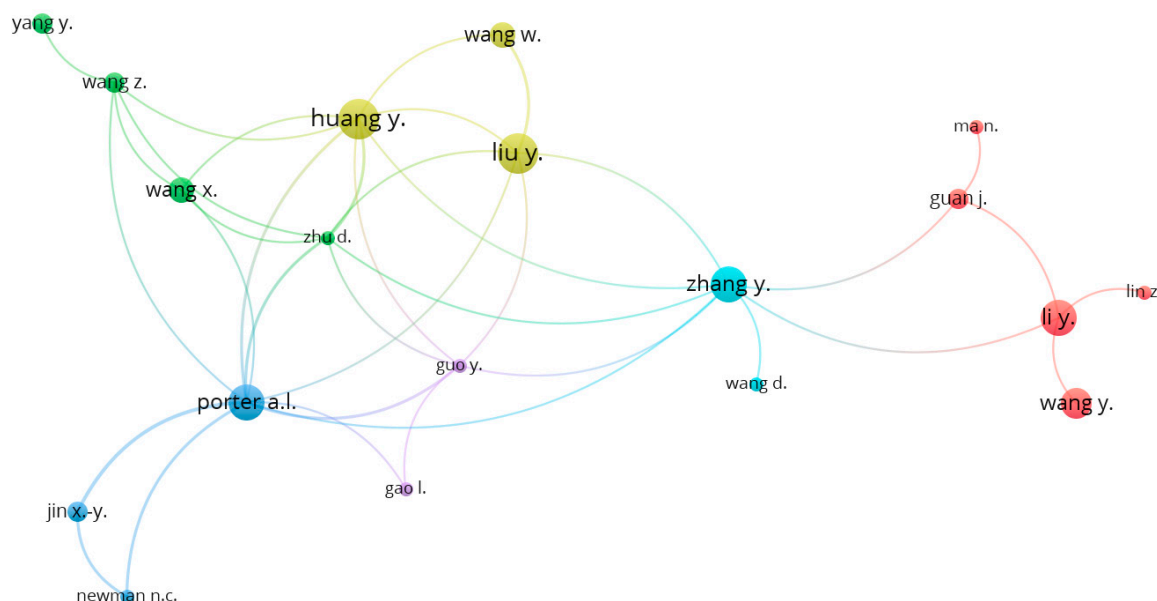


Figure 7. Network of relationships between authors (minimum two documents in common). Source: data from Scopus (2018), generated using VOSviewer.

Table 5 shows the main characteristics of the 10 most productive countries in competitiveness research from 1983 to 2017. The United States stands out in the first place with 373 papers, followed by the United Kingdom with 218 publications, China with 156, Germany with 137, and Australia with 106. Of these 10 most productive countries, four are located in Asia, three in Europe, two in North America and one in Oceania, which shows that this is a topic of interest in several regions of the world. Table 5 also shows the number of articles published per million inhabitant of each country (ApH). Taking this indicator into account, Australia is the country with the best average with 4.28, followed by the United Kingdom with 3.29, and Canada with 1.83. On the other hand, countries such

as China, Japan or Italy had the lowest averages in this indicator. The United Kingdom had the largest number of total citations (C) with 6119, followed by the United States with 5490, and Australia with 1349. Considering the average citations per article, again the United Kingdom is ranked top with 28.07, followed by the United States with 14.72, and Italy with 14.33. By contrast, India (4.44), Germany (7.07), and South Korea (7.08) had the least number of citations relative to the number of published articles. Finally, Table 5 shows the first year (1st A) and the last year that these countries published at least one article about competitiveness. Countries such as the United States, the United Kingdom, and Germany have had publications since the beginning of the study period (1983), while the other countries began publishing between 1984 and 1991. In 2017, all these countries continue to publish on competitiveness.

Table 5. The 10 most productive countries in competitiveness research from 1983 to 2017.

