Research Paper   **Open Access**

Bibliometric Assessment of Data Management in Libraries 2003-2022

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ABSTRACT:- The study was conducted to understand the documents available on data management in libraries between 2003-2022 as indexed by Scopus. The bibliographic facts and literature were gathered from Scopus database (https://scopus.com). All the vital bibliographical findings were recovered by the advanced exploration method through keywords such as 'Data management and library'. This gave the researchers a chance to come up with more organized and inclusive understanding of the philosophies and new advances in the area. The research resultssupport related investigators in nurturing their study in the famous research collection. The research study revealed year wise distribution of publication productivity between 2003-2022, authorship patterns, forms of documents that had been reflected in the publications of data management in libraries,the leading journals and their impact factor in which data management publications in libraries were published and country wise productivity plus subject areas in which data management in librarypublications surfaced.

Key words
Bibliometric assessment, Citation analysis, Data management, Library services, Scopus database

I.   INTRODUCTION

Data management has grown in importance as businesses are subjected to an increasing number of regulatory compliance requirements, including data privacy and protection laws. Data management is the process of storing, organizing and maintaining the data created and collected by an organization Cox and Pinfield (2014). The data management process includes a combination of different functions that collectively aim at making sure that data in corporate systems is accurate, available and accessible. Increasinglydata is seen as a corporate asset that can be used to make better-informed business decisions, improve marketing campaigns, optimizing business operations and reduce costs with the goal of increasing revenue and profits. But a lack of proper data management can saddle organizations with incompatible data silos, inconsistent data sets and data quality problems that limit their ability to run business intelligence or, worse, lead to faulty findings as pointed out by (Kirya and Lutaaya 2023).

In libraries, data management covers all steps in the collection, processing, storing and sharing of research data, including:Processing and analysingdata, verifying and documenting data, data formats, naming, and organization, data archiving and sharing, ethics and attribution of data. The library can help with data management planning and archiving of research data. Scopus database offersadmission to STM periodical articles and the references comprised in those articles, permitting the academic to examine both forward and backward in time. Scopus database can be used for gatheringgrowth as well as exploration of publications. This examinationoffers information on the key points of the databank and associates it to Web of Science database(Nabutto, 2022).

II.   OBJECTIVES

i.   To ascertain year wise distribution of articles published on data management in libraries
ii.   To study authorship pattern on data management in libraries
iii.   To analyse country productivity ranking on data management in libraries
iv.   To find out authors most bibliographic forms of documents that have been reflected in the publications of data management in libraries

v.   To identify the leading journals and their impact factor in which data management publications in libraries are published with

III.   LITERATURE REVIEW

3.1 Bibliometric Analysis/Bibliometric approach

Libraries are no longer focusing on updating libraryselections and assessment of circulatedresources and electricresources to supporting the examination and valuation of research productionat institutional levels as pointed out by (Gumpenberger etal, 2012). Gumpenberger et al. further noted that bibliometrics and scientometrics are essencegrounds of actions for present academic libraries, posingchances to develop and suggestnovelamenities for staff.

In agreement to the above, Ball and Tunger (2006) emphasized that information professionals took up this business area much later.Librarians should get involved in research valuation and citation study at a higher level, determining how to meet patrons interest as pointed out by Herther (2009). According to MacColl (2010),libraries need to reaffirm their role in regard to academic knowledge by exploiting and promoting their expertise in bibliometric, publishing, open access, and scholarly dissemination. This calls for a more practical, tacticalposture, that moves beyond bibliometric support services.

Zhao (2011) contended that bibliometricsexploration is pretty robust as well amongst research treasured and directed by academic librarians and research libraries. Bibliometrics is a projecting research zone in information science and typical in being a fieldadvanced within information science that has been effectivelytransferred to other fields that have taken up its approaches, in contrast to research methods introduced from other arenas and effected to LIS.

Lutaaya (2023) conducted a bibliometric analysis on application of ICTs in libraries between 2011 to 2021. A total number of 1186 documents were retrieved following the ICT application in libraries' search from Scopus database. It was revealed that 2019 had the highest publication of 163 with a percentage of (13.74%). It was further revealed that Gomez, R was the most productive author with 17 (25.37%) publications followed by Omeluzor, S. U with 8 (11.95%) publication. Gomez, R was the most productive author with 17 (25.37%) publications. It was noted that Mahmood, K was the most prolific author with an H-Index of 23.

