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Global Research on E-Resources: A Bibliometric Study of Global High-Cited Papers till 2024

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A bibliometric analysis of the global research on electronic resources is presented to identify its current research status, hotspots, trends and collaboration networks based on 854 high-cited documents retrieved from the Scopus database, using MS-Excel and VOSviewer. The study focused on publications from 75 countries, 631 institutions, and 1598 authors, and they were published in 136 journals. The USA (n=304), the U.K. (n=136), Spain (n=78) and Netherlands (n=47) were leading in publication output, citation impact and international cooperation, the University of Granada, Spain (n=23), University of Hawaii at Manoa, USA and University College London, UK (n=18 each), as key institutions; and D. Nicholas (n=16), H.R. Jamalli and M. Thelwell (n=14 each) as prominent authors. Research is predominantly focused on areas such as usage and users (158 papers), collection development (42 papers), information services & dissemination (31 papers), accessibility & search ability (24 papers), and reading & readers (22 papers). Concludes that research on e-resources is increasingly becoming popular worldwide and stresses the need to continue exploring this important area. This study provides valuable insights for shaping future research directions in this field.

Keywords: Electronic Resources, Electronic Books, Journals, Databases and Theses, Global Publications, Citation Impact, International Collaboration

1. Introduction

The digital age has revolutionized information acquisition and dissemination through electronic media and resources. Electronic (E) - resources have evolved over time in various formats, such as e-books, e-journals, databases, multimedia resources, and websites. Compared to print resources, e-resources provide timely access from any location, up-to-date content, along with advanced search features for quick retrieval of user-specific information. The shift from printed to e-resources is driven by user expectations, the need for enhanced engagement, and the demand for mobile accessibility. Robust IT infrastructure and information literacy skills are crucial for efficiently utilizing e-resources. E-resources offer interactive and engaging content, cater to diverse learning preferences, and facilitate enhanced learning experiences. E-resources facilitate multi-user and multi-database searching for a comprehensive search and efficient access to a wealth of information. Furthermore, the dynamic nature of e-resources ensures up-to-date information.

Libraries play a vital role in providing access to e-resources, adapting service models, and utilizing electronic resource management systems. Collaborative efforts through consortia are seen as strategically addressing rising demands for e-resources and financial constraints. Open-access trends and data-driven decision-making are reshaping library collections. With the increasing popularity of e-resource collections, libraries have undergone a substantial transformation in their service models from playing their traditional lending role to becoming dynamic information hubs. E-resources are

a transformative force in the digital landscape, essential for modern libraries, and enhanced by AI technologies for a more informed society.

2. Literature Review

Global scholars have contributed to bibliometric studies related to e-resources, utilizing Scopus and Web of Science as source databases. For example, Dhawan, Gupta and Gupta[1], Gupta and Dhawan[2] and Bansal, Bansal and Gupta[3] evaluated the quantity and quality of scholarly publications on a series of measures, including publication growth, citations per paper, highly cited papers, global collaboration, productive authors, institutions, and countries. These studies differed mainly in the coverage of publication data period, size of data evaluated and extent of subject aspects studied. Overall, these studies have sought to provide valuable insights into global research output related to e-resources. Selected bibliometric studies by Kolle, Shettar and Kumar[4], Gupta and Dhawan[5], Gupta, Dhawan and Kolle[6], Bansal and Bansal[7] and Chaudhari and Kumbar[8] were focused on e-books, e-journals and e-thesis and dissertations.

3. Scope And Objectives

In the absence of any comprehensive study on this topic, the present study aimed to identify current and emerging research trends related to electronic resources studies and to map collaborative network linkages among key participating players, covering 854 high-cited publications till 2024. The specific objectives of the study are: (i) To analyze the distribution of publications by type and source and to study the growth characteristics of the overall output; (ii) To analyze the share of externally funded and international collaborative publications; (iii) To identify the leading participating countries, organizations and authors; and to map collaborating linkages among them; (iv) To identify significant keywords and classify them by broad subject areas and sub-fields; (v) To identify the leading channels of communications; and (vi) To analyze the characteristics of top high-cited papers registering 100 or more citations.

