RESEARCH GROWTH TREND AND AUTHOR COLLABORATION OF ALAGAPPA UNIVERSITY IN INDIA DURING 1999-2011

Baskaran C.

Deputy Librarian, University Central Library,
Alagappa University, Karaikudi-630 003,TN.

ABSTRACT

The study analyzed the author productivity, discipline-wise and institution-wise collaboration and ranking of authors in research contribution of Alagappa University during 1999-2011. Relative Growth Rate (RGR) was found to be fluctuating trend during the study period. The Doubling time (Dt) was found to be increased and decreased trend in this study. Degree of collaboration and its means value is found to be 0.963. The top three institutions with Alagappa University are Central Electro Chemical Research Institute, National Cheng King University and Anna University.

Keywords: Relative Growth rate, Doubling time, Degree of collaboration, Alagappa University, Scientometrics

INTRODUCTION:

The terms bibliometrics and scientometrics have been introduced simultaneously by Pritchard, Nalimov and Mulchenko in (1969). Pritchard defined the term 'Bibliometrics' as 'the application of mathematical and statistical methods to books and other communication medium. Nalimov and Mulchenko (1969) defined 'Scientometrics' as 'the application of those quantitative methods which are dealing with the analysis of science viewed as an information process'. So, scientometrics is the measurement of science communication, and bibliometrics deals with more general information processes. Bandyopadhyay (2001) has studied the authorship collaboration in physics, philosophy and political science. The author also analyzed the authorship pattern of different disciplines such as mathematics, physics, mechanical engineering, philosophy and political science. Price (1963) on the basis of survey of Chemical Abstracts, observed a steady trend towards multiple authorship and thereby holding that if it continues at the present rate, by 1980 the single author papers will be extinct. Though the above postulation may not hold true, a decline in the number of scientific papers published by single authors is evident. Fox and Fever (1984) are of the view that the increase in the number of multi authored papers may be due to the collaboration of specialists leading to enhanced quality of research. The reasons for collaborative can be attributed to the interdisciplinary nature of investigations, escalating cost of instrumentation and laboratory facilities and interest of scientists in the same subjects fields. Degree of collaboration in respects of a discipline in an organization is the ratio of multi-authored papers published during a year and total number of papers published during the year. Science is an inherently collaborative enterprise. Collaboration being a significant indicator of the nature of scientific activity is geographically dispersed organization that brings together scientists, instrumentation and data to facilitate scientific research. It supports rich and recurring

human interaction oriented to a common research area and provides access to the data sources artifacts and tools required to accomplish research (Olson Gray and Luo among 2000) .Collaborators have been made possible by new communication and computational tools that enable more flexible and ambitious collaborations. Such collaborations are increasingly necessary. As science progresses, the unsolved problems become more complex, the need for expensive instrumentation increases larger data sets are required and a wider range of expertise is needed.

In scientific collaborations, researchers work together on a specific research project with a common goal. It can take many forms depending on the willingness of practitioners to collaborate which is influenced by the goals of those providing the funding (e.g. Government agency or philanthropic foundation) the needs of researchers for access to knowledge and research tools the availability of these researchers for access to knowledge and research tools, the availability of these resources and the opportunities of practitioners to link together (E.g. conferences, Internet connection) (Wagner carolin 2005) . Within a sub-filed of science, practitioners interact or co-operate with other scientists in a variety of ways including face to face meetings sharing papers and data attending seminars and workshops sharing equipment the most intense being collaboration in research experimentation.

International collaboration is an important ingredient of present day scientific research. Such collaboration with fruitful exchange of ideas, research techniques, methods and knowledge can be beneficial to both partners. Collaboration between single researchers can help them to obtain results faster and go ahead of the field in such “Big science" environment. At the same time co-authorship is easily detected in bibliographical databases and widely used as a reliable indicator of collaboration. It is also a method of measuring the integration into international scientific community or mainstream connectivity.