Country	A	ApH	C	C/A	1st A	Last A
United States	373	1.14	5490	14.72	1983	2017
United Kingdom	218	3.29	6119	28.07	1983	2017
China	156	0.11	1109	7.11	1991	2017
Germany	137	1.65	968	7.07	1983	2017
Australia	106	4.28	1348	12.72	1987	2017
South Korea	89	1.73	630	7.08	1984	2017
Japan	81	0.64	633	7.81	1988	2017
Canada	67	1.83	871	13.00	1987	2017
Italy	61	0.10	874	14.33	1990	2017
India	59	0.04	262	4.44	1990	2017

A: Number of total articles; ApH: Number of articles per 1 million inhabitants; C: Number of citations for all articles; C/A: Average citation per article; 1st A: Year of first published article; Last A: Year of last published article. Source: own elaboration based on Scopus 2018.

Figure 8 shows a network that illustrates the international collaboration between the main publishing countries. In these types of figures, the size of the nodes varies according to the number of articles published by each country, while the color corresponds to the cluster formed by a group of countries. As expected, following the results obtained in Table 5, in the network of collaborations between countries that publish documents related to competitiveness, eleven country clusters were formed, but two country nodes stand out, the United States and the United Kingdom, followed by China, Germany, and Australia. Figure 8 shows that British universities work with Turkish and Canadian universities. Finally, the United States forms an isolated cluster.

The main characteristics of the 10 most productive academic institutions in competitiveness research from 1983 to 2017 are presented in Table 6. As can be observed and as expected, British and American universities stand out with the highest scientific production on competitiveness in the international arena. Each of those countries had representation by three universities, while the other four academic institutions represent four different countries. The University of Cambridge takes the first position with 16 Articles. This is followed by the National University of Singapore with 15 articles, and the Seoul National University, and the University of Oxford with 14 papers each. The University of Cambridge had the most citations (C), with 1763 and the greatest h-Index with 12. However, the University of Oxford had the highest average number of citations per article (114.14), followed by the University of Cambridge with 110.19. It is worth noting that nine of the top-10 442 countries began publishing about competitiveness in the last two decades of the 20th century, between 1984 and 1996; the only exception is the University of Primorska, located in Slovenia, which began publishing about the search theme in 2005. Finally, it is important to point out that eight of the 10 academic institutions have published at least one paper in the last two years (2016 and 2017); the exceptions are the University of Cambridge and the government institution of The World Bank.

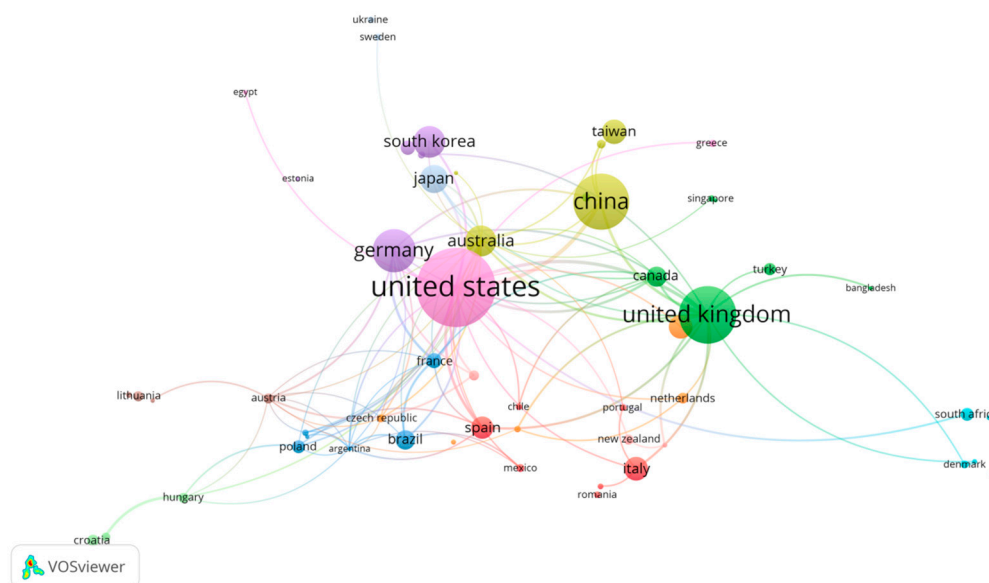


Figure 8. Network of relationships between countries with research teams. Source: data from Scopus (2018), generated using VOSviewer.