4. Methodology

The bibliographical data on different aspects of electronic resources was searched and retrieved using five independent search strategies: two covering general aspects, such as on "e-publishing" and "e-resources" or "electronic resource management" and third to fifth focused on specific electronic resources, such as "e-books", "e-journals" and "e-theses" within library and information science domain (subject code as 3309). Each of the five search strategies used a number of related keywords with Boolean operators on general or specific e-resources in search tags, as "Title-Abstract-Key" or "Title" or "Keyword" in an advanced search of the Scopus database. The final search conducted on 20 Jan 2025 combined all the previous five searches, identified 6236 publications till 2024 on e-resources, from which 854 publication records (having registered 20 or citations) were identified for final analysis. These records were downloaded and include information such as document title, type and language, authors and their institutional affiliations, keywords, number of citations, journal name, publication source details and cited references. MS Excel and VOSviewer software were used for bibliometric analyses and for mapping co-authorship (countries, organizations and authors) and co-occurrence of keywords.

5. Analysis & Results

In all, 854 high-cited papers (HCPs) were identified on electronic resources (E-resources) during 39 years (1977-2023), with no publications during 1978-80 and 1983-87, witnessing a 21.78% annual average growth rate and registering 21.89 publications per year. The annual publications output indicated fluctuating increases and decreasing growth trends till 2020, with a subsequent decrease. The largest (47, 51 and 49) number of publications were reported during the years 2005, 2010 and 2012 years (Figure 1). The 13-year cumulative publications (with average no. of publications and annual growth rate) increased from 38 (2.92 and 103.7%) from 1977-1997, to 419 (32.23 38.09%) during 1998-2010 and to 397 (30.54 and -6.85) during 2011-2023

The 854 HPCs registered 60593 citations, with an average per paper of 70.95. The citation distribution across 854 publications indicates uneven distribution. On one hand, 64.75% (553) and 22.37% (191) HCPs were in 20-49 and 50-99 citation range as against only 12.68% (110), 8.20% (70), 2.11% (18), 0.94% (8) and 0.59% (6) publications in citation range 100-199, 200-299, 300-499 and 500-2660 citation range. Of the 854 HCPs, 87.12% (744) were original articles, followed by reviews (9.02%), conference papers (2.58%) and letters (1.17%) and note (0.12%). Except letter (1 paper), reviews registered the highest citation

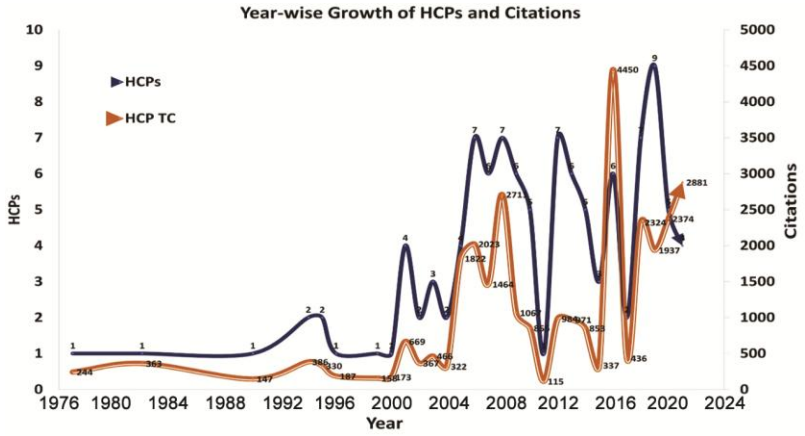

Fig. 1 — Annual growth of papers and citations on e-resources during 1977-2023

Table 1 — Bibliometric profile of the top 5 most productive and impactful countries each

S. No	Country name	TP	TC	CPP	RCI	TLS
		Top 5 most productive countries				
1	USA	304	20362	66.98	0.94	63
2	UK	136	11488	84.47	1.19	54
3	Spain	78	6059	77.68	1.09	32
4	Netherlands	47	4249	90.40	1.27	41
5	China	45	2751	61.13	0.86	19
		Top 5 most impactful countries				
1	Canada	39	5020	128.72	1.81	26
2	Australia	19	2061	108.47	1.53	16
3	Italy	14	1295	92.5	1.3	14
4	Netherlands	47	4249	90.4	1.27	41
5	Germany	25	2207	88.28	1.24	25

TP=Total papers; TC=Total citations; CPP=Citations per paper; RCI=Relative Citation Index; TLS=Total link strength

impact (81.12 CPP), followed by letters (70.8 CPP), articles (70.52 CPP), and conference papers (48.18).

