VISUALISING EMOTIONAL INTELLIGENCE GLOBAL RESEARCH TRENDS USING BIBLIOMETRIC ANALYSIS

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Abstract: The study of emotional intelligence (EI) is a rising trend frequently highlighted in psychology and leadership literature. EI influences performance in the workplace, academics, and personal-socio relationships. Therefore, synthesising and systematic study to understand the topic of interest and related network connections of EI are crucial to broadening the research field towards integrated efforts. The bibliometric analysis evaluates the global research trends in EI based on publication, co-authorship, affiliated countries, and author keywords. This analysis uses the Scopus database to generate data. A total of 5,783 articles published between 1966-2023 were retrieved. The result shows cumulative publications increased from three-digits between 2002and 2010 to four-digits between 2011and 2023. The USA, Spain, and the United Kingdom have the highest number of publications or co-occurrences on EI, with trait EI, leadership, personality, and adolescence as the highest-used author keywords besides EI. However, based on the current trend from 2019 to 2023, resilience, prosocial behaviour, sustainability, and Covid-19 are high on the average citations and co-occurrences. In conclusion, the bibliometric analysis provides an overview of the current trend in the EI research field based on the keywords used in the Scopus list of published articles.

Keywords: Bibliometric analysis, emotional intelligence, emotional quotient, VOSviewer, Scopus database.

Introduction

Emotional intelligence (EI) could be considered a growing phenomenon even if the concept existed more than 56 years ago and only picked up from 1998 onwards. EI can be broadly referred to as the ability to be aware of one's own emotional state as well as that of others and to regulate and use emotions to act appropriately. The term EI was coined by Salovey & Mayer in 1990. They posited that EI is a subset of social intelligence (Salovey & Mayer, 1990). Emotions are connected to intelligence in some ways, where emotions can alter thinking in many ways (Mayer & Salovey, 1997). The EI concept gained further popularity in public and business circles when Daniel Goleman's EI theory became a New York Times bestseller in 1995 (Joseph *et al*., 2015). According to Clarke (2010), significant research has linked EI with various work-related behaviours. Meanwhile, Kotsou *et al*. (2018) systematic literature review found that EI is closely linked to work-related and relationship-related outcomes.

Although more and more research focuses on EI, only a few are dedicated to measuring and analysing scientific publications from a global perspective. Yousaf *et al*. (2021)this field is still lacking synthesizing, chronological, and systematic studies focusing on how EI field has flourished. The objective of current study was to extend the state-of-the-art research work in the field of EI, based on bibliometric research studies published during 2000-2020. The result of the study depicted under subsequent perspectives: growth trend of EI, influential institutions, countries, articles, authors, keywords, and journals, and international collaborations. A publication growth in EI research gradually increase but a rapid increase in publication was found from 2017-2019. As a total, 714-research publications were produced

in 579 journals by 1924 authors, which were affiliated with 896 institutions listed in Web of Science (WOS presented research trends on EI for research published during 2000-2020 that are listed in the Web of Science (WoS) database. The authors found that EI, emotion, affective computing, and artificial intelligence are the widely used keywords related to EI research. Krishnan et al. (2020) analysed research trends on EI for publications between 1966-2018 using the Scopus database, where they found that EI, emotions, and personality were the most used key terms. Their study focuses on the research articles containing the keyword 'EI' in the title and abstract. Meanwhile, Campos *et al*. (2018) combine EI with leadership in their bibliometric analysis using the WoS database with articles published between 1980 and 2018. Other bibliometric analyses focus on cultural EI (Olaleye *et al*., 2021) and education-related EI (Akbey, 2018); both analyses also use the WoS database with articles published between 2001-2020 and 1996-2018, respectively.

Many reputable research databases such as WoS, Scopus, and PubMed provide access to journal articles and references. However, the Scopus developer claims to have the most extensive single abstract and indexing database (Burnham, 2006). The Scopus list of titles is based on user demand and market research. For example, in the biomedical field, the Scopus database covers a broader literature, particularly non-English-language sources, but WoS tracks older citations better (Yeung, 2019). Different databases have different characteristics with the possibility of a different outcome (AlRyalat *et al*., 2019). Even though there is a previous bibliometric analysis on EI using the Scopus database, they only used EI as the keyword in the search string. Another frequently used term for EI is emotional quotient (EQ), as used by Daniel Goleman. Thus, using more synonymic terms in the search string (EI and EQ) in the Scopus database will extend the scope of EI bibliometric analysis. Moreover, the Scopus database will cover more titles that may not be available in the WoS database.

EI is the main topic of bibliometric analysis because it has been a topic of interest and discussion among academic and business scholars over the past few decades (Ahsan, 2023). It can be seen that over the years, significant progress has been made in refining the conceptualisation and measurement of EI. The current research topic recognises EI as an emerging trend based on various approaches (Fiori *et al*., 2023). D'Amico & Geraci (2023) introduced the concept of Meta-emotional intelligence (MEI), a multidimensional construct comprising cognitive EI and meta-emotional dimensions such as beliefs about emotions. The World Economic Forum (2023) interpretations and conclusions expressed in this work do not necessarily reflect the views of the World Economic Forum. The report presents information and data that were compiled and/ or collected by the World Economic Forum (all information and data referred herein as "Data" has listed EI as one of the top 10 leadership skills needed in an organisation. The elements of EI, such as self-awareness, motivation, teamwork, and curiosity, are highly sought by businesses. The Scopus publications have also seen high publications in 2022 with 621 publications, and within six months in 2023, the publications in EI have already reached more than 300 publications. The number of publications shows that the focus for EI in the research world is gaining strength and interest in the research community.

