Insights From The Web Of Science: A Bibliometric Study On EResource Literature Output

Femy Francis[1*] and Dr Chinnasamy K[2]
[1*]Research Scholar, Madurai Kamaraj University, Madurai- 625021, Tamil Nadu, India;
[2]Professor (Former), Madurai Kamaraj University, Madurai- 625021, Tamil Nadu, India
*Corresponding Email: femypauljoseph@gmail.com

Abstract
In this digital era, electronic resources (e-resources) are becoming an essential part of education and research. As the use of eresources continues to grow, it is necessary to understand the trends and patterns in the literature surrounding them. This study tries to explore a bibliometric study of literature output on e-resources using the Web of Science database. The steps involved in mapping include defining the domain, selecting keywords pertinent to the field and its subfields, conducting searches, obtaining publication and citation data from the Web of Science, and outlining the structure of research outputs using bibliometric tools like Biblioshiny and VOSviewer. Important factors like annual scientific production, relative growth rate, document and source types, most productive authors, influential sources, and most often used keywords are heavily weighted in this study. Also, this study provides a visual summary of the various articles published on e-resources. Additionally, it is found that several studies on the topic of "e-resources" have been carried out, with a focus on user adoption and acceptance of e-resources, perspectives and attitudes, and potential benefits. Understanding the publication pattern from 1989 to 2023 is made easier by this study.
Keywords: *E-Resources, Bibliometric Study, E-books, E-journals, Web of Science, Research trends, Publication patterns, Citation analysis, Biblioshiny, VOSviewer*

1. INTRODUCTION

Education has been transformed along with many other facets of our lives by advancing information and communication technology (ICT). The introduction of ICT has given libraries new chances to improve their materials and offerings. ICT has reduced the relevance of manual-based library systems in academic, research, special, and public libraries. Both teachers and students now find that using technological materials in the classroom is essential. The way that teaching, learning, and research are conducted has been greatly changed by these electronic information resources, or "e-resources" [1]. When compared to print media, e-resources offer many more options and benefits. These include cross-referencing and searching across publications, convenience of use, speedy multiple-point access, and ease of data integration across varied information items. It also offers new techniques and tools for locating and analysing content in original ways. Additionally, e-resources are crossplatform interoperable, allowing companies to collaborate, communicate, and share content. E-resources provide multimedia and interactive components, which are important for understanding content in the online learning environment. The COVID-19 pandemic has further accelerated the reliance on e-resources, as online learning platforms and resources become crucial for students, lecturers, and researchers to continue their teaching and learning processes. E-resources provide users with access to current and up-to-date information. By accessing recently released articles and research findings through e-resources, researchers can stay up to date on the most recent advancements in their field. Academic literature can be quantitatively analysed through the use of bibliometric analysis. It is the statistical analysis of bibliographic data with a common emphasis on publications and research output citation analysis. Bibliometrics is the application of quantitative analysis to the bibliographic references found in the body of the literature [2]. Alan Prichard [3] defines it as the application of mathematics and statistical methods to books and other media of communication. Using bibliometric interpretation to analyse research assessment is the most effective way to see how a particular output in a given subject area is organised and trends [4]. Bibliometric studies not only aid in the ranking of particular metrics but also in the process of

formulating strategic decisions [5]. Bibliometric analysis is a widely researched topic, with several studies in almost every branch of knowledge having been published on it. Researching data on authors, specific keywords, citations, publishing trends, and volume and quality evaluations are all made possible by the practical and exciting applications of bibliometric studies. This is due to technological advancements and publishing software tools. The first bibliometric analysis utilising statistical analysis of subject-based publications was carried out by Campbell [6]. Cole and Eales [7] examined the patterns in comparative anatomy publications from 1550 to 1860 in another groundbreaking study. Bibliometric studies are employed in every discipline for various purposes, including evaluating the impact of scholarly research, identifying research trends, and informing research policy. A few examples are as follows:

Mohd Sofian, F. N. R., et al. [8] conducted a bibliometric analysis to identify patterns in publications about corporate reputation, as well as notable countries, organisations, sources, and academics. Also, Wan, G., Dawod, A. Y., & Chakpitak, N. [9] analysed the knowledge structure and the evolution path in the field of environment, social, and governance (ESG) research. The interest in and use of electronic resources by the contributors, who presented their papers in "ELITE 2011" national seminars from all over India, was identified in the study by V. Thangavel and C. Baskaran [10]. Deepa Guleria and Gurvinder Kaur Bains [11], through their study, provide a bibliometric analysis and use relational tools to analyse the relationships among the publications on ecopreneurship.

The subject of food security has been the subject of extensive research worldwide. To objectively reveal the state of the field, Xie, H. et al. [12] carefully employed bibliometrics techniques (i.e., Bibliometrix, VOSviewer, and CiteSpace) to explore the research status and development trends in the area of food security. The work by Xie Hualin, Yanwei Zhang, and Yongrok Choi [13] uses the Bibliometrix software tool to analyse the development characteristics and trends of global land ecosystem service research, based on the Web of Science database. Kolle, S. R. et al. [14] conducted a bibliometric analysis to examine document types, language, publication output, citations, authorship patterns, journals, prolific authors, productive countries, and the most frequently occurring top words or phrases from the article titles. Anita Chhatwal [15] conducted a study to determine the global literature output on e-resources. The purpose of the study by Chandrakanta Swain, Dillip K. Swain, and Bijayalaxmi Rautaray [16] was to analyse the academic communications published in Library Review (LR) between 2007 and 2011 and highlight key trends in its publishing. Also, Manoj Kumar and A.L. Moorthy [17] analysed the DESIDOC Journal of Library and Information Technology for the years 2001–2010.

2. Research Objectives

Bibliometrics is a tool or mechanism to identify research output on a certain subject of knowledge in the modern era of abundant information. Studies of this kind are quite beneficial for additional research in that specific area. The current study uses bibliometric analysis to examine the global e-resource literature produced. Because it enables the researchers to comprehend and assess the state of e-resources research, this study will be beneficial. The primary objectives of this study are to,

i. Examine annual publications and citation trends on E-resources.
ii. Identify the most prolific sources in E-Resources.
iii. Find out the most relevant authors.
iv. Identify the most-cited papers related to E-Resources.
v. Discuss the countries' scientific production and the most cited countries.
vi. Identify the most-used keywords in these publications. vii. Find out the top studies on e-resources.

2.1. Scope of the Study

This study aimed to examine the global literature output on e-resources. Even though there are no geographic restrictions in the study, only publications that are indexed in the Web of Science Core Collection (WoSCC) are included.

3. RESEARCH METHODOLOGY

3.1. Data Collection and Research Criteria

This study focused on the publications on e-resources and collected data from the Web of Science Core Collection (WoSCC) to apply bibliometric and content analysis algorithms to the chosen papers. This study's goal was to review early publications on e-resources. The WoSCC database makes it possible to locate studies that have been published in reputable publications where the calibre of the investigation and the results reported have undergone in-depth scrutiny.

The study was conducted using the WoSCC database and used the following search terms in the advanced search option: **TI = ("E-Resource*" OR "Electronic Resource*" OR "E-Book*" OR "Electronic Book*" OR "EJournal*" OR "Electronic Journal*" OR "E-Magazine*" OR "Electronic Magazine*" OR "E-Zine*" OR "Online Journal*" OR "Online Resource*" OR "Digital Resource*")**

The time was limited to retrieve the literature on e-resources from 1989-01-01 to 2023-09-30, and 3158 records were retained as the basis for data analysis. The research areas were refined to 'Information Science Library Science' OR 'Computer Science' OR 'Education Educational Research'. The search was quasi-restricted with language such as English and document types 'Article' OR 'Proceeding Paper' OR 'Review Article'. Also, records with anonymous authors were excluded. Thus, 2031 records were excluded, resulting in 1127 article records for further research and analysis (Figure 1). The query link for the study is as follows: https://www.webofscience.com/wos/woscc/summary/c15b388e-85f9-440c-9270-6befcc0b081ba7f9eb64/relevance/1. Table 1 summarises all of the established criteria used to collect data from the WoSCC.

