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Application of Information Technologies in Libraries: A Bibliometric Analysis as Indexed by Scopus Between 2011-2021

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APPLICATION OF INFORMATION TECHNOLOGIES IN LIBRARIES: ABIBLIOMETRIC ANALYSIS AS INDEXED BY SCOPUS BETWEEN 2011-2021

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Abstract

The intention of the study is to understand the literature available on ICT application in libraries between 2011-2021 as indexed by Scopus. The recovered bibliographic facts and literature distributed were gathered from Scopus database (https://scopus.com). All the essential bibliographical facts were recovered by means of advanced exploration method through keywords such as 'ICT and library'. The principal emphasis was on ICT in the library giving the investigator a chance to develop a more organized and comprehensive understanding of the ideas and new developments in the area. The outcomes of the study will support related investigators in fostering their investigation in the famous research collection. The study discloses year wise distribution of publications productivity between 2011-2021, geographical contributors, authors who published about ICT application in libraries, institution wise contribution, year wise distribution of citations, and subject areas of the publications.

Key words: Bibliometrics, ICT, Libraries, Research, SCOPUS

1. Introduction

Libraries are service organizations where individuals, organizations and societies can access substantial quantities of information. Information is important and key resources for every organization and it's an essential input for all types of individuals, publics, and community. Library is an excellent center of obtaining and accessing information from collection of books and other forms of records and resources organized and interpreted to meet the broad varying information

needs of its users. These information resources are in form of books, journals, newspapers, magazines, reports, workshop and

Generally, libraries play a vital role in providing information to its
community of users through systematic selection, acquisition, processing, preservation and dissemination of information using different format for effective library services. This ensure users access to current research that will impact their information need especially in teaching, learning, research activities that would promote national development (Abata-Ebire, Adetayo, & Ojokuku, 2018; Joell & Ayinla, 2015).

Globally, libraries are institutions of basic learning with the mission of providing collection of services to meet information needs of the academia and other individuals who may have need of their services Okebuihe (2011). Several authors regard libraries as the store of books and knowledge as well as the intellectual wealth of the world which serves as the working tool for satisfying man's curiosity (Amaechi, 2014; Obizue, E.C. and Obizue, 2016).

Application of Information and Communication Technology (ICT) in libraries has been offering sufficient opportunities to automate the library, create digital libraries, providing resource sharing networks, value-added information services and initiate capacity building programs for the library staff and users. The use of ICT in libraries has facilitated better security services and fulfils the needs of the user as per their requirements. It also used to develop new information services and improving the productivity and efficiency of library services. The ICT based resources help to reduce library space by using the electronic storage media, digital and virtual libraries. The quality of an academic institution depends upon the quality of services provided by the academic libraries

Of recent bibliometric analysis has become so popular in business research (Donthu, Kumar and Pattnaik 2020; Donthu, Kumar, Pattnaik and Lim, 2021). Since numerous scholars are publishing various publications on application of ICTs in libraries, it is now vital to know the research trends of those aspects. As a result, the policymakers and administration of libraries in different countries

can learn the best-applied work method for their library and information services. Therefore, bibliometric analysis is one of the significant ways to find the knowledge map easily. A bibliometric study has been one of the important topics of works in the literature (Prafulla Kumar Mahanta 2020).

2. Literature Review

Walmiki and Ramakrishnegowda (2009) studied ICT infrastructure in university libraries and found that most of the libraries "lack sufficient hardware, software facilities and do not have adequate internet nodes and bandwidth." The campus LANs were not fully extended to exploit the benefits of digital information environment. Ahmad and Fatima (2009) found that researchers use a variety of ICT products and services for research and further remarked that ICT products help to access information more easily. It was recommended that training be organized to increase the use of ICT-based products and services. Shafi-Ullah and Roberts (2010) found out that ICT infrastructure lacked funding and recommended allocating funds for ICT infrastructure. K. S. Sivakumaren, Dr V Geetha and B. Jeyaprakash (2011) stated that the university libraries must increase the numbers of computer available to enable the users to maximize the usage of ICT-based resources and services and it is found that most libraries have not implemented digitization of library management software. It is very useful to digitize rare collections such as older and out of print editions. Mhammed Ijas Mairaj, Widad Mustafa EI-Hadi (2012) found that provision of hardware, standardized library software, adequate financial resources, and proper training facilities for medical libraries will help to strengthen ICT applications in medical libraries.

