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Growth of Open Access Literature on Library and Information Science during 2011-2020: A Scientometrics Analysis

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ABSTRACT

In this study, we attempted to analyse the quantitative growth of open access publications on library and information science education research. The literature data obtained from Scopus database and scientometrics methods were deployed to analyse the publications originated during 2011-2020. The study shows that open access papers on Library and information science education (LIS) has grown expontially and significant amount of research papers published by both academics and working professionals. Scientometric study of the research on Scopus indexed open access Library and information science (LIS) journals is essential to investigate the existing literature to identify a suitable theory for new research. This study retrieved 8380 research papers and 25661 citations from SCOPUS also find 2019 is the most productive year with 1642 papers and 2321 citations. USA accounted for the highest number of publications with 2166 papers. The degree of collaboration (DC) for ten years was 0.634. USA and Canada are the most collaboration with 24 papers. "Library Philosophy and Practice" is the favourite source for researcher as it has published the highest number of papers totalling 3151 and 3932 citations. Further it has been found that information literacy, bibliometrics, academic libraries, scientometrics, open access and citation analysis are the emerging areas of research in this domain.

Keywords: Scientometric; LIS Journal, Open Access, Authorship Pattern, Degree of Collaboration.

INTRODUCTION

Scientometric study is used for the investigation of estimating and examining science, innovation, and development. Scientometrics also defines the estimation of logical yield and the effect of logical discoveries (Shukla, 2019). Exploration in the library and data science (LIS) adds to critical thinking and dynamic in libraries and data focuses; improves the board and arrangement of data benefits; and makes new information for the proceeded with advancement of LIS as a calling. Scholarly custodians additionally exploration to fulfill advancement and residency needs of their establishments (Sife and Lwoga, 2014). Assessing the profitability of an establishment's examination action features the commitment of the foundation and the individual researchers occupied with research. It additionally gives a few experiences into the perplexing elements of examination movement and empowers the arrangement producers and executives to make accessible satisfactory offices and direct the exploration exercises a legitimate way. A notable efficiency pointer is the quantity of distributions created by the researchers of a foundation. The organization which is producing a decent number of value research papers specifically field might be considered as a Boondock's establishment around there (Lekshmi, 2014). A number of quantitative methods were developed to study the various aspects library and information science (LIS). The metrics such as bibliometrics, librametrics, scientometrics, informetrics, webometrics, netometrics to cybermetrics are used increasingly in LIS research (Khan, 2016).

A decent number of single journals scientometric contemplates have been concentrated by various researchers from various pieces of the world. In any case, no investigation has been made on numerous journals of long term that are just open access journal which this current examination means to do. Open access journals are acquiring force in all fields of information, so additionally in the field of library and data science. In the current paper the open access journal, which were distributed during 2011 to 2020, and are listed in SCOPUS, have been chosen for reference study. A large portion of these open access journal remember a decent number of examination papers for different parts of library and data science. This examination plans to give well-informed and legitimate data to library and data science experts and exploration researchers. The papers remembered for these journals are for the most part contributed by a solitary creator, and have a place for the most part with created nations. The level of coordinated effort by creators of this journal is empowering and they have utilized a decent number of references in their papers.

REVIEW OF LITERATURE

Mohamed Boufarss (2020) analysed the scholarly journal landscape in the UAE. He completed a planning of insightful diaries distributed in the UAE ordered from worldwide and neighbourhood sources. The outcomes of this study found that,534 journals are distributed in the UAE and that the portion of OA is very essential with about 64% of every single online journals, the APC-based OA model is pervasive with around 75% of OA journals imposing a distribution expense, UAE journals are dominatingly in English while the quantity of Arabic-language journals is minimal, science, innovation and medication win as the most predominant branches of knowledge of the journals; and business distributers control the vast majority of the distributions particularly in the clinical feld. The investigation establishes a framework for additional examinations on insightful diaries in the UAE. The