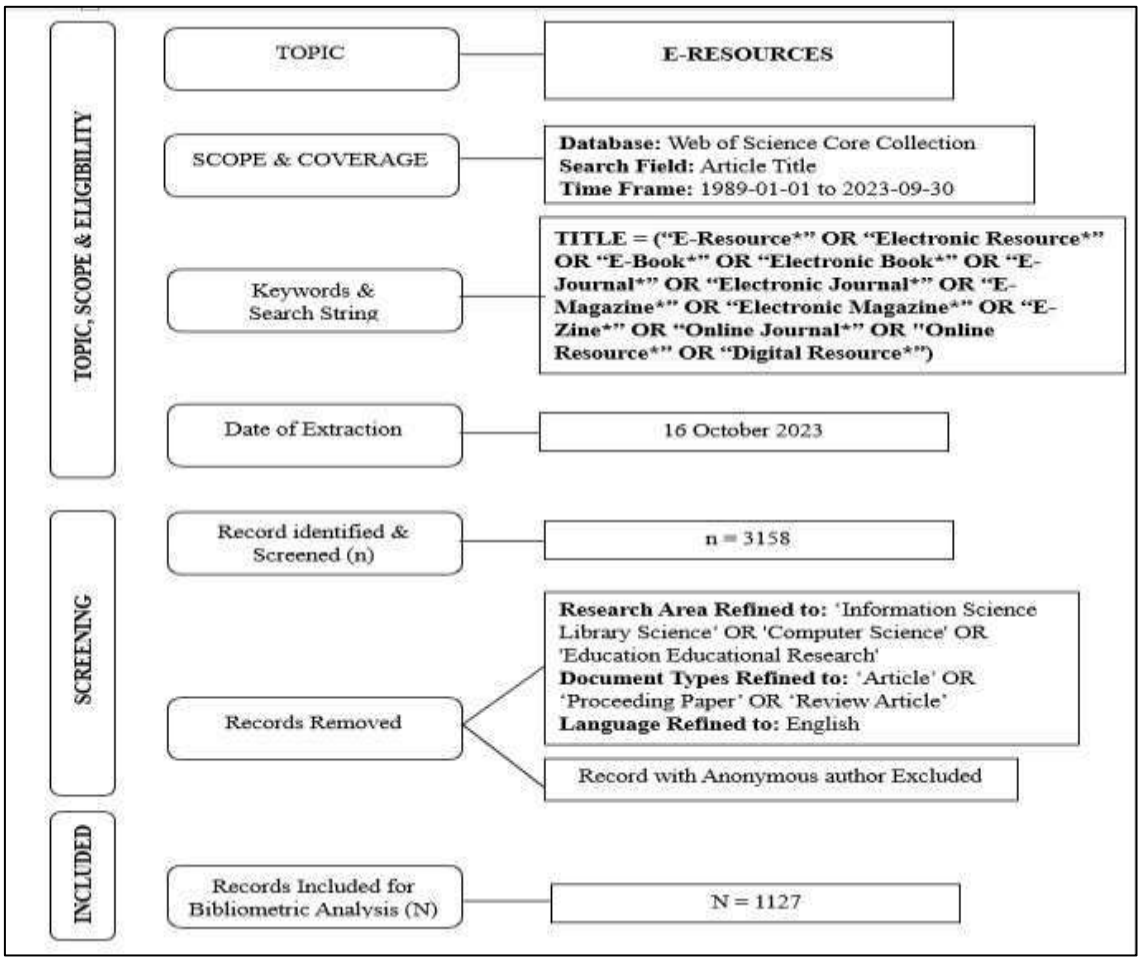


Figure 1. Flowchart for analysis and data retrieval procedure.

Keywords Search	TI = (“E-Resource*” OR “Electronic Resource*” OR “E-Book*” OR “Electronic Book*” OR “E-Journal*” OR “Electronic Journal*” OR “E-Magazine*” OR “Electronic Magazine*” OR “E-Zine*” OR “Online Journal*” OR "Online Resource*" OR “Digital Resource*”)
Period	1st January 1989 to 30 September 2023
Database	Web of Science Core Collection
Research Areas	‘Information Science Library Science’ OR 'Computer Science' OR 'Education Educational Research'
Language	English only
Document Types	‘Article’ OR ‘Proceeding Paper’ OR ‘Review Article’

Table 1. Criteria for gathering data. 3.2.

Method

A method for examining published academic works, as well as the hotspots and development trends in a field of study using data statistics, is called bibliometric analysis [18]. The direction of the study field and the academic institutions and researchers who have produced the greatest amount of research output can be determined by analysing indicators such as the number of citations, the author's work list, the national or thematic bibliography, and publication style [18]. The widespread application of bibliometric analysis in a wide range of fields, including economics and medicine, is undeniable.

Academic studies must include reviews of pertinent literature because they enable researchers to gauge the state of a certain topic. The quantitative study of the published literature in the domains of library and information science is the foundation of the research methodology known as bibliometrics. The three main components of this analysis approach—which was developed to address the exponential increase in published information—are the measurement of a specific scientific activity, its impacts as demonstrated by the total number of article citations, and the relationships between publications. About a certain issue, their combined efforts uncover the foundation of the body of information already present in a field of study. Using VOSviewer and Biblioshiny, the study examined general publication patterns and the most popular journals, fields, authors, countries, and study regions. This rating was primarily based on the number of publications, citations, and occurrences.

The most important studies, as well as the most foundational publications published between January 1, 1989, and September 30, 2023, were categorised using co-citation analysis. A common bibliometric technique for determining patterns of similarity between cited books is co-citation analysis. The study identifies the important works that have influenced research in the timespan using this technique in VOSviewer. The best technique for demonstrating how research themes have changed over time, identifying patterns in the field that were previously unnoticed, and recommending fresh research directions is content analysis. In-depth content analysis was performed on articles that were connected in the network similarly. The presence of a third article in each of the citations of two articles indicates that they are bibliographically related. Using Biblioshiny's bibliometrics analysis, this study developed conceptual frameworks, intellectual structures, and social structures to learn about publication patterns, well-known authors, highly cited papers, top-cited sources, and the most relevant sources.

4. RESULTS AND ANALYSIS

4.1. General information

The first publication about e-resources on WoSCC was released in 1989. Thus, works published from 1989 till September 30, 2023, were chosen as the time frame. Figure 2 provides an overview of the data set and a foundation for analysis, derived from Web of Science Core Collection (WoSCC) databases. There were 1127 articles in 244 sources, with an average citation per document of 13.3 and an average growth rate of 6.43%. The documents include 1031 journal articles (91.5%), 73 proceedings papers (6.5%), and 23 review articles (2%). The literature on e-resources has been written by 2174 authors, 356 (31.6%) of whom have written singleauthored publications. Comparably, there were more than two co-authors per paper, and the percentage of international co-authorship is 7.986%, suggesting that academics are working together more frequently on the topic of "e-resources." This supported the claim made by Wuchty et al. [19] that most social research is written by two writers. In addition, the authors employed 1856 keywords and 24546 references in all selected articles.

FIGURE 2. Data synthesis and dataset overview

4.2. Publication Trends

Figure 3 illustrates annual publications and citation trends on e-resources. From the year 1995 onwards, articles on e-resources were published a lot. Of these 1,127 papers, 51.3% were published after 2010, 37.5% were published in the period 2000–2010, and only 11.2% were published between 1989 and 1999. Figure 3 illustrates the exponential development pattern for the annual total citations, with 14,987 citations overall and an average citation frequency of 13.3 times per item. In 2014 (63 papers), the number of documents peaked, and in 2021, the number of cited articles peaked (1,222 times). It may be noted that, as shown in Figure 3, the quantity of papers in 2023 has significantly decreased as the query was conducted for the period until September 30, 2023.