About the University

Alagappa University accredited with 'A' Grade by National Assessment and Accreditation Council (NAAC) is located at Karaikudi in TamilNadu. The 440 acre green and lush campus houses all the academic activities. This University has emerged from the galaxy of institutions initially founded by the great philanthropist and educationist Dr. RM. Alagappa Chettiar. Alagappa University was brought into existence by a Special Act of the Government of TamilNadu in May 1985 with the objective of fostering research, development and dissemination of knowledge in various branches of learning. Alagappa University is recognized by the University Grants Commission (UGC) of India. The University has 18 Departments, 5 Centres and 2 Constituent Colleges on its campus. 28 Affiliated Colleges located in the districts of Sivaganga and Ramanathapuram are part of the University. As a member of the Association of Indian Universities (AIU), as well as the member of the Association of Common Wealth Universities (ACU), it has rewarding relations with other academic institutions, research laboratories and industrial establishments that promise a spectacular feature. The University is having International Collaborations with Universities / Institutions of Higher Learning in countries like China, Malaysia, West Indies, U.S.A. and South Korea. New innovative programmes suitable are designed and offered at the University (for the foreign students). Many exchange programmes attract the attention of the teachers and students from abroad.

OBJECTIVES:

The objectives of the present study to observe the trend of research collaboration among teaching community of Alagappa University, the publications have been brought out from science and its allied area.

1. To examine the year-wise distribution of the publications in Alagappa University.
2. To analyze the Relative Growth Rate (RGR) and Doubling Time (Dt) of the research productivity
3. To find out the single author vs. multi authored papers with degree of collaboration of research productivity.

METHODOLOGY:

The study aims at evaluate the research publication of Alagappa university in the field of Science and Technology. The degrees of collaboration of authors are examined to identify the pattern of research contribution in the field of science. The study is based on the data retrieved from Web of Science (WOS) database, an online database provided by Thompson Scientific Inc, Philadelphia, USA. Alagappa university publications identified on WOS by searching for the string Alagappa University (" Alagappa Univ") in the author affiliation field. Alagappa University publications from 1999-2011 are considered. WOS renders unique affiliation of all the authors; this feature of WOS makes it ideal for collaborative study. The research papers published by the researchers of Alagappa University in the field of Science and Technology covered by the WOS database over 12 years (1999-2011) were taken as the prime source for the present study, as WOS is multidisciplinary and provides affiliations of all the authors of a publication. The publications, which affiliate at least one address from Alagappa University, are taken for the analysis. The total publications produced during the study period accounted for 776. Bib-excel is the main tool used for the analysis of the data set. The idea is to generate data files that can be imported to excel that takes tabbed data records for further analyze.

ANALYSIS:

The analysis includes the year-wise distribution, author-wise collaboration, Institutional collaboration and subject–wise collaboration. The following paragraph details for the analysis of the publication of Alagappa University are given.

Growth of research productivity

The research output of the Alagappa University is given in table 1. From the above table it is observed that there is an increase in the number of publications published in 1999 (3.99%) and in 2011 (12.5%). However in 2004 and 2005 equally contributed (7.47%). It is observed that less than five percent of publications brought from 1999 to 2001, and less than ten percent of publications found from 2002 to 2008. It is also observed ten and above percent of publications found during 2009 to 2011 in the study (fig-1).

Table 1 Growth of research productivity

S.No	Year	No. of output	Percent	Cumulative percent
1	1999	31	3.99	3.99
2	2000	34	4.38	8.37
3	2001	37	4.76	13.14
4	2002	39	5.02	18.17
5	2003	48	6.18	24.35
6	2004	58	7.47	31.83
7	2005	58	7.47	39.30
8	2006	61	7.86	47.16
9	2007	62	7.98	55.15
10	2008	71	9.14	64.30
11	2009	87	11.21	75.51
12	2010	93	11.98	87.5
13	2011	97	12.5	100
	Total	776	100	

Relative Growth rate (RGR) and Doubling Time (DT)

The Relative Growth Rate (RGR) is the increase in number of articles/ pages per unit of time. The mean Relative Growth rate (R) over the specific period of interval can be calculated from the following equation.

