Quantitative Analysis of Scientific Publications Output on Virtual Library: A Scientometric Study

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Abstract

This study investigates the observations of research publications in the field of Virtual Library Global Level as reflected in the Web of Science (WoS) core collection database during 2018-2022. The data was interpreted by using Bibexcel and VoSviewer and tabulated using MS Excel. The results indicated that 2659 papers were published in the year of 2018 to 2022 and the loftiest number of publications, 707 (26.589%), was produced in 2022. Using colorful Scientometrics approaches, the study presents research published on Virtual Library as reflected in the Web of Science for Global and Indian output of citation analysis, keywords, H-index, Degree of Collaboration (DC), International Collaboration, and Institution based collaboration, ranking of core journals and so on.The degree of collaboration in the study of Deforestation Research is 0.92 which shows the collaboration of multiple authors. The USA is publishing 555 records from the years 2018 to 2022. The most productive and top-ranked journal is 'Journal of Biomolecular Structure Dynamics' with 123 records (4.625%).This paper discusses the concept of a digital library and how it helps in conserving manuscripts and what type of equipment or software are required in this work. This article also explores successful digital library projects set up in India and what is the future of digital libraries in the Indian scenario.

Keywords: Scientometric, Degree of Collaboration, Bibexcel, Virtual Library, Electronic Library, Cyber Library

Introduction

Scientometric is the "Organization, classification and quantitative evaluation of publication pattern of all macro and micro communication along with their authorship by mathematical and statistical calculus". Scientometrics is "the measurement of scientific output and the impact of scientific findings on public policy".

Virtual Library

The Virtual Library was initially created and controlled by Tim Berners-Lee in 1991. It was subsequently developed, coordinated, and administered for a number of years by Arthur Secret as the "virtual librarian" before it was legally constituted with Gerard Manning as its first chairman.An assortment of materials that are accessible through one or more computer systems are referred to as a virtual library since they all have a single interface or point of access. The availability of a plethora of material that may not be available through traditional library collections makes virtual libraries a significant tool for education and research. They are a great resource for people who, for whatever reason—due to their location or another—cannot use physical libraries. There is no charge for using our virtual library.

Review of Literature

Zare Zadeh Mehrizi, E., and Hazeri, A. (2022) this study's goal is to examine the document keywords that are comparable across three clusters of electronic, digital, and virtual libraries. Co-word analysis and clustering methods are used in this scientometric study. All pertinent texts from electronic, digital, and virtual libraries that have been indexed in the Web of Science between 1990 and 2018 are considered research materials. The Jaccard index is used to determine the rate of similarities in addition to the observable surface similarity. According to an analysis of growth patterns, there has been a minor and unfavorable increase in the number of documents about electronic and virtual libraries (growth coefficients of -0.68 and 36.1). However, there are more digital libraries now. **Sood, D. Tiwari, & S. Khanna (2018)** Numerous publications have been made in the sector as a result of the quick adoption and development of digital libraries in recent years. The current study looks at how publications in the area of digital libraries have changed and grown through time. The current scientometric study is limited to gathering data that were included in Scopus, Elsevier's citation database, between 2006 and 2015. A total of 17268 records were discovered that were relevant to the current investigation, and these were examined to draw findings. The current analysis analyzes publication data in a variety of performance areas, including year-over-year growth in publications, the most productive authors globally and nationally, the most prolific source titles, research articles across a range of themes, document types, relevant keywords, and research.**Visakhi, P., Kumbar, B. D., & Shivaram, J. (2021)**The study presents a bibliometric assessment of 681 Indian publications on research in digital libraries, as indexed in the Scopus database during 2000-19.

