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Visualizing the Research trends and Authorship pattern in the literature of Knowledge Organization and Management

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Abstract:

The paper visualized on the research trends in the literature of knowledge Organization and Management which reflected in SCOPUS database by the quantitative analysis. This study analysis the literature growth rate by relative Growth analysis (RGR) and the rate of publication of the research literature by Doubling time (Dt), also give a visualization on authorship pattern by the Collaborating and coefficient authors. To the achieve of the objective of the study, retrieved the bibliographical data from the SCOPUS database use the keyword “Knowledge organization” OR “Knowledge Management” in the .csv format. After retrieving the data, systematically organize and process data by scientometric formula. This study reveals the growth of publication on Knowledge Organization and Management is polynomial trends, then it explains in Relative Growth rate (RGR) and Doubling time (Dt) that is 1.05 and 1.46 as respectively. Finally, this study explores that more collaborative works has been done by the authors it is explain by Collaborative Index, Degree of Collaboration and Collaborative co-efficient.

Keywords: Knowledge organization, Knowledge Management, Relative Growth Rate, Authorship Pattern, SCOPUS, Scientometric

1. Introduction:

An Knowledge organization is an Managing thought, depicting an organization in which individuals use frameworks and cycles to create, change, oversee, use, and move knowledge based items and facilities to accomplish authoritative objectives (Wikipedia, 2020). Davenport & Prusak (1998) are asserted Knowledge organization led routines, procedures, methods and rules. Zheng et al. (2010) are explained position of knowledge management and the results show that knowledge management is not only an impartial managerial exercise, but also a core system that influences structural cultural, organizational, and planned influence on organizational use.

Knowledge Management (KM) is the most common way of making, sharing, utilizing, and dealing with the information and data of an organization. It mentions to a multidisciplinary way to

deal with achieve authoritative destinations by utilizing knowledge goals. Gupta et al. (2004) Knowledge management activities regularly focus on around hierarchical goals like further expanded implementation, competitive advantage, advancement, the sharing of exercises learned, combination and consistent improvement of the Organization.

The past review of bibliometrics revealed that the first bibliometric study was conducted by Cole & Eales (1917). In their study, they developed a statistical analysis of the literature in Science Progresses journal in 1543-1860. They also analyzed the comparative anatomy of publications by simply counting the number of titles of books and journal articles. In the second study, Hulme (1923) examined entries and authors of "English International Catalog of Scientific Literature". In fact, the term "Statistical Bibliography" was first coined by Hulme. The third study of bibliometrics and first citation analysis were conducted by Gross & Gross (1927) in an article in the Journal of American Chemical Society. Eventually, Pritchard (1969) replaced the obscure term of "Statistical Bibliography" with "Bibliometrics".

The term 'Scientometrics' is a field which comprises of the quantitative techniques applied to the investigation of science as a data interaction. It is a logical discipline, which performs reproducible estimations of logical action, and uncovers its target quantitative consistencies (Zainab & Wani, 2018). Further, Scientometric strategies incorporate factual and thesaurus techniques, and markers with regards to the quantity of references, terms and so on.

2. Need of the study

The exponential growth and quick development of libraries as created a few evaluation research about the adequacy and proficiency of information services. This research encouraged to the distinguishing substantiation and utilization of proper quantitative analyzing techniques known as Scientometrics. Libraries and information scientists when global started to utilize scientometric studies they illuminate on the pattern of growth of literature, collaborative research, ranking of journals, interrelationship among different branches of knowledge, productivity and influence of authors and authorship pattern, pattern of collection built up, their application and so on

It is the need of the time to understand the characteristics of literature such as growth and scatter, collaborative research trends, highly productive journals, research productivity of institutes, utilization and consumption in planning and designing of information systems are useful in developing need-based collection of library resources.

3. Objectives

The main objectives of the study are:

- 1 To determine the research trends by RGR and Dt for publications.
- 2 To study the authorship pattern.
- 3 To know the collaborative trends by CI, DC, and CC.
- 4 Find out the top productive authors

4. Methodology

SCOPUS is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings (Elsevier, 2021) For the present study the data has been retrieved from SCOPUS by using key word “Knowledge Organization” and “Knowledge Management”. A total of 12503 records have been retrieved from the SCOPUS database till 2020. Microsoft Excel has been used for data analysis.

