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Authorship Pattern and Collaboration Coefficient of Library Professional's Competency on Research Publications During 1999-2018: A Scientometric Analysis

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Abstract **- The present study aims to analysis authorship pattern and collaboration coefficient of library professional's competency publications research from 1999-2018. The data has been downloaded by Scopus database. A total number of published articles during the period of study was 433 in the particular database on the topic of 'professional's competency'. The study examine various scientometric parameter such as authorship pattern, year wise distribution of publication, determine the annual growth rate and compound annual growth rate of publication, relative growth rate and doubling time of publication and so many. After the analysis, it is found that the highest 11.78% of an article published in the year 2015. The highest growth rate in 2000 and the lowest in 1999. The United States published highest 174 article and secured first place in top five countries wish distribution of the publication. Majority of the article is published by single authors is 171 articles during the period of study.**
Keywords: **Scientometric, Professional's Competency, Compound Annual Growth Rate, Collaboration Coefficient, Modified Collaboration Coefficient, Collaboration Index**

I. INTRODUCTION

The term "Research" is commonly used for searching new knowledge or systematic investigation or search for information on a specific topic. So following this statement the study highlight the global growth rate of publication on library professional's competency. In this paper, we are able to find out the research trends in this particular area are called as professional's competency.

The term competency used as synonyms for skills and ability of a person. L.Ron Hubbord defines competency in the following manner. Being competent means the ability to control and operate the thing in the environment and the environment itself. Random House Dictionary of English Language (1969) a competent person is defined as one who is properly qualified, having adequate knowledge, skill or experience for some purpose. It has been defined as the "quantitative study of science, communication in science and science policy". (Hess, 1997). The use of the mathematical and statistical method to study identify the patterns that used in the literature especially in authorship pattern, subject area, document type, language and many others.

II. LITERATURE REVIEW

Literature review suggests the new approach to the solution of a chosen problem. It is an Evaluation Summary of the article related to your selected topic. The following literature has been reviewed to accumulate an idea to the present study.

Gaud, N., Shukla, R. and Verma, M. K. (2018) conducted a study on research output of faculty member of the library and information science, BBAU, Lucknow from the marked period 1991-2017. A total 426 publication was published by the faculty members of the department during the period of study. After the analysis it has been found that the 133 (30.75%) journal article, 131 (30.75%) conference proceeding and 117 (27.46%) books/edited book chapter were published. The highest AGR was 325 recorded in the year 2007. 92 article is published single-authored and 332 by multiple authored publication. Shukla, R., Yadav, S.K. & Verma, M. K. (2018) conducted a bibliometric study on IJIDI journal from 2011- 2017 in which a total 333 research article was published during the given period. The study examines the different bibliometric patterns like authorship pattern, prolific author's pattern, geographical distributions, the degree of collaboration etc. In this study it is found that the two authors contribution are maximum with 142 article and single author contribute highest 116 article in which Ashok Kumar Contribute Highest no. of publication with 29 article. At Findings of the study, it is mentioned that India is the leading country of the international journal of Information Dissemination and Technology with 96.48% of a research article. Shukla, R. and Verma, M.K. (2018) present a paper on the bibliometric analysis of the journal of library herald for the period of 10 years (2008-2017). Total 222 article taken in this study and found that 97 i.e. 43.68% articles are written by single authorship pattern. In which Dr K.P. Singh was a most productive author by his 11 contributed articles. India being the host country to the published article is 80.85%.

Chakravarty and Sharma (2017) investigated a bibliometric study on Library and Information Science Research Output of Panjab University, Chandigarh during the period of (1991-2014). The study found that total, 152 articles were published by Punjab University in the field of Library and

Information Science. The analysis was based on biodata of faculty members of DLIS and references information of their articles was recorded. The present study analysed various bibliometric patterns such as relative growth rate of publications, doubling time for publications, annual growth rate and compound annual growth rate and found that the RGR of Punjab University publications in DLIS decreases is maximum (0.442) in the year 1996 and lowest (0.036) in the year 2003. The maximum numbers of (59%) publications contributed by two authors, (2%) contribution are three authors, remaining contributions published by single authors. There are (61%) of the whole contributions with collaborations.

III. OBJECTIVES OF THE STUDY

The main objectives of the study are

1. To Analysis the year wise distribution of publications.
2. To determine the Annual Growth Rate (AGR) and Compound Annual Growth Rate (CAGR) of publications.
3. To find out the Relative Growth Rate and Doubling Time of Publications.
4. To analysis the most Productive Authors Name.
5. To identify the Document Wise Publication Distribution.
6. To find out year wise authorship pattern.
7. To examine the Collaboration Coefficient, Modified Collaboration Coefficient and Collaboration Index.