The 104 (12.18%) HCPs among 854 received were externally supported and funded, together registering 9604 citations (average=92.34). The National Science Foundation and Natural Science Foundation of China contributed 19 funded papers each, followed by the European Commission (7 papers), etc. The 135 (15.81%) HCPs among 854 HCPs were involved in international collaborations, with the U.K. and the USA contributing the most (n=43 and 42), followed by the Netherlands (29), Spain (n=26) and Canada (n=16), etc.

Research studies focusing on electronic databases received the most attention (47.89% share) among 854 HCPs, followed by electronic books (14.52%), electronic journals (14.17% share) and electronic theses & dissertations (2.81% share). Electronic databases also registered the highest citation impact (99.28 CPP) among all e-resources studies, followed by e-journals (44.22 CPP), e-books (41.48 CPP) and e-theses & dissertations (26.67 CPP).

5.1. Leading Countries

The 75 countries contributing to 854 HCPs showed uneven distribution. On one hand 29, 19 and 14 countries contributed 1, 2-5 and 6-10 papers each, while only 15 countries contributed 11 to 305 papers each. The top 15 countries collectively contributed 816 papers and 61810 citations, constituting more than 100% share respectively in total publications and citations. Among top 15 countries: (i) USA (n=304), U.K. (n=136) and Spain (n=78) contributed more than the average productivity (n=54.4); and Canada (128.72 and 1.81), Australia (108.47 and 1.53), Italy (92.5 and 1.3), Netherlands (90.4 and 1.27) and Germany (88.28 and 1.24) registered more than average citation impact (75.75 and 1.07). Table 1 lists

the top 5 most productive and impactful countries, each among the top 15 countries.

The VOSviewer analyzed the top 15 countries' collaboration networks, forming 170 collaborative links with a total link strength (TLS) of 339. They were categorized into five distinct clusters (Figure 2). Cluster 1 includes Spain, Netherlands, India, Germany and Australia; Cluster 2 includes USA, China, Canada and Pakistan, showing varying levels of collaborative engagement; Cluster 3 includes the U.K., Iran and Malaysia; Cluster 4 includes Taiwan and South Africa, and Cluster 5 consists solely of Italy.

The collaborative intensity (as measured by TLS) of the top 15 countries varied from 4 to 63, with the highest reported by the USA (63 links with 26 countries), followed by the U.K. (54 links with 18 countries), Netherlands (41 links with 15 countries), Spain (32 links with 18 countries) and Canada (26 links with 13 countries), and Germany (25 links with 15 countries). The ranking of the top 5 countries by central measures is shown in Table 2. The four among the top 15 countries, namely the USA, U.K., Netherlands and Spain, showed the most intense collaboration by ranking at the top in collaboration intensity and also by centrally measures.

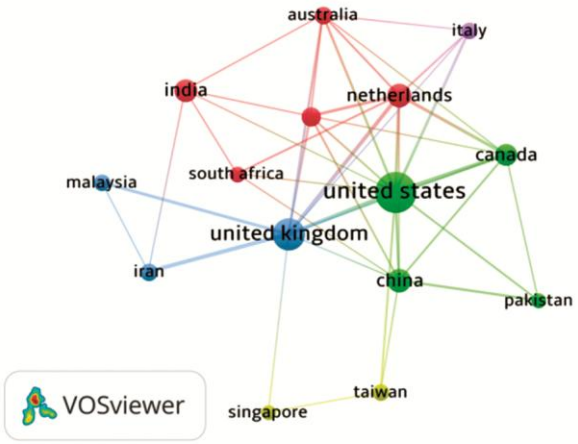

Fig. 2 — Top 15 countries collaboration network

5.2. Leading Organizations

The 631 organizations contributed to 854 publications and showed uneven distribution. On one hand 370 and 239 organizations contributed 1 and 2-6 publications each, while only 22 organizations contributed 7-23 papers each. Among the top 22 organizations, six were from the USA, four from the U.K., three from Spain and the Netherlands, and one each from other countries, and they collectively contributed 27.99% (239) publications and 38.75% (23478) citations share, respectively. Eight organizations, namely the University of Granada, Spain(n=23), University of Hawaii at Manoa, USA and University College London, UK (n=18 each), et al. and seven organizations, namely the University of Wolverhampton, U.K.(197.57 and 2.78), Universitat Politecnia de Valencia, Spain (191.79 and 2.56), Elsevier BV, Netherlands(168.0 and 2.37), University of Granada, Spain (147.35 and 2.08), et al registered more than their average productivity (38.82) and average citation impact (98.23 and 1.38). **Table 3** presents the profile of the top 5 most productive and most impactful organizations each.

