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A Bibliometric Analysis on Research Trend of e-Leadership

Analisis Bibliometrik ke atas Trend Penyelidikan e-Kepimpinan

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ABSTRACT

The outbreak of Covid-19 pandemic in late 2019 has had a significant impact on how organisations operate. Workers are permitted to work from home hence forcing leaders to change their leadership style in order to manage their teams virtually. Leadership via virtual setting is indeed more challenging as compared to the normal face-to-face setting. As technology continues to emerge rapidly, the notion of leadership must also follow suit. Hence, the paradigm of e-leadership is vital. To discover the field of e-leadership comprehensively, it is essential to examine and understand the trends ever since it first started in the year 2000. This study aims to review and report on published e-leadership documents based on data collected from the Scopus database between the period of 2000 until 2022 using bibliometric analysis. Specifically, it will be focused on examining the evolution of the e-leadership field over the past 20 years, identifying the predominant themes in e-leadership research, and highlighting the key authors and countries in the field. In total, 219 documents are retrieved from the database as of 27th December 2022. This study employed standard bibliometric indicators and uses tools such as Harzing's Publish and Perish software, VOSviewer, and Microsoft Excel to analyse the data. The findings indicate that the production rate of e-leadership literature is relatively slow from 2000 to 2010 and the number of publications continues to fluctuate ever since then. However, the study on e-leadership gained scholar attention again starting in the year 2020 and is expected to prosper in the years ahead.

Keywords: e-leadership; digital leadership; bibliometric analysis; Harzing's Publish and Perish; VOSviewer

ABSTRAK

Pandemik Covid-19 yang telah menular sejak lewat tahun 2019 telah memberi impak yang besar terhadap cara sesebuah organisasi beroperasi. Pekerja dibenarkan bekerja dari rumah justeru memaksa pemimpin menukar gaya kepimpinan mereka untuk menguruskan pasukan mereka secara maya. Kepimpinan melalui maya sememangnya lebih mencabar berbanding dengan cara bersemuka. Selain itu, konsep kepimpinan juga perlu selaras dengan perkembangan pesat teknologi. Oleh itu, konsep e-kepimpinan adalah penting. Untuk mengetahui bidang e-kepimpinan secara menyeluruh, adalah penting untuk meneliti dan memahami trend penyelidikan sejak ia mula dimulakan pada tahun

2000. Tujuan kertas kerja ini adalah untuk mengkaji trend penyelidikan berdasarkan data yang dikumpul daripada pangkalan data Scopus antara tahun 2000 hingga 2022 dengan menggunakan analisis bibliometrik. Secara khususnya, Khususnya, kajian ini ingin memahami bagaimana bidang e-pemimpin telah berkembang selama dua dekad yang lalu, mengenal pasti tema, penulis dan negara yang dominan dalam bidang ini. Secara keseluruhan, 219 dokumen diperoleh daripada pangkalan data pada 27 Disember 2022. Kajian ini menggunakan penunjuk asas bibliometrik serta perisian Harzing's Publish and Perish, VOSviewer, dan Microsoft Excel untuk menganalisis data. Penemuan menunjukkan bahawa kadar pengeluaran literatur e-kepimpinan adalah agak perlahan dari tahun 2000 hingga 2010. Walau bagaimanapun, kajian mengenai e-kepimpinan mendapat perhatian sarjana sekali lagi bermula pada tahun 2020 dan dijangka berkembang maju pada tahun-tahun akan datang.

Kata kunci: e-kepimpinan; kepimpinan digital;analisis bibliometrik; Harzing's Publish and Perish; VOSviewer

INTRODUCTION

Pandemic Covid-19 outbreak has forced most organizations to change their traditional way of operating the business to suit to the new norm. Some employees are allowed to be working from home, forcing new challenge for the management and the organization's leaders in managing their team. This pandemic has accelerated the adoption of communication technologies, paving the way in changes in lifestyle, work style, and business approaches (Amankwah-Amoah et al., 2021). To maintain relevancy in this unpredictable circumstance, organizations have to make urgent decision for organisational changes that suit the situation (Bussin & Swart-Opperman, 2021). Digitalization and the advanced development in information technology make it possible for organisational efficiency to be sustained in the period of pandemic. The arguments and theories surrounding remote work, online team management, and sustaining business through technological modernization must be promptly adapted and put into practise by organisational leaders. It is crucial for leaders to have appropriate skills in implementing emerging technologies either for personal or organizational use to become more effective and good role models. Miscommunications, confusion, communication overload, employee separation, interpersonal trust, lack of motivation, and deteriorated accountability among others as the most common caused by poor personal technology skills by leaders. The importance of improving digital skills among leaders led to the establishment of e-leadership paradigm. E-leadership is referring to social influence strategy based on information technology in altering behaviours, performance, and attitudes within companies (Avolio et al. (2000). It also been defined as virtual leadership - where a team is led by a virtual leader and emphasizes the connection between the leader and the team (Karl & Leschig, 2019), and digital leadership (Klus & Müller, 2021). This paper will use the term of e-leadership, and digital leadership as a synonym. This paper aim to review and report on published e-leadership documents using bibliometric approach based on data collected from the Scopus database.

LITERATURE REVIEW

Technology and Leadership

The rapid explosion of Information Communication Technology (ICT) is on the rise demand that such challenges need to be addressed through transformation in the current work process holistically. This rapid changes in technology have constantly changed the way people communicate over the past decades and today's modern technologies allow machines and humans to communicate almost seamlessly as well as allowing teams to work efficiently in different countries and time zones (Schmid & Dowling, 2020). Emerging technology has allowed work to be carried out anytime and anywhere (Pratama et al., 2020) and are progressively conveying boundaryless organizational structures, hence, leaders play a crucial role in efficient technology adoption (Li et al., 2016) to manage their team.