The objectives of this paper are i) to analyse temporal distribution patterns of EI journal articles; ii) to show the contributions of prolific authors, leading countries and academic institutions; iii) to highlight common terminology and research topics; iv) to determine the most dominant countries based on major applications, and v) to provide insight into potential future directions. This paper will benefit fellow researchers, policymakers, and knowledge seekers to gain from the research trends in EI and discover future research opportunities. The paper will open more possibilities for widening emotional intelligence research. Since EI research is multi-disciplinary,

researchers can link EI with current trending topics, such as resilience and Covid-19, in the scope of academic achievement and working environment. By considering the impact of EI, human resource departments can ensure positive personality growth by being creative and constructive in resolving conflict in the organisation.

Materials and Methods

Bibliometric analysis is a quantitative technic applied to bibliometric data. Bibliometric analysis assesses published journals and authors' information using a statistical and scientific computer-assisted method (Donthu *et al*., 2021). This approach enabled the researcher to understand the global research trends of a specific area based on the academic literature database. Therefore, bibliometric analysis differs from a review paper focusing on a particular topic's current progress and challenges (Md Khudzari *et al*., 2018).

Data Source and Search Strategy

The data mining process uses the Scopus database from 1st until 13th July 2023. The research articles contain specific keywords of 'emotional intelligence' or 'emotional quotient' in the title. Data publications from 1966 until 2023 were retrieved. The query string in the data mining process was TITLE ('emotional intelligence' OR 'emotional quotient') AND (LIMIT-TO (SRCTYPE, 'j')) AND (LIMIT-TO (DOCTYPE, 'ar')). As a result of the search query, 5,783 articles were retrieved. The search result is further scrutinised to identify several items such as single-country publication (SCP) and productive journals by using an additional command in the search strings, for example (LIMIT-TO (AFFILCOUNTRY, 'country') for SCP.

The central analysis theme is based on the main keyword of 'emotional intelligence' (EI) or 'emotional quotient' (EQ). The search results were further analysed based on year, document type, and source type. As for ranking purposes,
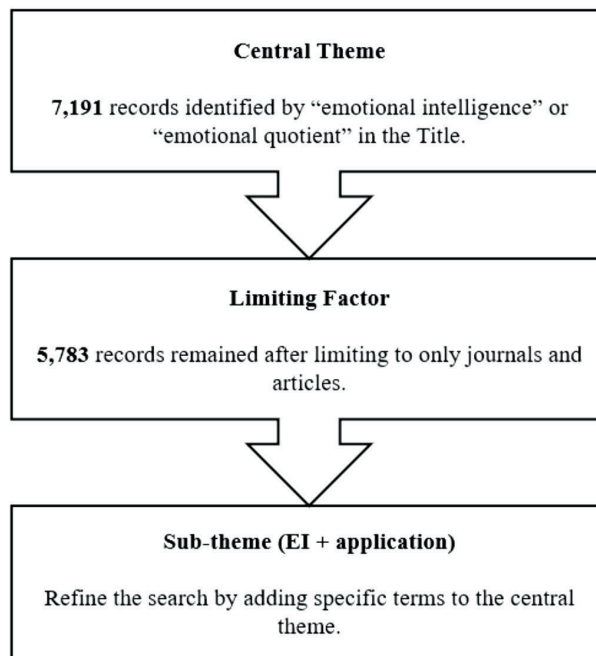

Figure 1: Flowchart of publication data collection according to theme and sub-theme

bibliometric indicators were used to identify mappings of total publications, total citations, and h-index. The most used author keywords in the EI field are also analysed, such as adolescent, trait EI, leadership and personality. There are possibilities for several author keywords that are synonyms or similar such as ability, ability model, ability EI, ability-based model, and ability-based model EI, which can be categorised under one keyword of ability EI.

The process of record collection and limiting several factors is summarised in Figure 1. The details on search strings used in the Scopus database are in Table 1.

Bibliometric Maps

The search result analysis is conducted using VOSviewer (version 1.6.19), a software for constructing and visualising bibliometric networks, developed by the Centre for Science and Technology Studies, Leiden University, The Netherlands. This paper uses VOSviewer to highlight the network mapping for countries, institutions, and author keywords. The mapping shows the strength of links between each item according to their affiliations. The stronger the affiliations between items, the stronger the link. For example, two countries with affiliations in terms of publications will be linked in the VOSviewer map. The higher the number of affiliations (number of publications) between the two countries, the stronger the link will be shown on the map. The user manual shows details on the VOSviewer features (Van Eck & Waltman, 2018).

Analysis of Co-authorship

The raw bibliometric analysis on co-authorship shows a list of 224 countries, including items unrelated to countries, such as dates and numbers. The outcome shows that 117 countries affiliated with 5,444 authors upon cleaning up the data by omitting the unrelated items. The countries are then clustered into continents of Asia, America, Europe, Africa and Oceania.

Analysis of Co-occurrence

The analysis of co-occurrence involved only author keywords, excluding indexed keywords. The reason is that indexed keywords are based on standardised public vocabularies chosen by the content supplier and may contain unrelated keywords such as article, human, male, and female. Thus, using only author keywords will avoid unnecessary search results.

The first raw screening found a total of 8,331 author keywords and grouped them into 593 items. However, some keywords represent similar items but are singular/plural or use short form, such as attitude and attitudes, or ability emotional intelligence and ability EI. Therefore, all the similar author keywords were grouped into one item; for example, cognitive ability is a combination of similar keywords such as cognitive ability, cognitive abilities, and cognitive intelligence.