IV. METHODOLOGY AND SEARCH STRATEGY

Scopus is abstract and citation database developed by Elsevier. It is a commercially available database which covers the largest abstract and citation database nearly 36,377 titles from approximately 11,678 publishers, in which 34,346 are peer-reviewed journals in their subjects like Science, technology, medicine, social science and arts and humanities. It is delivering a comprehensive overview of the world's research output of the following fields. The following search strategy has been used while searching data on the Scopus database. The Database was searched on 26th November 2018. (TITLE-ABS-KEY (library professional's competency) AND (LIMIT-TO (PUBYEAR, 1999 to 2018))). A total of 433 records have been found and the same has been exported in the excel format for further analysis.

V. DATA ANALYSIS

The year- wise distribution of publication on library professional's competency research output during the period 1999- 2018 (20 years) was analysed. The highest number of publication 51 i.e. (11.78%) published in 2015. The lowest number of publications were 5 i.e. (1.15 %) in the year 1999 and 2001 both. The study reveals that the majority of articles were published in 2015.

TABLE I YEAR-WISE DISTRIBUTION OF PUBLICATIONS

Year	Total Papers	Cumulative Sum	Percentage
1999	5	5	1.15
2000	9	14	2.08
2001	5	19	1.15
2002	12	31	2.77
2003	10	41	2.31
2004	14	55	3.23
2005	13	68	3.00
2006	18	86	4.16
2007	17	103	3.93
2008	24	127	5.54
2009	13	140	3.00
2010	21	161	4.85
2011	21	182	4.85
2012	24	206	5.54
2013	32	238	7.39
2014	37	275	8.55
2015	51	326	11.78
2016	33	359	7.62
2017	42	401	9.70
2018	32	433	7.39
Total	433		100

TABLE II ANNUAL GROWTH RATE AND COMPOUND ANNUAL GROWTH RATE OF PUBLICATION

Year	Total Papers	Cumulative Sum	AGR	CAGR (%)
1999	5	5	0	0
2000	9	14	80.00	34.16
2001	5	19	-44.44	-17.79
2002	12	31	140.00	24.47
2003	10	41	-16.67	-3.58
2004	14	55	40.00	5.77
2005	13	68	-7.14	-1.05
2006	18	86	38.46	4.15
2007	17	103	-5.56	-0.63
2008	24	127	41.18	3.51
2009	13	140	-45.83	-5.42
2010	21	161	61.54	4.08
2011	21	182	0.00	0
2012	24	206	14.29	0.96
2013	32	238	33.33	1.94
2014	37	275	15.63	0.91
2015	51	326	37.84	1.91
2016	33	359	-35.29	-2.39
2017	42	401	27.27	1.28
2018	32	433	-23.81	-1.35

Table II shows that the Annual Growth Rate (AGR) and Compound Annual Growth Rate (CAGR) of Publication during 1999-2018. The Highest growth rate was 140 in 2002 and the lowest growth rate is 0.00 in 2011. Similarly, the highest CAGR was 34.16 in 2000 and the lowest is 0 in 2011.

The annual growth rate (AGR) are calculated on the formula given by Kumar and Kaliyaperumal, 2015 and mention below:

$$AGR = \frac{EndValue - FirstValue}{FirstValue} \times 100$$

The compound annual growth rate was calculated by the following formula available on https://www.investopedia.com/terms/c/cagr.asp)

$$\text{CAGR} = [(\text{EndingValue} / \text{BeginningValue})^{1/n} - 1$$

TABLE III RELATIVE GROWTH RATE AND DOUBLING TIME OF PUBLICATIONS

Year	Total Papers	Cumulative Sum	W1	W2	RGR	Dt
1999	5	5	0	1.61	0	0
2000	9	14	1.61	2.64	1.03	0.67
2001	5	19	2.64	2.94	0.31	2.27
2002	12	31	2.94	3.43	0.49	1.42
2003	10	41	3.43	3.71	0.28	2.48
2004	14	55	3.71	4.01	0.29	2.36
2005	13	68	4.01	4.22	0.21	3.27
2006	18	86	4.22	4.45	0.23	2.95
2007	17	103	4.45	4.63	0.18	3.84
2008	24	127	4.63	4.84	0.21	3.31
2009	13	140	4.84	4.94	0.10	7.11
2010	21	161	4.94	5.08	0.14	4.96
2011	21	182	5.08	5.20	0.12	5.65
2012	24	206	5.20	5.33	0.12	5.59
2013	32	238	5.33	5.47	0.14	4.80
2014	37	275	5.47	5.62	0.14	4.80
2015	51	326	5.62	5.79	0.17	4.07
2016	33	359	5.79	5.88	0.10	7.19
2017	42	401	5.88	5.99	0.11	6.26
2018	32	433	5.99	6.07	0.08	9.03

The growth of literature has resulted during 1999- 2018. Relative Growth Rate (RGR) and Doubling Time (DT) found to be significant. The Highest growth rate was 1.03 in 2000, 0.49 in 2002, 0.31 in 2001 and the lowest 0 in 1999. 9.03 Doubling Time is highest recorded data in the chosen time period and 0 is lowest during 1999.