According to Rimbau-Gilabert et al. (2013), leaders face greater challenges in managing virtual team compared to normal face-to-face team and such challenges are due to geographic distance, temporal distance, perceived distance, distributed team configurations, and workers diversity.

As the technology continue to emerged rapidly, the concept of leadership must also follow suit. The lack of literature on how Advanced Information Technology (AIT) affects the way people learn and practice leadership in organizations led to the establishment of the concept of e-leadership. The term e-leadership was originally introduced by Avolio et al. (2000) that defined it as *"a social influence process mediated by AIT to produce a change in attitudes, feelings, thinking, behavior, and/or performance with individuals, groups, and/or organizations"*. Karl & Leschig (2019) defined e-leadership as virtual leadership in which, a team is led by a virtual leader and emphasizes the connection between the leader and the team. E-leadership is not only about communication between leaders and their team through ICT, but it also involves the use of ICT for two ways communication: the gathering and dissemination of information required in performing organizational work (Avolio & Kahai, 2003). Further, the concept of e-leadership was focusing about pursuing goals through people via virtual environment, hence modified the traditional leader-follower relationship (Savolainen, 2014). As time has passed, the paradigm of e-leadership has broadened to include more than just intercommunication mediated by AIT but also about leading in a digital setting effectively (Roman et al., 2019).

As for the author's knowledge, there have been two bibliometric articles on e-leadership. Garcia (2020) review the development of e-leadership from the year 1990 - 2019 using the data from Web of Science (WoS). Since the topic of e-leadership emerged from technology, the rapid pace of technological change means that the skills and knowledge required for e-leadership are constantly evolving. Hence, it will be interesting to discover how does this field evolved in years. The knowledge mapping approach in bibliometrics assumes that the subject matter changes over time, and its intrinsic logic follows the idea of paradigm evolution (Chen et al., 2015). The recent similar study was done by Tigre et al. (2023) which review the development of digital leadership from the year 2000 – 2022 focusing only to English language peer-reviewed journal on three subject areas that are: social sciences; business, management, and accounting; and psychology. In order to provide full dynamics and recommend future topics for research, the current study highlights the main domains of e-leadership as a whole without any language or subject area restrictions.

METHODOLOGY

This paper seeks to examine the productivity and development of e-leadership researches over the past two decades by employing bibliometric analysis. The outcome of this study is presented using network visualisation and bibliometric indicators.

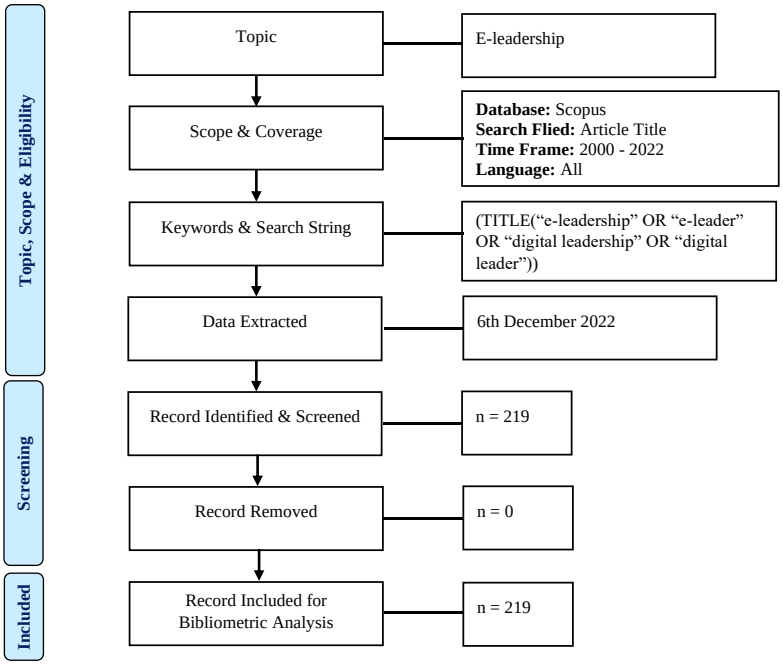
Bibliometric Analysis

Since its inception in the early 1900s (Diem & Wolter, 2013), bibliometric analysis has been used extensively in academic research. Bibliometrics analysis is a statistical analysis of literatures and is used to analyse written publications in a particular area quantitatively. Bibliometric assessment is a powerful method for literature mapping in a specific area of study (José de Oliveira et al., 2019) and could provide more comprehensive publication-related information (Rusly et al., 2019). Bibliometric techniques, based on text or citation analysis, are often used to extract and manipulate data (Wallin, 2005). Statistics on authors, keywords, sources, articles, countries, institutions and developments of the field are the main information will be focus in bibliographic analysis (Abramo et al., 2011). In addition, bibliometrics analysis also allow for further investigation on the impact of publications (Ahmi & Nasir, 2019). In addition to the statistical data, a visualization of network can further be done through VOSviewer, a tool that is freely accessible use to construct and visualize the relationship of networks.

Source and Data Collection

This study extracted data from Scopus database in achieving the objective of the study. Scopus database has been obtained. Scopus containing relatively 11,000 publishers and 36,000 titles which make it as the largest database for peer-reviewed literature (Rusly et al., 2019). The selection of the documents gathered for this study has been constructed based on the research protocol guided as per Figure 1 adapted from study by Kushairi & Ahmi (2021). Considering the sparse effort on bibliometric analysis of e-leadership, this study restricted the search query on the title of the documents. By analysing only the title, one can get a quick overview of the content of the publication and the research area it belongs to (Haunschild et al., 2016) and title analysis can provide insights into the trend of a particular research area and the frequency of certain keywords or themes in a given time period with a comprehensive view of the research landscape in a particular field and the distribution of research topics (Wahid et al., 2020).

