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## **Bibliometric analysis of the world scientific production on emotional intelligence (2000-2021)**

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**Abstract**--The aim of the study is to characterize the worldwide scientific production on emotional intelligence in the Scopus and Web of Science databases. The study is quantitative with bibliometric methodology. Its scope is descriptive and retrospective. The unit of study was considered to be the world scientific production generated on emotional intelligence, in the period from 2000 to 2021. A total of 2000 documents from the Web of Science database and 2000 from Scopus were analyzed. Regarding the number of authors, Scopus presents 4053 and Web of Science 4190 authors. The rate of collaboration between authors is slightly higher in Web of Science (2.26) compared to 2.22 in Scopus. The article "The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study" stands out as the most cited document in this period and Konstantinos Petrides of University College London as the author with the highest number of publications on emotional intelligence. The journal *Personality and Individual Differences* (Elsevier) is the medium with the largest number of documents on the subject. The United States is the main producer of scientific evidence, highlighting its collaborations with the United Kingdom. The type of scientific production that stands out most is original articles. It is

concluded that this study, unlike the previous ones, evaluated the two most important databases, generating a complete and comparative analysis highlighting the global trends in research related to emotional intelligence.

**Keywords**--bibliometric indicators, scientific production, emotional intelligence.

## Introduction

The concept of emotional intelligence (EI) was established more than 30 years ago, and since then it has been developing and gaining popularity and visibility among researchers and professionals in various areas. According to the definition suggested by Salovey & Mayer (1990), EI is "the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, discriminate between them, and use this information to guide thought and action" (p. 189).

EI is considered a set of skills ordered hierarchically from a lower level (perception of emotions) to a higher level of complexity (management). Skills influence people's ability to interact with others in an appropriate way, to communicate in an effective way, to manage conflicts, to handle stressful situations, to create a positive work environment, among many other aspects (Sánchez-Gómez, 2019). Based on this definition, EI can be considered an important personal resource to achieve a better perception, acceptance and regulation of negative emotions that help people to protect themselves against syndromes such as *burnout* (Schoeps et al., 2021; Suárez & Martín, 2021) or bullying (Rey et al., 2018).

But it was not until 1995 when Daniel Goleman popularized this concept, considering emotional intelligence as a much more important skill than intellectual intelligence, since those who use and manage their emotional and social world better will achieve greater occupational, personal, academic and social well-being. Over the years, the popularity that Goleman gave to EI materialized in self-help books and in various studies that proposed ways to assess it and to establish new components for its analysis (Bar-On, 1997; Cooper & Sawaf, 1997; Shapiro, 1997; Goleman, 1998; Gottman, 1997). This wave of proposals had a common point: to consider EI as the component that helps people to lead their lives in a much easier way and to achieve happiness. However, it was not until the year 2000 that scientific evidence of the effects of EI on people began to emerge. From this period, the studies of Mayer et al. (2000) and Salovey et al. (2001), who developed models and instruments for a better understanding and assessment of EI, stand out.

Currently there are important studies within the field of Emotional Intelligence that have received special attention due to the scope and relevance of their findings. Of note, for example, are studies that address the problem of emotion detection by programmed machines and emotional text processing (Picard et al., 2001; Liu et al., 2019), those that relate emotional intelligence in leadership and management studies, as well as with competitive intelligence, sport, social

learning and organizational performance (Wong & Law, 2002; do Prado & de Campos, 2018; Cristóvão et al., 2017; Campos et al., 2018; Martínez et al., 2013), the search for and explanation of the main approaches that shape a modern theory of emotional intelligence (Mayer et al., 2008; Mayer et al., 2004; Mayer et al., 2003), its importance in regulating emotions and those of others to enhance happiness and well-being and prevent psychological maladjustment (Fernandez-Berrocal & Extremera, 2016; Hill et al., 2015; Tucker et al., 2015), its relationship with traditional bullying and cybervictimization (Elipe et al., 2015; Garaigordobil & Oñederra, 2010; Lomas et al., 2012), among the most salient.

The boom in bibliometrics since the late 1960s is reflected in remarkable academic activities. Its use is closely related to advanced information technology, to the development of computer science and technology and, especially, to the worldwide availability of large bibliographic databases. Bibliometric studies are very useful to obtain relevant scientific information on a topic, since it allows quantifying and organizing it by highlighting components such as authorship, keywords, collaborative networks, among others (Aria & Cuccurullo, 2017; Arias-Chávez et al., 2021; Holden et al., 2005).