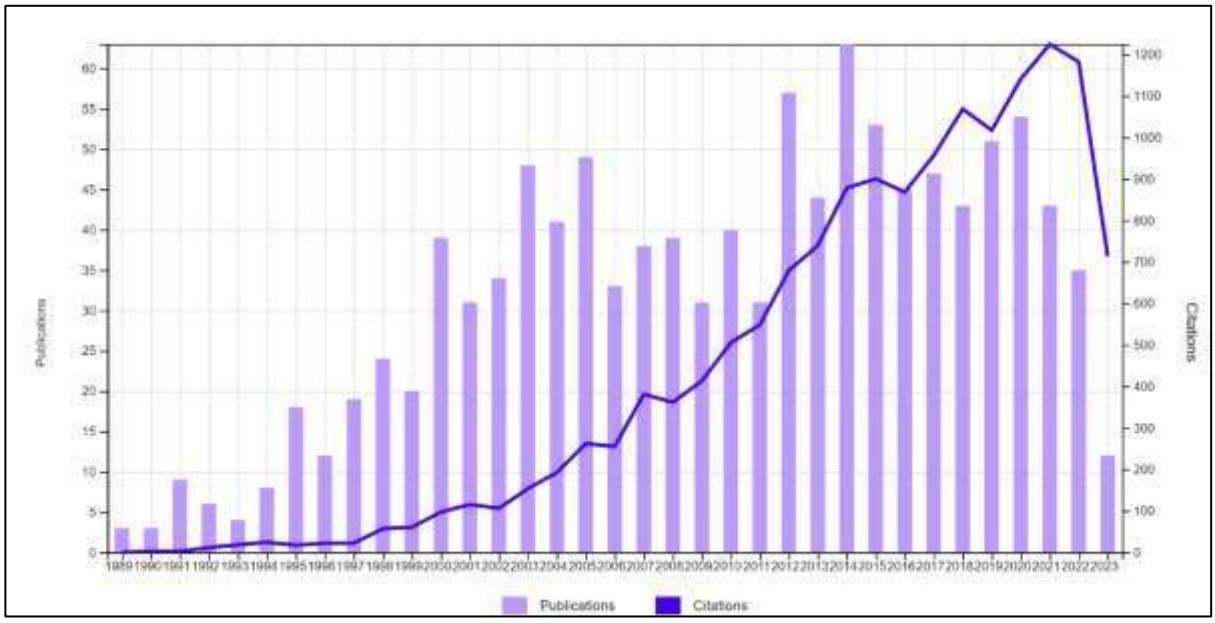


FIGURE 3. Annual publications and citation trends on E-resources

4.3. Sources Analysis

244 sources published a total of 1127 articles about e-resources. The top 10 journals in terms of publications are shown in Table 2 based on many metrics, including publication year start, total citations (TC), number of publications (NP), h-index, g-index, and m-index.

#	Journal	h index	g index	m index	TC	NP	PY start
1	ELECTRONIC LIBRARY	18	25	0.529	1029	95	1990
2	SERIALS REVIEW	10	15	0.526	353	67	2005
3	JOURNAL OF ACADEMIC LIBRARIANSHIP	18	27	0.857	817	46	2003
4	COLLEGE & RESEARCH LIBRARIES	18	24	0.545	683	39	1991

5	LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	12	22	0.48	525	38	1999
6	LIBRARY RESOURCES & TECHNICAL SERVICES	10	17	0.385	325	32	1998
7	PROGRAM-ELECTRONIC LIBRARY AND INFORMATION SYSTEMS	10	17	0.4	349	31	1999
8	LEARNED PUBLISHING	7	12	0.233	170	26	1994
9	INTERLENDING & DOCUMENT SUPPLY	8	10	0.276	161	25	1995
10	SERIALS LIBRARIAN	4	5	0.121	49	24	1991

Table 2. Most prolific sources in E-Resources

Of the 1127 papers, 423 were published in the top 10 journals, making up 46.4% of the total. With 95 publications, the journal "Electronic Library" is determined to be the best. 'Serials Review' is the next top periodical with 67 publications.

The h-index, g-index, and m-index bibliometric indicators are used to measure the influence and visibility of journals based on the citation counts of their published articles. These indices, typically meant to measure the influence of particular academics, can also be used to gauge the overall influence and contribution of journals within their fields.

A publication that has a higher h-index is generally thought to be more important and influential because it suggests that a considerable portion of the papers published there have been widely cited and acknowledged by the scientific community. A journal's h-index means the highest value of h in a journal, which ensures every hpublished article obtains a minimum of h citations.

The g-index is a measure of an author's most significant article citation scores. The top g articles together received at least g^2 citations, making the g-index the biggest number of that kind.

An additional version of the h-index that shows the h-index for each year since it was first published is called the m-index. It is computed by dividing the h-index by the total number of years that have passed since the publication year. The m-index, a normalised measure of influence, can be used to compare journals with varying publishing histories.

In terms of these bibliometric indicators, 'Electronic Library' (NP = 95; TC = 1029; h-index = 18; g-index = 25; m-index = 0.529), 'Journal of Academic Librarianship' (NP = 46; TC = 817; h-index = 18; g-index = 27; m-index = 0.857), and 'College & Research Libraries' (NP = 39; TC = 683; h-index = 18; g-index = 24; m-index = 0.545) are the most relevant journals on the topic of e-resources.

The bibliometric theory known as Bradford's law, or Bradford's law of scattering, explains the exponential distribution of publications on a given topic over several journals. It was initially presented by Samuel C. Bradford in 1934, and since then, it has been applied in scientometrics, library science, and information science, among other fields. Bradford's law provides a useful framework for understanding the distribution of material throughout journals and aids in guiding scholars in their quest for relevant information. It also emphasises how important academic papers are for disseminating research findings and building a body of knowledge about a particular subject [20].

Based on Bradford's Law, Figure 4 displays the core e-resource sources. Figure 5 shows how publications have increased over time in the **five most active journals.**