Table 6. The 10 most productive academic institutions in competitiveness research from 1983 to 2017.

Institution	Country	A	C	C/A	1st A	Last A	h-Index *
University of Cambridge	United Kingdom	16	1763	110.19	1991	2015	12
National University of Singapore	Singapore	15	203	13.53	1994	2016	9
Seoul National University	South Korea	14	241	17.21	1993	2017	7
University of Oxford	United Kingdom	14	1598	114.14	1994	2017	10
The World Bank, USA	United States	12	245	20.42	1984	2014	6
George Washington University	United States	11	70	6.36	1984	2016	4
Australian National University	Australia	11	146	13.27	1987	2016	6
Georgia Institute of Technology	United States	11	118	10.73	1996	2017	6
University of Primorska	Slovenia	10	64	6.40	2005	2017	4
University of Reading	United Kingdom	10	233	23.30	1984	2016	8

* Only sample items. A: Number of total articles; C: Number of citations for all articles; C/A: Average citation per article; 1st A: Year of first published article; Last A: Year of last published article. Source: own elaboration based on Scopus 2018.

4.4. Scientific Production by Keywords

The 20 most frequently used keywords during the period of 1983 to 2017 are shown in Table 7 in four different sub-periods. Two words were eliminated, “competitiveness” for its generality in itself, and the word “article”. The term most used during the entire study period was “International-competitiveness”. It appeared in 584 different articles, i.e., in more than 25% of the published papers. What is more, in three of the four sub-periods it was the most used term; only the period 1983–1991 ranked second, behind the keyword “International-trade”. In Table 7, the terms “International Competitiveness”, “National Competitiveness”, and “Export Competitiveness” have not been combined, in order to see which term is the most used and, as can be seen, “National Competitiveness” appeared in 8.46% of the articles as a keyword and “Export Competitiveness” in 4.19% (ranks 19), so the sum of these two terms are equivalent to approximately half of those for “International competitiveness”.

Table 7. Top 15 most frequently used keywords from 1983 to 2017.

Keywords	1983–2017		1983–1991		1992–2000		2001–2009		2010–2017	
	A	%	A	%	A	%	A	%	A	%
International-competitiveness	584	25.47	18	9.05	102	22.22	124	19.08	340	34.38
Competition	452	19.71	2	1.01	72	15.69	122	18.77	256	25.88
International-trade	346	15.09	24	12.06	58	12.64	112	17.23	152	15.37
China	208	9.07	4	2.01	12	2.61	72	11.08	120	12.13
Innovation	200	8.72	2	1.01	6	1.31	76	11.69	116	11.73
National-competitiveness	194	8.46	8	4.02	8	1.74	56	8.62	122	12.34
Eurasia	186	8.11	0	0.00	0	0.00	184	28.31	2	0.20
Export	178	7.76	0	0.00	6	1.31	62	9.54	110	11.12
Asia	160	6.98	2	1.01	16	3.49	128	19.69	14	1.42
Europe	144	6.28	4	2.01	16	3.49	96	14.77	28	2.83
Economic-growth	134	5.84	4	2.01	32	6.97	36	5.54	62	6.27
Manufacturing	126	5.49	8	4.02	30	6.54	50	7.69	38	3.84
Globalization	124	5.41	0	0.00	8	1.74	52	8.00	64	6.47
European-Union	114	4.97	0	0.00	8	1.74	50	7.69	56	5.66
Productivity	108	4.71	0	0.00	20	4.36	40	6.15	48	4.85

A: number of total articles; Source: own elaboration based on Scopus 2018.

Regarding, the sub-period 1983–1991 and leaving aside the three terms mentioned above, the most used terms were “International-trade”, “Economics”, and “Manufacturing”, showing the importance of these concepts for the definitions presented in the 1980s. Among the most used terms during the following sub-period (1992–2000) were those which illustrated the growing concern with competitiveness and production together with the economy, such as: “Competition”, “International-trade”, “Economic-growth”, and “Manufacturing”. Furthermore, the terms “Productivity” and “Globalization” appeared for the first time.