India's research output on digital libraries registered 36.95% annual average growth, registered an average citation impact of 4.07 citations per paper, accounted for 11.75% share of internationally collaborative papers, and ranked 6th highest in global publication share (3.53%). Computer science accounted for the highest publications share (60.94%) in India's research output on digital libraries, followed by social sciences (33.33%), engineering (25.99%), mathematics (13.80) and arts & humanities (6.02%) during 2000-19. About 231 organizations and 262 authors contributed to India's research output on digital libraries during 2000-19. After ten years of study and development, **Verma, N. C., and Dominic, J. (2009)** report that operational systems and services for digital libraries are now available. The difficulties involved in making such adjustments are outlined in this essay. Particularly when we take into account the service aspects, digital libraries as systems and digital libraries as institutions are merging. They serve as enabling technologies for programs like information retrieval, e-commerce, and classroom instruction. Research on uses and users of digital libraries needs to be done in a variety of locations because usability significantly depends on context. Scalability and interoperability remain significant difficulties, although they are now better understood.

Institutional collaboration is becoming more and more of a priority as technological development on interoperability and scale is ongoing.

Objectives of the Study
1. To examine the year-wise distribution of publications
2. To measure the Degree of Collaboration among the authors
3. To find out Continent countries
4. To identify the most productive keywords
5. To find out a language-wise publication of Virtual Library

Methodology

The Web of Science databases, which are maintained by Thomson Reuters, contained the bibliographic information for the publications used to collect the data for their study. The top ten authors, nations, institutions, and keyword analysis were examples of scientometric indicators that were published in the publication. 2659 records from the scientometric analysis of Virtual Library from 2018 to 2022 were used in this study. The Social Science Citation Index (SSCI) was used to submit the obtained data to a Web of Science database. Bibexcel was used to analyze the data, and an Excel calculation was used to determine the outcome after tabulating the data.
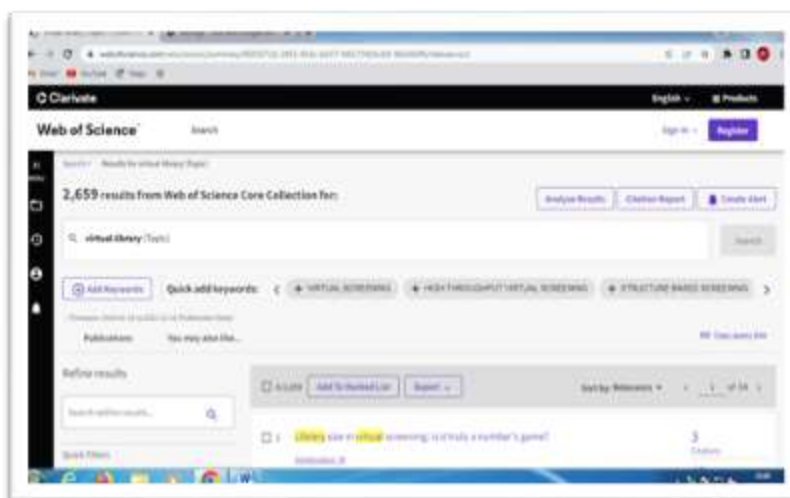
Figure: 1 Screenshot of Web of Science page for records shown

Data Analysis and Interpretation

Table 1: Detailed information of samples on child sexual abuse

S.No	Details about the sample	Observation values
1	Duration	2018 - 2022
2	Period	Five Years
3	Records	2659
4	Citations	25549
5	Document Types	13
6	Keywords	6117
7	Countries	122
8	Authors	15377
9	H-Index	66

This table indicates the detailed information of samples on Virtual Library during the period 2018 – 2022. This table shows the overall data in all types of disciplines, similar as; period, records, citations, authors' donation, document types, keywords, H-index, and countries. These are the sample details of the exploration.