Bibliometrics is the quantitative method of citation and content analysis for academic journals, books and researchers. The quantitative impact of a given publication is assessed by measuring the number of times a given work is cited by other resources. By implication, it can measure the influence or "impact" that a given work has on the rest of the scholarly literature, which facilitates the selection of journals in which to publish. Knowing where to publish helps the researcher to increase the impact of his or her work as well as its visualization (González-Sala et al., 2017). Bibliometrics as a technique to evaluate scientific production, should always be complemented with qualitative peer review and a strong argument about impact in a personal statement.

The analysis of publication patterns allows precise comparisons to be made between authors, countries and types of publication, as well as the media with the highest production on a topic. The data obtained from the analysis is extremely useful for the social sciences where the publication landscape is broader than in other sciences such as, for example, the biomedical sciences (Glänzel & Schoepflin, 1995; 1999). The specific objectives of this paper are, first, to provide bibliometric information on EI production in the Scopus and Web of Science (WoS) databases, list the most cited articles, specify the authors with the highest scientific production, specify the scientific journals with the highest number of articles on the subject, indicate the types of publications with the highest presence in the databases analyzed and determine the countries with the highest production of scientific documents.

## **Material and Methods**

This is a quantitative study with bibliometric methodology. Its scope is descriptive and retrospective. The unit of study was considered to be the world scientific production generated on EI in the period from 2000 to 2021. For this study, the Scopus and WoS databases were considered and their bibliometric indicators were calculated using Bibliometrix R software and the database managers

themselves. The TITLE (intelligence AND emotional) AND (LIMIT-TO ( PUBYEAR, 2021-2000) formula was used for the search strategies. The WoS database is one of the oldest databases whose articles generate the greatest academic impact worldwide. In the case of Scopus, this rises as the base with the largest directory of scientific publications in the world (Perez, 2017). Scopus, like WoS, has a large number of indexed journals and is one of the most widely used for bibliometric studies (Osca-Lluch et al., 2013).

The search and selection process was carried out in five phases: (a) use of the search software and access to the databases, (b) validation and use of the search equations, (c) verification and identification of journals in each database, (d) cross-checking of information from the results of the articles with the journals in which they were published, and (e) recording of the final information (Rivas et al., 2021). The results were reviewed individually, forming a final sample of 3379 results in WoS and 6073 in Scopus. The data obtained were exported in RIS and CSV formats. A representative sample of 2000 articles was obtained for each database, which were then processed and analyzed using Bibliometrix R software and Vos Viewer software. The bibliometric indicators considered for the research were based on general information about the data, authors and author collaboration. The results were presented in tables and figures in order to address the stated objective.

## Results

Table 1 shows the information on the main bibliometric indicators extracted from the Bibliometrix R software on IE. A total of 2000 documents were obtained from the WoS database and 2000 from Scopus, extracted from 717 and 790 sources respectively. A favorable average number of citations was generated for Scopus (43.70 for WoS and 55.16 for Scopus). The average number of citations per document therefore favors Scopus (4.582). Regarding the number of authors, Scopus presents 4053 authors and WoS, 4190. The collaboration index between authors is slightly higher in WoS (2.26) compared to 2.22 in Scopus. Finally, WoS presents 2497 keywords and Scopus 2601.

Table 1. Bibliometric information on EI in Scopus and WoS (2020-2021)

Description	WoS	Scopus
<b>Main data information</b>		
Sources	717	790
Documents	2000	2000
Average number of years since publication	8.78	10.30
Average number of citations per document	43.70	55.16
Average number of citations per year per document	3.914	4.582
References	1	1
<b>Authors</b>		
Authors	4190	4053
Authors' appearances	6271	6202
Authors of single-authored documents	179	223
Authors of multi-authored documents	4011	3830

Collaboration of authors		
Documents by Author	0.477	0.493
Authors per document	2.10	2.03
Co-authors per document	3.14	3.10
Collaboration index	2.26	2.22
Content of the document		
Keywords (ID)	2497	2601
Author's keywords (DE)	3207	2945

Note: Information obtained from Bibliometrix R (2022).

Regarding the global scientific production by years (see Figure 1), it is observed that Scopus presents a higher production from 2000 to 2015. However, since 2016, the WoS database production predominates. From 2019 onwards, a decrease in scientific production on IE is observed in both databases.