Figure 1: Research Protocol



The search query of e-leadership ("e-leadership" OR "e-leader" OR "digital leadership" OR "digital leader") was applied to the article title within the Scopus database on 6th December 2022. This query yielded a total of 219 documents. It was then exported in RIS and CSV format and tools like Microsoft Excel , VOSViewer, and Harzing's Publish and Perish were used to analyse the collected documents.

RESULTS

To provide an overview of the research on e-leadership, some of the general statistics from the data sets are presented. All extracted documents were evaluated based on research productivity, authorship, keywords, title and abstract analysis and citation analysis. It also included annual growth data up to 2022, along with their frequency and accumulated percentage.

Research Productivity

The first analysis examines research production which is derived for the number of publications released by year. The documents screening based on year of publications allow for observation on research topic pattern (Ahmi & Nasir, 2019). The first publication of e-leadership was produced by Avolio, Kahai,

and Dodge in year 2000. Since then, the growth of publications has been rather slow, with the peak number of publications on e-leadership only being recorded in 2016 and continuing to decline until it started to increase again in 2019 and continue to flourish in 2022. The summary details about the total publications on e-leadership since 2000 is as shown in Table 1.

Table 1: Publications by Year

Year	No. of Publications	Percentage (%)
2022	46	21.00
2021	27	12.33
2020	24	10.96
2019	28	12.79
2018	11	5.02
2017	10	4.57
2016	19	8.68
2015	6	2.74
2014	8	3.65
2013	9	4.11
2012	6	2.74
2011	4	1.83
2010	2	0.91
2009	3	1.37
2008	1	0.46
2007	1	0.46
2005	1	0.46
2004	4	1.83
2003	4	1.83
2002	2	0.91
2001	2	0.91
2000	1	0.46
TOTAL	**219**	**100.00**

Table 2 below summarizes e-leadership annual publication and citation structure. From the table, it can be translated that although most e-leadership publications were published in 2022 (43), publications from year 2003 have however gained the highest number of citations (515) with cited per paper of 128.00. As for citation per cited publication, the most significant year is year 2000 (333.00). In term of impact of the publication, 2019 were the most significant year with an h-index of 9 and g-index of 16. Figure 1 depicts the overall publication trend in this field.

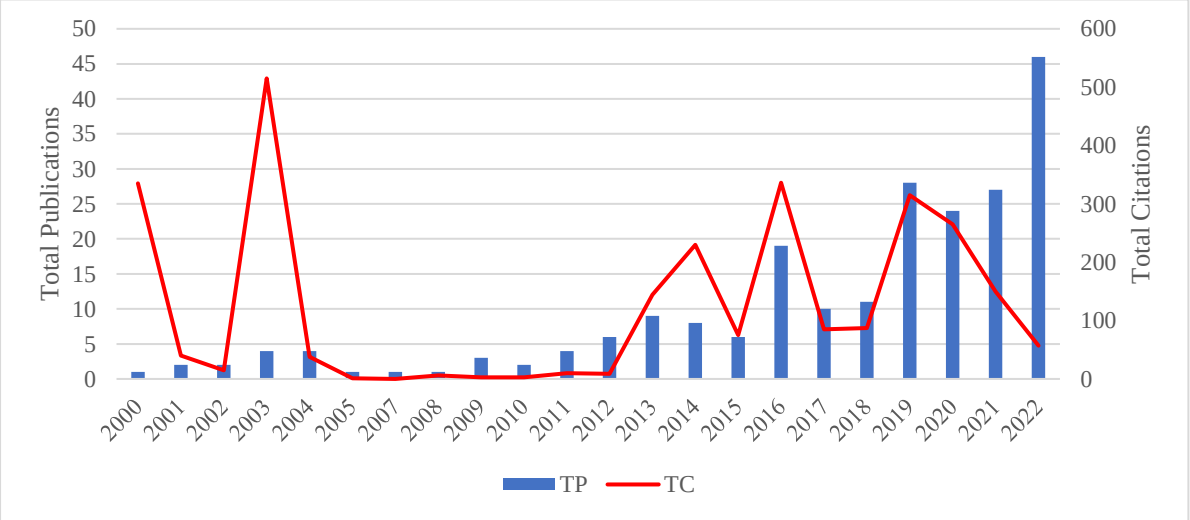
Table 2: Citations structure on e-leadership publications between 2000 and 2022

Year	TP	NCP	TC	C/P	C/CP	*h*	*g*
2022	46	16	57	1.24	3.56	4	6
2021	27	21	150	5.56	7.14	6	11
2020	24	18	265	11.04	14.72	9	16
2019	28	24	315	11.25	13.13	9	17
2018	11	9	87	7.91	9.67	4	9
2017	10	8	85	8.50	10.63	3	9
2016	19	13	336	17.68	25.85	6	18
2015	6	5	75	12.50	15.00	4	6
2014	8	7	230	28.75	32.86	4	8
2013	9	8	144	16.00	18.00	5	9

Year	TP	NCP	TC	C/P	C/CP	*h*	*g*
2012	6	4	9	1.50	2.25	2	2
2011	4	2	10	2.50	5.00	2	2
2010	2	2	3	1.50	1.50	1	1
2009	3	1	3	1.00	3.00	1	1
2008	1	1	6	6.00	6.00	1	1
2007	1	0	0	0.00	0.00	0	0
2005	1	1	1	1.00	1.00	1	1
2004	4	2	38	9.50	19.00	1	4
2003	4	4	515	128.75	128.75	4	4
2002	2	2	15	7.50	7.50	2	2
2001	2	2	40	20.00	20.00	2	2
2000	1	1	335	335.00	335.00	1	1
Total	**219**						