blend of local lists and global indexes to quantify the country's academic diary yield can likewise be repeated and based upon for different nations where the significant worldwide bibliometric data sets don't give a complete portrayal of insightful distributing exercises.Rodrigues and et.al. (2016) investigate the dissects research articles about open access (OA) recorded by the Scopus information base, distributed from 2001 to 2015, to: (a) propose an arrangement plot about OA; (b) classify the logical creation about OA; and (c) recognize research drifts on OA through disciplines at worldwide level over the long run. The writers utilized illustrative factual techniques and deductive substance investigation utilizing an unconstrained grid in 347 chose research articles. The most investigated topics were discovered to be "outline, present status, and development of OA" meaning 98 articles (28.2%), and "mindfulness, insights, and perspectives toward OA" for 75 articles (21.6%). As a decision, this investigation uncovers a ceaseless and developing examination premium by the OA people group in examinations zeroed in on contextual analyses in regards to the turn of events or advancement of OA corresponding to specific gatherings, organizations, areas, periods, and how various entertainers see and address the OA development.Husain and Nazim (2013) analysed the birthplace and advancement of the Open Access Initiative and clarifies the idea of open access distributing. It likewise features different aspects identified with the open access academic distributing in the field of Media and Communication based on information gathered from the most definitive online registry of open access journals, i.e., Directory of Open Access Journals (DOAJ). The DOAJ covers 8492 open access journalsof which 106 journals are recorded under the subject heading 'Media and Communication'. The vast majority of the open access diaries in Media and Communication were begun during late 1990s and are being distributed from 34 unique nations on 6 mainlands in 13 distinct dialects. More than 80 % open access diaries are being distributed by the not-revenue driven area like scholarly organizations and colleges. Shukla (2019) conducted a scientometric study on genetic disorder productivity from 2008 to 2017 in Scopus database and retrieve 3673 research papers in this particular field. In this analysis the output find as the publication on genetic disorder grow year-wise. And 2017 is the most productive year with 504(13.72%) papers and lowest in the year 2008 that is 184(5.01%). Also found a maximum growth rate in the year 2012 with 36.268 and minimum in the year 2010. Ghosh K is the most prolific author with 66 papers, 30 h-index and 5078 citation. In the subject field medicine, highest number 2421 of document should appear.Renjith V. R.(2018)investigates the trend in three scientometric indicators, namely SCImago Journal Rank (SJR), h-index and total citation count for three year period, of open access (OA) journals in Library and Information Science, based on the data appeared in the SCImago Journal and Country Rank database for the period 2012-2016. Statistical analysis to test whether the SJR, h index and citations of OA journals in LIS significantly differ throughout the years, is conducted using Kruskal-Wallis Test. It is observed that scientometric indicators of OA journals under study remain almost steady during the period. Srichandan and et.al (2020) address the published output in Web of Science, from 100 most productive institutions in India and analyze how much research output in Open Access (OA). Also analyzed availability of research papers from these institutions in the popular pirate site Sci-Hub. It is interesting to observe that legal OA percentages are significantly lesser than the Sci-Hub availability for all the institutions, an indication that the existing systems for promoting open access in India are not working efficiently. The key finds of this revolve, only 23% of the combined output of the 100 institutions in 2016, as indexed in Web of Science, are available in open access. the open

access proportions in the 100 most productive institutions are found to vary significantly, ranging from as low as 7% to as high as 75% of the total published papers. the paper also found disciplinary variations in open access levels, with disciplines like physics and medicine having a higher proportion of articles available as open access. The paper concludes by pointing to some factors that impede Open Access in India

OBJECTIVES OF THE STUDY

➢ To determine the number of papers published, Total citation, Mean Citation per year, Year-wise distribution from 2011 to 2020.
➢ To ascertain the major source of publication and types of documents.
➢ To study the geographical distribution of contributions.
➢ To determine the most prolific authors.
➢ To analyze the top 10 highly cited papers from 2011 to 2020.
➢ To examine the authorship pattern and Degree of collaboration.
➢ To analyze the most relevant source for publication and Source Impact
➢ To examine the Keyword Analysis.
➢ To examine the top 10 Institutions/Organization.
➢ To visualize the Country collaboration.

METHODOLOGY

For this study, the bibliographical data were collected from the Scopus considering its wide coverage in indexing a large number of peer-reviewed journals. We identified the journals listed in the subject Library and Information Science, further collected their ISSN AND E-ISSN and fixed the search query. We considered only the open access journal Article, Editorial and Review paper published during 2011 to 2020. Several bibliometric indicators are used (degree of collaboration, authorship pattern, most prolific authors) to analysed the sample data.