VOSviewer was used to analyze the top 22 organizations collaboration networks, which together formed 157 collaborative links with a TLS of 229 and were categorized into seven distinct clusters (Figure 3). Cluster 1 (green) includes the University of Hawaii at Manoa, USA, Drexel University, USA, Texas A & M University, USA; University of Tennessee, Knoxville, USA; and University of the Pittsburg, USA; Cluster 2 (red) includes Universitat Politecnia de Valencia, Spain, University of Wolverhampton, U.K., University of Strathclyde, U.K., University of Malaya and Tehran University. Cluster 3 includes Bar Ilam University, Zhejiang University of Finance & Economics and the University of the Punjab. Cluster 4 (purple) includes the University College London, Univ. of Barcelona and the University of Tehran; Cluster 5 (orange) includes the Univ. of Granada and Leiden Univ.; and Cluster 6 (blue) consists of the Univ. of Loughborough and the Univ. of Amsterdam.

Table 2 — Ranking of top countries by centrality measures

Rank	Country name	WDC	Country name	CC	Country name	BC
1	USA	92	USA	0.68	USA	0.43
2	U.K.	56	U.K.	0.56	U.K.	0.17
3	Netherlands	43	Netherlands	0.55	Netherlands	0.15
4	Spain	39	China	0.53	China	0.14
5	Canada	26	Spain	0.52	Spain	0.12

WDC=Weighted Degree Centrality; CC=Closeness Centrality and BC=Betweenness Centrality

Table 3 — Bibliometric profile of the top 5 most productive and impactful organizations each

S. No	Name of the Organization	TP	TC	CPP	RCI	TLS
	Top 5 most productive organizations					
1	University of Granada, Spain	23	3389	147.35	2.08	27
2	University of Hawaii at Manoa, USA	18	1360	75.56	1.06	8
3	University College London, UK	18	1175	65.28	0.92	11
4	Universitat Politecnia de Valencia, Spain	14	2545	181.79	2.56	24
5	University of Wolverhampton, U.K.	14	2766	197.57	2.78	9
	Top 5 most impactful organizations					
1	University of Wolverhampton, U.K.	14	2766	197.57	2.78	9
2	Universitat Politecnia de Valencia, Spain	14	2545	181.79	2.56	24
3	Elsevier BV, Netherlands	7	1176	168	2.37	20
4	University of Granada, Spain	23	3389	147.35	2.08	27
5	Bar Ilam University, Israel	10	1399	139.9	1.97	3

Table 4 — Ranking of organizations by centrality measures

Rank	Organization name	WDC	Organization name	CC	Organization name	BC
1	Univ. of Granada, Spain	27	Zhejiang Univ. of Finance & Economics, China	0.0528	Univ. of Granada, Spain	0.0141
2	Universitat Politecnia de Valencia, Spain	24	Univ. of Granada, Spain	0.0517	Zhejiang Univ. of Finance & Economics, China	0.0132
3	Elsevier BV, Netherlands	20	Univ. of the Punjab, Pakistan	0.0515	Univ. of the Punjab, Pakistan	0.0128
4	Leiden Univ., Netherlands	18	Leiden Univ., Netherlands	0.0505	Univ. of Wolverhampton, UK	0.0098
5	Univ of the Punjab, Pakistan	13	Indiana Univ., Bloomington, USA	0.0419	Universitat Politecnia de Valencia, Spain	0.0025