In the following sub-period, the use of terms related to countries or regions such as Eurasia, Asia, Europe, and China grew, but the term “Innovation” also gained importance, this being the seventh most important keyword between 2001 and 2009. Finally, in the last sub-period (2010–2017), it can be observed that there is continuity of the use of the majority of terms without any great changes. However, it should be noted that some keywords consolidated their emergence during this sub-period, for example the term “Competition” was the second most used term, presenting a constant growth since the first sub-period. The term “Innovation” also appeared in this sub-period in more publications than in previous sub-periods.

The network of relationships between keywords (co-occurrence) is used to identify the most relevant topics in the published scientific documents that are related to the search. Chen et al. [49] explain that each node stands for a high-frequency keyword, and the sizes of nodes show the frequency of occurrence. The thicker lines mean more frequent co-occurrence, i.e., in how many papers a keyword appears together with another keyword. The shorter the distance is between the nodes, the stronger the relationship they have, for example how many papers these two keywords appear in together, and relatively comparing co-occurrence with other keywords [50]. Figure 9 illustrates the main keywords used and the size of the nodes. Six clusters were identified that group together related keywords, forming groups that are heterogeneous with each other and homogeneous internally. The most common keywords leading the main clusters are: “international competitiveness” (green), “international trade” (blue), “economic development” (red), “technology” (yellow), “science & technology” (light blue), and “environmental policy” (violet), highlighting the European Union as a strong node that seems to spur environmental issues.

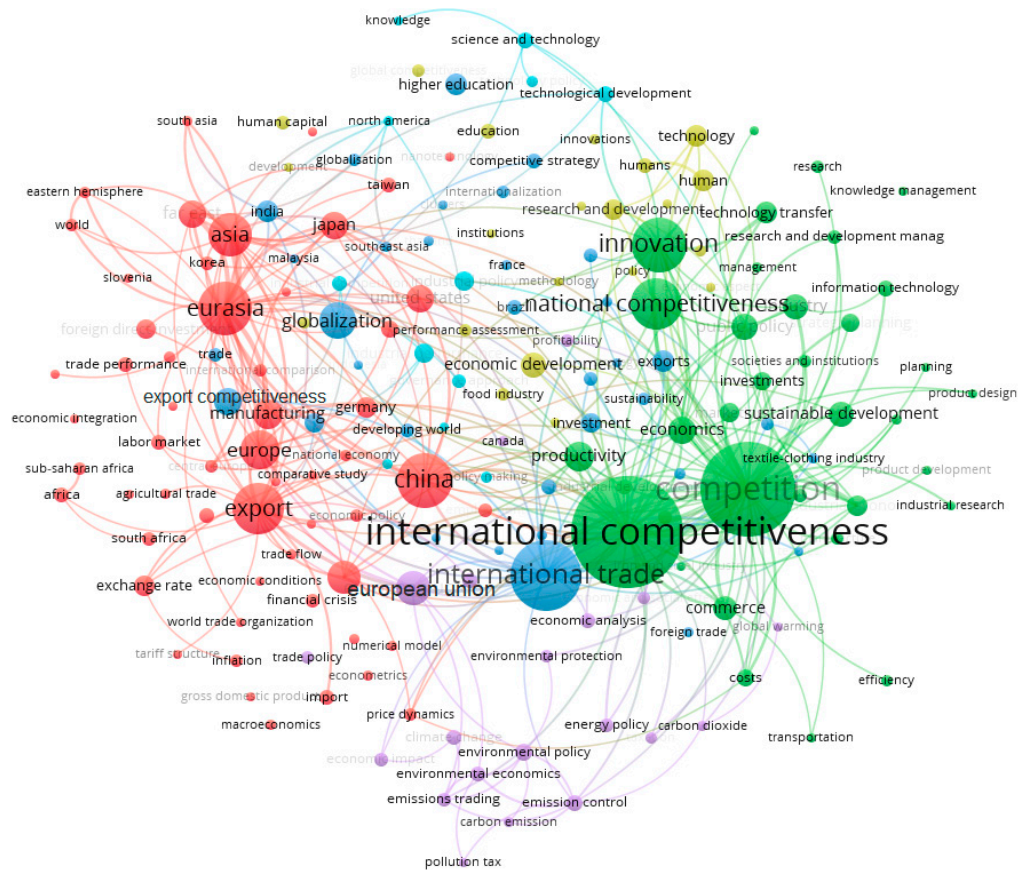


Figure 9. Network of relationships between keywords used in documents. Source: data from Scopus (2018), generated using VOSviewer.