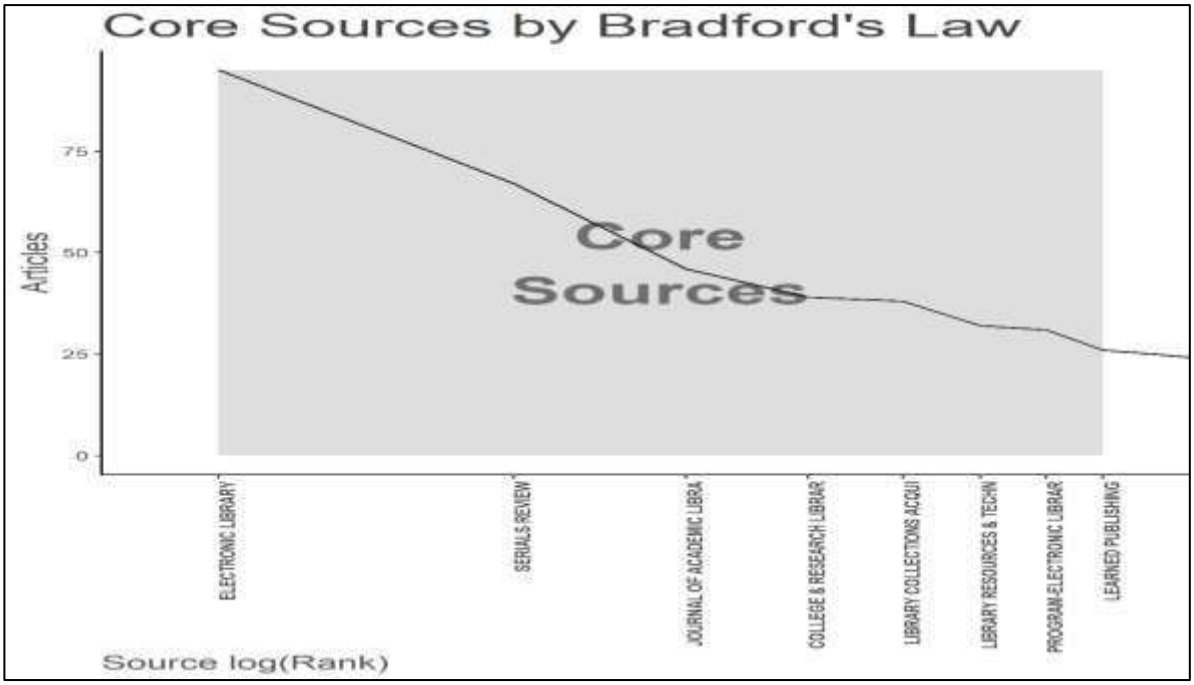


FIGURE 4. The core sources of E-Resources based on Bradford's Law

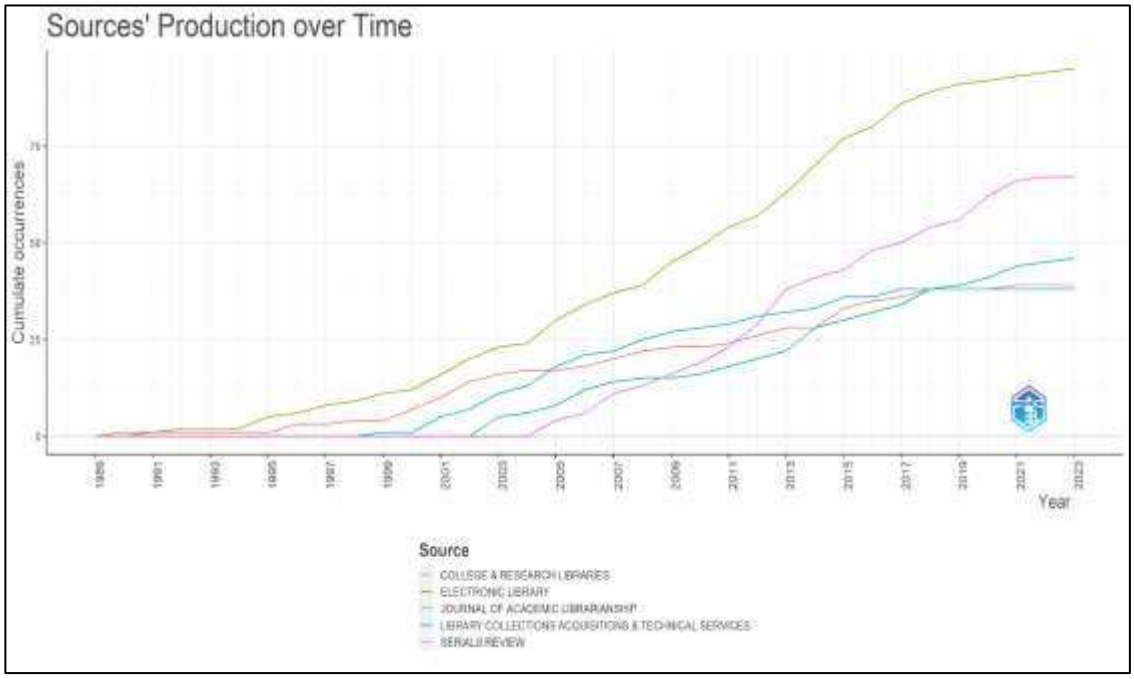


FIGURE 5. Annual publications of the most productive journals

4.4. Most Prolific Authors

It's crucial to consider both an author's productivity and their influence when determining how significant they are in a particular sector. Figure 6 takes into account both of these measures to provide a picture of the top 10 authors in terms of productivity over the previous ten years. The total number of articles written by one author during a specific period was used to gauge productivity. However, the impact was assessed by counting the number of citations received annually. In Figure 6, the circle's size indicates how many articles the author authored during that particular year. The circle's shade indicates the number of citations received annually.

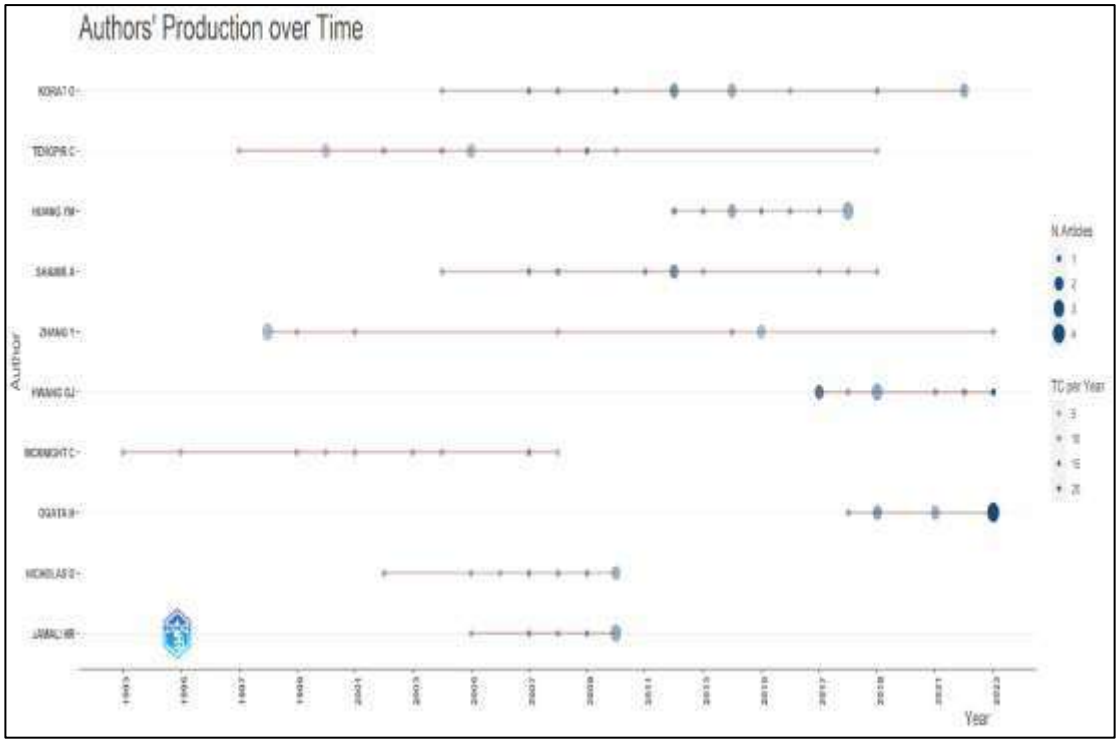


Figure 6. Top authors' production over time.

Among the 1127 articles, some authors are very prolific, publishing more papers related to e-resources. As shown in Figure 6, Ofra Korat is the leading author in E-Resources with the most publications, contributing 12 papers in the period 2004–2023. This is followed by Carol Tenopir with 11 publications and Yueh-Min Huang, Adina Shamir, and Yin Zhang with 10 publications.

The top 15 extremely productive authors are shown in Table 3 based on many metrics, including publication year start, total citations (TC), number of publications (NP), h-index, g-index, and m-index. The top two contributors with the most citations in the dataset were Ofra Korat (TC = 575; NP = 12) and Carol Tenopir (TC = 356; NP = 11).

With 1127 articles taken from WoSCC, Ofra Korat is a well-known author with an h-index of 10 and a g-index of 12, and Yueh-Min Huang, Adina Shamir, and Yin Zhang are the top authors with an h-index of 8 and a gindex of 10.

While considering m-index, it is essential to acknowledge not only long-standing authors like Ofra Korat and Carol Tenopir but also recent researchers like Yueh-Min Huang (PY_start = 2012) with m-index = 0.667, GwoJen Hwang (PY_start = 2017) with m-index = 1, and Hiroaki Ogata (PY_start = 2018) with m-index = 0.833, who are also among the most significant writers in the field

Most Relevant Authors							
#	**Author**	**h_index**	**g_index**	**m_index**	**TC**	**NP**	**PY_start**
1	Ofra Korat	10	12	0.5	575	12	2004
2	Carol Tenopir	6	11	0.222	356	11	1997
3	Yueh-Min Huang	8	10	0.667	325	10	2012
4	Adina Shamir	8	10	0.4	452	10	2004
5	Yin Zhang	6	10	0.231	138	10	1998
6	Gwo-Jen Hwang	7	9	1	189	9	2017
7	Cliff McKnight	7	9	0.226	180	9	1993

8	Hiroaki Ogata	5	9	0.833	94	9	2018
9	David Nicholas	8	8	0.364	348	8	2002
10	Hamid R. Jamali	7	7	0.368	312	7	2005
11	Jennifer Rowley	7	7	0.438	233	7	2008
12	Ting-Ting Wu	5	7	0.625	77	7	2016
13	Paul Huntington	6	6	0.316	230	6	2005
14	Ian Rowlands	6	6	0.353	307	6	2007
15	Magdalini Vasileiou	6	6	0.4	134	6	2009

Table 3. The 15 most relevant authors. [Number of Publications (NP), Total Citations (TC), and Publication Year (PY)].

An extremely useful method for better understanding the current state of the area of study is the analysis of the most productive authors, as it highlights the importance of the most developed states in e-resource research.

4.5. Most Influential Articles

Future research can be built upon a strong foundation of knowledge of the most important e-resources. As a result, Table 4 was created, which sorts the most influential works and determines their annual number of citations. This provides a relative indicator that enables us to evaluate an article's impact regardless of when it was written. The article titled "E-books or textbooks: Students prefer textbooks," written by Woody, W. D. et al. (2010), had the most citations (TC = 270), followed by "Children's relevance criteria and information seeking on electronic resources" written by Sandra G. Hirsh (1999) (TC = 167) and "Electronic journals and changes in scholarly article seeking and reading patterns" written by Carol Tenopir et al. (2008) (TC = 136). In light of our search criteria, these papers should be regarded as the most important in the literature on e-resources.

According to the fascinating method of assessing the importance of work using the average number of citations per year, the article "Empowering personalised learning with an interactive e-book learning system for elementary school students" by Huang, YM. et al. (2012) is the second most influential in this regard, with a TC per year of 10.42.