Tsay& Shu (2011) studied citation pattern of journal of documentation between 1998 and 2008. They noted that authors preferred producing journal articles to other forms of publications. Abdi & et al. (2018) mentioned that, they studied 2,913 articles of information processing and management journal ranging between 1980 and 2015. They further mentioned that 67.15% of the publications were articles. While Olatokun&Makinde (2009) in their discussion, discussed citation pattern of dissertation submitted in department of animal science, University of Ibadan during the period of 2000-2007 projected that peer reviewed journals were found to be the most cited documents in the dissertations. Poultry nutrition was the most prominent subject field identified by this study and forage production and management while mono gastric nutrition was the lowest one.

Data Management in libraries

Library participation in research data management has a much shorter history, although prior experience in engaging with social science data archives and geospatial data resources offers models that could be adopted for other domains. Macdonald and Martinez (2005) traced the history of data librarianship in the United Kingdom, showed how practitioners had moved beyond supporting dataset discovery and desktop analysis to repository, reference, and education services.

According to Yoon and Schultz (2017), researchers don't have enough time to grip the necessities of data management. Researchers also had a lot of issues in relation to data management. Such issues include storage of data, integrity, and stoppage choices, therefore researchers need team experts to manage data. In the same vain, academic libraries have been actively involved in services that report the complete data lifecycle, comprising of the management of dataas indicated by Ball (2013). Bearing in mind that libraries are involved in data management and curation, not all libraries are in the same stage due to the different observations and requirements linked to data management at the established levels which vary with institutional capacity and policies.

It should be noted that various recommendations to overcome challenges of data management have been made by leading libraries. For example, partnerships and collaboration with other institutions and

continues professional training to develop more skills in recognising suitable materials as pointed out by (Lutaaya and Hoskins 2019; Lutaaya and Hoskins 2015).

According to Jodi, Jason, Morgan, Natsuko and Ece 2015, data management encompasses many stakeholders, mutually within and outside the university civic. The academic library is particularly significant since it inhabits the exclusive position together as a facility with expertise in numerous areas involving data management and with a relationship amongst the different stakeholders that are constructively positioned to lead the research data management effort (Jodi, Jason, Morgan, Natsuko and Ece 2015). Historically, libraries have trained researchers and also curated and preserved information materials hence key players in research data management.

Additionally, libraries have also helped researchers deal with federal agencies' as a new prerequisite for data management planning; also according to Lauren (2014), "Navigating braving the new world is simply an extension of the work that has been going on for decades.''
But providing data management services had been tough for various libraries. This is because of the new skills that librarians must possess to deliver data management services. To support the aboveLutaaya and Hoskins(2019); Lutaaya and Hoskins (2015) in their study revealed that many librarians lacked required skills, they were not given enough time by their institutions to provide data management services and some libraries did not ponder data management services as a priority.

Bibliometric Assessment
In response to the vast amount of scientific information created in recent years, paired with new modes of communication, the research community came up with a measure that has given rise to a new field of study known as bibliometrics (bibliographical statistics)as indicated by (Góngora Orjuela, 2010). Bibliometric analysis literally means measuring the properties of all kinds of documents, including journal articles, conference proceedings, books, etc. This makes use of mathematical and statistical analytic approaches that allow for the collection of reliable indicators of product quality and reliability. The number of documents released by an institution or a country, as well as research groups and people with the highest levels of scientific production, may be obtained in this way as pointed out by (GóngoraOrjuela, 2010; Lutaaya 2020).

According to Malone and Burke (2016), the use of bibliometric tools is extremely significant for research in which librarians are required to give research support services to researchers. Since numerous scholars are publishing various publications on data management in libraries, it is now vital to know the research trends of those aspects. As a result, the policymakers and library administrators in different countries have learnt the best-applied work method for their library and information services. A bibliometric study has been one of the important topics of works in the literature. Therefore, bibliometric analysis is one of the significant ways to find the knowledge map easily as pointed out by (Lutaaya 2020; Lutaaya 2022).