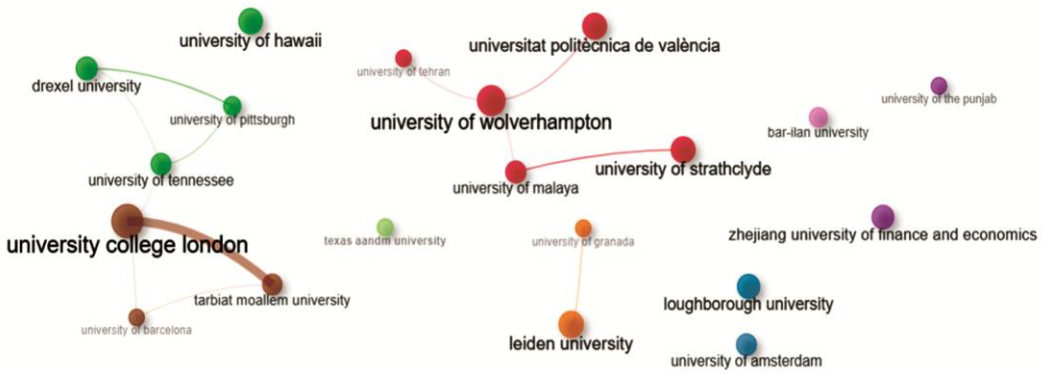

Fig. 3 — Top 22 organisations collaboration network

The collaborative intensity (as measured by TLS) of the top 22 organizations varied from 3 to 27, with the highest reported by Univ. of Granada, Spain (27 links with 13 organizations), followed by Universitat Politecnia de Valencia, Spain (24 links with 12 organizations), Elsevier BV, Netherlands (20 links with 18 organizations), Leiden Univ., Netherland (n=18 links with 14 organizations), Univ. of the Punjab, Pakistan (13 links with 13 organisations), Univ. of Amsterdam, Netherland (11 links with 8 organizations), Univ. College London, UK (11 links with 4 organizations), Tarbiat Moallen Univ., Tehran, Iran (9 links with 3 organizations), Univ. of Wolverhampton, U.K. (Likely 9 links with 6 organizations), Univ. of Barcelona, Spain (9 links with 7 organizations), Zhejiang Univ. of Finance & Economics, China (9 links with 4 organizations) and Drexel Univ., USA (9 links with 7 organizations). The ranking of the top 5 organizations by central measures is shown in Table 4.

5.3. Leading Authors

The 1598 authors contributed to 854 HCPs, of which 1405, 173 and 12 authors contributed 1, 2-5

Table 5 — Bibliometric profile of the top 5 most productive and impactful authors each among the top 23 authors

S. No	Name of the author	Affiliation	TP	TC	CPP	RCI	TLS
		Top 5 most productive authors					
1	D. Nicholas.	University College London, UK	16	970	60.63	0.85	44
2	H.R. Jamalli	University College London, UK	14	865	61.79	0.87	32
3	M. Thelwell	University of Wolverhampton, U.K.	14	2766	197.57	2.78	13
4	P.Jacso	University of Hawaii at Manoa, USA	13	1034	79.54	1.12	0
5	E.D. Lopez-Cozar	University of Granada, Spain	12	2580	215.00	3.03	28
		Top 5 most impactful authors					
1	A.W. Harzing	Middlesex University, London	5	1643	328.6	4.63	4
2	A. Martin-Martin	University of Granada, Spain	8	2236	279.5	3.94	21
3	E.D. Lopez-Cozar	University of Granada, Spain	12	2580	215	3.03	28
4	E.Orduna-Malea	Universitat Politechnicale Valencia, Spain	11	2356	214.18	3.02	24
5	M.Thelwell	University of Wolverhampton, U.K.	14	2766	197.57	2.78	13