Most Global Cited Documents						
#	JOURNAL	TITLE	AUTHOR/S	YEAR	TC	TC per Year
1	Computers & Education	E-books or textbooks: Students prefer textbooks.	William Douglas Woody, David B. Daniel, & Crystal A Baker	2010	270	19.29
2	Journal of the American Society for Information Science	Children's relevance criteria and information seeking on electronic resources.	Sandra G. Hirsh	1999	167	6.68
3	Aslib Proceedings	Electronic journals and changes in scholarly article seeking and reading patterns	Carol Tenopir & Donald W. King	2008	136	9.07
4	Library Collections, Acquisitions, & Technical Services	E-book usage in an academic library: User attitudes and behaviors	Wendy Allen Shelburne	2009	129	8.60
5	Reading Research Quarterly	The efficacy of electronic books in fostering kindergarten children's emergent story understanding.	Maria T. de Jong & Adriana G. Bus	2004	127	6.35
6	Educational Technology Research and Development	Empowering personalized learning with an interactive e-book learning system for elementary school students	Yueh-Min Huang, Tsung-Ho Liang, Yen-Ning Su & NianShing Chen	2012	125	10.42
7	Computers & Education	Reading electronic books as a support for vocabulary, story comprehension and word reading in kindergarten and first grade.	Ofra Korat	2010	125	8.93

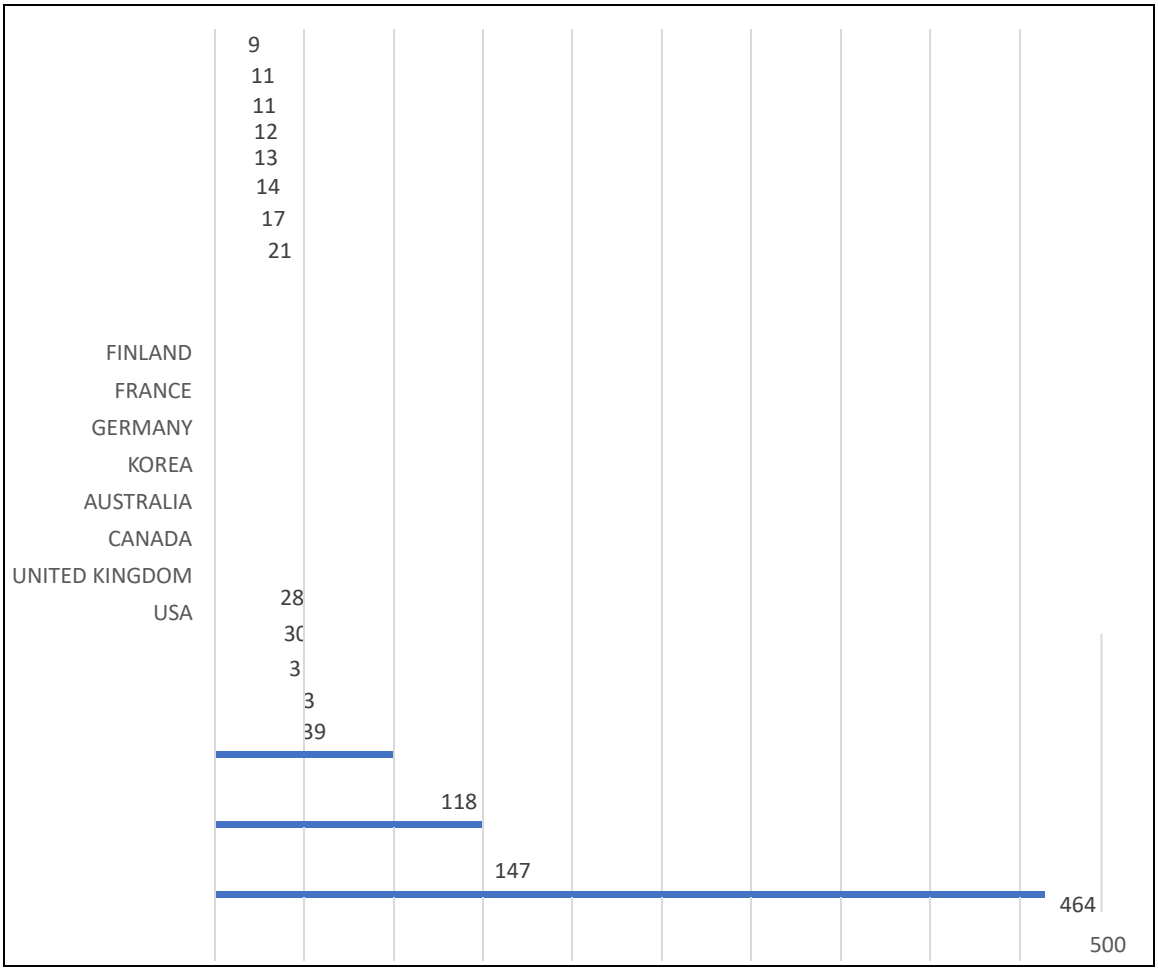
8	Journal of Educational Computing Research	The Effects of Electronic Books on PreKindergarten-to-Grade 5 Students' Literacy and Language Outcomes: A Research Synthesis.	Tricia A Zucker, Amelia A Moody, & Michael C. Mckenna	2009	119	7.93
9	Journal of Computer Assisted Learning	Electronic books versus adult readers: Effects on children's emergent literacy as a function of social class.	Ofra Korat & A. Shamir	2007	118	6.94
10	Journal of Documentation	Reasons for the use and non-use of electronic journals and databases: A domain analytic study in four scholarly disciplines	Sanna Talja & Hanni Maula.	1995	116	5.52

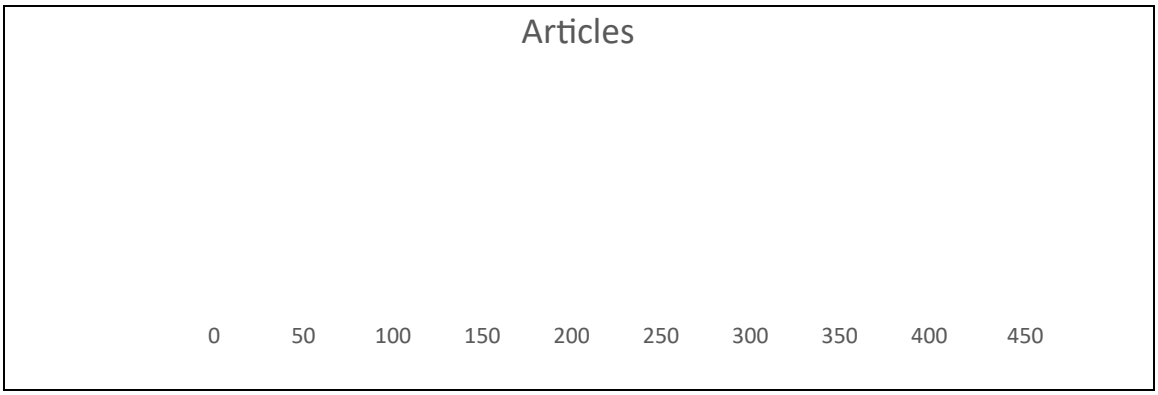
Table 4. Ten most-cited papers related to E-Resources.

4.6. Publication by Country

4.6.1. Corresponding Author's Countries

The corresponding author is the one who takes responsibility for the manuscript during the submission, peer review, and production processes. All communication, from submission to publication, will be with the corresponding author. Considering the most relevant countries in terms of corresponding authors, the USA is at the top with 464 documents, followed by China with 118 and India with 39 papers, as shown in Figure 7.





7. **Figure 7. Corresponding Author's Countries**

4.6.2. Countries' Scientific Production

Scientific productivity refers to the productivity of scientists in their research performance. Considering the scientific publication, the ten most productive countries out of 58 are shown in Figure 8. With 734 publications, the USA leads the world in productivity (NP). China, with 284 NP, is the second-most productive country, followed by the UK, with 189 NP, in that order. India is in fourth place (NP = 61) and Spain is fifth (NP = 54) in terms of scientific production. The United States is making notable advancements in the field of research on e-resources.

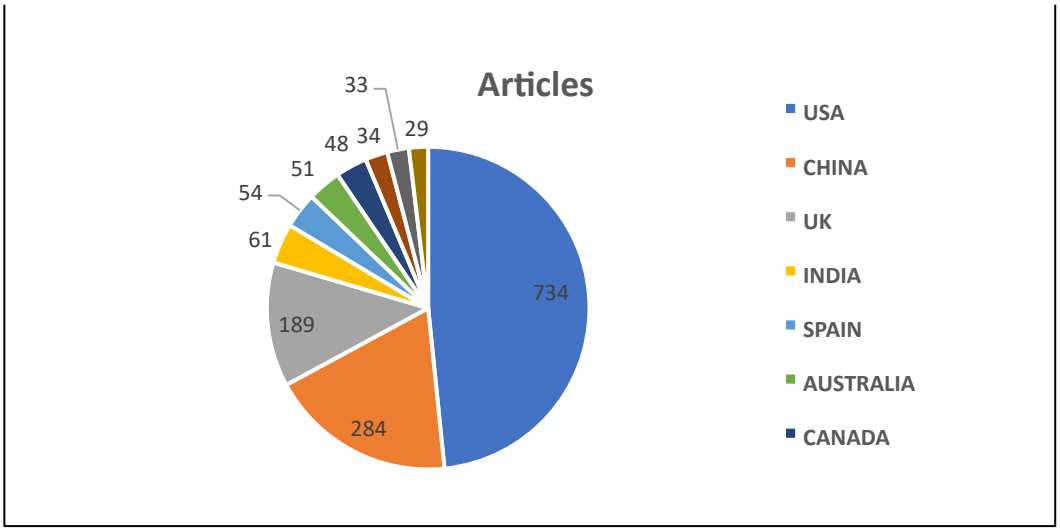


Figure 8. Top 15 countries' publications

4.6.3. Most Cited Countries

Figure 9 shows the countries with the most cited articles. The countries with the highest number of most-cited papers were the USA (TC = 6450), China (TC = 2076), and the UK (TC = 1700).