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index

Figure 2: Total Publications and Citations by Year

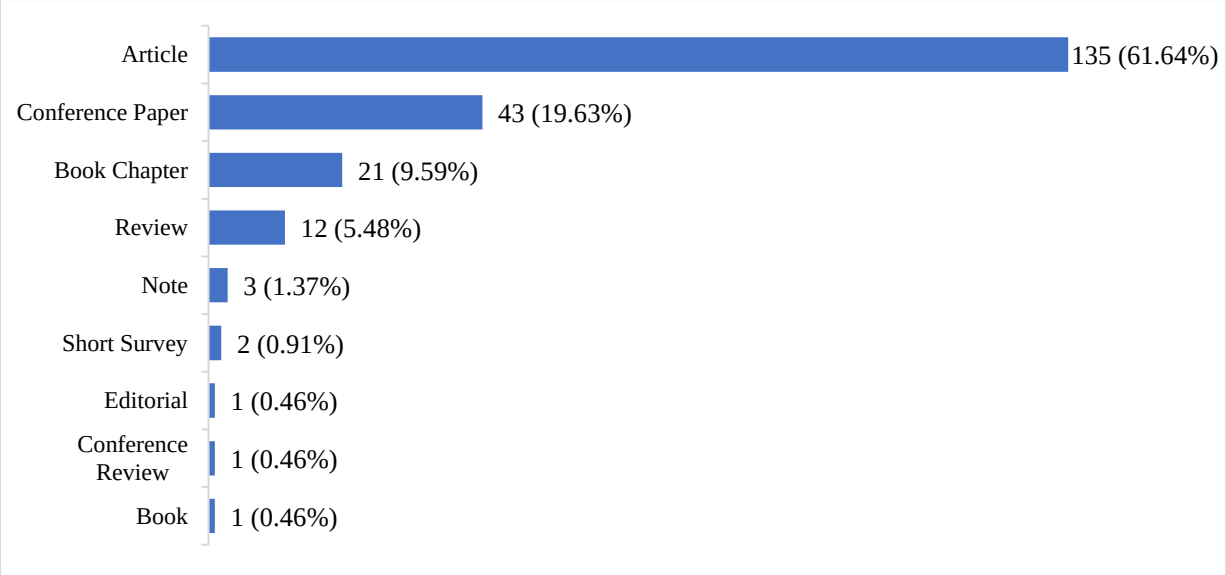


(Source: Present Study, 2022)

Document and Source Type

Further, the analysis on the types of documents and source in which the research on e-leadership was published was carried out. Result of document types is presented in Figure 2 and it shows that 61.64 percent of e-leadership studies were published as an article, 19.63 percent as conference paper and 9.59 percent as book chapter. Others were review document (5.48%), note document (1.37%), and short survey (0.91%). Only one research published each as a book, conference review, and editorial document.

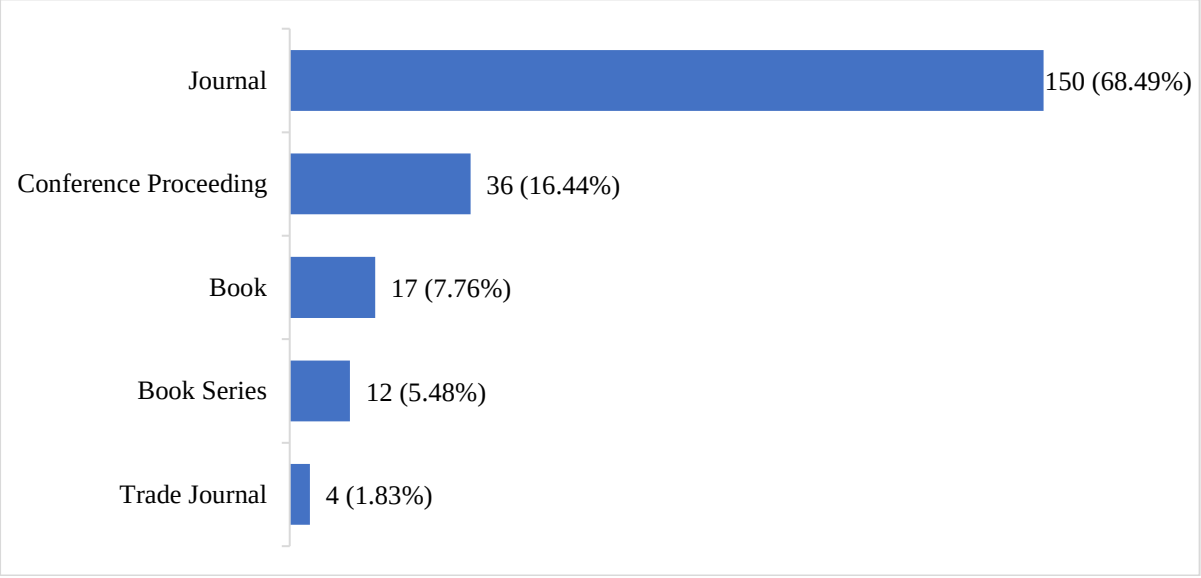
Figure 3:Document Type



(Source: Present Study, 2022)

Figure 3 displays the five main source types that these 219 publications fall under, namely journals (68.49%), conference proceeding (16.44%), book (7.76%), book series (5.48%), and trade journal (1.83%).

Figure 4: Source Type



(Source: Present Study, 2022)

Language of Publications

Table 3 shows that the most commonly used language for e-leadership publications are English (92.44%). Other languages used for the e-leadership publications are Italian, German, Croatian, French, Persian, and Spanish. Six of the publications were also found to be bilingual documents.

Table 3: Language of Publications

Language	Total Publications (TP)*	Percentage (%)
English	208	92.44
Italian	8	3.56
German	4	1.78
Spanish	2	0.89
Croatian	1	0.44
French	1	0.44
Persian	1	0.44
Total	**225**	**100.00**

Note: Six documents are bilingual publications

Subject Area

Table 4 illustrates the subject areas of the e-leadership publications. Management, leadership, and communication are all components of the discipline of e-leadership. Thus, it explains the finding that most publications were in the area of social sciences (24.57%) and business, management and accounting (19.46%). Computer science, engineering, decision science, economics, econometrics, and finance were other important subject areas.