In the initial network of keyword relationships (Figure 9), two types of keywords were identified and although they belong to different clusters, their separate study provides relevant information for analysis. The set of keywords related to topics was separated from the set of keywords associated with different countries, territories, or commercial areas, because it is very usual in these types of researches to place the geographical context where the competitiveness study was carried out. Figure 10 shows only keywords related to topics and the software created seven clusters. The main cluster (blue), continued to be led by “international competitiveness” and the violet cluster by “environmental policy”. However, other clusters are formed, highlighting other keywords such as, “international trade” (red), “innovation” (green), “globalization” (yellow), “commerce” (light blue), and “profitability” (orange). Furthermore, in Figure 11, the keywords in yellow zones indicate the trend of the most recent investigations. Although the keywords trends were distributed throughout the network, forming parts of different clusters, there was a greater abundance of keywords that mark a trend in the cluster formed by environmental topics (emission control and carbon emission) and other topics about commerce, efficiency, economic development, and export competitiveness. In the keywords co-occurrence network, five topics for productive sectors stand out: “transportation”, “iron and steel industry”, “agriculture”, “textile industry” and “food industry”.

The red cluster with the greatest participation of individuals is formed by countries or territories of Southeast Asia (China, Japan, Taiwan, Korea, Malaysia, and Hong Kong) and the Regional Trade Agreement associated with these countries (Association of Southeast Asian Nation, ASEAN). The European countries are in two separate clusters, one group (yellow) is formed by Occidental European countries (the United Kingdom, the Netherlands, Germany, Ireland, France, and Spain) and the other cluster (blue) brings together the countries of Southern Europe (Czech Republic, Slovenia, and Hungary). The South African territories (light blue) are grouped in another cluster. Moreover, the brown cluster is led by the United States linked to the Latin America node. Finally, the last outstanding cluster formed (green), by countries such as Brazil and India (BRICS), together with Australia and Turkey. In Figure 13, the keywords trends are also distributed throughout the network forming parts of different clusters, although recently they highlight documents based on competitiveness in the international context in ASEAN, the OECD (The Organisation for Economic Co-operation and Development), Latin America, and countries such as Croatia, Indonesia, Bangladesh, and Netherlands.

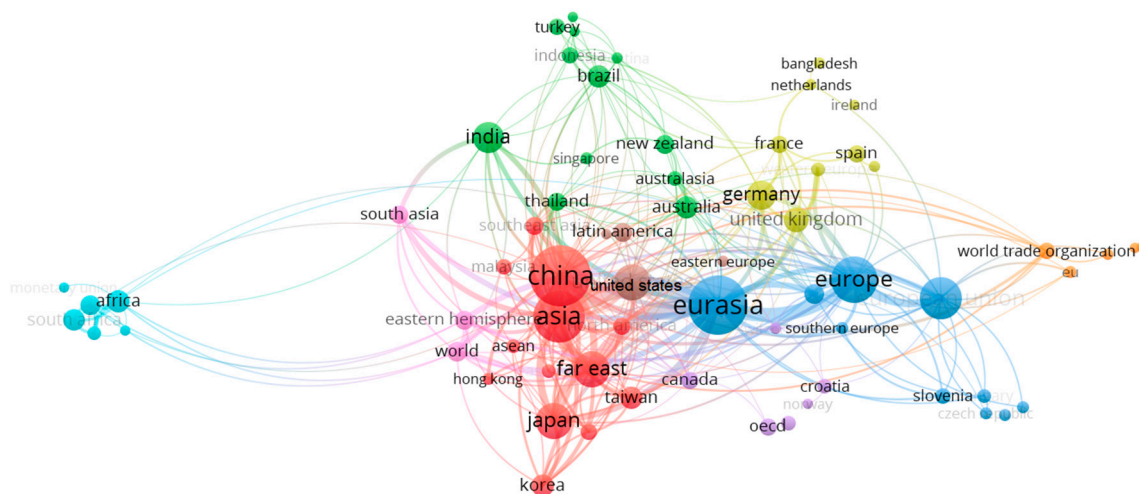


Figure 12. Network of relationships between keywords associated with geographical areas. Source: data from Scopus (2018), generated using VOSviewer.