Scope and methodology of the study
A bibliometric valuation on data management in libraries was conducted from 2003 to 2022 from Scopus database. This period was chosen because it ranges in the most recent 20 years. The study used Scopus database, because it is the leading research platform that assisted researchers in finding, analysing, and sharing data in the sciences, social sciences, arts, and humanities as revealed by (Lutaaya, 2022). Scopus has grown to become one of the major abstract and citation databases. It is the most comprehensive peer reviewed database with the different largest academic output in the world. Further still Scopus is 20% broader handling in time equated with the Web of Science, regularly used database in a bibliometric analysis, stood a benefit in steering development and citation analysis (del Río-Rama et al., 2020).

A search strategy of data management in libraries was carried using document field. This was done to ensure that all retrieved publications were in line with data management in libraries. The search yielded 17, 373 publications and there were no language restrictions applied in the study. Examination of documents was prepared grounding on year wise distribution of publications' productivity between 2003-2022, geographical contributors and authors who published about data management in libraries in the same period were considered. The institution wise contributions of publication in data management, year wise distribution of citations, and subject areas of the publications were also considered.

Data analysis and interpretation
The discussion of results was focussed on the ICT application in libraries, basing on year wise distribution of publications' productivity between 2003-2022, authorship patterns on data management in

libraries, forms of documents that had been reflected in the publications of data management in libraries, the leading journals and their impact factor in which data management publications in libraries were published with and country wise productivity plus subject areas in which these publications surface.

IV.   FINDINGS AND CONCLUSIONS
Table 1Year wise distribution of publications

SN	Year	N0. Publications	Percentage	Cumulative Percentage
1	2022	1708	9.8	9.8
2	2021	1669	9.6	19.4
3	2020	1426	8.2	27.6
4	2019	1380	7.9	35.5
5	2018	1139	6.6	42.1
6	2017	1090	6.3	48.4
7	2016	951	5.5	53.9
8	2015	942	5.4	59.3
9	2014	876	5.0	64.3
10	2013	833	4.8	69.1
11	2012	775	4.5	73.6
12	2011	668	3.8	77.4
13	2010	593	3.4	80.8
14	2009	562	3.2	84.0
15	2008	554	3.2	87.2
16	2007	488	2.8	90.0
17	2006	520	3.0	93.0
18	2005	472	2.7	95.7
19	2004	426	2.5	98.3
20	2003	301	1.7	100

According to year wise distribution of publication in Table 1 above, it exhibited the year wise distribution statistics of data management in libraries basing on Scopus database ranging from 2003-2022 and a total of 17,373 publications were recovered. In Table 1 above, it wasrevealed that 2022 had the utmostdocuments of 1708 with a percentage of (9.8), followed by 2021 with 1669(9.6%)publication while the leastrecords of documents were made in 2003 with301(1.7%) documents. The findings revealed a steady increase in publications from all the rest of the years unlike in 2007where a decrease in publications was registered.

Publication Type

Below is Table 2 displaying the types of documents retrieved from Scopus database on data management ranging between 2003-2022.

Table 2Publication Types

SN	Type of document	No. of literature	Cumulative Literature	Percentage	Rank
1	Articles	7860	7860	45.2	1
2	Review	4991	12851	28.7	2
3	Conference Papers	3665	16516	21.1	3
4	Conference reviews	296	16812	1.7	4
5	Book Chapters	284	17096	1.6	5
6	Books	79	17175	0.5	6
7	Note	48	17223	0.3	7
8	Short Survey	47	17270	0.3	8
9	Editorial	34	17304	0.2	9
10	Retract	33	17337	0.2	10

Table 2 above revealed that most of the documents re-claimed on data management in libraries were articles 7860 (45.2%) followed by reviews 4991 (28.7%), then conference papers with 3665 (21.1%) documents, conference reviews with 296 (1.7%) publications, book chapters were 284 (1.6%) documents, book were79

(0.5%), note 48and short surveys with47 documents with a percentage of 0.3 each while editorials and retract had 34, 33 documents respectively with the same percentage of 0.2. This indicated that most academic publications on data management in libraries are distributed as articles. This can further be illustrated in the bar graph below.