5. Data Analysis and Discussion

The paper is make use of SCOPUS database for data analysis. First record was found in year 1976. The research publication has been published in the different forms. The different forms of records have been depicted in table 1

Table-1 Forms of Documents

Sl. No	Document Type	No. of publication	Percentage
1.	Article	7533	60.25
2.	Conference Paper	3030	24.23
3.	Book Chapter	884	7.07
4.	Review	695	5.56
5.	Book	122	0.98
6.	Editorial	97	0.78
7.	Conference Review	79	0.63
8.	Note	18	0.14
9.	Erratum	16	0.13
10.	Retracted	13	0.10
11.	Short Survey	6	0.05
12.	Letter	4	0.03
13.	Data Paper	1	0.01
14.	Undefined	5	0.04
Total		12503	100

The above schedule show that highest authors (60.25%) are prepare research work in article forms to published i.e. 7533 out of 12503 records.

6. Research trends in Knowledge Organization and Management literature

Research literature on Knowledge Organization and Management in the deferent discipline as published in SCOPUS database by year-wise showed in table 1.

Table 1 Year wise publication

Year	Publication	Year	Publication	Year	Publication
2020	764	2006	542	1992	6
2019	784	2005	508	1991	1
2018	746	2004	241	1990	12
2017	696	2003	218	1989	8
2016	689	2002	218	1988	3
2015	781	2001	175	1987	9
2014	592	2000	149	1986	3
2013	644	1999	77	1985	1
2012	671	1998	29	1984	1
2011	739	1997	25	1983	4
2010	934	1996	18	1982	2
2009	749	1995	15	1981	1
2008	774	1994	16	1977	1
2007	642	1993	14	1971	1

The above schedule shows total 12503 research literature has been published. First literature found in 1971, after 90s-decade publication has been gradually increased. In the 2010, highest number of publications as recorded i.e., 934, overall, the publication has increased constantly, so polynomial trendline suit to research trends because R^2 value (0.868) is at or near to 1 (figure 1).

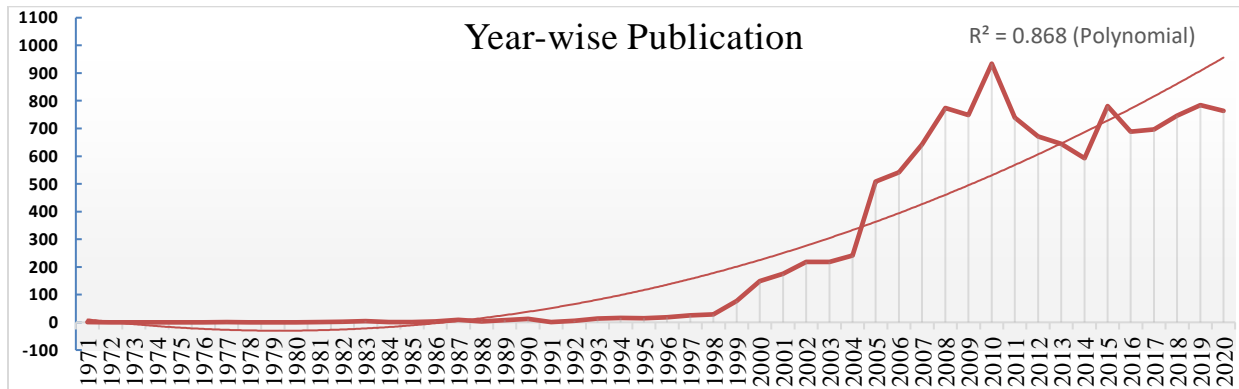


Fig. 1 Year wise publication

Relative Growth Rate (RGR) and Doubling time (Dt)

The growth rate of the research literature of each year expresses in terms of relative growth rate (RGR), its widely used to quantify the speed of publications each year. Also used Doubling time (Dt) to how take the time to double the publication of research work.

$$\text{Relative Growth Rate (RGR) is analyzed by } (RGR) = \frac{\text{Log}_e W_2 - \text{Log}_e W_1}{T_2 - T_1}$$

$\text{Log}_e W_2 = \log$ of the final number of articles/pages after a specific period of interval

$\text{Log}_e W_1 = \log$ of the initial number of articles/pages

T_2 represents that final time (e.g. in years)