SQ=ISSN (0010-0870 OR 1536-5050 OR 1933-5954 OR 2514-9288 OR 1750-5968 OR 1521-4672 OR 2304-6775 OR 1368-1613 OR 2096-157x OR 1435-5205 OR 0730-9295 OR 0972-5423 OR 1846-3312 OR 1735-188x OR 1058-6768 OR 2280-9112 OR 1715-720x OR 1092-1206 OR 1013-090x OR 2287-9099 OR 2409-7462 OR 2008-8302 OR 2038-5366 OR 1575-2437 OR 1606-7509 OR 1522-0222) AND (LIMIT-TO (PUBYEAR , 2011-2020) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "ed"))

DATA ANALYSIS AND RESULTS DISCUSSION

Year-wise distribution

Table-1 shows the year wise publication statistics of Scopus indexed 26*Open Access Library and information science journals.* Within this specified period of Scopus coverage years from 2011 to 2020, a total number of 10 years including 8380 documents have been published. It is found that the highest number of 1642 papers was published in the year 2019 with 2321 citations. The highest citation receives in the year 2013 with 3360 citations. The mean citation per paper is 3.067. The total citation receives from 2011 to 2020 is 25661.

Table-1: Year-wise growth of publication and citation distribution

Year	Number of publications	Total Citation	Mean Total Citation per Paper	Mean Total Citation per Year	Ranking
2011	569	2984	7.44	0.74	10
2012	593	3338	6.13	0.68	8
2013	578	3360	5.54	0.69	9
2014	640	2354	5.30	0.75	6
2015	624	2440	4.87	0.81	7
2016	654	3086	3.68	0.73	5
2017	701	2438	3.12	0.78	4
2018	898	2611	2.14	0.71	3
2019	1642	2321	0.81	0.40	1
2020	1481	729	0.21	0.21	2
Total	8380	25661	3.067	0.4644	

Category-Wise Classification of Document

It has been observed that different types of documents published during 2011 to 2020 in 26 selected LIS open access journals indexed in Scopus. Out of the 8380 research documents, 7611 (90.82%) documents were published in the form of 'Article' in 26 sources, 383 (4.58%) as editorial and 386 (4.60%) of document in the form of 'Review'. The detail categorization of document is shown in Table 2. These publications have received 25661 Citations at a rate of 3.067 per paper from 2011 to 2020. It can be concluded that the 'Article' is the most preferred form of research communication and holds larger share of the total document.

Table-2: Document Type Distribution

Document Types	Number of Papers	Percentage (%)
Article	7611	90.82%
Editorial	383	4.58%
Review	386	4.60%

Geographical Distribution of Contributors

Geographical distribution there was 8380 publications in Scopus on Open access LIS journal that had originated from different countries. From USA (2166), India (1495), Nigeria (1006) and other countries are below 1000 contributed in the period of 2011 to 2020. The majority of studies, which contributed by USA, that defines the contribution towards open access for LIS professional. Table 3 represented the top 20 countries that contributed significantly open access research.

Table-3: Geographical Distribution of Research

Ranking	Country	No. of Document	% of Document
1.	USA	2166	25.85
2.	India	1495	17.84
3.	Nigeria	1006	12.00
4.	Iran	400	4.77
5.	Canada	398	4.75
6.	Italy	264	3.15
7.	UK	231	2.76
8.	Pakistan	207	2.47
9.	Taiwan	180	2.15
10.	Spain	163	1.95
11.	Australia	143	1.71
12.	Indonesia	133	1.59
13.	Ghana	129	1.54
14.	China	113	1.35
15.	Germany	90	1.07
16.	Malaysia	89	1.06
17.	South Africa	82	0.98
18.	Croatia	69	0.82
19.	Saudi Arabia	69	0.82
20.	Sweden	63	0.75

Prolific Authors

The examination further dissected the creators, their h-index, institution, country, and their efficiency as far as the quantity of distributed papers and number of citation received to their work. Table 4 portrays the accomplishments of the main ten authors distribution astute. Wilson V ranked in the first position with publishing 41 papers and of 106 citations & 6 as h-index. Bhatti R have received only 8 citations with 32 publications. Thanuskodi S, obtained the value for h-index 7 for his 29 publications and also get highest 88 citation between the top 10 author. The cummulative publications of the top ten authors is accounted for 3.03% of the total sample and 4.34% share of total citations received. Table 4 represents the detail of prolific authors & their productivity. Mahmood K found to be the author with highest h-index of 17 and highest citation of 476.