Figure 1: Types of Documents
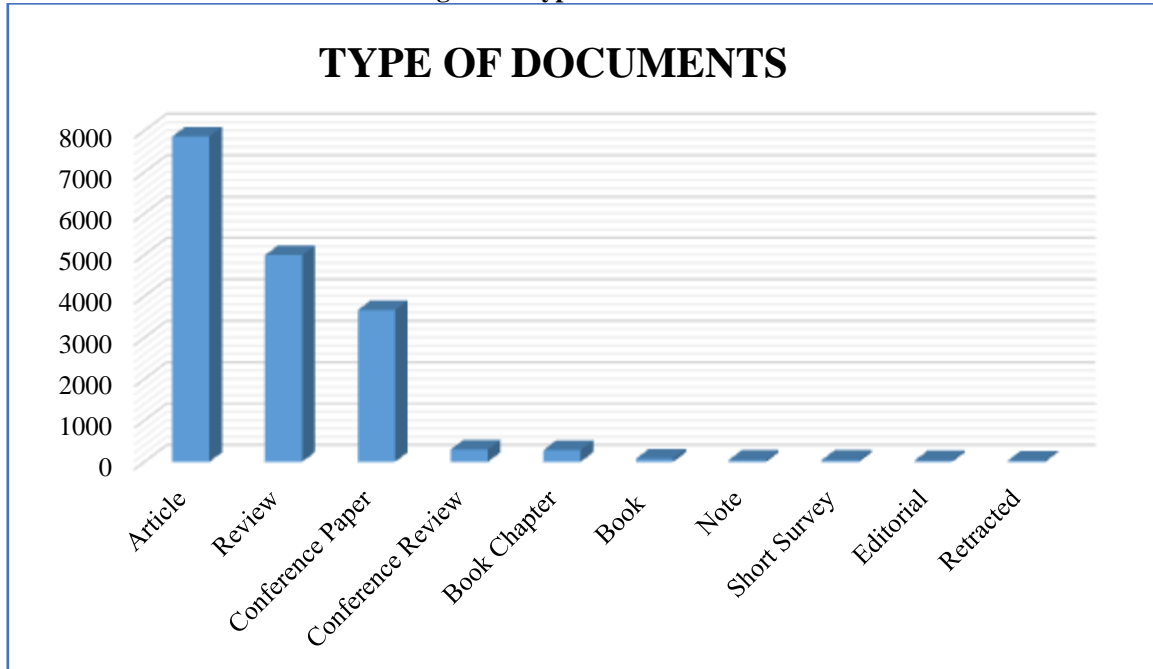
Geographical Distribution of Contributors

Table 3: Geographical Distribution of Contributors

SN	Country	No. of Documents	Cumulative	Percentage
1	United States	4399	4399	25.3
2	China	2372	6771	13.7
3	United Kingdom	2294	9065	13.2
4	Canada	989	10054	5.7
5	Australia	951	11005	5.5
6	Germany	831	11836	4.8
7	Italy	780	12616	4.5
8	India	653	13269	3.8
9	France	495	13764	2.8
10	Spain	495	14259	2.8
11	Netherlands	489	14748	2.8
12	Iran	390	15138	2.2
13	Brazil	388	15526	2.2
14	Switzerland	332	15858	1.9
15	Nigeria	317	16175	1.8

Table 3 above, illustrates the geographical distribution of documents distributed on data management in libraries as indexed by Scopus ranging between 2003 and 2022. United States of America had the uppermostamount of documents4399 (25.3%) followed by China with 2372 (13.7%) publications and thirdly United Kingdomwith 2294 (13.2%) documents. Canadahad 989 (5.7%) publications, Australia had 951 (5.5%) documents whileGermany had 831 (4.8%) documents. These were followed by Italy with 780(4.5%) publications and Indiawith 653 (3.8%) documents, France and Spain had 495 (2.8%) documents each, while Netherlands had 489 (2.8%) publications. It was noted that Iran had 390 documents followed by Brazil with 388 documents with the same percentage of 2.2. Yet Switzerland had 332 (1.9%) publications and lastly Nigeria with 317 (1.8%) documents.