T_1 represents that initial time (e.g. in years)

$$\text{Doubling timing (Dt.)} = \frac{0.693}{RGR}$$

Table 2 Relative Growth Rate and Doubling time

Block Year	Publication	Cumulative	Log _e W ₁	Log _e W ₂	RGR	Mean RGR	Dt	Mean Dt
1971-75	1	1	--	0.00	--	--	--	--
1976-80	1	2	0.00	0.69	0.69		1.00	
1981-85	9	11	0.69	2.40	1.70		2.46	
1986-90	35	46	2.40	3.83	1.43		2.06	
1991-95	52	98	3.83	4.58	0.76		1.09	
1996-00	298	396	4.58	5.98	1.40	1.05	2.02	1.46
2001-05	1360	1756	5.98	7.47	1.49		2.15	
2006-10	3641	5397	7.47	8.59	1.12		1.62	
2011-15	3427	8824	8.59	9.09	0.49		0.71	
2016-20	3679	12503	9.09	9.43	0.35		0.50	

Table 2 displaying that Relative Growth Rate (RGR) and Doubling time (Dt) of scholarly communication on knowledge organization and management. Each five-year publication as combined with one block period, and total ten block year period set up to effortless data analysis and interpretation. We found this study in the 1981-85 block period has gone highest RGR i.e., 1.70 and 2.46 doubling time (Dt). Mean value of Relative Growth Rate and doubling time is 1.05 and 0.46 respectively.

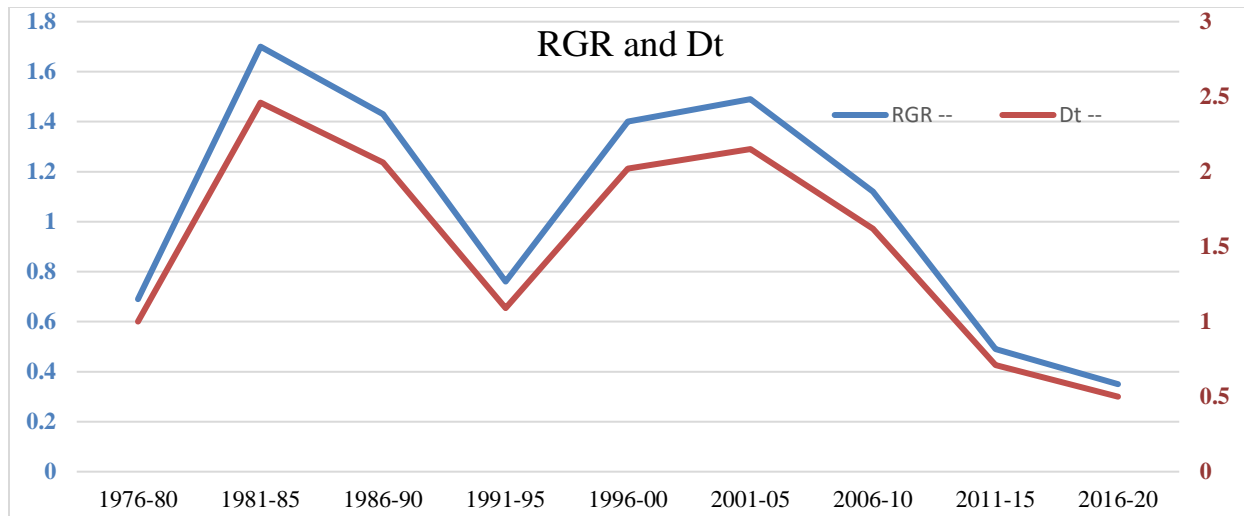


Fig. 2 Relative Growth Rate and Doubling time (Dt)

Figure 2 clearly demonstrate that the Relative Growth Rate and Doubling Time (D_t) are in same trundles. After the 2000s research trends towards knowledge organization and management slightly decreasing, my be research trends are diverted to some other fields in library science.

7. Authorship Pattern

Authorship is the more important bibliometric methods reflecting contemporary communication patterns, productivity, and collaboration among the researchers

Table 3 Authorship Pattern

Block Year	Anony-mous	Single	Double	Three	Four	Five	Six	Seven	Eight	Nine	Ten &>10	Total
2016-20	30	724	1059	921	536	217	110	38	17	12	15	3679
2011-15	54	874	1062	769	394	155	64	27	8	5	15	3427
2006-10	31	1126	1179	756	342	121	45	21	9	3	8	3641
2001-05	16	570	436	226	71	22	11	4	0	2	2	1360
1996-00	5	151	96	30	13	2	1	0	0	0	0	298
1991-95	1	32	11	5	3	0	0	0	0	0	0	52
1986-90	0	18	13	3	0	0	0	1	0	0	0	35
1981-85	0	4	3	1	1	0	0	0	0	0	0	9
1976-80	0	1	0	0	0	0	0	0	0	0	0	1
1971-75	0	0	1	0	0	0	0	0	0	0	0	1
Total	137	3500	3860	2711	1360	517	231	91	34	22	40	12503

The above the table (3) displaying the authorship pattern. In the table total publication as bifurcate into Unknown authors (Anonymous), Single authors to ten & >10 authors. In the 12503 total publication 137 are unknown authors and 12366 are author publication. In that double author are highest numbers i.e., 3860 than followed by single authors and three authors are stands in second and third position with 3500 and 2711 publication respectively. It clearly shows that single authors to four authors (more than 90%) are predominant over other authorship.