Table 4: Subject Area

Subject Area	Total Publications (TP)	Percentage (%)
Social Sciences	101	24.57
Business, Management and Accounting	80	19.46
Computer Science	65	15.82
Engineering	40	9.73
Decision Sciences	20	4.87
Economics, Econometrics and Finance	20	4.87
Psychology	17	4.14
Environmental Science	12	2.92
Medicine	9	2.19
Mathematics	8	1.95
Pharmacology, Toxicology and Pharmaceutics	7	1.70
Energy	6	1.46
Arts and Humanities	4	0.97
Nursing	4	0.97
Physics and Astronomy	4	0.97
Biochemistry, Genetics and Molecular Biology	3	0.73
Chemical Engineering	3	0.73
Health Professions	3	0.73
Agricultural and Biological Sciences	2	0.49
Earth and Planetary Sciences	1	0.24
Materials Science	1	0.24
Multidisciplinary	1	0.24

Note: The classification of the publications is based on the source title category which some of it had multiple subject areas.

Most Active Source Title

Table 5 shows the most active source title with two or more publications on e-leadership and publisher's information. The British Journal of Educational Technology is the top publisher contributing to e-leadership publications with a total of six publications followed by Sustainable Switzerland with five publications. However, in term of total number of citations, publications from Organizational Dynamics have been cited the most with a total of 512 citations followed by Leadership Quarterly with a total of 504 citations.

Table 5: Most Active Source Title

Source Title	TP	TC	Publisher	Cite Score	SJR 2021	SNIP 2021
British Journal of Educational Technology	6	147	Wiley-Blackwell	9.6	1.870	2.634
Sustainable Switzerland	5	59	Multidisciplinary Digital Publishing Institute (MDPI)	5.0	0.664	1.31
Organizational Dynamics	4	512	Elsevier	2.3	0.493	0.934
Frontiers in Psychology	4	95	Frontiers Media S.A.	4.0	0.873	1.605
International Journal of Learning Teaching and Educational Research	4	22	Society for Research and Knowledge Management	1.1	0.232	0.508
Leadership Quarterly	3	504	Elsevier	16.2	4.907	4.362

Numbers of Publications by Country

Based on the author's institution of affiliation, this study also evaluates the number of publications by country. The publications on e-leadership involved contributors from 57 countries. The top five active countries that contributed a minimum of ten publications on e-leadership is shown in Table 6. The United States is on top of the list with total publication of 40, number of cited publications of 32, total citations of 1,040, citation per publication of 26.00, citations per cited publication of 32.50, h-index of 14 and g-index of 32. Other countries that have contributed significantly for the field of e-leadership are Indonesia, United Kingdom, Germany and Malaysia. This result shows that western and developed nations have dominated e-leadership studies.

Table 6: Top countries contributed to the publications

Country	TP	%	NCP	TC	C/P	C/CP	h	g
United States	40	13.47	32	1,040	26.00	32.50	14	32
Indonesia	27	9.09	20	164	8.20	8.05	7	12
United Kingdom	23	7.74	17	322	14.00	18.94	7	17
Germany	19	6.40	11	86	4.53	7.82	5	9
Malaysia	15	5.05	9	68	4.53	7.56	5	8

Most Active Institutions

Table 7 shows the most active institutions in the e-leadership field. Bina Nusantara University leads the list in term of total publication (12), and number of cited paper (10). This is followed by California State University City University of Hong Kong with 7 publication and 6 cited papers. However, in term of total citations, Binghamton University State University of New York is leading with a total of 516 citations. Bina Nusantara University, California State University, and City University of Hong Kong take the lead in term of impact factor of g-index.

Table 7: Most Active Institutions

Affiliation	Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
Bina Nusantara University	Indonesia	12	10	105	8.75	10.50	6	10
California State University	United States	7	6	193	27.57	32.17	6	7
City University of Hong Kong	Hong Kong	7	6	202	28.86	33.67	6	6
NC State University	United States	5	4	11	2.20	2.75	2	3
Binghamton University State University of New York	United States	4	4	516	129.00	129.00	3	4
University of Reading	United Kingdom	4	4	140	35.00	35.00	3	4
Henley Business School	United Kingdom	4	4	139	34.75	34.75	3	4

KDI School of Public Policy and Management	South Korea	4	4	123	30.75	30.75	4	4
University of Galway	Ireland	4	3	71	17.75	23.67	3	4
Rheinisch-Westfälische Technische Hochschule Aachen	Germany	4	3	10	2.50	3.33	2	3
Telkom University	Indonesia	4	2	5	1.25	2.50	2	2

Note: The minimum number of 4 publications by each institutions

Authorship Analysis

Further analysis on the authorship is done to determine the most productive authors in the field. In total, there are 286 authors contributed to a total of 219 publications on e-leadership. Table 8 show the list of 15 most active authors. Van Wart, M. are the most active author in the e-leadership field with total publications of 7 and number of cited publications of 6. However, among the most active authors, Avolio, B.J.'s publications have been cited the most with the total number of 514 citations, followed by Kahai, S. with total number of 347 citations and Van Wart, M. with a total number of 193 citations. In terms of impact factor of g-index, publications by Van Wart, M. scored the highest (7) followed by Liu, C. (6), and Mihardjo, L.W.W. (6) and Wang, X.H. (5).