Table 4 Publications per Author

SN	Author	Country	No. Documents	%	Citations	H-index	Overall Documents
1	Wiffen, P.K	United Kingdom	22	0.13	17,143	69	342
2	Muffuli, N	United Kingdom	21	0.12	57,614	110	1836
3	Ameen, K	Pakistan	17	0.10	1,124	18	124
4	Doreen, C. J	United Kingdom	16	0.09	6,104	44	166
5	Gurusamy, K	United Kingdom	16	0.09	15,345	63	396
6	Sheikh, A	United Kingdom	16	0.09	95,689	130	1294
7	Car, J	Singapore	15	0.09	25,941	74	421
8	Dumville	United Kingdom	15	0.09	7,990	50	210
9	Garner, P	United Kingdom	14	0.08	13,312	62	336
10	Moore, R	United Kingdom	14	0.08	48,760	99	505
11	Crowther, C.A	New Zealand	13	0.07	21,354	76	453
12	Fox, E	USA	13	0.07	5,727	34	360
13	Worthington	United Kingdom	13	0.07	24,858	83	488
14	Buchbinder, R	Australia	12	0.07	98,918	109	648
15	Cox, A	United Kingdom	12	0.07	2,225	24	129

The contributions of the most productive authors were shown in Table 4 above. Different writers authored17, 373 documents as indexed by Scopus between the years 2003 and 2022. Wiffen, P.N from the United Kingdomwas the most productive writer with 22(0.13%) documents followed by Muffuli, Nfrom United Kingdom with21 (0.12%)documents, Ameen, K from Pakistan had 17 (0.10%), while Doreen, C. J; Gurusamy, K and Sheikh, A all from United Kingdom had 16 (0.09%) documents each. Car, J from Singapore and Dumville, J.C from United Kingdom had 15 (0.09%) publications each. Garner, P and Moore, R both from the United States of America had 14 (0.08%) documents each while Fox, E from United States of America and Worthington, H.V had 13 (0.07%) documents each. Lastly Buchbinder, R from Australia and Cox, Aboth from United Kingdom had 12 (0.07%) publications each.

Wiffen Phillip, J was the most productive author with 22 publications and an H-index of 69 and 342 overall documents while Buchbinder, Rachelle was the most prolific author with 98,918 citations with an H-index of 109 with 648 overall documents.Considering the overall publications of the above mentioned authors in Table 4 above, Muffuli, Nichola from Queen Mary University of London in United Kingdom had the greatest number of overall publications 1,836 with 110 H-index, followed by Sheikh, Aziz from Edinburg, United Kingdom with 1294 overallpublications with an H-index of 130, the rest had less than one thousand overall publications.

The most cited author as shown in Table 4 above was Buchbinder, R with 98,918 citations followed by Sheikh, A with 95,689 and Muffuli, P.Nichola with 57,614 citations while the rest of the authors had less than 5000 citations each.

Table 5: Institutional Wise Distribution

SN	University	No. of Contributors	Percentage
1	University of Toronto	213	1.23
2	MCMaster University	162	0.93
3	University of Oxford	140	0.81
4	University college London	126	0.73
5	Imperial College London	120	0.69
6	The University of Sydney	118	0.68
7	Sichvan University	113	0.65
8	Kings College London	106	0.65
9	Monash University	102	0.61
10	Harvard Medical School	101	0.58
11	University of Oxford Medical sciences division	99	0.57
12	University of Alberta	98	0.56
13	University of Manchester	97	0.56
14	University of Ottawa	97	0.56
15	University of Melbourne	94	0.54

Considering Table 5 above, it specified the institutional-wise dissemination of documents in data management in libraries through the period 2003-2022. Out of 17373documents published, university of Torontohad the uppermostinfluence with 213 (1.23%) documents followed by McMaster University with 162 (0.93%), University of Oxford with 140 (0.81%) publications and Universityof college London with 126 (0.73%) publications. Imperial college London had 120 (0.69%) documents; the university of Sydney had 118 (0.68%) publications while Sichvan University and Kings College London had 113 and 106 publications respectively with a percentage of 0.65 each. Lastly, Monash University had 102 (0.61%) documents relating to data management in libraries as indexed by Scopus.