Collaborative Index

Collaborative Index is used to measure the level of collaborative practices by the authors in their research productive. Collaborative Index is measured by

$$CI = \frac{\sum_{j=1}^A j^{f_j}}{N} = \frac{[(f_1)1+(f_2)2+(f_3)3+(f_4)4+(f_5)5\dots(f_k)k]}{N}$$

Table-4 Collaborative Index

Block Year	Anonymous	Single	Multi	Total	CI
1971-75	0	0	1	1	2.00
1976-80	0	1	0	1	1.00
1981-85	0	4	5	9	3.40
1986-90	0	18	17	35	3.53
1991-95	1	32	19	52	4.26
1996-00	5	151	142	298	3.53
2001-05	16	570	774	1360	3.42
2006-10	31	1126	2484	3641	3.35
2011-15	54	874	2499	3427	3.40
2016-20	30	724	2925	3679	3.47
Total	137	3500	8866	12503	3.41

Table 4 depicts the mean number of authors known as Collaborative Index (CI). Collaborative Index in the block period 1991-95 was highest viz. 4.26, followed by 1986-90 and 1996-2000 as 3.53. Least collaborative Index was 1 recorded in the block period 1976-80. Therefore, overall average collaborative index (CI) was 3.41.

Degree of Collaboration

The degree of collaboration is demarcated as the ratio of the number of collaborative research publications to the total number of research publications in the discipline during a certain period, so it is conveying the collaborative research pattern.

$$\text{Degree of Collaboration (DC)} = \frac{N_m}{N_m + N_s}$$

N_m = No. of Multi author Publication

N_s = No. of Single Author

Table-5 Degree of Collaborative

Block Year	Anonymous	Single	Multi	Total	DC
1971-75	0	0	1	1	1.00
1976-80	0	1	0	1	0.00
1981-85	0	4	5	9	0.56
1986-90	0	18	17	35	0.49
1991-95	1	32	19	52	0.37
1996-00	5	151	142	298	0.48
2001-05	16	570	774	1360	0.58
2006-10	31	1126	2484	3641	0.69
2011-15	54	874	2499	3427	0.74
2016-20	30	724	2925	3679	0.80
Total	137	3500	8866	12503	0.72

Table 5 shows Highest Degree of collaboration (DC) was 0.80 in the block period 2016-20 and followed by 0.74 recorded in the block period 2011-15. Least degree of collaboration (0) is found in block period 1976-80. Average Degree of collaboration (DC) was 0.72.

Collaborative Co-Efficient

Collaborative coefficient (CC) is a measure of relationship in research, that reflects mutual the mean authors number per paper in addition to the proportion of multi-authored papers.

$$\text{Collaborative Coefficient (CC)} = \frac{1 - \left(\frac{f_1}{1} + \frac{f_2}{2} + \frac{f_3}{3} + \frac{f_4}{4} + \frac{f_5}{5} + \dots + \frac{f_k}{k} \right)}{N}$$

$$1 - \left(\frac{f_1}{1} + \frac{f_2}{2} + \frac{f_3}{3} + \frac{f_4}{4} + \frac{f_5}{5} + \dots + \frac{f_k}{k} \right) \geq f_5$$

No. of total publication

f1= single author,

f2= Two Author,

f3= Three Author,

f4= Four Author,

≥f5= Five and more than five Author

Table-6 Collaborative Co-efficient

Block Year	Anonymous	Single	Multi	Total	CC
1971-75	0	0	1	1	0.50
1976-80	0	1	0	1	0.00
1981-85	0	4	5	9	0.32
1986-90	0	18	17	35	0.27
1991-95	1	32	19	52	0.22
1996-00	5	151	142	298	0.27
2001-05	16	570	774	1360	0.34
2006-10	31	1126	2484	3641	0.42
2011-15	54	874	2499	3427	0.46
2016-20	30	724	2925	3679	0.52
Total	137	3500	8866	12503	0.45

Above the data shows the author collaborative coefficient which measure both CI and DC in one pattern. Highest author collaborative coefficient is 0.52 in the block Period 2016-20 and followed by 0.50 CC recorded in the block period 1971-75. The least (0) Collaborative Coefficient found in the period of 1976-80. The average collaborative coefficient on knowledge organization and management is 0.45.