2.1 INFORMATION TECHNOLOGIES IN LIBRARIES

Prafulla Kumar Mahanta (2020) found out that ICT infrastructure in the college libraries of Assam has improved. All the surveyed libraries are found automated and they had been using Software for University Libraries (SOUL) whereas few libraries have institutional repository, and most of them have been using Dspace. All the libraries are providing internet facilities to the library users.

Most of the users are found satisfied with the use of ICT in the college libraries. Prafulla Kumar Mahanta 2020).

Saleem, Saleem, Tabusum (2013) found out that the application of ICT tools has been increasing in academic libraries, especially in engineering and arts and science colleges. Most of the academic libraries had expressed that usage of internet was found less due to proper LAN connection. Mondal and Bandyopadhyay (2010) found out that all the college libraries have computers for computerized the library system but LAN facility was limited. Most of the libraries have acquired library management software. The libraries have faced few problems to implement IT such as financial constraints, the less interest the authority to upgrade IT, lack of trained manpower, etc

Onunga, (2021) noted that there were several information communication technologies for various housekeeping, management and administrative functions of the library, different electronic and digital media, and computer aided electronic equipment, networks and Internet had provided significant role in retrieval and dissemination of information hence playing a vital role for modernization of libraries.

2.2 Bibliometric approach

The study used bibliometric and citation analysis techniques to analyze the publications of ICT in libraries. The study focused on all documents published between 2011-2021 as indexed by Scopus as such the query (ICT and libraries 2011-2021). The study revealed that …The study further revealed that researchers are more interested in publishing articles compared to other categories of publications.

3. Why bibliometric analysis

Bibliometrics is statistical analysis of written publications, such as books or articles (Lutaaya 2020). Bibliometric systems are normally recycled in the ground of library and information science, with scientometrics. Bibliometric examination is a commanding device used in inspection presentation duty (Prasad 2019). Bibliometric study is so vital in today's enquiry action because it

helps one understand the vibrant range of study work being done. Scopus is a foremost inquiry podium that supports investigators in discovery, examining, and distribution of facts in different disciplines like social sciences, arts, and humanities (Lallawm, Lalngai and Lalduh 2022). The study of ICT application in libraries through the lens of bibliometric investigation is a significant process for learning numerical examination, revealing publications in their largest sense with a specified subject area, and allowing the discovery of dependable value pointers that will profit individuals all over the world. Bibliometric analysis of ICT application in libraries enhances the literature by mixing bibliometric investigation and content analysis to develop a further logical and inclusive understanding of the study area.

Bibliometric Analysis of Information Communication Technology Application in Libraries

Research into citation analysis has a long history. Many bibliometrics studies have been conducted on different subject domains. For instance, (Chauhan & Mahajan, 2017) conducted a bibliometrics study of LIS papers published in India. Authors used Science Citation Index database, a sample of 934 articles between 1951 and 2010 (Chauhan & Mahajan, 2017) reported that 34 per cent of total publications contributed by the professionals working in technical institutions.

Naseer and Mahmood (2014) conducted a comprehensive study of LIS subject dispersion. They analyzed 5195 publications in Pakistan over a period of 62 years and revealed that the majority of the Pakistani LIS research was focused on a few subject areas, thus paying less attention to many important areas related to the field. In a different study, Naseer and Mahmood (2009b) reviewed the use of bibliometrics in Pakistani LIS research and found bibliometric methods to be very useful in addressing diverse issues; their application, however, was not common in Pakistan. The study recommended comprehensive bibliographical control and better access to LIS literature, and urged for the sharing of best practices related to the use of bibliometrics.