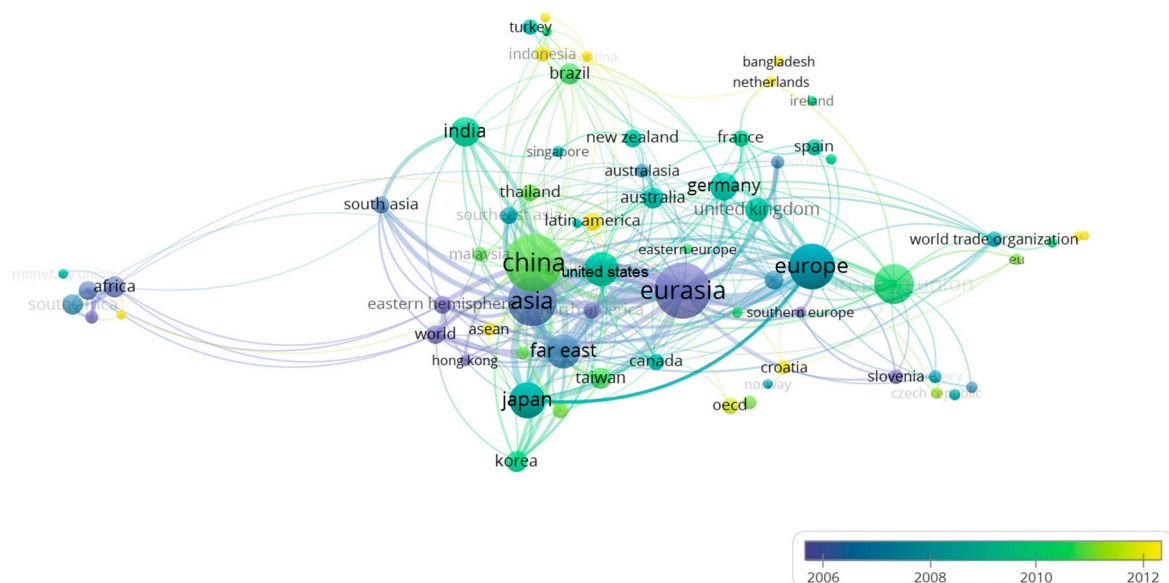


Figure 13. Network of relationships between keywords associated with geographical areas according to their temporal evolution. Source: data from Scopus (2018), generated using VOSviewer.

5. Discussion

Although our results may seem similar to previous studies [14,15] in general terms, if we delve into the analysis, our results differ from them. Generally speaking, our results support findings by Acevedo et al. [15] regarding the fact that the United States is the most productive country of scientific papers about competitiveness. Although the United Kingdom shows the largest amount of high-quality studies, measured through the number of citations per article. Specifically, our findings indicate that the number of citations per article of British origin (28.07) are almost double those from the United States (14.72). By contrast, the findings by Acevedo et al. study [15] show that the number of citations per article of British origin (37.71) is nearly seven times higher than their United States counterparts (5.63).

With regards to journals that published more articles based on competitiveness, our findings coincide with previous studies [14,15] in the sense that these journals are from the United Kingdom. Nevertheless, the journals are not the same. While Acevedo et al. show that *Technology Analysis and Strategic Management*, *Technological Forecasting and Social Change* and *Technovation* are the reviews publishing the highest number of papers based on competitiveness; Olczyk [14] states that *American Economic Review*, *Economic Journal* and *Journal of International Economics* are the most relevant journals based on the number of citations. However, our results indicate that *Competitiveness Review*, *World Development* and *Applied Economics* are the leading journals on the topic of competitiveness, taking into consideration the number of articles published. What is more, *Research Policy*, *World Development* and *Technovation* are the more outstanding journals concerning the number of citations achieved.