The mathematical representation of the mean relative growth rate of articles over a specific period is derived from the following formula:

$$RGR = \frac{W2 - W1}{T2 - T1}$$

Where,
RGR = Growth Rate over the specific period of the interval,
W1 = Log_e (natural log of the initial number of contributions)
W2 = Log_e (natural log of the final number of contributions)
T1 = the unit of initial time
T2 = the unit of final time

A. Doubling Time

From the calculation, it is identifying that there is a direct equivalence existing between the RGR and Dt. If the number of contributions of a subject double during a given period, then the difference between the logarithm of the numbers at the beginning and at the end of the period must be the logarithms of the number 2. If one uses a natural logarithm, this difference has a value of 0.693 (Beaie and Acol, 2009). The formula of corresponding Dt for contributions and pages measurement.

$$DoublingTime(Dt) = \frac{0.693}{R}$$

TABLE IV TOP 5 COUNTRY WISE DISTRIBUTIONS OF PUBLICATIONS

Country Name	Total No. of Publications
United States	174
United Kingdom	40
Australia	26
India	26
Canada	16

Top 5 countries are listed in table IV and the highest number of publication is made by the United States with 174 articles and Canada is last with 16 publication only. Other than this UK have 40, Australia and India have 26 Article in their account.

TABLE V DOCUMENTS TYPE DISTRIBUTION OF PUBLICATIONS

Document Type	No. of Publications	Percentage
Article	292	67.44
Review	66	15.24
Conference Paper	43	9.93
Book Chapter	12	2.77
Article in Press	6	1.39
Note	5	1.15
Book	4	0.92
Conference Review	3	0.69
Editorial	1	0.23
Short Survey	1	0.23
Total	433	100

The table V shows that the document type distribution of the publication. In this category article is most prefered document i.e. 292 (67.44%), 15.24 % review, 9.93% conference papers, 2.77% Book chapters and so on. In this category short survey was used only 0.23% it the least amount used in this category.

TABLE VI YEAR-WISE AUTHORSHIP DISTRIBUTION PATTERN

Year	Single Author	Two Authors	Three Authors	Four Authors	More than Four Author	Total
999	2	1	1	0	1	5
2000	6	3	0	0	0	9
2001	1	3	1	0	0	5
2002	5	5	1	0	1	12
2003	3	2	2	0	3	10
2004	6	5	2	0	1	14
2005	7	2	1	2	1	13
2006	10	3	1	0	4	18
2007	5	7	3	1	1	17
2008	13	5	1	2	3	24
2009	5	4	3	1	0	13
2010	8	7	2	1	3	21
2011	7	13	1	0	0	21
2012	6	10	3	0	5	24
2013	10	10	3	2	6	32
2014	20	5	6	4	2	37
2015	17	12	7	7	7	51
2016	15	8	2	4	4	33
2017	14	12	6	4	6	42
2018	11	6	8	3	3	32
Total	171	123	54	31	51	433

TABLE VII COLLABORATION COEFFICIENT, MODIFIED COLLABORATION COEFFICIENT AND COLLABORATION INDEX

Year	Single Author	Two Authors	Three Authors	Four Authors	More than Four Author	Total No. of Publications	CC	MCC	CI
1999	2	1	1	0	1	5	0.39	0.49	2.40
2000	6	3	0	0	0	9	0.17	0.19	1.33
2001	1	3	1	0	0	5	0.43	0.54	2.00
2002	5	5	1	0	1	12	0.33	0.36	1.92
2003	3	2	2	0	3	10	0.47	0.53	2.80
2004	6	5	2	0	1	14	0.33	0.36	1.93
2005	7	2	1	2	1	13	0.31	0.33	2.08
2006	10	3	1	0	4	18	0.30	0.32	2.17
2007	5	7	3	1	1	17	0.41	0.44	2.18
2008	13	5	1	2	3	24	0.29	0.31	2.04
2009	5	4	3	1	0	13	0.37	0.40	2.00
2010	8	7	2	1	3	21	0.38	0.40	2.24
2011	7	13	1	0	0	21	0.34	0.36	1.71
2012	6	10	3	0	5	24	0.46	0.48	2.50
2013	10	10	3	2	6	32	0.45	0.46	2.41
2014	20	5	6	4	2	37	0.30	0.31	2.00
2015	17	12	7	7	7	51	0.44	0.45	2.45
2016	15	8	2	4	4	33	0.35	0.36	2.21
2017	14	12	6	4	6	42	0.42	0.43	2.43
2018	11	6	8	3	3	32	0.44	0.45	2.31
Total	171	123	54	31	51	433	0.38	0.38	2.21

The table VI shows that the majority of an author like single authorship pattern of article writing. Out of Total 433 article 171 article was written by the single author, 123 article by two authors, 54 by three, 31 by four and 51 article written by more than four authors. Highest 51 article published in the year 2015.