Lutaaya (2020) conducted a bibliometric study analyzing publications of Ndejje University. The study focused on all documents published by staff of Ndejje University between 2009-2018 as indexed by Scopus. This query yielded a total of 23 documents for further analysis. The study

revealed that there is little research done in Ndejje University. Rugumayo A.I was the most productive author while Onuoha et al (2009) was the most prolific author. While (Jamali, Mansourian, &Alijani, 2015) examined LIS research out in Iran authors used sample of 11 Persian journals related to LIS. It was reported that 3,466 papers were published during 1991-2014 with 2,135 unique authors.

4. Objectives of the study

I. To study publication productivity on ICT application in library researches.
II. To find out the year wise distribution of publications on ICT application in library researches.
III. To understand the institution and geographical wise distributions of the publication on ICT application in library researches.
IV. To find out the most productive and prolific authors who published about ICT application in library research.
V. To explore the year wise distribution of citation on ICT application in library research.
VI. To study the subject facets of publications published about ICT application in library research.

5. Scope and methodology of the study

A bibliometric analysis on application of ICTs in libraries was conducted from 2011 to 2021. The choice of the period was promoted by the fact that it was the most recent period that ranges in the most recent 10 years. The study used SCOPUS database, because it is the leading research platform that assists researchers in finding, analyzing, and sharing data in the sciences, social sciences, arts, and humanities. Since its inauguration in November 2004, Scopus has grown to become one of the largest abstract and citation databases of peer-reviewed literature, with smart delivers and the most comprehensive picture of the world's academic output in a variety of subjects. To ensure that all retrieved publications address ICT application in libraries, a search strategy with ICT in libraries was conducted using document field. This resulted in 1,186 documents in ICT applications in

libraries with no language restriction applied in the study. Analysis of publication was done basing on year wise distribution of publications' productivity between 2011-2021, geographical contributors, authors who published about ICT application in libraries in that same period, institution wise contribution, year wise distribution of citations, and subject areas of the publications.

6. Data analysis and interpretation

The discussion of results was centered on the ICT application in libraries, basing on year wise distribution of publications' productivity between 2011-2021, geographical contributors, authors who published about ICT application in libraries in that same period, institution wise contribution, year wise distribution of citations, and subject areas in which publications were made.

Table 1. Year-wise distribution of publications

SN	YEAR	No. of the contributions	Percentage
1	2011	79	6.66
2	2012	93	7.84
3	2013	109	9.19
4	2014	88	7.42
5	2015	90	7.59
6	2016	83	7.17
7	2017	79	6.66
8	2018	100	8.43
9	2019	163	13.74
10	2020	142	11.97
11	2021	158	13.32
		1186	**100**

Year wise distribution of publication

Table 1 above showed the year wise distribution statistics of ICT application in libraries using SCOPUS database ranging from 2011-2021. A total number of 1186 documents were retrieved. Table 1 above reveals that 2019 had the highest publication of 163 with a percentage of (13.74) the lowest numbers of publications were produced in both 2011 and 2017 with 79 publications each year with a percentage of (6.66%).

Publication Types

Table 2 below shows the types of publications retrieved on ICT application in libraries between 2011-2021.

SN	Type of document	No. of Literature	Cumulative literature	Percentage	Rank
1	Article	756	756	67.0	1
2	Conference paper	234	990	19.7	2
3	Chapter	91	1081	7.7	3
4	Review	45	1126	3.8	4
5	Conference review	12	1138	1.0	5
6	Book	7	1145	0.6	6
7	Editorial	1	1146	0.1	7
8	Note	1	1147	0.1	8

The findings revealed that majority of the publications retrieved were in form of journal articles (67.0%) followed by conference papers (19.7%), review (3.8%), Chapter (7.7%), conference review (1.0%), book (0.6%), Editorial (0.1%) and note (0.1%). This indicated that most scholarly publications are published as journal articles.