Table 6: Documents by Subject Area

SN	Subject Area	No. of Publications	Percentage
1	Medicine	6977	26.0
2	computer Sciences	4696	17.5
3	Social Sciences	3674	13.7
4	Engineering	2199	8.2
5	Mathematics	1199	4.5
6	Biochemistry, genetics and molecular biology	968	3.6
7	Arts and humanities	635	2.4
8	Environmental sciences	585	2.2
9	Nursing	559	2.1
10	Business, management and accounting	556	2.1

Table 6 above revealed that Medicine had the uppermost figure of documents 6977 (26.0%) trailed by computer sciences with 4696 (17.5%) documents then social sciences with 3674 (13.7%) documents whileengineering had 2199 (8.2%) publications and mathematics had 1199 (4.5%) documents. Additionally, biochemistry, genetics and molecular biology had 968 (3.6%) publications, arts and humanities had635 (2.4%) documents, while environmental science had 585 (2.2%) followed by nursing that had 559 (2.1%) publications and Business Management and Accounting had 556 (2.1%) documents while the rest of the subject areas had below 550 documents each. This was further illustrated in Pie Chartin Figure 2 below.

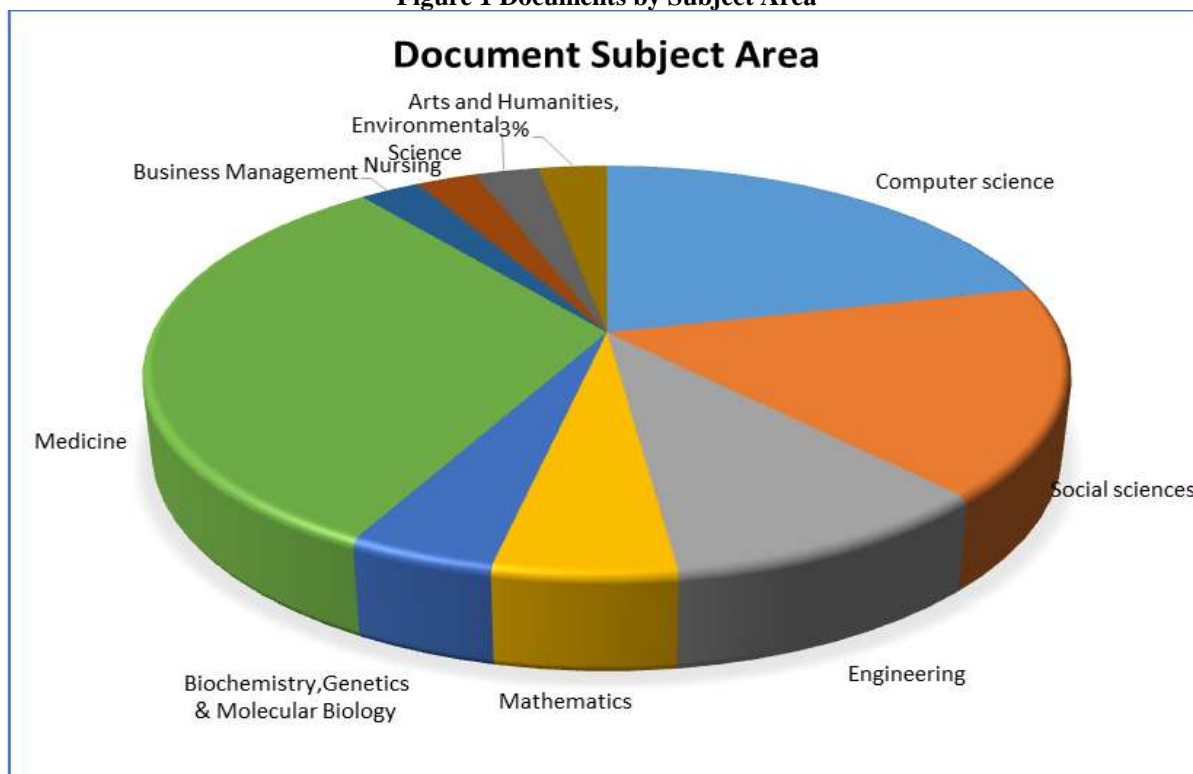**Figure 1 Documents by Subject Area**

Table 7 below, demonstrated the most relevant journals in which data management publications were published.