Table: 2 Year-wise Publications with Citations of Virtual Library

S.No	Publication Years	Records	Percentage	Citations
1	2022	707	26.589%	10960
2	2021	659	24.784%	8564
3	2020	531	19.970%	4431
4	2019	423	15.908%	1368
5	2018	339	12.749%	226
Total		**2659**	**100%**	**25549**

Table 1 shows the distribution of articles with citations published on Virtual Library research during 2018–2022 (5 years). The year 2020 provides 531 records with an average of 19.970 percent. In 2022 carries 707 records with an average of 26.589%. The year 2018 leads with 339 records with an average of 12.749%. The year 2019 contains 423 records with an average of 15.908%. The year 2020 contains 531 records with an average of 19.970%. According to the year-wise publication of records; the year 2022 carries more records i-e.26.589 with 26.589% and the highest citation of 10960 in the year 2022.

Table: 3 Document type of Virtual Library

S.No	Document Types	Records	Percentage
1	Article	1,961	73.750%
2	Review Article	656	24.671%
3	Early Access	49	1.843%
4	Editorial Material	25	0.940%
5	Proceeding Paper	18	0.677%
6	Meeting Abstract	7	0.263%
7	Book Review	5	0.188%
8	Book Chapters	3	0.113%
9	News Item	3	0.113%
10	Data Paper	2	0.075%
11	Correction	1	0.038%
12	Letter	1	0.038%
13	Retracted Publication	1	0.038%

Table 3 shows the document type distribution atthe Global level and it is a contribution to Virtual Library research. It shows 13 document types such as Article, Review Article, Editorial Material, Letter, Meeting Abstract, Early Access, Proceeding Paper, Book Review, and so on. Among them the highest publications were published in the form of Articleswith (1961, 73.750%), followed by Review Articles(656, 24.671%). The lowest number of publications were found in Articles; News Item, Reprint, Retracted Publications, and Retraction with 1 (0.038%).

Table: 4 Prolific Authors Wise Distribution

S.No	Authors	Records	Percentage
1	Ahmad S	20	0.752%
2	Kumar A	20	0.752%
3	Kumar S	20	0.752%
4	Wang J	19	0.715%
5	Liu Y	13	0.489%
6	Sharma P	13	0.489%
7	Durdagi S	12	0.451%
8	Wang X	12	0.451%
9	Chandra S	11	0.414%
10	Yang Y	11	0.414%

The top 10 prolific authors were recognized in Virtual Library research. They have published 20 or more papers during 2018–2022. The identified top 10 authors had published about 826 (55.0%) papers. Ahmad S became the most productive author, contributing 20 (0.752%) articles, followed by Kumar A with 20 (0.752%) articles.

Table: 5 Single Authors Vs Multi authors

S.No	Authorship Pattern	Publication	Percentage
1	Single Authors	116	4.36%
2	Multi Authors	2543	95.63%
Total		2659	100%

The table shows the result of the contributions of a single author and multiple authors. The multiple authors published 2543 records with an average of 95.63%, but the single author contributed only 116 works with an average of 4.36%. The study reveals that multiple authors contributed more than single authors.

Table: 6 Degree of Collaboration

Single Author(NS)	Percentage	Multi Authors(NM)	Percentage	Total (NS+NM)	DC=NM/NS+NM
116	4.36%	2543	95.63%	2659	96%

(DC = Degree of Collaboration, NM = Number of Multi Authors, NS = Number of Single Authors)

The table shows the details of the degree of collaboration during 2018–2022. The average degree of collaboration was 96%. The formula is used to calculate the DC. K. Subramanian, 1982: The formula is where,

DC= NM/NM+NS   DC= 2543/2659
DC = 96%

As a result, the degree of collaboration in the study of Deforestation Research is 0.92 which shows the collaboration of multiple authors.

Table: 7 Web of Science Index wise Publications

S.No	Web of Science Index	Records	Percentage
1	Science Citation Index Expanded (SCI-EXPANDED)	2,442	91.839%
2	Social Sciences Citation Index (SSCI)	479	18.014%
3	Index Chemicus (IC)	88	3.310%
4	Arts & Humanities Citation Index (A&HCI)	24	0.903%
5	Conference Proceedings Citation Index – Science (CPCI-S)	18	0.677%
6	Current Chemical Reactions (CCR-EXPANDED)	5	0.188%
7	Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	5	0.188%
8	Book Citation Index – Science (BKCI-S)	3	0.113%

Table 7 illustrates 8 Web of Science Index and categorized rank-wise production. The most productive and top-ranked Web of Science Index l is 'Science Citation Index Expanded (SCI-EXPANDED)' with 2442 records (91.839%) and 'Social Sciences Citation Index (SSCI)' has occupied second place with 479 records (18.014%). The third rank has got 'Index Chemicus (IC)' positioned with 88 records count along with (3.31%) Web of Science Indexes.