Upon combining the possible similar keywords, the co-occurrence analysis on author keywords shows a total of 7,458 author keywords grouped into 131 items. The minimum occurrence keywords to be analysed was set to five. In the

Table 1: Search strategies and query strings for EI (data retrieved on 13th July 2023)

Search for	Step	Query string	Search results
Any documents related to EI or EQ	Keywords: EI, EQ	TITLE ('emotional intelligence' OR 'emotional quotient')	7,191
Journal articles from the beginning until 13th July 2023	Refine the search: Year, Document type, and Source type.	TITLE ('emotional intelligence' OR 'emotional quotient') AND (LIMIT-TO (SRCTYPE, 'j')) AND (LIMIT-TO (DOCTYPE, 'ar'))	5,783

overlay visualisation mode, VOSviewer network maps show keywords with different colours according to the average publication year of the documents for the selected keywords.

EI Applications

The trends between keyword co-occurrences and total publication were compared. For example, personality is the application; thus, in VOSviewer software, keywords occurrences for 'general factor for personality', 'personality traits', and 'personality disorder' were all counted. This paper also analysed the highest publications by country and the most productive journals for EI application.

Results and Discussion

Publication Output and Growth of Research Interest

From 1966 to 13th July 2023, a total of 5,783 research articles were published (Figure 2). Since 1966, there has been only one publication until the topic was picked up again in 1990. The publications leapt to two-digits in 2000 with 28 publications and kept gaining momentum until 2008 growing to three-digits with 108 publications. Since then, the publication has increased from 100 publications a year from 2008 to 2010, to 200 publications a year from 2011 to 2015. The highest number of publications was recorded in 2022, with 621 publications.

Analysis of the subject area showed that psychology is the main focus of EI studies. This is indicated by the total publication classified under the following subject areas: Psychology (2,188 articles), Social Sciences (1,925 articles), and Medicine (1,211 articles). However, EI does not only fit in these subject areas, as it is a multi-disciplinary area; EI also covers other subject areas such as Engineering (255 articles), Computer Science (213 articles), and Environmental Science (235 articles).

EI articles were also published in 35 different languages, led by English (5,323 articles; 92%), Spanish (297 articles; 5%), and Russian (47 articles; 1%). Other languages that make up the list are Portuguese, French, Turkish, Persian, Polish, German, Italian, Chinese, Korean, Hungarian, Croatian, Arabic, Greek, Afrikaans, Bosnian, Japanese, Slovenian, Czech, Dutch, Lithuanian, Malay, Hebrew, Serbian, Thai, Ukrainian, Bulgarian, Indonesian, Moldovan, Moldovan, Romanian, Slovak, and Catalan. However, articles published in the Scopus database must have an English title and abstract.
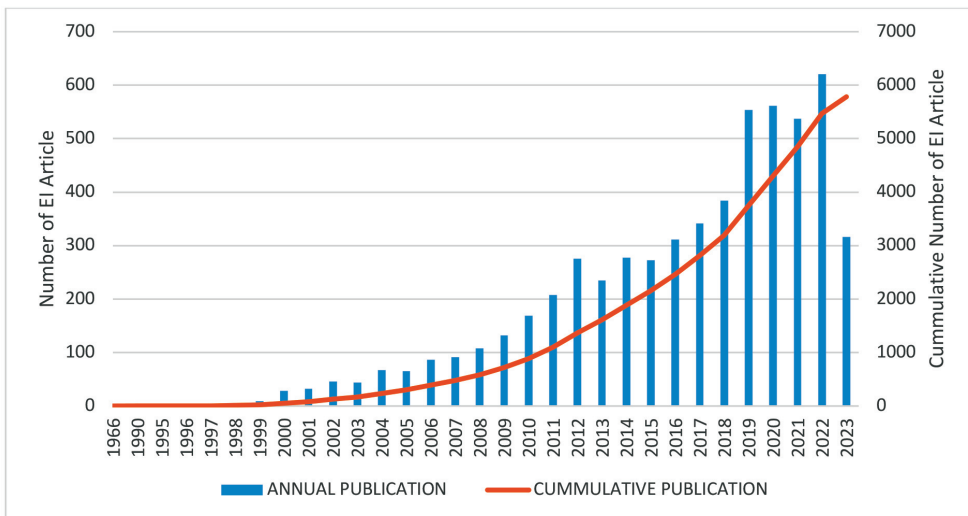

Figure 2. The annual and cumulative numbers of research articles on EI indexed in Scopus from 1966 until 13th July 2023

Preferred Journals

Eight different publishers own the results for the top ten most productive journals (Table 2). Elsevier, Frontiers Media SA, and Multidisciplinary Digital Publishing Institute (MDPI) published the top three journals. The rest are from Springer Nature, University of Almeria, SAGE, Society for Personality Research, and Public Library of Science.

The most productive journal was Personality and Individual Differences from Elsevier, with 270 publications covering 4.7% of the total publications. Frontiers in Psychology from Frontiers Media SA took the second spot with 177 publications (3.1%), followed by the International Journal of Environmental Research and Public Health (100, 1.7%), Current Psychology (63, 1.1%), Sustainability Switzerland (45, 0.8%), Electronic Journal of Research in Educational Psychology (35, 0.6%), Psychological Reports (34, 0.6%), Social Behaviour and Personality (32, 0.6%), Nurse Education Today (30, 0.5%), and PLOS One (25, 0.4%). The Personality and Individual Differences journal is the most productive journal because of the highest number of publications

on EI and one of the articles in this journal was the highest cited article, with 1,907 citations (article titled 'Development and validation of a measure of emotional intelligence' by Schutte *et al*. (1998)).