Table-4: Ranking of Authors

Sr.No	Authors	Papers	h-index	Articles Fractionalized	Country	Institution	Total citation
1.	Wilson V	41	6	40.00	Canada	University Of Saskatchewan	106
2.	Bhatti R	32	8	12.67	Pakistan	Islamia University	8
3.	Thanuskodi S	29	7	18.50	India	Alagappa University	88
4.	Chiu J.Y	26	1	24.00	United States	JOEMLS	1
5.	Jeyshankar R	23	4	12.67	India	Alagappa University,	53
6.	Thirumagal A	23	2	10.08	India	ManonmaniamSundaranar University	16
7.	Gupta B.M	22	12	10.33	India	National Institute Of Science Technology And Development Studies India	307
8.	Wilson T	22	30	23.50	United Kingdom	The University Of Sheffield	20
9.	Mahmood K	18	17	8.75	Pakistan	University Of The Punjab, Lahore, Lahore	476
10.	Sen B.K	18	8	12.33	India	Dst, New Delhi	40

Top 15 Highly Cited Publications

A total of 8380 research documents has received 25661 citations with the average citation per paper of 3.067. The citation pattern of the open access publication in LIS journal research papers indicated an exponential growth. The top 15 papers received total number 1686 citations, which accounted for 6.57% of the total citations received. *"Adopting evidence-based practice in clinical decision making: Nurses' perceptions, knowledge, and barriers"* authored by Majid S and his co-authors published in Journal of the Medical Library Association in 2011 received the highest number of citations. The top 15 cited papers are listed in Table 5.

Table-5: Top 15 Highly Cited Publications

Rank	Authors	Year	Title	Total citation	Source title
1.	Majid S and et.al.	2011	Adopting evidence-based practice in clinical decision making: Nurses' perceptions, knowledge, and barriers	187	Journal of the Medical Library Association
2.	Mackey and Jacobson	2011	Reframing information literacy as a metaliteracy	168	College and Research Libraries
3.	Bramer W.M and et.al	2016	De-duplication of database search results for systematic reviews in endnote	165	Journal of the Medical Library Association
4.	Adams N.E.	2015	Bloom's taxonomy of cognitive learning objectives	160	Journal of the Medical Library Association
5.	Boruff J.T and Storie D.	2014	Mobile devices in medicine: A survey of how medical students, residents, and faculty use smartphones and other mobile devices to find information	147	Journal of the Medical Library Association
6.	Arnold-Garza S.	2014	The flipped classroom teaching model and its use for information literacy instruction	95	Communications in Information Literacy

7.	Omotayo F.O.	2015	Knowledge management as an important tool in organisational management: A review of literature	94	Library Philosophy and Practice
8.	Beliga S and et.al.	2015	An overview of graph-based keyword extraction methods and approaches	92	Journal of Information and Organizational Sciences
9.	Asher A.D and et.al.	2013	Paths of discovery: Comparing the search effectiveness of EBSCO discovery service, summon, google scholar, and conventional library resources	88	College and Research Libraries
10	Cooper I.D and Crum J.A.	2013	New activities and changing roles of health sciences librarians: A systematic review, 1990-2012	86	Journal of the Medical Library Association
11	Lewis D.W.	2012	The inevitability of open access	86	College and Research Libraries
12	Davis P.M and Walters W.H.	2011	The impact of free access to the scientific literature: A review of recent research	84	Journal of the Medical Library Association
13	Stone G and Ramsden B.	2013	Library impact data project: Looking for the link between library usage and student attainment	83	College and Research Libraries
14	Marshall J.G and et.al.	2013	The value of library and information services in patient care: Results of a multisite study	79	Journal of the Medical Library Association
15	Fagan J.C and et.al.	2012	Usability test results for a discovery tool in an academic library	72	Information Technology and Libraries

Authorship Pattern & Degree of collaboration

The authorship pattern was analyzed to determine the publication pattern of single, double, three authors, four authors, five and more than five authors and multiple authorship etc. Articles are the major constituent of Scopus indexed open access LISjournal. As indicated in Table 6, our author sample consists of 8380 documents. This table shows that the majority of authors preferred to publish their research results in single authorship mode (3064 papers) followed by Double authorship mode (2808), three authorship mode (1480) followed by four authorship mode (604) while published by five and more than five authors (424) and Multi-author mode (5316) respectively.