Table: 8 Institution and University based distribution (Top Ten)

S.No	Institution	Records	Percentage
1	Udice French Research Universities	56	2.106%
2	Centre National De La RechercheScientifiqueCnrs	55	2.068%
3	Egyptian Knowledge Bank Ekb	48	1.805%
4	Chinese Academy of Sciences	46	1.730%
5	Indian Institute of Technology System Iit System	45	1.692%
6	University of London	42	1.580%
7	N8 Research Partnership	37	1.392%
8	The University of California System	36	1.354%
9	Universidade De Sao Paulo	34	1.279%
10	Pennsylvania Commonwealth System of Higher Education Pcshe	33	1.241%

This table indicates the literature outputs from Institutions and Universities in the field of Virtual Librariesduring the study period.We have chosen to analyze only the top most productive research papers which are published by the eminent scholars and faculty members of the Virtual Library Department. This table illustrates the results with the highest number of articles (56, 2.106 %%) published by the "Udice French Research Universities" and the same articles (55, 2.068 %%) placed in the first and second positions. The other institutions and universities listed in the table above have been placed in the next-level positions based on the research papers of Virtual Library.

Table: 9 Language-wise distribution of Virtual Library

S.No	Languages	Records	Percentage
1	English	2,600	97.781%
2	Spanish	23	0.865%
3	Portuguese	22	0.827%
4	German	9	0.338%
5	Chinese	4	0.150%
6	Russian	1	0.038%

The language-wise distribution of research output is identified. The majority of scientists choose to publish their output in the English language, which is about 2600. The subsequent language is Spanish, which accounted for 23 publications followed by Portuguese (22).The languages of German and Chineseare found at appreciable levels. English is the common language so the majority of the articles are published from this language.

Table: 10 International Collaboration on Virtual Library (Top10)

S.No	Countries	Record	Percentage
1	USA	555	20.873%
2	Peoples R China	462	17.375%
3	India	334	12.561%
4	Brazil	311	11.696%
5	England	175	6.581%
6	Germany	160	6.017%
7	Italy	160	6.017%
8	Spain	122	4.588%
9	Canada	100	3.761%
10	Saudi Arabia	98	3.686%

In keeping with the country-wise distribution of that table, The USA is publishing 555 records from the years 2018 to 2022. Peoples R China followed the second position, publishing 462 records. India published 334 (12.561%) records and got third position worldwide. The USA is the leading country to publish records on deforestation among the highest top ten countries.
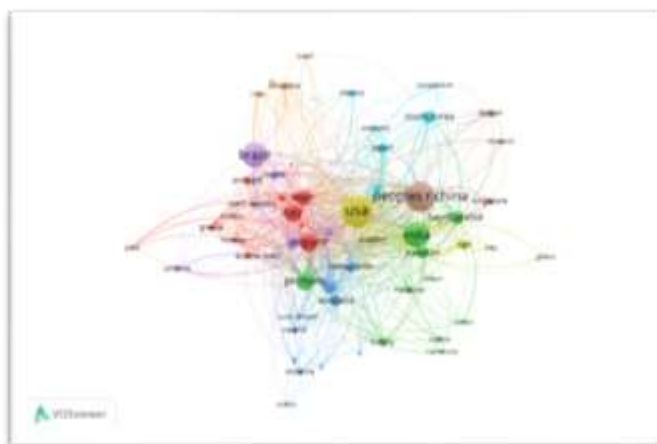
Figure: 4 International Collaboration on Virtual Library