Table 8: Most Prolific Authors

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
Van Wart, M.	California State University	United States	7	6	193	27.57	32.17	6	7
Liu, C.	KDI, School of Public Policy and Management	South Korea	6	5	177	29.17	35.40	5	6
Mihardjo, L.W.W.	Bina Nusantara University	Indonesia	6	5	46	7.67	9.20	3	6
Wang, X.H.	City University of Hong Kong	Hong Kong	5	4	164	32.80	41.00	4	5
Elidjen	Bina Nusantara University	Indonesia	5	4	17	3.40	4.25	3	4
Kim, S.	KDI School of Public Policy and Management	South Korea	4	3	71	17.75	23.67	3	4
McCarthy, A.	J.E. Cairnes School of Business & Economics	Ireland	4	3	71	17.75	23.67	3	4
Alamsjah, F.	Bina Nusantara University	Indonesia	4	3	36	9.00	12.00	3	4
Sasmoko	Bina Nusantara University	Indonesia	4	3	23	5.75	7.67	3	4
Abbu, H.	Rheinisch-Westfälische Technische Hochschule Aachen	Germany	4	3	10	2.50	3.33	2	3
Gudergan, G.	Rheinisch-Westfälische Technische Hochschule Aachen	Germany	4	3	10	2.50	3.33	2	3
Mugge, P.	NC State University	United States	4	3	10	2.50	3.33	2	3

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
Avolio, B.J.	University of Washington	United States	3	3	514	171.33	171.33	3	3
Kahai, S.			3	3	347	115.67	115.67	2	3
Roman, A.			3	3	128	42.67	42.67	3	3

Based on Table 9, most of the articles on e-leadership were co-authored of two (24.66%) and single-authored (23.74%). The most number of authors in a single publication is fifteen (15).

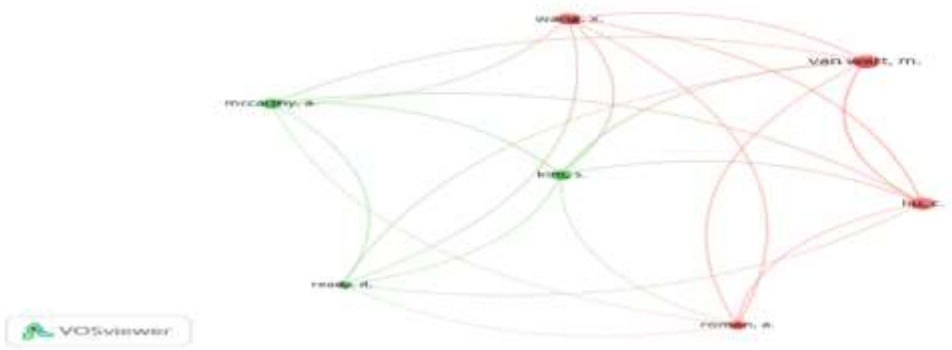
Table 9: Number of Authors per document

Author Count	Total Publications (TP)	Percentage (%)
1	52	23.74
2	54	24.66
3	43	19.63
4	38	17.35
5	10	4.57
6	8	3.65
7	5	2.28
11	1	0.46
12	2	0.91
15	1	0.46
*0	4	1.83
Total	**219**	**100.00**

*Note: *No author is listed in conference review document.*

The authors' collaboration was further analysed by performing the co-authorship analysis with VOSviewer. The analysis used fractional counting method with minimum 2 number of documents of an author and at least 5 citations of an author. The relationship amongst the author is indicated by the color and size of the circle and and font. Figure 4 shows network visualisation map based on co-authorship and it suggests two group that have worked closely together and usually collaborated in research: group of Kim, S., McCarthy, A., and Ready, D., and group of Liu, C., Roman, A., Van Wart, M., and Wang, X.

Figure 5: Co-authorship

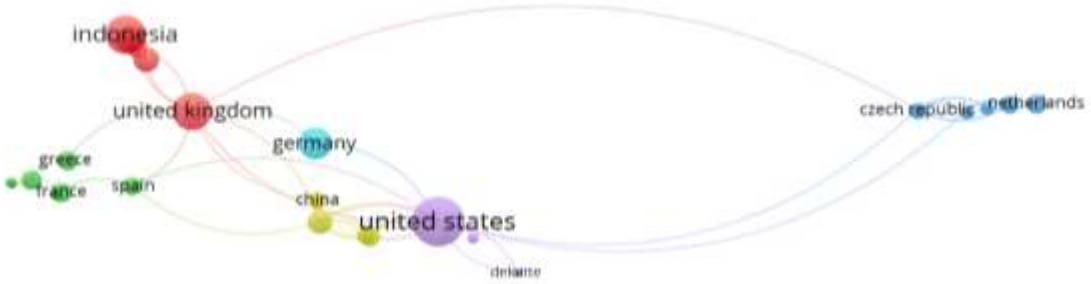


(Source: Present Study, 2022)

Figure 5 shows the co-authorship based on countries network visualization map. Countries with at least one article and three citations were considered for the purpose of this mapping. The result indicates that the United States is the leading player in working with other countries to produce publications on e-

leadership. The Czech Republic, Germany, United Kingdom, Hong Kong, and the United States have collaborated closely.