Articles that are indexed in Scopus are in CiteScore. CiteScore is the journal metric from the Scopus citation index, where the journal must have at least one publication in three years (James *et al*., 2019). The higher the CiteScore, the more valuable the journal is. Personality and Individual Differences (6.6), International Journal of Environmental Research and Public Health (5.4), and Sustainability Switzerland (5.4) have the highest mark according to CiteScore 2023. Electronic Journal of Research in Educational Psychology (0.9) has the lowest CiteScore mark.

Five journals have scores above the 75-percentile mark, which makes them in quartile Q1. The journals are Nurse Education Today (88th), PLOS One (87th), Sustainability Switzerland (87th), Personality and Individual Differences (86th), and International Journal

Table 2: The top 10 most productive journals on EI research

Rank	Journal	No. of Publication	No. of Citation	Cite Score 2023*	Percentile & Quartile
1	Personality and Individual Differences (Elsevier)	270	22,512	6.6	86th (Q1)
2	Frontiers in Psychology (Frontiers Media SA)	177	2,320	4.1	73rd (Q2)
3	International Journal of Environmental Research and Public Health (MDPI)	100	1,184	5.4	77th (Q1)
4	Current Psychology (Springer Nature)	63	317	4.4	74th (Q2)
5	Sustainability Switzerland (MDPI)	45	448	5.4	87th (Q1)
6	Electronic Journal of Research in Educational Psychology (University of Almeria)	35	538	0.9	32nd (Q3)
7	Psychological Reports (SAGE)	34	471	4.0	72nd (Q2)
8	Social Behaviour and Personality (Society for Personality Research)	32	885	1.9	44th (Q3)
9	Nurse Education Today (Elsevier)	30	1,072	5.1	88th (Q1)
10	PLOS One (Public Library of Science)	25	527	5.1	87th (Q1)

*CiteScore 2023 marks include total citation and publication.

of Environmental Research and Public Health (77th). The rest are in Q2 (three journals) and Q3 (two journals).

Meanwhile, the article from Schutte *et al.* (1998) tops the most cited articles on EI research with 1,907 citations. Two articles from John D. Mayer, Peter Salovey, and David R. Caruso are included in the top 10 most cited articles on EI, with 1,457 and 1,014 citations. Similarly, Konstantinos V. Petrides also has two articles with 971 and 871 citations (Table 3).

Table 3: The top 10 most cited articles on EI research

Rank	Most Cited Article	Authors	Year Published	Journal	Times Cited	Publisher
1	Development and validation of a measure of emotional intelligence	Schutte N.S., Malouff J.M, Hall L.E., Haggerty D.J., Cooper J.T., Golden C.J., Dornheim L.	1998	Personality and Individual Differences	1,907	Elsevier
2	The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study	Wong, C.-S., Law, KS.	2002	Leadership Quarterly	1,717	Elsevier
3	Toward machine emotional intelligence: Analysis of affective physiological state	Picard, R.W., Vyzas, E., Healey, J.	2001	IEEE Transactions on Pattern Analysis and Machine Intelligence	1,646	IEEE
4	Emotional intelligence meets traditional standards for an intelligence	Mayer, J.D., Caruso, D.R., Salovey, P.	1999	Intelligence	1,457	Elsevier
5	Measuring Emotional Intelligence with the MSCEIT V2.0	Mayer, J.D., Salovey, P., Caruso, D.R., Sitarenios, G.	2003	Emotion	1,014	APA
6	Emotions and leadership: The role of emotional intelligence	George, J.M.	2000	Human Relations	1,001	SAGE
7	Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies	Petrides, K.V., Furnham, A.	2001	European Journal of Personality	971	SAGE
8	Emotional Intelligence: An Integrative Meta-Analysis and Cascading Model	Joseph, D.L., Newman, D.A.	2010	Journal of Applied Psychology	944	APA

| Rank	Most Cited Article	Authors	Year Published	Journal	Times Cited	Publisher
9	The location of trait emotional intelligence in personality factor space	Petrides, K.V., Pita, R., Kokkinaki, F.	2007	British Journal of Psychology	871	Wiley-Blackwell
10	Convergent, discriminant, and incremental validity of competing measures of emotional intelligence	Brackett, M.A., Mayer, J.D.	2003	Personality and Social Psychology Bulletin	804	SAGE

Leading Countries, Top Institutions, and International Collaboration

The most productive countries with the highest total publication on EI are the USA (1,077), Spain (775) and the United Kingdom (485). Although the academic institutions' total publications (TPI) from Yale University, USA (48) is lower than the Universidad de Malaga, Spain (151), the USA have more research universities than Spain, which contributes to the high total publications overall. The top 10 most productive countries and academic institutions for EI publication are shown in Figure 3.

Among the top ten countries, India (88.0%), Iran (87.7%), Spain (77.7%), the USA (73.4%) and Malaysia (70.4%) have above 2/3 of single-country publications (SCP). SCP is where all authors belong to the same country, and higher SCP shows an intra-country solid collaboration.

On the other hand, Canada has the least SCP, with 48.9%, where 94 out of 192 publications were linked to multiple affiliations from 33 countries. The advantages of multiple affiliations with other countries can broaden research scope, network, and sharing of expertise. Malaysia, for example, has 254 total publications, and 179 single-country publications are affiliated with 30 countries, ranking it in the top ten most productive countries in the EI publications.