Table: 11 Ranking of core Journals on Virtual Library (Top 10 Journals Out of 55)

S.No	Publication Titles	Records	Percentage
1	Journal of Biomolecular Structure Dynamics	123	4.624%
2	Molecules	82	3.083%
3	Journal of Chemical Information And Modeling	79	2.970%
4	International Journal of Molecular Sciences	46	1.729%
5	Journal of Molecular Graphics Modelling	32	1.203%
6	Molecular Diversity	32	1.203%
7	European Journal of Medicinal Chemistry	31	1.165%
8	Molecular Informatics	24	0.902%
9	Plos One	24	0.902%
10	Ciencia Saude Coletiva	22	0.827%

Table 11 illustrates 55 core journals and categorized rank-wise production. The most productive and top-ranked journal is 'Journal of Biomolecular Structure Dynamics' with 123 records (4.625%) and 'Molecules' has occupied second place with 82 records (3.083%). The third rank has got 'The Journal of Chemical Information and Modeling' positioned with 79 records count along with (2.970) core journals.

Table: 12 Highly Productive Keywords on Virtual Library (Top 15)

S.No	Keywords	Records
1	Docking	280
2	Discovery	266
3	Design	252
4	Drug Discovery	197
5	Identification	180
6	Protein	168
7	Prediction	142
8	Inhibitors	136
9	Binding	124
10	Model	89
11	Database	86
12	Derivatives	81
13	Expression	78
14	Tool	78
15	Cancer	77

Table 10 and the below picture reveals the frequency of Virtual Library research. The research has taken up the occurring words. The word "Docking" has been repeatedly used 280 times by Virtual Library research scientists during the study period, followed by "Discovery" 266 times. The word "Design" occupies the third position being used 252 times.
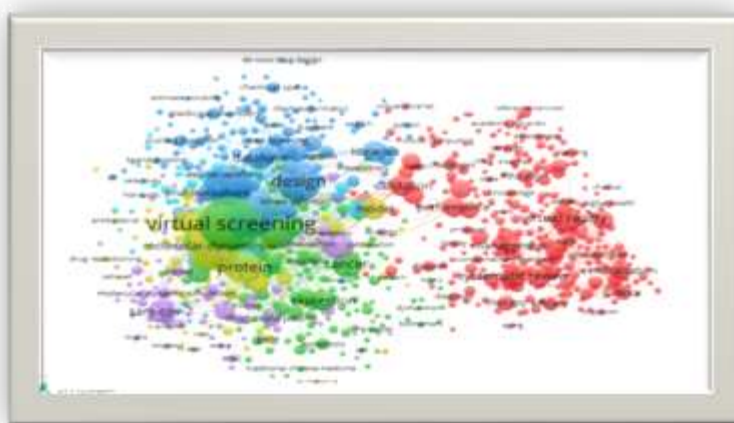
Figure 5 Keywords on Virtual Library

Findings and Conclusion

Virtual Library research during 2018–2022 (5 years). The year 2020 provides 531 records with an average of 19.970 percent. In 2022 carries 707 records with an average of 26.589%. Document type distribution atthe Global level and is a contribution to Virtual Library research. It shows 13 document types Article, Review Article, Editorial Material, Letter, Meeting Abstract, Early Access, Proceeding Paper, Book Review, and so on. Prolific authors were recognized in Virtual Library research. They have published 20 or more papers during 2018–2022. The identified top 10 authors had published about 826 (55.0%) papers. contributions of a single author and multiple authors. The multiple authors published 2543 records with an average of 95.63%, but the single author contributed only 116 works with an average of 4.36%. The study reveals that multiple authors contributed more than single authors. The degree of collaboration during 2018–2022. The average degree of collaboration was 96%.Web of Science Index and categorized rank-wise production. The most productive and top-ranked Web of Science Index l is 'Science Citation Index Expanded (SCI-EXPANDED)' with 2442 records (91.839%).

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