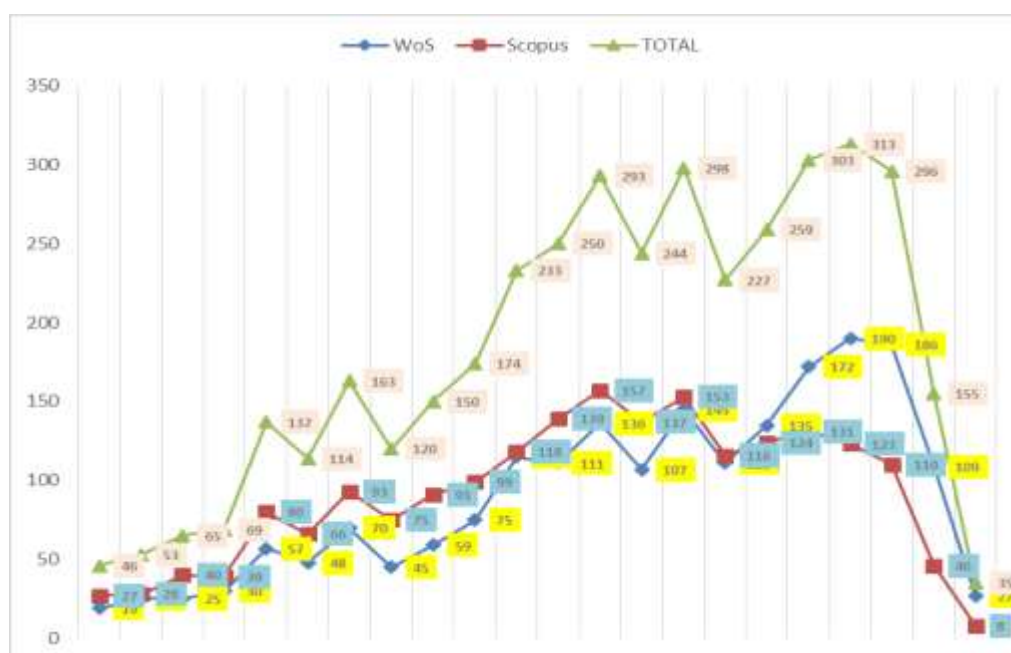


Figure 1. Annual production. Data obtained from Bibliometrix R (2022)

Table 2 shows the list of the most cited articles in the WoS and Scopus databases. The study by Wong, CS and Law, KS, authors affiliated with the Department of Management of the Chinese University of Hong Kong and the Department of Organizational Management of the Hong Kong University of Science and Technology, entitled "The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study", which has received 1415 citations in Scopus and 1221 in WoS since its publication in 2002 in the journal *Leadership Quarterly* (Elsevier), a social science journal dedicated to improving the understanding of leadership as a phenomenon, stands out. Also noteworthy is the article "Toward machine emotional intelligence: Analysis of affective physiological state" by Picard, RW; Vyzas, E and Healey, J., which has 1464 citations in Scopus and 1126 in WoS. The article was published in the *IEEE*

Transactions on Pattern Analysis and Machine Intelligence (IEEE Computer Society), October 2001.

Table 2. Five most cited articles on EI in Scopus and WoS

N°	Authors	Title	Quotations		Year	Source
			Scopus	Wos		
1	Picard, RW; Vyzas, E. and Healey, J.	Toward machine emotional intelligence: Analysis of affective physiological state. The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study.	1464	1126	2001	Educational Researcher
2	Wong, CS and Law, KS.	Human abilities: Emotional intelligence	978	882	2008	Annual Review of Psychology
3	Mayer, J.D., Roberts, R.D., and Barsade, S.G.	Measuring Emotional Intelligence with the MSCEIT V2.0	921	815	2003	Emotion
4	Mayer, J.D., Salovey, P., Caruso, D.R., & Sitarenios, G.	Emotional intelligence: Theory, findings, and implications.	912	809	2004	Psychologica l Inquiry
5	Mayer, J.D., Salovey, P., Caruso, D.R.					

The table 3 shows the authors with the highest number of publications. In the case of WoS (63) and Scopus (66), Konstantinos Petrides of University College London stands out as the author with the highest number of publications on IE.

Table 3. Authors with the highest number of publications in WoS and Scopus

WoS		Scopus	
Petrides K	63	Petrides K	66
Extremera N	50	Extremera N	50
Fernández-Berrocal P	42	Fernández-Berrocal P	45
Saklofske D	28	Salovey P	33
Roberts R	27	Saklofske D	32

With respect to the journals with the highest number of published documents (see Table 4), Personality and individual differences (Elsevier) stands out, with 213 publications in Scopus, while in WoS it has 231 publications. It is followed by Frontiers in psychology (Switzerland) with 48 documents in Scopus and 70 in WoS; and Psicothema (Spain) with 28 documents in Scopus and 29 in WoS.