Looking at the list of most productive academic institutions in EI publications, three universities are in the top 1,000 QS World University Ranking 2024 – Universitat de Valencia (485th), Yale University (16th), and Western University (114th). It shows that the top universities have EI as one of their research focuses.
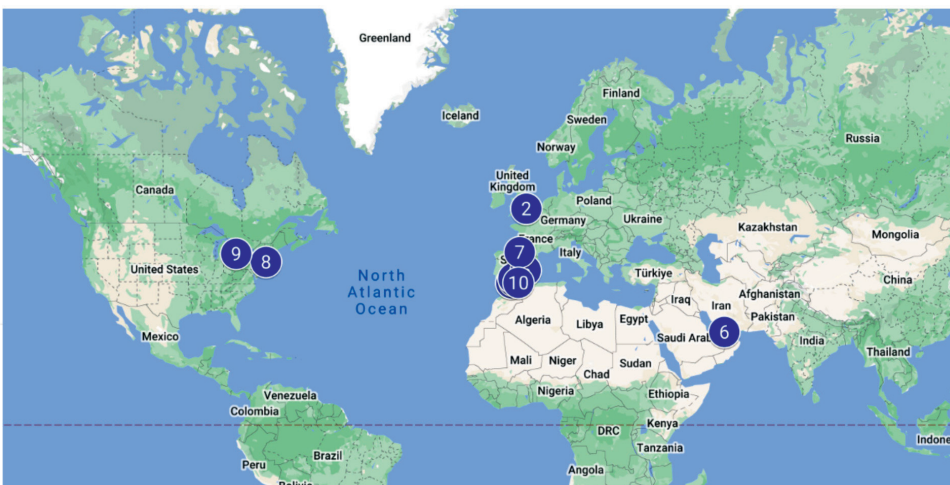
Rank	Country	Total Publication by Country	Single-Country Publication (SCP)	SCP (%)	Academic Institution	Total Publication by Institution (TPI)
1	USA	1,077	791	73.4	Universidad de Málaga, Spain	151
2	Spain	775	602	77.7	University College London, UK	91
3	United Kingdom	485	241	49.7	Universidad de Granada, Spain	90
4	India	400	352	88.0	Universidad de Jaen, Spain	76
5	Iran	359	315	87.7	Universitat de Valencia, Spain	64
6	China	329	210	63.8	Islamic Azad University, Iran	52
7	Australia	290	181	62.4	Universidad del Pais Vasco, Spain	49
8	Malaysia	254	179	70.4	Yale University, USA	48
9	Canada	192	94	48.9	Western University, Canada	46
10	Italy	169	103	60.9	Universidad de Almeria, Spain	46

Figure 3: The top 10 most productive countries and academic institutions in the EI publications

In VOSviewer, the distribution of countries per region is based on the line thickness between countries, as shown in Figure 4. The stronger their relatedness and the stronger the link between two countries, the thicker the line. Europe (36 countries) has the highest number of countries per region in the EI publications, followed by Asia (34), America (16), Africa (15), and Oceania (3). The co-authorship results indicated that the United Kingdom was the most affiliated country, linked to 55 countries with 326 times of co-authorship, followed closely by the USA (54 countries, 358 co-authorship). Other countries are Canada (33 countries, 128 co-authorship), Australia (37 countries, 156 co-authorship), China (35 countries, 172 co-authorship), Spain (38 countries, 221 co-authorship), Germany (29 countries, 102 co-authorship), Netherlands (20 countries, 55 co-authorship), Malaysia (29 countries, 108 co-authorship), and Italy (27 countries, 86 co-authorship). Fifteen countries have only one affiliation, such as Algeria (affiliated with Jordan), Argentina (with Spain), and Cuba (with Peru).

Several factors that lead to the dynamic collaboration between countries are the diversity of research teams, foreign postgraduates or visiting scholars, and high research funding. The country's policies on research and education also play a vital role in international research collaboration.

Leading Authors

The top ten most prolific authors in the EI research area show that researchers from Spain have the highest representatives with three researchers, Australia with two representatives, and one for the United Kingdom, Canada, Norway, Australia, and the USA. The earliest publication between these authors started in 1990 by Peter Salovey. This publication is the first to coin the term EI and piqued the interest of other researchers. Even in the first publication, there are affiliations of authors involved. For example, in the publication from Peter Salovey in 1990, the other co-authors were John D. Mayer and Maria DiPaolo.
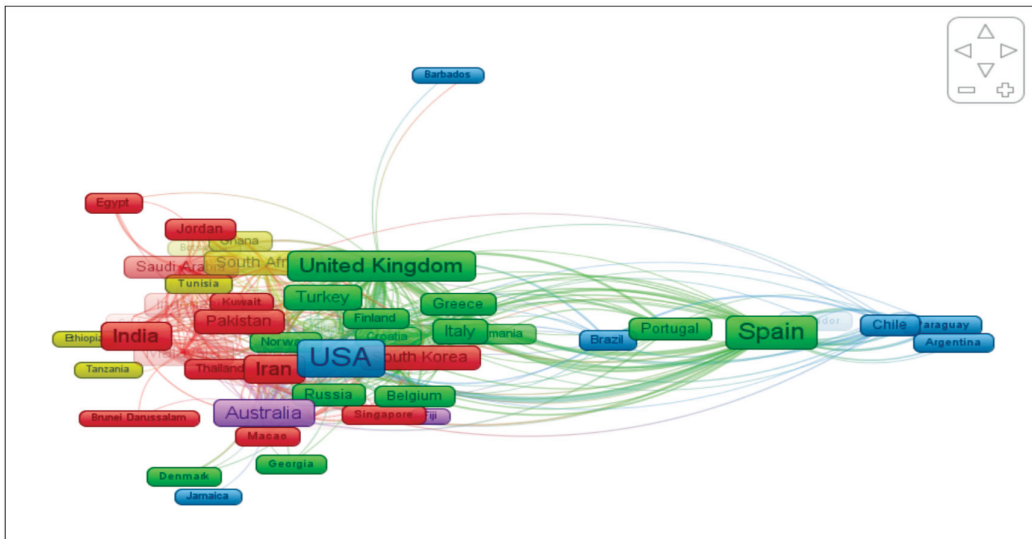
Figure 4: A screenshot of the bibliometric map created based on co-authorships with network visualisation mode. The following URL can be used to open Figure 4 in VOSviewer: https://tinyurl.com/2nxa4p57