Geographical Distribution of Contributors

Table 3 above: Country-wise distribution of publications- Top 10

Rank	Country	No. of contributors	Percentage	Rank
1	India	214	27.36	1
2	Nigeria	209	26.73	2
3	United State	74	9.46	3
4	South Africa	58	7.42	4
5	Pakistan	52	6.65	5
6	Italy	41	5.25	6
7	Malaysia	39	4.99	7
8	United Kingdom	38	4.86	8
9	Spain	30	3.84	9
10	Ghana	27	3.45	10

TOTAL		**782**	**100**	

Table 3 represented country wise distribution of publications published on ICT application in libraries. It would be too much for the researcher to mention all the countries, that's why she pointed out the top 10 countries as indicated above in Table 3. India had the highest number of publications 214 (27.36%) followed by Nigeria with 209 (26.73%) publications and thirdly United States of America with 74 (9.46%). South Africa had 58 (7.42%) publications, Pakistan had 52 (6.64%), Italy had 41 (5.25%) while Malaysia had 39 (4.99%) followed by United Kingdom with 38 (4.86%), Spain had 30 (3.84%) and lastly Ghana with 27 (3.45%) publications.

Authors who published about ICT application in libraries

Table 4: Shows the ranking of 10 top most productive author

Rank	Author	No. of publications	Percentage	H-Index
1	Gomez, R	17	25.37	13
2	Omeluzor, S. U	8	11.95	7
3	Bhatti, R	6	8.96	12
4	Idiegbeyan-Ose, J	6	8.96	7
5	Fourie, I	5	7.46	13
6	Hussain, M	5	7.46	2
7	Ifijeh, G	5	7.46	7
8	Mahanta, P	5	7.46	2
9	Mahmood, K	5	7.46	23
10	Ngulube, P	5	7.46	13
TOTAL		**67**	**100**	

Table 4 above revealed the contributions of top 10 most productive authors. Different contributors authored 1186 publications. Gomez, R from United States was the most productive author with 17 (25.37%) publications followed by Omeluzor, S. U from Nigeria with 8 (11.95%) publication. Bhatti, R and Idiegbeyan-Os, J were in the third position as the most productive authors with 6 (8.96%) publications each. The rest, that is Fourie, I; Hussain, M; Ifijeh, G; Mahanta, P; Mahmood, K; and Ngulube all had 5 (7.46%) publications each. Gomez, R was the most productive author while Mahmood, K was the most prolific author with an H-Index of 23.

Table 5: Institution-Wise Distribution of Publication-Top 10

SN	University	No. of Contributors	Percentage
1	University of Nigeria	35	20.23
2	University of South Africa	20	11.56
3	University of Washington	20	11.56
4	University of Delhi	16	9.25
5	Covenant University	15	8.67
6	The Islamic University of Bahawalpur	13	7.51
7	University of Ibadan	12	6.94
8	University of Punjab	12	6.94
9	University of Ghana	11	6.36
10	University of Washington	10	5.78
TOTAL		**164**	

Table 5 above revealed institutional-wise distribution of publications in ICT applications in libraries during the period of 2011-2022. Out of 164 publications, University of Nigeria had the highest contribution with 35 (20.23%) followed by University of South Africa and University of Washington with 20 (11.56%) Publications each. University of new Delhi had 16 (9.25%), covenant University had 15 (8.67%), The Islamic University of Bahawalpur 13 (7.51%), University of Ibadan and University of Punjab had 12 (6.94%) while University of Ghana had 11(6.36%), University of Washington had 10 (5.78%) and University of Teknologi Mara had 9 (5.20%) publications as indexed by Scopus.