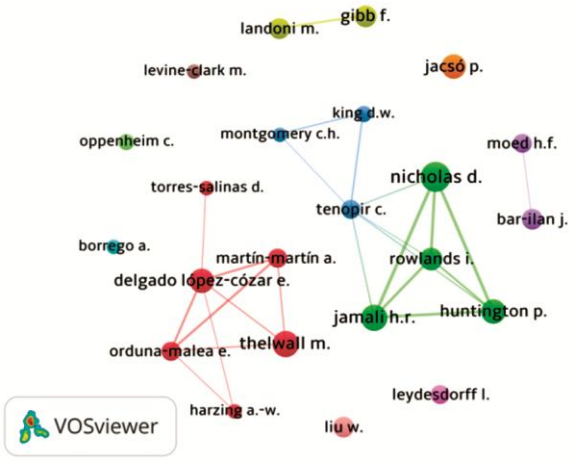

Fig. 4 — Top 23 author's collaboration network

and 6-10 papers each, while only 8 authors contributed 11-16 papers each. Among the top 23 authors, nine were from the U.K., five from the USA and Spain, two from the Netherlands and one from China and Israel. The top 23 authors collectively contributed 23.54% (201) publications and 37.83% (22924) citations share, respectively. Ten out of the top 23 authors, namely D. Nicholas (n=16), H.R. Jamalli and M. Thelwell (n=14 each), P. Jacso (n=13), E.D. Lopez-Cozar (n=12), et al contributed more than the average productivity (8.74), and (ii) Seven authors, namely A.W. Harzing (328.6 and 4.63), A. Martin-Martin (279.5 and 3.94), E.D. Lopez-Cozar (215.0 and 3.03), E- Orduna-Malea (214.18 and 3.02), M. Thelwell (197.57 and 2.78), et al registered more than their average (114.05 and 1.61) citation impact. Table 5 lists the top 5 most productive and most impactful organizations each.

Figure 4 presents a co-authorship network visualization map of the top 23 authors (with 5 or more papers), which grouped them into 11 clusters, which together formed 157 collaborative links with a TLS of 229. Cluster 1 includes A. Martín-Martín, A. W. Harzing, D. Terres-Salinas, E. D. López-Cózar, E. Orduna - Malea, and M. Thelwell; Cluster 2 includes D. Nicholas, H. R. Jamalli, I. Roylands, and P. Huntington; Cluster 3 includes C. H. Montgomery, C. Tenopir and D. W. King; Cluster 4 includes F. Gibb and M. Landoni; Cluster 5 includes H. F. Moed and J. Bar-Ilan; Cluster 6-11 includes contain individual authors, such as A. Borrego, P. Jacso, M. Levine-Clark, L. Leydesdorff, W. Liu and C. Oppenheim

The collaborative intensity (as measured by total link strength) of top 23 authors varied from 0 to 447, with maximum reported by D. Nicholas (44 links with 12 authors), followed by I. Roylands (35 links with 6 authors), P. Huntington (34 links with 5 authors), H.R. Jamalli (32 links with 12 authors), E.D. Lopez-Cozar (28 links with 9 authors), E- Orduna-Malea (24 links with 12 authors), A. Martin-Martin (21links with 7 authors), et al. However, the ranking of the top 5 authors by centrality measures is shown in Table 6.

5.4. Leading Communication Channels

The 136 journals published 854 HCPs. On one hand 94, 21 and 13 journals contributed 1-5, 6-10 and 11-20 papers each, while 7 and 1 journals contributed 21-50 and 51-99 papers each. The top 24 journals individually contributed to 10 to 99 papers and collectively contributed 64.05% (547) publications and 64.94% (39348) citations share, respectively, and among them: (i) The top five by publication output were *Scientometrics* (n=99), The *Electronics Library* (n=50), *Online Information Review* (n=38), *IEEE Transactions on Information Theory* (n=33) and The *Journal of Informetrics* (n=32); (ii) the top five by

Table 6 — Ranking of authors by centrality measures

Rank	Author name	WDC	Author name	CC	Author name	BC
1	Nicholas D,	37	Tenopir C	0.3000	Thelwall M	0.0141
2	Jamali HR	33	Delgado LCE	0.3000	Tenopir C	0.0132
3	Huntington P	28	Orduna-MaleaE	0.2625	Delgado LCE	0.0128
4	Rowlands I	25	Martin-Martin A	0.2625	Demoyaanegãn F	0.0098
5	Orduna-MaleaE	16	Thelwall M	0.2625	Leydesdorff L	0.0025

Table 7 — Classification of Keywords by broad subject areas under different types of electronic documents