Table-6: Authorship Pattern

Year	Single Author (Ns)	Double Author	3(Authors)	4 (Authors)	5≥ (Authors)	Total
2011	266	189	72	18	24	569
2012	248	208	102	20	15	593
2013	241	190	92	34	21	578
2014	277	190	109	42	22	640
2015	277	194	94	35	24	624
2016	282	223	121	39	36	701
2017	286	194	101	40	33	654
2018	348	281	166	58	45	898
2019	493	578	330	146	95	1642
2020	346	561	293	172	109	1481

Total	3064	2808	1480	604	424	8380

Term "collaboration" has become match all type of phrase for any type of cooperation, shared stakes or investments; the alternative to competition. Collaboration is more specific than just teamwork or cooperation although it is intimately connected to those terms. Table 6 to find out the ratio of the number of collaborative papers to the total numbers of paper in a specific period, the formula suggested by Subramanyam (1983) is used. (Subramanyam, 1983).

Table-7: Degree of Collaboration

Year	Single author (Ns)	Multiple author (Nm)	Total author (Nm+Ns)	Degree of collaboration (DC)
2011	266	303	569	0.532
2012	248	345	593	0.581
2013	241	337	578	0.583
2014	277	363	640	0.567
2015	277	347	624	0.556
2016	282	419	701	0.597
2017	286	368	654	0.562
2018	348	550	898	0.612
2019	493	1149	1642	0.699
2020	346	1135	1481	0.766
Total	3064	5316	8380	0.634

C= Nm/ Nm+Ns

Where, C= Degree of Collaboration

Nm= No. of multi-authored research paper

Ns= No. of single-authored research paper

C=5316/5316+3064=0.634

Therefore, it proves that 0.634 is the overall DC for ten years, and the result reveals that the value of DC was maximum in the year 2019 with 0.766 and minimum in the year 2011 with 0.532.

Top 10 Most Relevant Sources for Publishing during 2010-2019

During study period, it has found that journal titled '*Library Philosophy And Practice*' has published 3151 papers and secured in top position for highest number of publications

followed by "*Evidence Based Library And Information Practice*" with 620 papers. The top ten sources shown in Table 7 have contributed a volume of 6474 papers (77.25%), to the literature in open access LIS journals. The highest number of citation received by the "*College and Research Libraries*" (n=4940) and also have the highest h-index of 30.

Table-7: Most Relevant Sources

Sl. No	Source	Rank	No. Of Publication	Cum No. of Publication	h-index	g-index	m-index	Total Citation
1.	Library Philosophy and Practice	1	3151	3151	15	22	1.36	3932
2.	Evidence Based Library and Information Practice	2	620	3771	14	21	1.27	1264
3.	Journal of The Medical Library Association	3	541	4312	27	46	2.45	4367
4.	College and Research Libraries	4	495	4807	30	44	2.72	4940
5.	Information Research	5	433	5240	22	30	2	2487
6.	Annals of Library and Information Studies	6	305	5545	13	14	1.18	955
7.	Information Technology and Libraries	7	289	5834	19	28	1.72	1364
8.	Issues in Science and Technology Librarianship	8	221	6055	12	17	1.09	621
9.	Webology	9	220	6275	12	19	1.09	604
10.	Liber Quarterly	10	199	6474	13	18	1.18	610

Cloud Based analysis of top keywords

We have conducted cloud analysis of top keywords to visualize the research theme. Keywords having higher density are presented in larger fonts and displayed in alphabetic order. Top keywords were selected to draw the cloud whose minimum frequency of occurrences is 10. As seen in Figure 2, the size of the keyword is as per the occurrence of the keyword. The top key terms having the largest total of occurance were as follows: information literacy (251, times), bibliometrics(235, times), academic libraries(195, times) respectively. These prominent keywords are positioned in the central area of the cloud that indicates their influences and direction of the research areas. From the analysis, it can be inferred that research on library and information sciences focus on the aspect of strong