Table 7: Most relevant journals published in

SN	Journal	Documents	%	Cite Score	SJR	SNIP 2021
1	Cochrane Database of Systematic reviews	693	3.99	7.6	1.412	1.879
2	Lecture notes in computer science	356	2.05	2.1	0.407	0.534
3	Library philosophy and practice	316	1.82	0.4	0.233	0.810
4	BMJ Open	293	1.67	4.4	1.059	1.168
5	Cochrane Database of Systematic reviews Online	289	1.66	8.9	1.476	1.825
6	Medicine United States	208	1.20	2.9	0.460	0.799
7	Plos One	155	0.90	6.0	0.885	1.253
8	Library Management	138	0.79	2.3	0.439	0.737
9	Communication in Computer and Information Science	133	0.77	1.0	0.194	0.241
10	Journal of the medical library association	133	0.77	3.3	0.789	1.129
11	ACM International Conference Proceeding Series	131	0.75	1.1	0.209	0.229
12	Ceur Workshop Proceedings	122	0.70	1.1	0.202	0.223
13	Electronic Library	100	0.58	3.9	0.488	0.998
14	Systematic Reviews	92	0.53	5.9	1.269	1.561
15	Journal of Physics Conference Series	88	0.51	1.0	0.183	0.260

The main journal contributors in terms of productivity and impact or cite score as revealed in Table 7 above as explained below. Cochrane database of systematic reviews, Lecture notes in computer science, Library philosophy and practice, BMJ Open, Cochrane database of systematic reviews online and Medicine United States were ranked top six journals with publication numbers of 693, 356, 316, 293, 289 and 208 respectively. While Plos One, Library management, Communications in computer and information science, Journal of the medical library association, ACM international conference proceedings series, Ceur workshop proceedings and Electronic library had publications ranging between 133 and 100 publications, the rest of the journal sources had less than 100 publications.

V. FINDINGS

Seventeen thousand three hundred seventy-three (17,373) documents were retrieved following the search of data management in libraries from Scopus database between the years 2003 and 2022. It was revealed that the year 2022 had the uppermost publicationsof 1708 (9.8%) documents followed by year 2021 with 1669 (9.6%) documents while 2003 had the lowest numbers of publications301 (1.7%). In the same vain, the country sagedispersal of publication was also deliberated upon. It was shown that United States of America had most publications of 4399 (25.3%)trailed by China with 2372 (13.7%)documents followed by United Kingdom with 2294 (13.2%)publications. Nigeria came in the last position with 317 documents with a percentage of 1.8.

It was further noted from the findings that Wiffen, P.K from United Kingdom was the most productive author with 22 (0.13%) documents with an H-Index of 69 and 17,143 citations. He was followed by Muffuli, N also from the United Kingdom with 21 (0.12%) documents and an H-Index of 110 with 57,614 citations.It was further revealed that Buchbinder, R from Australia was the most prolific author with 98918 citations and an H-Index of 109.

The institutional distribution was also considered and it was revealed that University of Toronto was the most productive institution with 213 (1.23%) documents followed by McMaster University with 162 (0.93%) publications.In relation to subject area, it was revealed that Medicine had the highest score of 6977 (26.0%) documents followed by computer sciencewith 4696 (17.5%) documents. It was further revealed while considering the categories of publications that articles had the biggest number of publications 7860 (45.2%), followed by reviews with 4991 (28.7%) publications while retract had the least number of publications 33 (0.2%). In considering the journal sources, it was discovered that Cochrane Database of systematic reviews was the leading journal in which publications about data management in libraries had been published in with 693

(3.99%) publication with a cite score of 7.6 followed by Lecture notes in computer science with 356 (2.05%) documents with a cite score of 2.1 and Library philosophy and practice with 316 (1.82%) publications with cite score of 0.4.

Limitations and future research
    This study was limited to Scopus database collection published 2003-2022 leaving out other databases. Future researches could be conducted basing on web of science, google scholar, LISA and LISTA. Future research can also be conducted basing on Scopus database but considering others years other than 2003-2022 in LIS areas.

Implications for policymakers
    Thisstudy focused on publication indexed by Scopus this implies that various publications have not been analysed. It is recommended that authors publishing research on LIS should follow the guidelines and criteria for Scopus such that they are considered for inclusion in this data base. This will increase their visibility and citations of their publications at various level. This will lead to increased publications with Scopus data base which will therefore increase the amount of research conducted.

VI.   CONCLUSION
    The reviewed literature disclosed bibliometric studies conducted on data management in libraries basing on Scopus database between 2003-2022 thus a period of 20 years. The study revealed year wise distribution of articles published on data management in libraries, the most prolific and productive authors, country wise productivity, bibliographic forms of documents published and the leading journals with their impact factor in which data management publications in libraries published with. This will encourage authors to publish with the identified journals.

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