Year-wise distribution of Citations

Table 6: Year-wise distribution of citation

Year	Rank	No. Papers	No. of Citations	Average No. of Citations	Cumulative	
					Citation	Percentage
2011	11	79	11	0.14	11	0.05
2012	10	93	63	0.68	74	0.40
2013	9	109	146	1.34	220	1.18
2014	8	88	221	2.51	441	2.37
2015	7	90	261	2.9	702	3.77
2016	6	85	363	4.27	1.065	5.73
2017	5	79	398	5.01	1.463	7.87
2018	3	100	595	5.95	2,O58	11.03
2019	4	163	895	5.33	2,926	15.73
2020	2	142	868	7.99	4,060	21.83
2021	1	158	1517	9.60	5,577	29.99
Grand Total		**1186**	**5338**	**45.72**	**18,597**	**100**

Table 6 above, indicated year wise distribution of citations. Out of the 10 years, 1187 publications published as indexed by Scopus with a total of 18,597 citations affixed. The average number of publications varies year to year. It was indicated in Table 6 that maximum citations occurred in 2021 with (9.60%). Implying that year 2021 was in the first position with maximum number of citations per paper, whereas 7.99% in the year 2020, 5.95 in the year 2018, 5.33 in the year 2019, 5.01 in the year 2017, 4.27 in the year 2016 while the rest of the years had less than 3.00.

Table 7: Documents by subject area

SN	SUBJECT AREA	NO. of publication	Percentage
1	Social sciences	820	39.6
2	Arts and Humanities	385	18.6
3	Computer Science	369	17
4	Engineering	103	5.0
5	Business Management	69	3.3
6	Medicine	64	3.1
7	Mathematics	60	2.9
8	Economics	36	1.7
9	Decision Science	33	1.6
10	Energy	14	0.7

It was revealed in Table 7 above that social sciences had the highest number of publications 820 (39.6%) followed by arts and humanities with 385 (18.6%) publications, while computer science and engineering had 369 (17%), 103 (5.0%) publications respectively. The rest of the subject areas had below 100 publications.

7. Findings and Conclusions

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%), the lowest numbers of publications were produced in both 2011 and 2017 with 79 publications each with a percentage of (6.66%). While the country wise distribution of publication was also considered. It was indicated that India was the most productive country with 214 documents (27.36%) followed by Nigeria 209 (26.73%), United States 74 (9.46%) and South Africa held the fourth position with 58 (7.42%) documents.

The institutional distribution was also considered and it was revealed that University of Nigeria was the most productive institution with 35 (20.23%) followed by University of South Africa and University of Delhi with 20 (11.6%) publications each. It was further noted from the study that Gomez, R was the most productive author with 17 (25.37%) publications followed by Omeluzor, S. U with 8 (11.95%) publication. Bhatti, R and Idiegbeyan-Os, J were in the third with 6 (8.96%) publications each. The rest, that is Fourie, I; Hussain, M; Ifijeh, G; Mahanta, P; Mahmood, K; and Ngulube all had 5 (7.46%) publications each. It was further revealed that Mahmood, K was the most prolific author with an H-Index of 23.

The year wise category was also considered and it was noted that 2019 had the highest number of publications 163 (13.74%) followed by 2017 with 158 (13.32%) publications. The study further revealed that there was an increase in publications between 2017 to 2019 while there was a registered decline in number of publications in 2020 yet another increase occurred in 2021.

In relation to publication types, it was revealed that article category had the most number of publications 67.0% followed by conference papers 19.7% and chapter with 7.7% etc. whereas in the least category was Editorial and note categories with both 0.1%. It was further noted that the subject area was also studied under the Scopus database and Social Sciences had the items with highest score of 820 (39.6%) followed by Arts and Humanities 385 (18.6%) while Computer Science was in the third position with 369 (17.8%) and Engineering came fourth with 103(5.0%) publications.

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