Table 4. Journals with the highest number of publications in WoS and Scopus

Scopus		WoS	
Personality and individual differences	213	Personality and individual differences	231
Frontiers in psychology	48	Frontiers in psychology	70
Psicothema	28	Psicothema	29
Nurse education today	23	International journal of environmental research and public health	27
Emotion	22	Nurse education today	26

Regarding the types of documents published in the two databases analyzed (see Table 5), original scientific articles predominate (1850 in WoS and 1792 in Scopus), followed by *reviews* with 112 in Scopus and 75 in WoS.

Table 5. Types of publications in WoS and Scopus

WoS		Scopus	
Article	1850	Article	1792
<i>Review</i>	75	<i>Review</i>	112
Editorial Material	36	Proceedings paper	40
Proceedings paper	26	Book chapter	37
Book chapter	3	Note	9

With respect to the countries of origin of the research (see Table 6), both databases highlight the United States, followed by the United Kingdom and Spain, which exchange their positions in the Scopus and WoS databases. Figure 2 shows the country of the corresponding author and the intra-country (SCP) and inter-country (MCP) collaboration. The United States leads in both intra-country (SCP) and inter-country (MCP) collaboration, with 382 to 81 publications in WoS and 381 to 70 in Scopus.

Table 6. Countries of origin of publications in WoS and Scopus

Scopus		WoS	
United States	1241	United States	1544
United Kingdom	484	Spain	907
Spain	459	United Kingdom	670
Australia	286	China	510
Canada	226	Australia	417

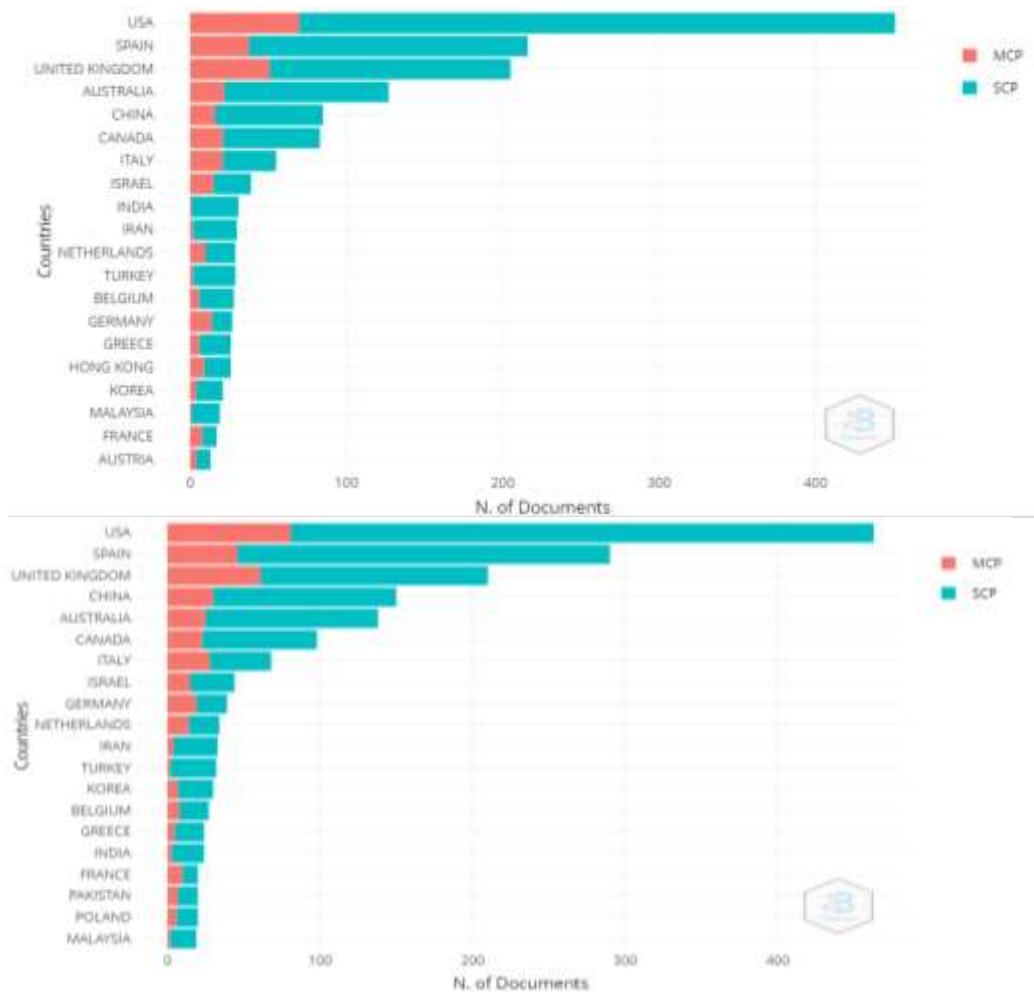


Figure2 . Country of correspondence author. Intra-country (SCP) and inter-country (MCP) collaboration during 2000-2021.