Figure 6: Co-authorship based on countries

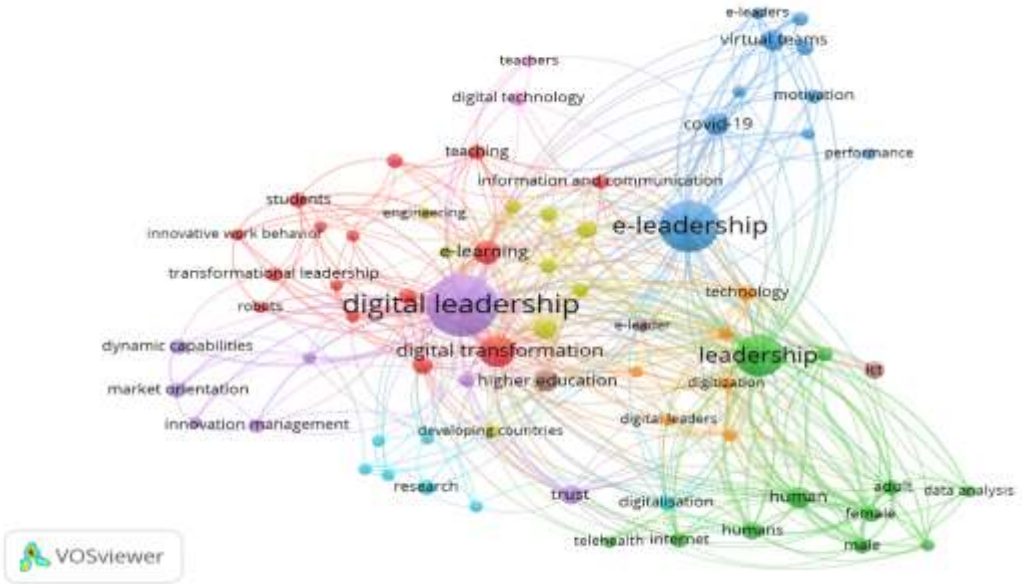


(Source: Present Study, 2022)

Keyword Analysis

Further analysis using VOSviewer is done on the keywords. Keywords can be collected from a publication's title and abstract, or they can be extracted from a publication's list of keywords supplied by the author (Eck & Waltman, 2014). Network visualisation map of the co-occurrences of keywords is presented in Figure 6. The relationship between keywords are visualized by the thickness of colour, font size, circle size, and connecting lines (Sweileh et al., 2017). Using fractional counting method and minimum number of 3 occurrences, the result shows that four clusters have been formed in the e-leadership study based on keywords.

Figure 7: Co-occurrence of the keywords



(Source: Present Study, 2022)

Keywords such as digital leadership, e-leadership, leadership, and digital transformation are among the most encountered keywords to a search query as shown in Table 10 below.

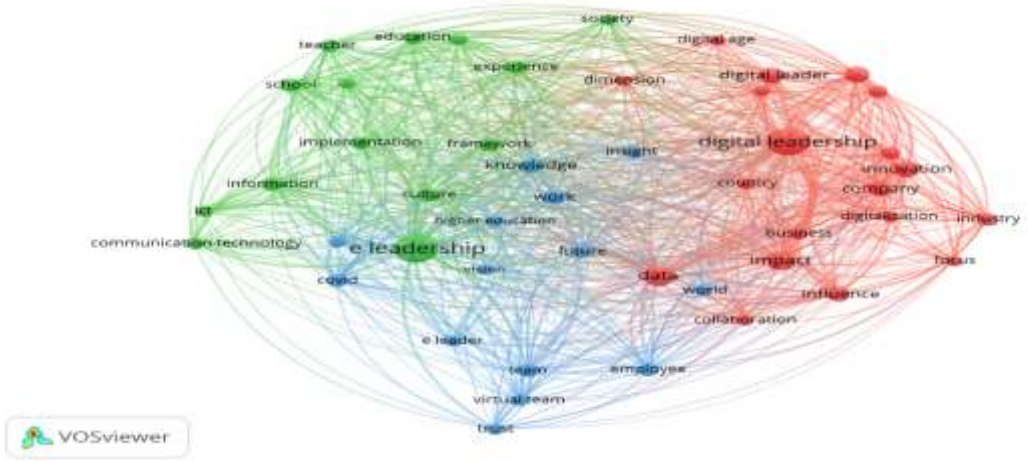
Table 10:Top Keywords

Author Keywords	Total Publications (TP)	Percentage (%)
Digital Leadership	75	11.36
E-leadership	44	6.67
Leadership	34	5.15
Digital Transformation	20	3.03
Article	11	1.67
E-learning	11	1.67
Higher Education	10	1.52
E-Leadership	9	1.36
Human	9	1.36
Virtual Teams	9	1.36
COVID-19	8	1.21
Innovation	8	1.21
Trust	7	1.06
Humans	6	0.91
Information Systems	6	0.91
Social Media	6	0.91
Adult	5	0.76
Decision Making	5	0.76
Digital Technologies	5	0.76
Dynamic Capabilities	5	0.76

Title and Abstract Analysis

VOSviewer was employed to examine the number of occurrences and co-occurrences of the term in the title and abstract of collected data set in this study. The network visualisation mapping of term co-occurrence based on title and abstract fields is shown in Figure 7. For this purpose, the consideration of term is grounded on at least ten occurrences and binary counting method is applied. The figure suggests that there are three clusters with fifty terms linking with each other as generated by VOSviewer. According to the figure, the first cluster, which is represented by the red group, includes terms like "digital leadership", "digital transformation", and "digital technology". The second cluster is the green coloured group that consists of words like “e-leadership”, “communication technology”, and “culture”. The third cluster, which is represented by the blue group, includes terms like "e-leader", "pandemic", and "virtual team".

Figure 8: Term co-occurrence based on title and abstract fields network visualization map



(Source: Present Study, 2022)

Citation Analysis

Using a RIS format file derived from the Scopus database, this study utilized Harzings Publish and Perish software to analyse the total number of e-leadership publications citations. The essence of citation analysis is to discover the relationship amongst the publication and publication that it has cited, with the assumption that publications that citing each other are related (McBurney & Novak, 2002). Table 11 shows the citation metrics for the retrieved data set. There have been 2,719 recorded citations during the 22-year span of e-leadership articles.

Table 11: Citations Metrics

Metrics	Data
Publication years	2000 - 2022
Citation years	22
Papers	219
Citations	2,719
Citations/year	123.59
Citations/paper	12.42
Authors/paper	2.85
h-index	25
g-index	48

Table 12 below discloses the list of the highly cited articles as per database set retrieved from Scopus. The publication that has received highest citation in the area of e-leadership with 334 citations or an average of 15.18 citations per year is the document entitled "*E-leadership: Implications for theory, research, and practice*" by B.J. Avolio, S. Kahai, G.E. Dodge (2000). The newest article that highly cited is the document entitled "*Examining teachers' perspectives on school principals' digital leadership roles and technology capabilities during the covid-19 pandemic*" by T. Karakose, H. Polat, S. Papadakis (2021).