Table VII depicts the Collaboration Coefficient, Modified Collaboration Coefficient and Collaboration Index. On the observation of the table 7, it has been found that the maximum 0.47 CC was recorded in the year 2003, followed by 0.46 in 2012 while the highest modified collaboration coefficient was 0.54 recorded in the year 2001, followed by 0.53 in the year 2003. The highest collaborative index 2.80 was recorded in the year 2003, followed by 2.50 in 2012.

VII. CONCLUSION

The present study base on Scientometric tools to the literature of professional's competency covering the 433 publications during 1999-2018. The highest number of publication was found in 2015 with 51 publications. Different statistical methods are also applied to measure the year's wise distribution of articles, authorship pattern, the degree of collaboration and many more. This study will bring out the notable productivity on a professional's competency during the chosen period for the study (1999-2018). A very large number of research papers are contributed in chosen topic across the world.

REFERENCES

[1] Ajiferuke, I., Burell, Q., & Tague, J. (1988). Collaborative coefficient: A single measure of the degree of collaboration in research. *Scientometrics*, *14*(5–6), 421–433.https://doi. org/10.1007 /BF02017 100

[2] Beaie, S. T., & Acol, P. (2009). Population and Demographic Measures: Concepts and Definitions for Basic MDG Indicators. Kingston Georgetown, Guyana: Bureau of Statistics. 2009. Retrieved from file:///C:/Users/welcome/Desktop/Concepts_and_ Definitions. pdf

[3] Chakravarty, R., & Sharma, J. (2017). Mapping Library and Information Science Research Output: A Bibliometric Study of Panjab University, Chandigarh. *PEARL - A Journal of Library and Information Science, 11*(2), 110-115.

[4] Gaud, N., Shukla, R., & Verma, M. K. (2018). Mapping of Library and Information Science output: A bibliometric study of Babasaheb Bhimrao Ambedkar University, Lucknow during the period of 1991-2017. *Indian Journal of Information Library and Society, 31*(3-4)**,** 218-231.

[5] Kumar, R. S., & Kaliyaperumal, K. (2015). A scientometric analysis of mobile technology publications. (2015). *Scientometrics An International Journal for all Quantitative Aspects of the Science of Science, Communication in Science and Science Policy, 105*(2), 921-939.

[6] Mahapatra, M. (1985). On the validity of the theory of exponential growth of scientific literature in *Proceedings of the 15th IASLIC Conference*, Bangalore, 61-70.

[7] Shukla, R., & Verma, M. K. (2018). Journal of library progress (2010-2017): A bibliometric study. *Librarian, 25*(1), 37-46.

[8] Shukla, R., & Verma, M. K. (2018). Library Herald 2008-2017: A bibliometric study. *Library Philosophy and Practice (e-journal).* Available at https://digitalcommons.unl.edu /libphilprac/1762/1-11

[9] Shukla, R., & Verma, M. K. (2019). Research productivity of the journal of knowledge & communication management (JKCM) from 2011-2017: A bibliometric analysis. *International journal of information, library & society, 8*(1), 54-63

[10] Shukla, R., Yadav, S. K., & Verma, M. K. (2018). International Journal of Information Dissemination and Technology (IJIDT) from 2011-2017: A bibliometric analysis. *Gyankosh-Journal of Library and Information Management, 9*(1), 42-57.

[11] Shukla, R., Yadav, S. K., & Verma, M. K. (2018). Journal of agricultural extension (2008-2017): A bibliometric study. *Indian Journal of Information Library and Society, 31*(3-4), 261-275.

[12] Singh, M. K. (2017). Authorship pattern and collaboration coefficient of India in biotechnology research during 2001-2016: Based on Scopus database. *Library Philosophy and Practice (e-journal)*. 1549. http://digitalcommons.unl.edu/libphilprac/1549

[13] Subramaniam K. (1983). Bibliometrics Studies of Research Collaboration: A Review. *Journal of Information Science.* 6,33-38.

[14] Verma, M. K., & Shukla, R. (2018). Mapping the research publications trends in Journal of Advances in Library and Information Science (JALIS) during 2012-2016: Bibliometric analysis. *International Journal of Library Information Network and Knowledge, 3*(2), 94-106.

[15] Verma, M. K., & Shukla, R. (2018). Researchers World: Journal of Arts, Science and Commerce (RW-JASC) from (2010-2017): A bibliometric analysis. *Journal of Library and Information Communication Technology, 7*(1), 1-12.