Natalio Extremera from Universidad de Málaga, Spain, is the author with the most publications on EI in Scopus, with 81 publications since 2002, 38 document h-index, and 3,197 citations. The top ten authors list also has two more authors from Universidad de Málaga, Spain; Pablo Fernandez-Berrocal (ranked third) and Lourdes Rey (ranked fourth), with 39 and 26 publications. The second top author is Konstantinos V. Petrides from University College London, United Kingdom, with 75 publications since 2000, 57 h-index, and 8,627 citations. Other top ten authors are Donald H. Saklofske (36 publications, The University of Western Ontario), Con Stough (29 publications, Swinburne University of Technology), Peter Salovey (27 publications, Yale University), Adrian F. Furnham (27 publications, BI Norwegian Business School), Annamaria Di Fabio (27 publications, Università Degli Studi di Firenze), and Nicola S. Schutte (26 publications, University of New England Australia).

The ranking will be different if it is based on the most citations, where Peter Salovey (8,687 citations) and Konstantinos V. Petrides (8,627 citations) have higher citations as compared to other authors in Table 4. Therefore, other reputable authors were not on the list simply because of the diverse selection criteria.

By sorting the author list total citations (including EI but not limited to), authors such as John D Mayer, Neal M. Ashkanasy, David R. Caruso and John Antonakis made the list of most prolific authors on EI (Table 5). Previously these names were missing in the list that is based on publications. Adrian F. Furnham leads the list of the most prolific authors with 46,044 citations with the most contributed topics of help-seeking, health literacy, and first aid. The most contributed topics from the list cover EI, job performance, and leadership effectiveness research area from authors Peter Salovey (27,217 citations), Jennifer M. George (15,531 citations), John D. Mayer (13,235 citations), Konstantinos V. Petrides (12,157 citations), Neal M. Ashkanasy (10,919 citations), Kenneth Law (9,954 citations), John Antonakis (7,376 citations), Marc A. Brackett (7,026 citations), and David R. Caruso (6,136 citations).

Table 4: List of the most prolific authors in the EI research area based on publications

No.	Author	Scopus Author ID	Year of 1st Publication	Publication on EI	Citation on EI	Document h-index	Current Affiliation
1	Extremera, N.	6602380970	2002	81	3,197	38	Universidad de Málaga, Spain
2	Petrides, K. V.	6603597461	2000	75	8,627	57	University College London, United Kingdom
3	Fernández-Berrocal, P.	6603121863	2002	61	2,781	39	Universidad de Málaga, Spain
4	Rey, L.	7005153945	2006	39	1,109	26	Universidad de Málaga, Spain
5	Saklofske, D.H.	7004876348	2003	36	2,420	41	The University of Western Ontario, Canada
6	Stough, C.	7004331792	2001	29	1,913	50	Swinburne University of Technology, Australia
7	Salovey, P.	7005302162	1990	27	8,687	80	Yale University, USA
8	Furnham, A.	36045985300	2000	27	5,051	97	BI Norwegian Business School, Norway
9	Di Fabio, A.	23097256500	2008	27	1,388	40	Università degli Studi di Firenze, Italy
10	Schutte, N. S.	6701817726	1998	26	4,149	41	University of New England Australia, Australia

Table 5: List of the prolific authors in the EI research area based on total citations

No.	Author	Scopus Author ID	Total Publications	Total Citations	Document h-index	Most Contributed Topics	Current Affiliation
1	Furnham, Adrian F.	36045985300	1,166	46,044	97	Help-Seeking; Health Literacy; First Aid	Handelshøyskolen BI, Norway
2	Salovey, Peter	7005302162	207	27,217	80	EI; Job Performance; Leadership Effectiveness	Yale University, USA
3	George, Jennifer M.	35608977600	55	15,531	42	Counterfactual Thinking; Regret Theory; Stated Choice	Jones Graduate School of Business, USA
4	Mayer, John D.	7403140597	100	13,235	37	EI; Job Performance; Leadership Effectiveness	University of New Hampshire Durham, USA
5	Petrides, Konstantinos V.	6603597461	154	12,157	57	EI; Job Performance; Leadership Effectiveness	University College London, United Kingdom
6	Ashkanasy, Neal M.	35613977200	236	10,919	51	Emotional Labour; Surface Acting; Service Employees	The University of Queensland Business School, Australia
7	Law, Kenneth	7202563432	70	9,954	39	EI; Job Performance; Leadership Effectiveness	Chinese University of Hong Kong, Hong Kong
8	Antonakis, John	8256230000	74	7,376	34	Leader-Member Exchange; Transformational Leadership; Followership	University of Lausanne, Sweden
9	Brackett, Marc A.	6602774679	86	7,026	34	EI; Job Performance; Leadership Effectiveness	Yale University, USA
10	Caruso, David R.	7006602431	39	6,136	16	EI; Job Performance; Leadership Effectiveness	Yale University, USA