Table 12: Highly cited articles

Authors	Title	Year	Cites	Cites/Year
B.J. Avolio, S. Kahai, G.E. Dodge	E-leadership: Implications for theory, research, and practice	2000	334	15.18
W.F. Cascio, S. Shurygailo	E-leadership and virtual teams	2003	196	10.32
B.J. Avolio, J.J. Sosik, S.S. Kahai, B. Baker	E-leadership: Re-examining transformations in leadership source and transmission	2014	169	21.13
B.J. Ovolio, S.S. Kahai S.	Adding the "E" to E-leadership: Hot it may impact your leadership	2003	162	8.53
S.J. Zaccaro, P. Bader	E-leadership and the challeges of leading E-Teams: Minimizing the bad and miximizing the good	2003	146	7.68
O.A.E. Sawy, H. Amsinck, P. KrÃ¦mmergaard, A.L. Vinther	How LEGO built the foundations and enterprise capabilities for digital leadership	2016	128	21.33
W. Li, K. Liu, M. Belitski, A. Ghobadian, N. O'Regan	e-Leadership through strategic alignment: An empirical study of small- and medium-sized enterprises in the digital age	2016	117	19.50
F.Contreras, E.Baykal, G.Abid	E-Leadership and Teleworking in Times of COVID-19 and Beyond: What We Know and Where Do We Go	2020	80	40.00
T. Karakose, H. Polat, S. Papadakis	Examining teachers' perspectives on school principals' digital leadership roles and technology capabilities during the covid-19 pandemic	2021	53	53.00

Authors	Title	Year	Cites	Cites/Year
M. Van Wart, A. Roman, X. Wang, C. Liu	Operationalizing the definition of e-leadership: identifying the elements of e-leadership	2019	53	17.67
M. Van Wart, A. Roman, X. Wang, C. Liu	Integrating ICT adoption issues into (e-)leadership theory	2017	52	10.40

Discussion and Conclusions

This study aims to review and report on published e-leadership documents based on data collected from the Scopus database using bibliometric approach. Bibliometric analysis enables researchers to determine the trends in particular research fields (Kim et al.,2021), which helps to provide links and summaries within the research topic to draw conclusions and leverage on supplementary evidence (Tigre et al., 2022). Therefore, this study emphases on e-leadership publications attained from the Scopus database and a total of 219 documents were retrieved with defined search query. Based on the database, the study on e-leadership was initiated by Avolio, Kahai and Dodge (2000) with the title "E-leadership: Implications for theory, research, and practice". The lead authors in the field of e-leadership in term of highly cited publications are Bruce J. Avolio, Surinder Kahai, George E. Dodge, B. Baker, Wayne F. Cascio and Stan Shurygailo. While in term of total number of publications, Monty Van Wart, Cheol Liu, and Leonardus W.W. Mihardjo are the most prolific authors. The growth of publications has been rather slow in the early 2000s, with the peak number of publications on e-leadership only being recorded in 2016 and continuing to decline until it started to increase again in 2019 and continue to flourish in 2022. This may be driven by an unexpected transition into virtual working worldwide as a result of the outbreak of Covid-19 that has forced people to accept 'new normal' of working environment that is away from the office.

The study on e-leadership is generally published in the publications that group under social sciences as well as business, accounting and management area. Studies on e-leadership also occur in chemical engineering, neuroscience physics and astronomy field. From the citation measure presented in this study, the impact of publications on e-leadership can be understood. A total of 2,719 citations were counted from 219 published documents on e-leadership throughout 22 years of publication (2000-2022) with overall of 123.59 citations per year. Majority of the e-leadership publications (68.49%) were written as journal articles. In term of language, English language is the main language of publications which originated from 57 identified countries. United States is the top country contributed to the publication of e-leadership. Interestingly, Indonesia and Malaysia, are also listed in the top 5 list of most active countries in the publications of e-leadership. Previously, e-leadership studies were found to be more western-oriented (Liu et al., 2020). The shift in the participation of developing nations in this field of research was successfully indicated by the analysis.

E-leadership is one of the interesting topics to be explored especially in today's modern digital era. As the world is rapidly becoming more digital, and organizations are expected to adapt to this change by embracing technology in their operations and processes as it provides the tools and strategies needed to lead remote teams effectively. Organizations that embrace e-leadership are better equipped to take advantage of the opportunities presented by digital transformation, and are therefore more likely to stay ahead of their competitors. As depicted on the keyword's analysis, e-leadership studies normally associated with educational settings (e-learning, teaching, higher education, teachers, students, training). This may be due to the fact of the increase use of virtual learning during the pandemic (Chang et al., 2022) that attracted researchers to understands the phenomena. This create opportunity for future research to explore the applicable of e-leadership in management and workplace. It is especially important because a widespread application of remote work and hybrid work in organisations is expected in the near future (Babapour Chafi et al., 2022).

This study does have some limitation. Firstly, the Scopus database served as the sole repository for the materials used in this study, hence, it may not cover all available sources. Future research can extend research using other available databases. It is feasible that combining a few datasets from more than one database would produce more intriguing and useful results. Secondly, the outputs of the search query in other areas, such as the abstract and keyword, were not included in this study because it focused on keyword based on the document title. The reason mainly due to the fact that the researchers normally put the focuses of the study in their title instead of in the abstract. However, in some cases, a term relevant to the search query has been inserted into the keyword or abstract column. In this case, the objective of the research may not be directly relevant to what the researcher is searching and a filtering process must be performed before such analysis is done. It can be expanded upon in future studies. A contribution of knowledge is successfully obtained in this study by presenting the recent trend of research on e-leadership, despite the limitations. Through the use of a bibliometric approach, this study adds to and enriches previous e-leadership literatures while also providing valuable insights into previous literature trends.

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