linking between information literacy, bibliometrics, academic libraries, scientometrics and open access, citation analysis during 2011 to 2020.
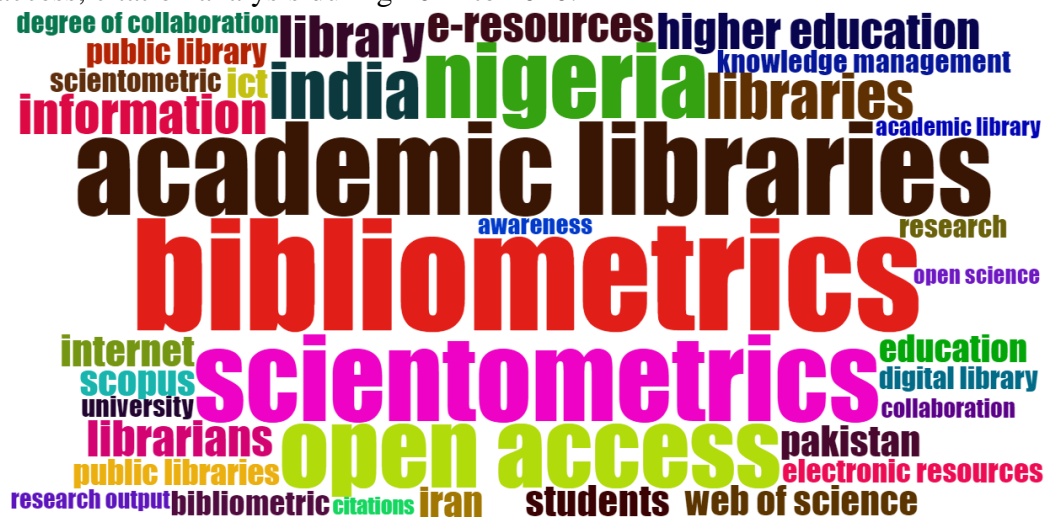

Figure-1: Cloud analysis of Top Keyword Occurrence

Most productive institution

The top 15 organizations that produce significant numbers of research paper were shown in Figure-2. It has been found that "University of Ibadan" has published 127 papers and position in the top followed by University of Nigeria (n=121) and Alagappa University with 87 papers. Interestingly, it is observed that six prominent university from India has made position in the top 15 institutions list.
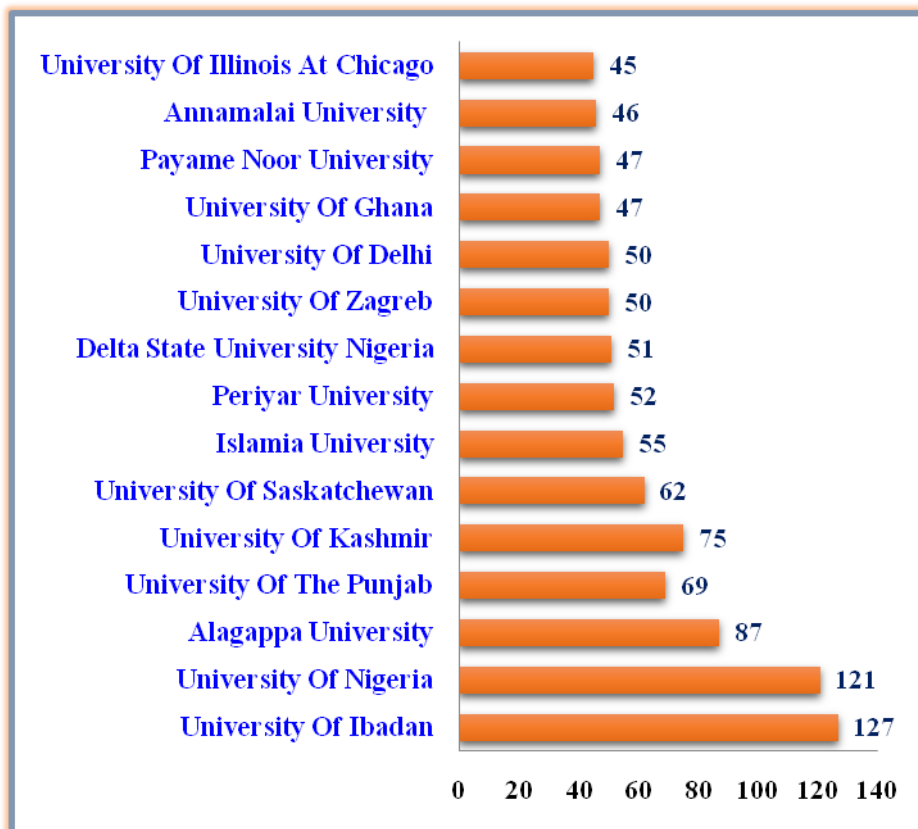