Figure 5 shows the VOSviewer map generated 16,976 total authors. The list of authors was reduced to 257 upon setting up the map using the author's criteria with a minimum number of documents set to five and a minimum number of citations set to one. Prominent authors in EI make the cut, among others are Natalio Extremera Pacheco (159 total link strength), Pablo Fernandez-Berrocal (125 total link strength), Konstantinos V. Petrides (120 total link strength), Peter Salovey (63 total link strength), and Neal M. Ashkanasy (16 total link strength).

Author Keywords

VOSviewer recorded a total of 7,948 co-occurrences of author keywords. After relabelling synonymic and similar keywords, the 407 keywords met the threshold of a minimum of five occurrences in VOSviewer mapping. EI (6,892 total link strength) has the highest total link strength, followed by other notable keywords such as personality (642), adolescence (635) and leadership (440). Figure 6 shows the VOSviewer mapping where EI was

the most frequently used keyword with 4,115 occurrences and 215 links to other keywords. Other general terms that were frequently used based on co-occurrences are trait EI (355 occurrences), adolescence (260 occurrences), personality (245 occurrences), and leadership (202 occurrences).

The term EI itself was linked to many similar attributes such as emotional quotient (72 occurrences), ability EI (68 occurrences), and trait EI (355 occurrences). Based on the various attributes of EI, it is known that the ability and trait EI is one of the EI models introduced by Salovey & Mayer (1990) and Petrides & Furnham (2000), respectively. The other attributes are the effectiveness of EI when using group, perceived, self-reported, and team functionality.

Topic of Interest

Searching on author keywords trending is an excellent way to find topics of interest. The latest author keywords in 2020-2023 are topics such as Covid-19 pandemic (65 occurrences, 10.58 average citations), pandemic (11 occurrences,
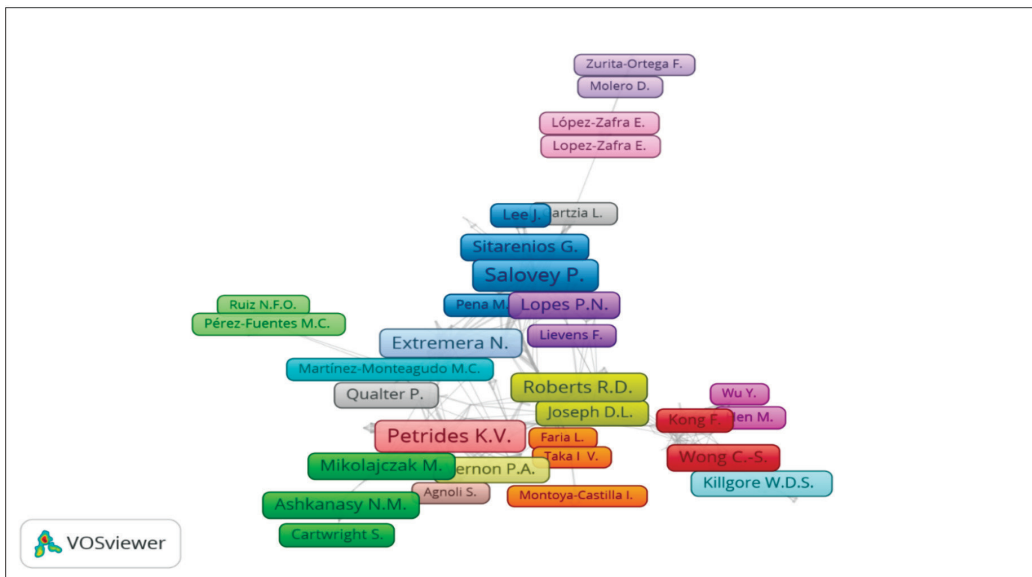

Figure 5: A screenshot of the overlay bibliometric map created based on the authors' citation. The minimum number of documents are set to five, and the minimum number of citations is set to one. The following URL can be used to open Figure 5 in VOSviewer: https://tinyurl.com/2r2tfwdo

Figure 6: A screenshot of the overlay bibliometric map created based on author keywords co-occurrence. Minimum occurrences of a keyword are set to four. The following URL can be used to open Figure 6 in VOSviewer: https://tinyurl.com/2kakajm5

2.18 average citations), turnover intention (25 occurrences, 6.76 average citations), primary school (22 occurrences, 6.59 average citations), and critical thinking (16 occurrences, 9.18 average citations).

Author keywords with a high number of average citations score are such as behaviour (25 occurrences, 69.08 average citations), big five personality (46 occurrences, 61.72 average citations), personality (245 occurrences, 64.17 average citations), and social competence (17 occurrences, 112.47 average citations). However, the articles were averagely published from 2013 to 2015.