S. No	Broad subject area	Number of papers					
		E-Resources (General)	Electronic Books	Electronic Journals	Electronic Databases	Electronic Theses	TP
1	Print vs electronic		7	11			18
2	Use, Usage and Users	18	54	59	25	2	158
3	Collection development	5	18	12	4	3	42
4	Reading & Readers	0	16	6	0	0	22
5	Acquisition & Purchase	2	7	5	2	1	17
6	Accessibility & Searchability	2	4	9	6	3	24
7	Information services & dissemination	9	3	6	12	1	31
8	Information processing (classification & cataloguing)	1	1	1	2	1	6
9	Information systems		1	1	2		4
10	Information storage & retrieval	1			1		1
11	Organization & management	12		1	1		14
12	Economics, pricing and Finance	1		4	4		8
13	Education & Literacy	6	5		1		11
14	Impact		2	6	1		9
15	Technology and Production		7	2	1		10
16	Design & Format		4				4
17	Marketing & Promotion		7				7
18	Metadata & Digital Identity	2		1		3	6
19	Repository & Digital Library					6	6
20	Copyright	4					
21	Licensing	5					

CPP were *Scientometrics* (143.95 CPP), The *Journal of Informetrics* (131.09*), International Journal of Information Management* (90.18), *Information Processing & Management* (77.0);and (iii) the top 5 by impact factor were*: International Journal of Information Management* (n=17)(IF=20.1), *Information Processing & Management* (n=17) (IF=7.4), *Scientometrics (*n=99)(IF=3.5); *Journal of Informetrics* (n=32)(IF=3.4) and *Library High-Tech* (n=28)(IF=3.4)

5.5. Broad and Narrow Subject Areas

The various broad and narrow subject areas studied under e-resources studies were identified by manually scanning the titles of papers and using keywords, and they are presented by type of electronic documents in Table 7. The maximum number of publications were published on use, usage and users (158 papers), followed by collection development (42 papers), information services & dissemination (31), accessibility &search ability (24 papers), reading & readers (22 papers), acquisition & purchase (17 papers), organization & management (14 papers). It was observed that there were different priorities of subject aspects in studies under each e-resource.

6. Summary & Results

The quantitative and qualitative bibliometric methods were used in the present study to examining the global 854 high-cited publications (HCPs) on the electronic resources domain during 1977-2023. The global studies on e-resources involved 1598 authors

affiliated with 631 organizations from 75 countries and published in 136 journals. It identified the prominent countries, organizations and authors, studied their performance using select bibliometric indicators, and created network maps to analyze their collaborative trends across participating countries, institutions and authors.

The 854 HCPs have received 60,593 citations, averaging 70.95 citations per paper (CPP). Their citations distribution indicates uneven distribution: 87.32% HCPs falling in the 20-99 citation range, and 12.68% HCPs were in the 100-2660 citation range. A total of 110 (12.88%) HCPs among 854 were identified as comparatively higher-cited (with 100 or more citations) (range: 100–2660) and registering an average CPP of 265.8.

The 12.18% (104) and 15.81% HCPs out of 854 resulted from externally funded support and for their involvement in international collaboration.

The four countries, namely the USA (with 36.6% share), the U.K. (15.93%), Spain (9.13%) and the Netherlands (5.5%) among the top 15 were considered as the most important as they played the most prominent role, having made the most significant contributions. In contrast (i) Four less prominent countries by productivity, namely Canada (128.72 and 1.81), Australia (108.47 and 1.53), Italy (92.5 and 1.3) and Germany (88.28 and 1.24) and (ii) The three prominent countries, namely Netherlands (90.4and 1.27), U.K. (84.47 and 1.19) and Spain (77.68 and 1.09) registered comparative higher citation impact than their average citation impact (75.75 and 1.07), with the exception of USA (66.98, 0.94).

Also, the four prominent countries, USA (63 linkages with 26 countries), followed by the U.K. (54 linkages with 18 countries), Netherlands (41 linkages with 15 countries) and Spain (32 linkages with 18 countries) registered the most intense international collaboration linkages and ranked on top among top 15 countries by both collaboration intensity and centrally measures. The most apparent reason for the dominance of these four prominent countries in e-resources studies is because of their well-established research institutions, funding agencies, and regulatory frameworks that support research activities in e-resources.