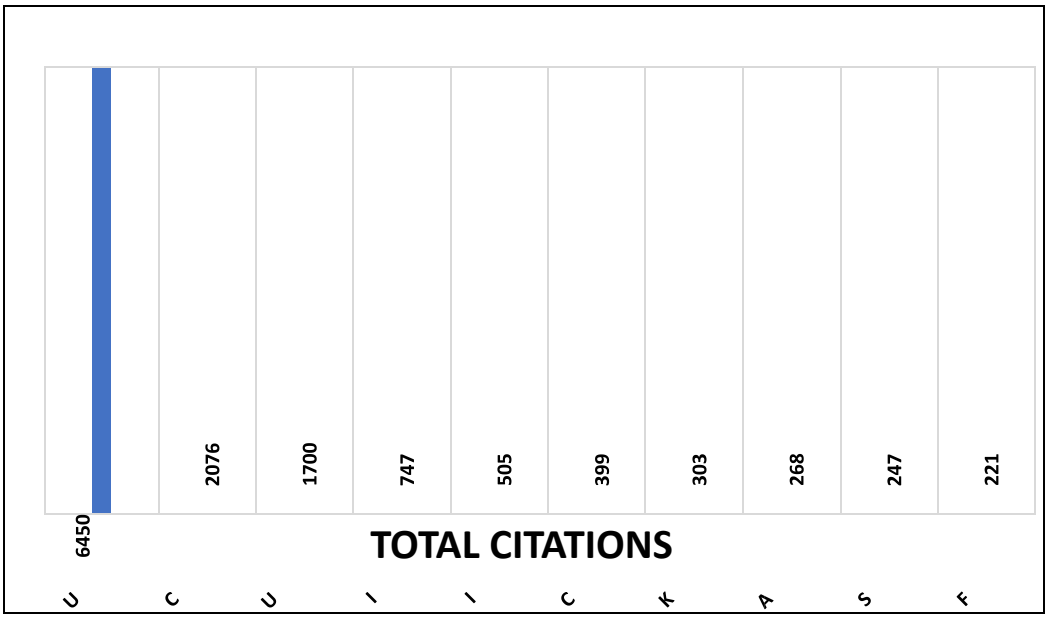


Figure 9. Most Cited Countries

4.7. Keywords Co-Occurrence Analysis

In the area of E-Resources, a term co-occurrence clustering view was produced using the VOSviewer software. Figure 10 displays the results of a co-occurrence study on 64 keywords that were chosen from 1842 keywords and had a frequency of not less than five.

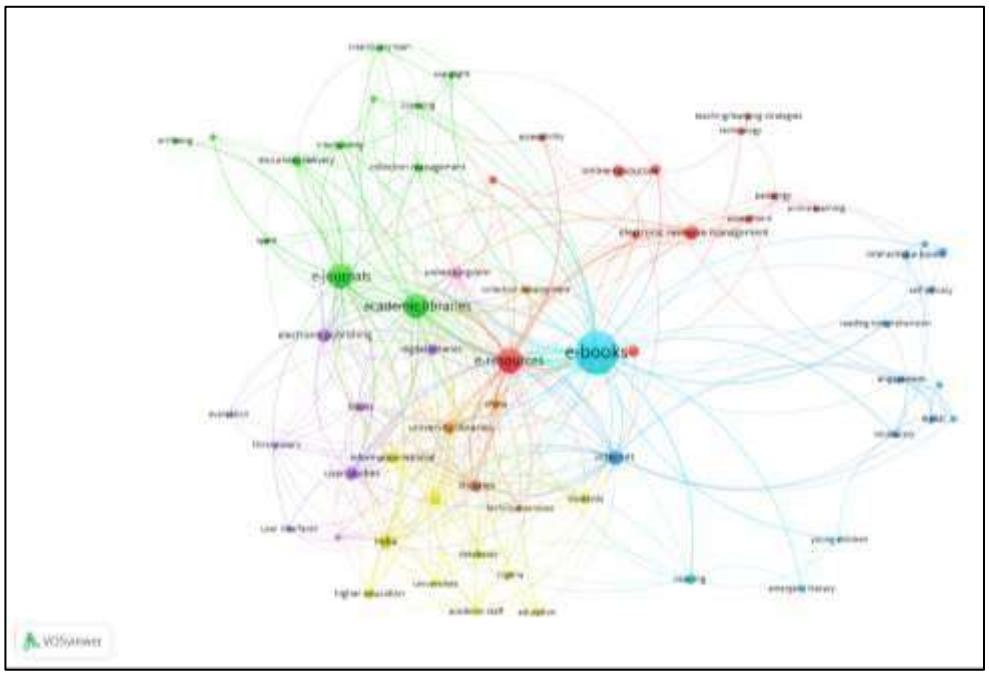


Figure 10. Co-occurrence of keywords

The weight value of the keyword affects the node area and font size. The weight number determines how often a keyword appears, and the larger the associated node and font, the more often the keyword appears in the line between nodes. The connecting line's thickness indicates the degree of co-occurrence between the two terms. The co-occurrence strength and connection line thickness are inversely correlated, which implies that the more

frequently two terms co-occur, the thicker the connection line. The software VOSviewer also received a thesaurus for the co-occurrence analysis of the keywords shown in Table 5.

Label	Replace by
collections management	collection management
e-book	e-books
electronic books	e-books
electronic book	e-books
e-journal	e-journals
electronic journals	e-journals
electronic resources management	electronic resource management
e-resource	e-resources
electronic resources	e-resources
electronic resource	e-resources
e-book readers	e-books
e-book reading	e-books
electronic resource management systems	electronic resource management
interactive e-book	interactive e-books

Table 5. Thesaurus added in VOSviewer for Co-Occurrence Analysis of Keywords

On the map, the keywords "e-books," "e-resources," "e-journals," and "academic libraries" were all given larger nodes. Figure 10 represents the most popular keywords, according to the findings of the co-occurrences study. This finding corresponds to Table 6, which lists the phrases and terms that appear most frequently in scholarly writing.

#	Keyword	Occurrences	Total link strength (TLS)
1	e-books	206	214
2	e-resources	71	91
3	e-journals	67	96
4	academic libraries	66	137
5	internet	25	47
6	electronic resource management	23	20
7	user studies	23	57
8	electronic publishing	20	40
9	india	20	55
10	libraries	17	40
11	online resources	17	8
12	university libraries	16	36
13	digital resources	15	13
14	electronic media	15	39
15	united kingdom	15	40
16	information retrieval	14	33

17	digital libraries	13	14
18	document delivery	13	28
19	china	11	21
20	e-learning	11	13

Table 6. Top 20 Co-Occurrence Keywords

Additionally, Figure 10 demonstrates that there are nine clusters, each of which has a distinct set of keywords in a designated colour. Table 7 displays the total number of items in each cluster, indicating a considerable advancement in e-resource research. One way to determine how often keywords communicate similar notions is to look at how much they tend to cluster together.

Clusters	Number of Keywords	Keywords
Cluster 1	13	accessibility, assessment, digital resources, e-learning, e-resources, electronic resource management, online learning, online resources, pedagogy, public libraries, teaching/learning strategies, technology, usage statistics
Cluster 2	12	academic libraries, archiving, collection management, copyright, document delivery, e-journals, interlending, interlibrary loan, licensing, perpetual access, spain, united states of america
Cluster 3	11	digital, engagement, interactive e-books, mobile learning, mobile technology, motivation, new literacies, reading comprehension, self-efficacy, vocabulary
Cluster 4	10	academic staff, databases, education, electronic media, higher education, india, information retrieval, nigeria, students, universities
Cluster 5	8	books, digital libraries, electronic publishing, evaluation, library users, user interfaces, user satisfaction, user studies
Cluster 6	4	e-books, emergent literacy, reading, young children
Cluster 7	4	china, collection development, university libraries
Cluster 8	1	libraries, technical services
Cluster 9	1	united kingdom

Table 7. Clusters of Keywords.