To look at the current research trends, articles with average publications from 2019 to 2023 and high average citations will better reflect the latest topics of interest trending. One such keyword is resilience (94 occurrences, 252 total link strengths, and 13.52 average citations) with average publications year 2019. There are 109 articles in the Scopus database linked to

resilience and emotional intelligence, with 32 articles in 2022 and 2023 (Jiménez-Rodríguez et al., 2022; Lacomba-Trejo et al., 2022; Shuo et al., 2022; Sharma & Tiwari, 2023). EI and resilience is also linked with Covid-19 pandemic (Mon-López et al., 2020; Yuan, 2021), depression (Peláez-Fernández et al., 2021)the specific roles of personal resources like emotional intelligence (EI, sustainability (Dolev et al., 2021)resilience enables individuals to cope with stressful life events and to adapt to diverse situations. In the framework of Conservation of Resource (COR, and personality (Cuartero & Tur, 2021; Grover & Furnham, 2021; Valor-Segura et al., 2020)as well as knowing the personality (extraversion versus emotional instability or neuroticism.

Another recent keyword is prosocial behaviour (13 occurrences, 31 total link strength, and 18.38 average citations). The Scopus database shows 93 articles with prosocial behaviour as one of the author keywords in the EI literature. Prosocial behaviour is linked with

EI (Wang *et al*., 2021; S. S. Batool & Lewis, 2022; Martí-Vilar *et al*., 2022)behavior, and relationships during their lifespan. The present study aimed to assess the impact of positive parenting on the trait emotional intelligence, prosocial behavior (altruism and adolescence (Sullivan *et al*., 2022).

Sustainability also is one of the trending keywords (8 occurrences, 23 total link strength, and 8.12 average citations). There were 28 articles in the Scopus database with sustainability as one of the author keywords. EI articles related to sustainability are linked with work life balance (Deshpande & Srivastava, 2023), education (Estrada *et al*., 2021; Nogueira *et al*., 2023; Wujema *et al*., 2022), adolescence (Giancola *et al*., 2022), trust (F. Batool *et al*., 2022), and leadership (Hanafi & Daud, 2021). As EI covers a multi-disciplinary area, it can fit into any 17 sustainable development goals (SDG) set by the United Nations (UN), and management scholars should contribute to the sustainability agenda (Howard-Grenville *et al*., 2019).

The latest interest in EI is related to Covid-19 (65 occurrences, 198 total link strength, and 10.58 average citations). There were 99 articles in the Scopus database with covid-19 as the keywords related to EI. EI with covid-19 articles is linked with a topic such as burnout (Basri *et al*., 2022; Kirkpatrick *et al*., 2022), wellbeing (Andrei *et al*., 2022), leadership (Alam et al., 2023), adolescents (Pino, 2023) and job satisfaction (Rogowska & Meres, 2022).

These are just a few interesting topics that can be explored further based on the author's keywords. Even the highest used keywords such as behaviour and personality are still widely researched. It shows that recreating the keywords in a map would make knowing their occurrences and relationship strength easier.

Limitation of Study

Despite using the latest VOSviewer data mapping to guide and stimulate future research in the field of EI using bibliometric analysis,

this paper remains limited in several ways. First, this paper is limited to a broad overview of EI due to its systematic and bibliometric approach to review. Even by using rigorous information science methods, the paper lacks critical depths and tensions that may exist in the field (e.g. the extant debate about EI's effect on job performance in organisations). Nevertheless, the bibliometric analysis provided more approachable and grounded trends for researchers to tackle based on the knowledge cluster in which they are situated. Second, this paper is limited to the accuracy and availability of bibliometric and bibliographic data retrieved from the Scopus database. When the keywords are restricted to only 'emotional intelligence' or 'emotional quotient' within titles and abstracts, the results are limited to covering all EI-related studies available in Scopus. Earlier researchers used the term social intelligence or cognitive emotion, in which EI can be a subset or part of those terms. In the VOSviewer data mapping, unknown items do not represent any related group of a country or author keywords. The author's keyword information might be missing from journals such as Scientific Reports, PLOSOne, and others.

Future studies should compare the outputs from multiple databases such as WoS and Scopus. WoS offers different search functions and has the option to browse indexes for personal and group authors and publications. Bibliometric analysis using multiple data sources will have better coverage for a more comprehensive study.

Conclusion

This paper shows the overview of EI research trends based on the 5,783 publications retrieved from the Scopus database. Research on EI has been expanding rapidly over the last five years, reaching more than 500 publications annually. The research topic can be said to be growing stronger over the years. This paper has discussed the widely used keywords based on the EI co-occurrences, such as adolescent, trait EI, leadership and personality. The latest

keywords based on the average citations were also highlighted, such as behaviour, Big Five model, personality, resilience, sustainability, and prosocial behaviour, to name a few. Elsevier's Personality and Individual Differences journal has the most EI publications (270 articles and the highest number of citations with 22,512), surpassing the second and third-ranked Frontiers in Psychology (177 articles, 2,320 citations) and International Journal of Environmental Research and Public Health (100 articles, 1,184 citations). The USA, Spain and the United Kingdom dominate the publication numbers for EI research. However, Asia is also strongly contributing, with four countries (India, Iran, China, and Malaysia) in EI publications' top 10 most productive countries.

In this paper, themes emerged from the co-authorship and co-occurrence of words using bibliometric analysis. The triangulation of bibliometric analysis for mapping the EI research revealed three key themes: EI's role in leadership, academics, and personality. Future research should, therefore, position their contributions against these major research streams to better situate the novelty and uniqueness in the EI fields. The academic implications revolve around theories regarding EI and the relationship between leadership, academics and personality. Meanwhile, the practical implication is for human resource management to include EI in the policy development process to strengthen the leadership and relationships between leaders and subordinates.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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