Figure-2: Top 20 Institutions/Organization

Country collaboration network

As shown in Figure-3, Most of the research collaborating with USA. 24 papers publications are internationally co-authored by USA and Canada during this period of study that is highest. Figure-3 shows the collaboration of different country for produce a quality publication and knowledge sharing between the authors. In the second position, Pakistan and Saudi Arabia collaborate to publish 16 papers. Mapping scientific cooperation at the country level reveals that Western countries cooperate together extensively and represent the core of the network. These core countries are producing the largest number of scientific publications of the world. The Canada. U.K., Germany, France, Italy, and USA produce a large number of the publications and occupy a central location in the collaboration network. There is less number of Asian countries collaboration takes place in this period of study.
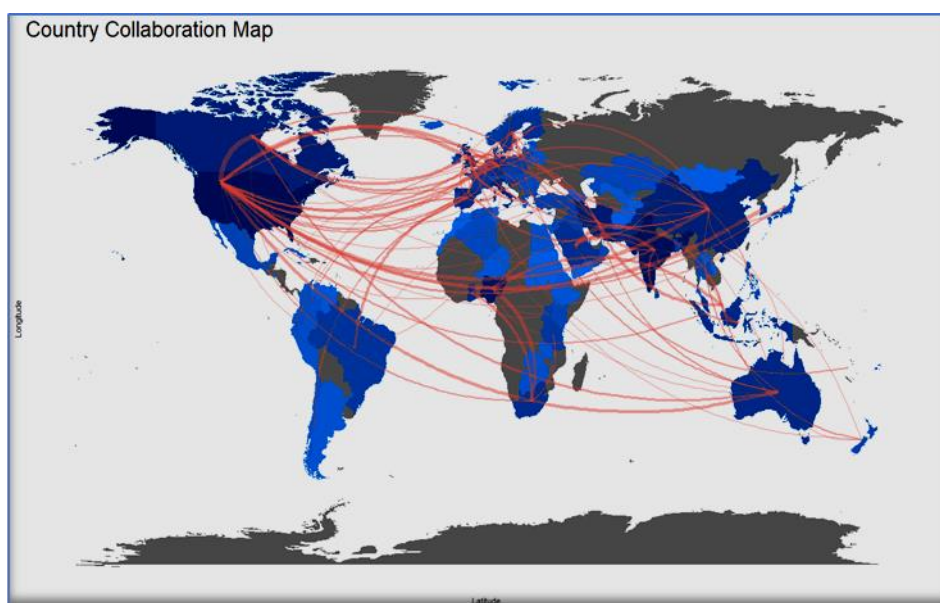

Figure-3: Country collaboration network

CONCLUSIONS

In this study a sample of 8380 research papers that were published in open access LIS journals from 2011 to 2020 in SCOPUS were analysed using scientometrics techniques. The maximum growth of publication was recorded in 2019. USA found to be topmost contributors with 2166 papers. Among the most productive Institutions, *University of Ibadan*has the highest 127 numbers of publication. The most prominent authors found to be Wilson V. with 41 papers, 106 citation, h-index of 6 respectively. The top journal was '*Library Philosophy and Practice'* as it has published the highest number of papers totalling 3151 and 3932 citation out of total paper and citation during research period. Together the top ten journals have contributed 6474 papers, which account for 77.25% of the total research output. The most frequently cited paper (187 citations) was "Adopting evidence-based practice in clinical decision making: Nurses' perceptions, knowledge, and barriers" authored by Majid S and et.al. Published in "*Journal of the Medical Library Association"* in 2011.

This study concluded that across the world countries have publishing in open access LIS journal. Analysis of publication reveals that 2019 is the most productive year with 1642 number of papers. In the study period out of 8380 papers, 3064 number of papers written by single authors, 2808 by double authors, 1480 by three authors, 604 by four author and 424 by five or more than five authors respectively. The study further reveals the degree of collaboration of author that is 0.634 which indicates a strong collaboration pattern in the research domian. From the analysis, it can be inferred that research on library and information sciences focus on the aspect of strong linking between information literacy, bibliometrics, academic libraries, scientometrics and open access, citation analysis during 2011 to 2020. The dominance of International collaboration shows the multiple dimension of the research domain. USA and Canada have the most collaborative research partners during the studied period. This study shows positive trends on adaptability of open access research of library and information professional and researchers across the globe of their preference in communicating research in the open access LIS journals.

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