Among the top 22 organizations, the four prominent countries participating organizations include six were from the USA, four from the U.K., and three each from Spain and the Netherlands. They contribute the most publications share, and registered comparatively higher citation impact. For example, Univ. of Granada, Spain (n=23), Univ. of Hawaii at Manoa, USA and Univ. College London, UK (n=18 each), Universitat Politecnia de Valencia, Spain and Univ. of Wolverhampton, U.K. (n=14 each) etc., contributed more than the average productivity (10.86), and (ii) Univ. of Wolverhampton, U.K. (197.57 and 2.78), Universitat Politecnia de Valencia, Spain(191.79 and 2.56), Elsevier BV, Netherlands (168.0 and 2.37) and Univ. of Granada, Spain (147.35 and 2.08) registered more than their average (98.23 and 1.38) citation impact.

In addition, the five organizations are the University of Granada, Spain, Universitat Politecnia de Valencia, Spain, Elsevier BV, Netherlands, and the Leiden Univ., Netherland, University of Wolverhampton, U.K., among four prominent countries and the Univ. of the Punjab, Pakistan and Zhejiang Univ. of Finance & Economics, China from other countries, showed comparatively more intense collaboration by ranking at the top in collaboration intensity and central measures. This suggests that their respective countries need to encourage a much higher level of collaboration to improve publication output and citation impact.

Among the top 23 authors, maximum participation came from four prominent countries authors (9 were from the U.K., five each from the USA and Spain and two from the Netherlands). They contribute the most publications share, and registered comparatively higher citation impact. For example, D. Nicholas (U.K.) (n=16), H.R. Jamalli and M. Thelwell (U.K.) (n=14 each), P. Jacso (USA)(n=13)and E.D. Lopez-Cozar (Spain) contributed more than the average productivity (8.74) and (ii) A.W. Harzing (U.K.) (328.6 and 4.63), A. Martin-Martin(Spain) (279.5 and 3.94), E.D. Lopez-Cozar (Spain) (215.0 and 3.03), E. Orduna - Malea (Spain) (214.18 and 3.02) and M. Thelwell (U.K.) (197.57 and 2.78) registered more than their average (114.05 and 1.61) citation impact.

In addition, the authors, namely D. Nicholas, HR Jamali, P Huntington, I. Rowlands and M. Thelwell from the U.K., E. Orduna-Malea and A. Martin-Martin from Spain and C. Tenopir from the USA, also showed intense collaboration by ranking among the top 5 positions by central measures in collaboration. These findings give an idea about the prominent researchers in this area, and they can provide

important information to newly entering scholars in this area for future collaboration.

The most productive research channels identified on e-resources include *Scientometrics* (n=99), and was followed by *The Electronics Library* (n=50), *Online Information Review* (n=38), *IEEE Transactions on Information Theory* (n=33), etc. and academically influential journals were *Scientometrics* (143.95 CPP), *Journal of Informetrics* (131.09), *International Journal of Information Management* (90.18) and *Information Processing & Management* (77.0). The top 24 journals, among a total of 136, accounted for 64.05% and 64.94% (39348) share of total publications and citations, respectively.

The subject focus on HCPs allows us to identify key trends and themes within the literature and assess the scholarly impact of these contributions. The major subject areas identified were use, usage and users' studies (158 papers), followed by studies on collection development (42 papers), information services & dissemination (31), accessibility & search ability (24 papers), reading & readers (22 papers), acquisition & purchase (17 papers), organization & management (14 papers).

7. Conclusion

This present study examines the evolving landscape of research on e-resources and highlighting the significant growth of research on this topic. A total of 854 high-cited publications (with an average of 70.95 CPP) from 1977 to 2023 were identified from the Scopus database, revealing evolving trends and thematic focuses. The growth trajectory of e-resources publications by volume and the high annual average growth rate underscores their rising recognition in the library and information research field. The US and the U.K. emerged as the leading contributors, reflecting their pivotal roles in advancing this field of study. Key institutions, such as the Univ. of Granada, Spain, Universitat Politecnia de Valencia, Spain; Leiden Univ., Netherlands; and the Univ. of Wolverhampton, the U.K., have been instrumental in driving impactful research. The *Scientometrics* and the *Electronics Library* were the leading publishing and impactful journals. The study identified significant research themes and indicates subject areas ripe for further exploration and collaboration, and demonstrated the collaborative efforts of key countries, authors and institutions. This analysis aims to facilitate international collaborative efforts and may act as a vital resource for researchers and policymakers, providing insights that can inform future investigations and address the growing challenge of global e-resources research studies.

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