Finally, regarding the network analysis of the titles and *abstracts of the* Scopus database (see Figure 3), we observe the creation of 8 clusters, 641 items, 41803 links and a total link strength of 158426. Cluster 1 (red) is born from *emotional intelligence* with 639 links, cluster 2 (green) with *male* and 10967 links, cluster 3 (blue) with *adolescent* and 461 links and cluster 4 (yellow) with *human* and 612 links.





et.al (2020), Md Hossain et. al (2021), Md Nazirul Islam Sarker et. al (2021) ,Y. Shi et. al (2020), Guobin Chen et. al (2020), Poongodi M et. al (2019), Poongodi M et. al (2020)

The most outstanding publication is the study by Wong, CS and Law, KS, entitled "The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study", which has received 1415 citations in Scopus and 1221 in WoS since its publication in 2002. The author with the highest number of publications is Konstantinos Petrides from University College London. For Akbey (2018), in his bibliometric study on education and EI, the article "Mixed emotions: teachers' perceptions of their interactions with students (2000)" by Hargreaves, A. stands out as the most cited with 329 citations. It should be noted that this article was the second most cited for the present research. Finally, Karakus et al. (2021) in their bibliometric study on emotions in learning, teaching and leadership in the Asian context, highlight DW Chan and M. Zembylas as the main authors.

The field of emotional intelligence (EI) is growing enormously as it plays an important role in all areas of life. Therefore, it is very important to know which are the *top* journals that publish research on the subject in order to understand the current trends. In the present study, the journal *Personality and Individual Differences* (Elsevier) stands out with 213 publications in Scopus and 231 in WoS. It is worth highlighting that in Akbey's (2018) research, the journals *Nurse Education Today* and *Journal of Psychoeducational Assessment* stand out in publications on topics related to EI literature. For Martínez et al. (2013), the most productive journal was the *International Journal of Sports Science & Coaching* followed by *Social Behavior & Personality: An International Journal*.

With respect to the countries with the highest production on emotional intelligence, the United States stands out, followed by the United Kingdom and Spain, which exchange their positions in the Scopus and WoS databases. With regard to collaborations between countries, the United States and the United Kingdom stand out in Scopus (31 in WoS and 32 in Scopus) and between the United States and Australia (30 in WoS and 27 in Scopus). This is corroborated by Olaley (2020), who confirms in his bibliometric study on visualization of cultural EI literature the United States as the leader with close collaboration with the United Kingdom and Australia.

Regarding the types of scientific documents, original scientific articles predominate (245 in WoS and 463 in Scopus), followed by editorials and *reviews*. As for the network analysis of the titles and abstracts in the WoS database, 7 clusters were created, highlighting *performance*, *personality*, *performance*, *validity* and *emotional intelligence*. Finally, the network analysis of titles and abstracts from the Scopus database showed the creation of 8 clusters. The first cluster is born from *emotional intelligence*, *male*, *adolescent* and *human*. While for Yousaf et al. (2021) the keywords of the top five authors published during 2001-2020 were *EI* with 296 publications, *emotion* (45), *affective computing* (32), *leadership* 23, and *artificial intelligence* with 18.

It is concluded that this study, unlike the previous ones, evaluated the two most important databases, generating a complete and comparative analysis in which global trends in research related to emotional intelligence are highlighted. Based on the databases, the main characteristics concerning publications, authors, sources, collaboration between authors and countries, and network analysis were extracted. Bibliometric techniques were used to extract documents from the last 21 years. The irregular scientific production probably originated by the COVID-19 pandemic is visualized. The United States is the main producer of scientific evidence on the subject, with collaborative research predominating over individual research and the article being the preferred document.

Bibliometric methods make it possible to evaluate unlimited quantities of publications from institutions or countries. It is tempting to replace these quantitative estimates with definitive and undifferentiated statements on scientific quality. However, a true assessment of scientific quality is not obtained simply by analyzing the citation impact of publications, but must also include peer review of the social effects of research (Wallin 2005). The present research has sought to generate a significant number of selected publications, forming a more than representative sample of international research on EI, also considering that scientific production does not stop due to the current situation facing the world. Future research will expand the amount of data through more databases and publications. In addition, to obtain the scientometric indicators using other computer tools that could be more precise than those used in the present research.

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