According to Acevedo et al. [15], the most productive author is Sohn, S.Y. and Porter, A.L. is the author who has the highest number of citations and the highest h index. By contrast, Olczyk [14] states that Krugman P. and Fagerberg J. are the authors with the higher number of citations per paper. However, our results do not support those findings. According to our results, Añón J. seems to be the most productive author and Rugman A.M. appears to be the author with more citations per paper. Moreover, Porter A.L. together with Rugman A.M. have the highest h-index.

Finally, our findings support Acevedo et al.'s results [15] concerning the areas in which competitiveness studies have most impact, these being competition and innovation. Furthermore, international trade is coincident with Olczyk 's results [14].

The present study differs from others [14,15] due to several reasons. First, the amount of papers analyzed is higher because of the search formula applied. Second, we use a longer time period, which allows us to take into account a broader search and to avoid the exclusion bias in articles based on competitiveness.

6. Conclusions

The objective of this study was to review the last 34 years of research on competitiveness in the international context, from its formal inception in 1983 to 2017. A bibliometric analysis was carried out with a sample of 2293 scientific reports in total. Moreover, the paper examined the previous bibliometrics regarding competitiveness in an international context. Due to the fact that previous studies suffer from exclusion bias [14,15], the results differ from each other and it is necessary to use combined search phrases. A search parameter with three combinations of words linked together with logical operators was used, TITLE-ABS-KEY (“international competitiveness” OR “national competitiveness” OR “export competitiveness”), in order to extend the concept of competitiveness in an international context.

The literature about competitiveness in an international context increased until 2013, more than 138.7% during the 10 years previous to 2013. Scientific documents related to competitiveness in the international context highlight three knowledge areas that cover almost 60% of the scientific production, Social Sciences; Economics, Econometrics and Finance; and Business Management and Accounting.

What is most striking is the fact that the most productive authors and journals are not the most cited on competitiveness. The top journals with the largest number of publications on competitiveness

are *Competitiveness Review*, *World Development* and *Applied Economics*, while the most cited were *Research Policy*, *World Development* and *Technovation*. Examinations of the citations indicates that the most influential and cited article on competitiveness is the one by Partha D. and David P.A. [46] published in *Research Policy* and titled “Towards a new economics of science”. Furthermore, the author with the highest scientific production on competitiveness is Añón and Rugman A.M. is the most cited author. Nevertheless, the bibliographic coupling of authors indicates that Porter A.L. stands out as the author who works most internationally, especially with South East Asian universities.

Regarding the countries that have published the most number of articles, the United States, the United Kingdom, and China lead the ranking of the most productive countries. Although, taking into consideration the number of citations and h-index, the United Kingdom’s institutions are the most influential. Furthermore, the University of Cambridge from the United Kingdom, the National University of Singapore, and the Seoul National University from South Korea seem to be the most productive research centers on competitiveness.

This paper is pioneering in the method in which the keyword analysis is carried out. To the best of our knowledge, there are no previous studies in this vein. Our keyword study is based on the separation of geographical areas from the topics themselves, thereby generating two different groups of keywords. This fact gives added value to economic studies that focus mainly on a geographical area. On the one hand, the topic keyword analysis highlights six clusters. These clusters are focused on different subjects, namely “international competitiveness”, “international trade”, “innovation”, “globalization” “environmental issues” and, “profitability”. On the other hand, in geographical keywords analysis, the competitiveness studies are based mainly on South East Asian countries. What is more, western European countries are studied separately from oriental ones, while emerging countries (BRICS) are studied together. Finally, this study improves our understanding of how the competitiveness concept and the current research trends have been developed. In particular, the latter studies shed light on the fact that the research on competitiveness and environmental issues go hand to hand.

This paper is not exempt from limitations. Especially those relating to bibliometric studies that should be taken into account, namely quality of citations (excessive, erroneous or self-citations) and selection of documents/journals (changes in journal titles, spelling differences and errors, inconsistencies about indexing of subjects) [51]. It would be interesting to use TITLE-ABS-KEY as a search formula (“sustainable competitiveness” OR “competitiveness” AND “sustainability”) to be studied by bibliometric analysis as a new line of research derived from the evolution of the competitiveness concept and the main research trend identified with environmental issues in our study.

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