4.8. Co-Citation Analysis

A well-known co-citation-based analysis is a study by White and McCain (1998) of researchers in the field of information science. The term "co-citations" describes when a third article cites two references. In academic writing, two references are traditionally regarded as co-cited if they are referenced anywhere in the third article. The co-citation of cited references on e-resources is shown in Figure 11. The more citations an article has, according to a common standard, are represented by a larger bubble, and the stronger the citation relationships are shown by thicker lines.

In the visualisation shown in Figure 10, each circle stands for an article. The size of a circle shows the number of citations an article has obtained. Based on co-citations, publications situated next to one another in the visualisation typically have stronger relationships than those put far apart. The presence of the connection and the separation between the two articles affect their co-citation relationship. Each colour represents a different subject matter that is covered in the publication. Each bubble has the author's name and the year of publication noted next to it.

The researchers used a full counting approach, the VOS viewer tool, and co-citation analysis to generate the cluster. Twenty-five citations were the minimal requirement for a reference to be referenced, and 12 out of 24506 references met this standard.

According to the co-citation index, the top five studies are:

- Woody, W. D., Daniel, D. B., & Baker, C. A. (2010). E-books or textbooks: Students prefer textbooks. Computers & Education, 55(3), 945-948.
- Shelburne, W. A. (2009). E-book usage in an academic library: User attitudes and behaviors. Library Collections, Acquisitions, and Technical Services, 33(2-3), 59-72.

- Levine-Clark, Michael. (2006). Electronic Book Usage: A Survey at the University of Denver. portal: Libraries and the Academy. 6. 285-299.
- Davis, Fred & Davis, Fred. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly. 13. 319-339.
- Korat, O. (2010). Reading electronic books as a support for vocabulary, story comprehension and word reading in kindergarten and first grade. Computers & Education, 55(1), 24-31.

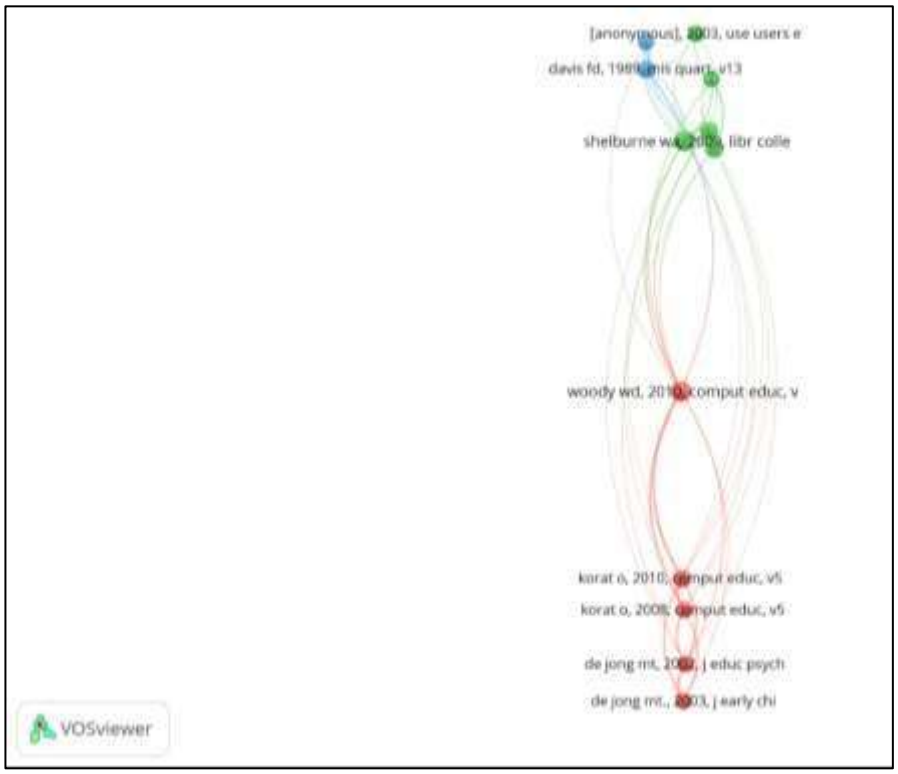


FIGURE 11. Visualised networks of co-citation

The results of a co-citation analysis of articles on e-resources are summarised in Table 8, which identified three key themes. The authors thoroughly examined each illustrative article for each topic before naming them. The first theme focused on the perceptions and attitudes of faculty and students towards e-books in academic library settings. The second theme shows the potential benefits of electronic books in supporting children's emergent literacy skills, particularly in comparison to traditional textbooks. The third theme examines the factors that influence user acceptance and adoption of information technology, particularly e-books.

Theme	Representative Citation
Theme 1: Perception and attitudes towards e-books	[21], [22], [23], [24], [25], [26], [27], [28], [29]
Theme 2: Potential benefits of e-books	[30], [31], [32], [33], [34], [35], [36], [37]
Theme 3: Factors that influence user acceptance and adoption of e-books	[38], [39], [40], [41]

Table 8. Co-citation Themes

5. FINDINGS & CONCLUSION

This study complies with its limitations as it used only the Web of Science Core Collection to construct the dataset. However, using two or more databases could alter the investigation's findings and course. The range of this study was also limited by the database's ongoing expansion of its collection of scholarly papers. This analysis

focused exclusively on scientific publications written in English, excluding important literary works written in numerous other languages.

The investigation's findings explore the objectives and highlight publications on the Web of Science Core Collection database on the use of electronic resources between January 1, 1989, and September 30, 2023. 1127 documents have reportedly been published in 3 different categories of publications, including articles, proceedings papers, and reviews.

The study covered a wide range of topics that served as the foundation for the bibliometric analysis, including documents published on this subject during the study period, annual publication rates and citation trends, top relevant sources, the authors and nations with the highest productivity, co-occurring keywords, and highly cited and co-cited articles.

This study will help academics understand the publishing pattern of literature on e-resources from 1989 through 2023. This bibliometric study achieves its goals and offers data in a statistical style.

The outcomes highlight the purpose of this study.

- The majority of documents were released as e-books, with "articles" making up the highest category of publications. Results demonstrate that, compared to other types of studies, the interest of researchers in mentioning the publications created was high.
- The year with the highest number of publications is 2014, with 63 (5.9%) publications, followed by 2012 with 57 (5%) publications. Also, the maximum number of citations achieved in 2021 was 1,222.
- The average annual growth rate of publications is 6.31%.
- “Electronic Library” is the most outstanding source with 95 articles. “Serials Review” is the next top source with a frequency of 67.
- Considering the prolific authors, Ofra Korat (NP = 12; TC = 575; h-index = 10) is the leading author in E-Resources with the most publications in the period 2004 to 2023. Carol Tenopir (NP = 11; TC = 356, h-index = 6), Yueh-Min Huang (NP = 10; TC = 325; h-index = 8), and Adina Shamir (NP = 10; TC = 452, h-index = 8) can also be considered the most relevant authors.
- It found that the single most prevalent type of publication is journal articles, in which 1031 (91.5%) of the total publications were published.
- The article titled “E-books or textbooks: Students prefer textbooks” by Woody, W. D., Daniel, D. B., & Baker, C. A., published in 2010 (Computers & Education, 55(3), 945–948) is the most cited article with a total citation of 270.
- Considering scientific production, the USA is the most productive country with 734 publications and the country with the highest number of most-cited papers (TC = 6450).
- Considering the co-occurrence of keywords, ‘e-books’ is the most frequent keyword, with occurrences of 206 and a total link strength of 214. Also, ‘e-resources’, ‘e-journals’, and ‘academic libraries’ can be considered the most popular keywords.
- From the co-citation analysis, it is understood that lots of studies have been undertaken on the topic “eresources” focused on the perceptions and attitudes, the potential benefits, and the factors that influence user acceptance and adoption of e-resources.

In conclusion, by utilising the Web of Science database, this bibliometric analysis offers insightful information about the output of literature on e-resources. The findings show a growing interest in the topic among researchers and highlight the leading authors and journals in the field. It also sheds light on the various applications of eresources, including in the field of human resources. As the use of e-resources continues to grow, researchers need to stay updated on the most recent trends and developments in this field.