Most productive Authors

The most productive authors evaluated by the research work published on knowledge organization and Management. Table 7 shows that most productive authors with their research prolifically.

Table 7 Top 20 prolific authors

S. N	Author Name	Publi- cation	Cita- tion	H Index	Affiliation Institute	Country
1.	Petter Gottschalk	39	8894	46	BI Norwegian Business School	Norway
2.	Richard P Smiraglia	39	2774	27	Uni. of Wisconsin-Milwaukee	USA
3.	Nick Bontis	27	38084	74	McMaster University	Canada
4.	Peyman Akhavan	27	4017	35	Malek Ashtar Uni. of Tech.	Iran
5.	John S. Edwards	26	5514	36	Aston University	UK
6.	Birger Hjørland	25	14069	50	University of Copenhagen	Denmark
7.	Murray Jennex	23	5426	40	San Diego State University	USA
8.	Ettore Bolisani	19	2123	21	University of Padua	Italy
9.	Dana Indra Sensus	19	400	9	Universitas Indonesia	Indonesia
10.	Clyde W Holsapple	18	18771	68	University of Illinois	USA
11.	Meliha Handzic	17	2077	22	International Burch University	Bosnia and Herzegovina
12.	Jennifer Rowley	17	640	14	University of Sydney	Australia
13.	J. A.C Guimarães	16	2963	27	São Paulo State University	Brazil
14.	Miltiadis D. Lytras	16	7980	47	American College of Greece	Greece
15.	Alexander Serenko	16	9570	46	Uni. of Ontario Institute of Tech	Canada
16.	Douglas Tudhope	16	1469	--	University of South Wales	UK
17.	C.N. Wickramasinghe	16	58	04	University of Kelaniya	Sri Lanka
18.	Jay Liebowitz	15	16737	49	Harrisburg University	USA
19.	Martínez-Ávila, D.	15	556	12	Complutense Uni. of Madrid	Spain
20.	Sang Chul Chong	14	2576	18	Yonsei University	S. Korea

In the above table indicates the prolific author based on research work. In the top productivity authors Petter Gottschalk of BI Norwegian Business School (Norway) stands first with 39 publications (8894 total citation). followed by Richard P Smiraglia of University of Wisconsin-Milwaukee (USA) with 39 publications (2774 total citation) stands second rank. In the third position secured by Nick Bontis of McMaster University (Canada) with 27 publication (38084 total citations) and Peyman Akhavan of Malek Ashtar University of Technology (Iran) with 27 research articles having 10,698 total citations stands forth rank. The Indian authors are poor in research publication on knowledge organization and Management.

Finding and Suggestion

We found this study Research growth rate of publications on knowledge Organization and Management is Polynomial trend, whereas R² value is 0.868. the relative Growth Rate in the 1981-85 block period has gone highest RGR i.e., 1.70 and 2.46 doubling time (Dt). Mean value of Relative Growth Rate and doubling time is 1.05 and 0.46 respectively

In the Authorship pattern the Collaborative Index in the block year 1991-95 was highest viz. 3.31. It means on an average 3.41. collaboratively worked for an article. Degree of collaboration (DC) was Highest (0.80) in the period 2016-20 and followed by 0.74 recorded in the 2011-15. Average Degree of collaboration (DC) was 0.72. Highest author collaborative coefficient (0.52) is recorded in the year 2016-20 and followed by 0.50 CC recorded in the 1971-75. The mean collaborative coefficient is 0.45.

Also, this reveals the Highest proliferated productivity by the Norway author Petter Gottschalk (BI Norwegian Business School). followed by Richard P Smiraglia (University of Wisconsin-Milwaukee, USA) with 39 publications and Nick Bontis (McMaster University, Canada) with 27 publication stands second and third position.

Conclusion

The outcome of the study may help the library authority or personals to dealing with the collections of knowledge organization and management in general as well as particular. Knowledge on organization and management of library support to frame the library policy and chalk out the system as well as allocate the library budget. The good collection of knowledge organization and management has helped to very systemize the library for modern requirements. It examine likewise valuable to the approach creators like bookkeepers, educators, and scientists to choose the need regions in specific areas. The analysis is extremely valuable in understanding the correspondence design in the scholarly communication which has a few ramifications for libraries and data focuses, particularly in the innovative work organizations.

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