BIBLIOGRAPHY

1. Osinulu, L. F. (2020). Awareness and Use of Electronic Information Resources by Students of College of Health Sciences in Olabisi Onabanjo University, Nigeria. *Information Impact: Journal of Information and Knowledge Management*, *11*(3), 1–11. https://doi.org/10.4314/iijikm.v11i3.1
2. Hawkins, D. T. (1978). Bibliometrics of the online information retrieval literature. *Online Review*, *2*(4), 345–352.

https://doi.org/10.1108/eb023985
3. Pritchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, *25*, 348–349.
4. Montero-Díaz, J., Cobo, M.-J., Gutiérrez-Salcedo, M., Segado-Boj, F., & Herrera-Viedma, E. (2018). A science mapping analysis of 'Communication' WoS subject category (1980-2013). *Comunicar*, *26*(55), 81–91. https://doi.org/10.3916/C55-2018-08
5. Mora, L., Bolici, R., & Deakin, M. (2017). The First Two Decades of Smart-City Research: A Bibliometric Analysis. *Journal of Urban Technology*, *24*(1), 3–27. https://doi.org/10.1080/10630732.2017.1285123
6. Campbell, F. B. F. (1896). *The theory of national and international bibliography. With special reference to the introduction of system in the record of modern literature*. Library Bureau.
7. Cole, F. J., & Eales, N. B. (1917). The history of comparative anatomy: Part 1- A statistical analysis of the literature on JSTOP. *Science Progress (1916-1919)*, *11*(44), 578–596. http://www.jstor.org/stable/43426882
8. Mohd Sofian, F. N. R., Abdullah, K. H., & Mohd-Sabrun, I. (2023). Research on Corporate Reputation: A Bibliometric Review of 43 Years (1977-2020). *International Journal of Information Science and Management*, *21*(2), 31–54. https://doi.org/10.22034/ijism.2023.1977558.0
9. Wan, G., Dawod, A. Y., & Chakpitak, N. (2023). A Bibliometric and Visual Analysis in the Field of Environment, Social and Governance (ESG) Between 2004 and 2021. *International Journal of Information Science and Management (IJISM)*, *21*(2), 103–125. https://doi.org/10.22034/IJISM.2023.1977765.0
10. Thangavel, V., & Baskaran, C. (2023). Use of E-Resources by the Library Professionals in Tamil Nadu: A Bibliometric Study. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4371623
11. Guleria, D., & Kaur, G. (2021). Bibliometric analysis of ecopreneurship using VOSviewer and RStudio Bibliometrix, 1989–2019. Library Hi Tech, 39(4), 1001–1024. https://doi.org/10.1108/LHT-09-2020-0218
12. Xie, H., Wen, Y., Choi, Y., & Zhang, X. (2021). Global Trends on Food Security Research: A Bibliometric Analysis. Land 2021, Vol. 10, Page 119, 10(2), 119. https://doi.org/10.3390/LAND10020119
13. Xie, H., Zhang, Y., Choi, Y., & Li, F. (2020). A Scientometrics Review on Land Ecosystem Service Research. *Sustainability 2020, Vol. 12, Page 2959*, *12*(7), 2959. https://doi.org/10.3390/SU12072959
14. Kolle, S. R., Shettar, I., M., V. K., & G.S., P. (2018). Publication trends in literature on eBooks: a Scopus based bibliometric analysis. *Collection and Curation*, *37*(3), 119–127. https://doi.org/10.1108/CC-07-2017-0027
15. Chhatwal, A. (2018). A bibliometric study of world research output on e-resources during 2006–2016. *International Journal of Information Dissemination and Technology*, *8*(1), 8. https://doi.org/10.5958/2249-5576.2018.00002.X
16. Swain, C., K. Swain, D., & Rautaray, B. (2013). Bibliometric analysis of Library Review from 2007 to 2011. *Library Review*, *62*(8/9), 602–618. https://doi.org/10.1108/LR-02-2013-0012
17. Manoj Kumar, M. K., & Moorthy, A. L. (2011). Bibliometric Analysis of DESIDOC Journal of Library and Information Technology from 2001-2010. *DESIDOC Journal of Library & Information Technology*, *31*(3), 203–208. https://doi.org/10.14429/DJLIT.31.3.989
18. Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/S11192-015-1645-Z/TABLES/9
19. Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The Increasing Dominance of Teams in Production of Knowledge. *Science*, *316*(5827), 1036–1039. https://doi.org/10.1126/science.1136099
20. Bradford, S. (1934). Sources of information on specific subjects. *Engineering*, *137*(3550), 85–86.
21. Dillon, D. (2001). E-books: The University of Texas experience, part 2. *Library Hi Tech*, *19*(4), 350–362. https://doi.org/10.1108/EUM0000000006540/FULL/PDF
22. Langston, M. (2003). The California State University E-book Pilot Project: implications for cooperative collection development. *Library Collections, Acquisitions, and Technical Services*, *27*(1), 19–32. https://doi.org/10.1016/S1464-9055(02)00305-6
23. Tenopir, C., Hitchcock, B., & Pillow, A. (2003). *Use and Users of Electronic Library Resources: An Overview and Analysis of Recent Research Studies*. Council on Library and Information Resources. http://webdoc.sub.gwdg.de/ebook/aw/2004/pub120.pdf
24. Littman, J., & Connaway, L. S. (2004). A Circulation Analysis Of Print Books And e-Books In An Academic Research Library. *Library Resources & Technical Services*, *48*, 256–262. http://www.oclc.org/
25. Christianson, M., & Aucoin, M. (2005). Electronic or print books: Which are used? *Library Collections, Acquisitions, & Technical Services*, *29*(1), 71–81. https://doi.org/10.1080/14649055.2005.10766034
26. Anuradha, K. T., & Usha, H. S. (2006). Use of e-books in an academic and research environment. *Program*, *40*(1), 48–62. https://doi.org/10.1108/00330330610646807
27. Levine-Clark, M. (2006). Electronic Book Usage: A Survey at the University of Denver. *Portal: Libraries and the Academy*, *6*(3), 285–299. https://doi.org/10.1353/pla.2006.0041
28. Rowlands, I., Nicholas, D., Jamali, H. R., & Huntington, P. (2007). What do faculty and students really think about e-books? *Aslib Proceedings*, *59*(6), 489–511. https://doi.org/10.1108/00012530710839588
29. Shelburne, W. A. (2009). E-book usage in an academic library: User attitudes and behaviors. Library Collections, Acquisitions, & Technical Services, 33(2–3), 59–72. https://doi.org/10.1080/14649055.2009 .10766234
30. de Jong, M. T., & Bus, A. G. (2002). Quality of book-reading matters for emergent readers: An experiment with the same book in a regular or electronic format. *Journal of Educational Psychology*, *94*(1), 145–155. https://doi.org/10.1037/0022-0663.94.1.145
31. de Jong, M. T., & Bus, A. G. (2003). How Well Suited are Electronic Books to Supporting Literacy? *Journal of Early Childhood Literacy*, *3*(2), 147–164. https://doi.org/10.1177/14687984030032002

32. de Jong, M. T., & Bus, A. G. (2004). The efficacy of electronic books in fostering kindergarten children's emergent story understanding. *Reading Research Quarterly*, *39*(4), 378–393. https://doi.org/10.1598 /RRQ.39.4.2
33. Korat, O., & Shamir, A. (2007). Electronic books versus adult readers: effects on children's emergent literacy as a function of social class. Journal of Computer Assisted Learning, 23(3), 248–259. https://doi.org/10.1111 /j.1365-2729.2006.00213.x
34. Korat, O., & Shamir, A. (2008). The educational electronic book as a tool for supporting children's emergent literacy in low versus middle SES groups. *Computers & Education*, *50*(1), 110–124. https://doi.org/10.1016/j.compedu.2006.04.002
35. Korat, O. (2010). Reading electronic books as a support for vocabulary, story comprehension and word reading in kindergarten and first grade. Computers & Education, 55(1), 24–31. https://doi.org/10.1016 /j.compedu.2009.11.014
36. Woody, W. D., Daniel, D. B., & Baker, C. A. (2010). E-books or textbooks: Students prefer textbooks. *Computers & Education*, *55*(3), 945–948. https://doi.org/10.1016/j.compedu.2010.04.005
37. Huang, Y.-M., Liang, T.-H., Su, Y.-N., & Chen, N.-S. (2012). Empowering personalized learning with an interactive e-book learning system for elementary school students. *Educational Technology Research and Development*, *60*(4), 703–722. https://doi.org/10.1007/s11423-012-9237-6
38. Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39. https://doi.org/10.2307/3151312
39. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319. https://doi.org/10.2307/249008
40. Venkatesh, Morris, Davis, & Davis. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425. https://doi.org/10.2307/30036540
41. Vassiliou, M., & Rowley, J. (2008). Progressing the definition of "e-book". *Library Hi Tech*, *26*(3), 355–368. https://doi.org/10.1108/07378830810903292