Relative Growth rate (RGR) $$R_{1-2} = \frac{Log_e W_2 - \overline{log}_e W_1}{T_2 - T_1}$$

There exists a direct equivalence between the relative growth rate and the doubling time. If the number of articles/ pages of subject double during a given period then the difference the logarithms of numbers at the beginning and end of this period must be logarithms of number 2. If natural logarithm is used this difference has a value of 0.693. Thus the corresponding doubling time for each specific period of interval and for both articles and pages can be calculated by the formula,

Doubling time (Dt) $$= \frac{0.693}{R}$$

It has been observed from table 2 and fig-1 that RGR is down ward and upward trend from 2000 (0.04) to 2011(0.01). The doubling time (Dt) has shown an increasing and suddenly down ward trend from the period of study. The data in table 2 reveals that doubling time has been increased and decreasing trend from 0.010 to 0.533 during 2000 to 2011.

Table 2 Relative Growth rate (RGR) and Doubling Time (DT)

S.No	Year	No. of output	W_1	W_2	RGR	DT
1	1999	31		1.491	0	0
2	2000	34	1.491	1.531	0.04	0.057
3	2001	37	1.531	1.568	0.037	0.533
4	2002	39	1.568	1.591	0.023	0.033
5	2003	48	1.591	1.681	0.09	0.129
6	2004	58	1.681	1.763	0.082	0.118
7	2005	58	1.763	1.763	0	0
8	2006	61	1.763	1.785	0.022	0.031
9	2007	62	1.785	1.792	0.007	0.010
10	2008	71	1.792	1.851	0.059	0.085
11	2009	87	1.851	1.939	0.088	0.126
12	2010	93	1.939	1.968	0.029	0.418
13	2011	97	1.968	1.986	0.018	0.025

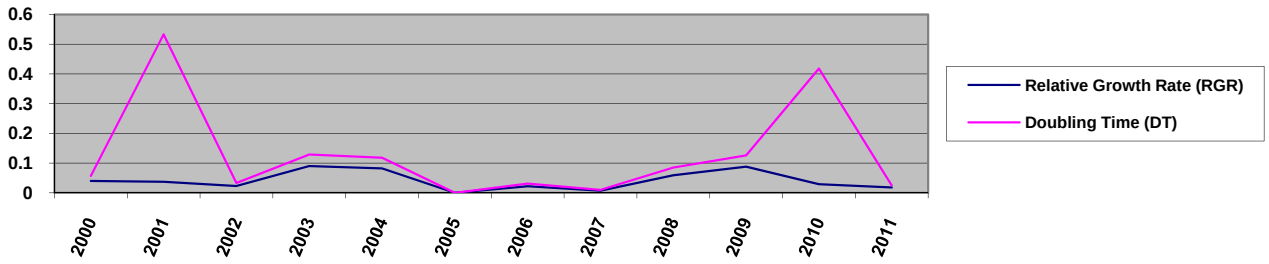

Fig-1 Relative Growth rate (RGR) and Doubling Time (DT)

Degree of author collaboration

Subramanyam (1983) proposed a mathematical formula for calculating author's degree of collaboration in a discipline. The degree of collaboration among authors is the ratio of the number of papers published in a discipline during certain period of time.
The degree of collaboration (collaboration coefficient) among authors is measured mathematically as;

$$C = \frac{Nm}{Nm + Ns}$$

Where, C= degree of collaboration
Nm= number of multi authored papers
Ns= number of single authored papers

The degree of collaboration in different years calculated as per the equation proposed by Subramanyam and is presented in Table 3. The degree of collaboration over the years from 1999-

2011 is calculated and it varies from 0.923 to 0.983. The mean value is found to be 0.963.

Table-3 Degree of collaboration of research productivity

Year	Single authored (NS)	Percent	Multi authored (Mm)	Percent	Total (NS+Nm)	Degree of Collaboration (DC)
1999	1	3.84	30	4.0	31	0.96
2000	1	3.84	33	4.4	34	0.97
2001	1	3.84	36	4.8	37	0.97
2002	3	11.53	36	4.8	39	0.92
2003	2	7.69	46	6.13	48	0.95
2004	2	7.69	56	7.46	58	0.96
2005	3	11.53	55	7.33	58	0.94
2006	1	3.84	60	8	61	0.98
2007	3	11.53	59	7.86	62	0.95
2008	2	7.69	69	9.2	71	0.97
2009	3	11.53	84	11.2	87	0.96
2010	2	7.69	91	12.13	93	0.97
2011	2	7.69	95	12.66	97	0.97
Total	26		750		776	0.96(Mean)

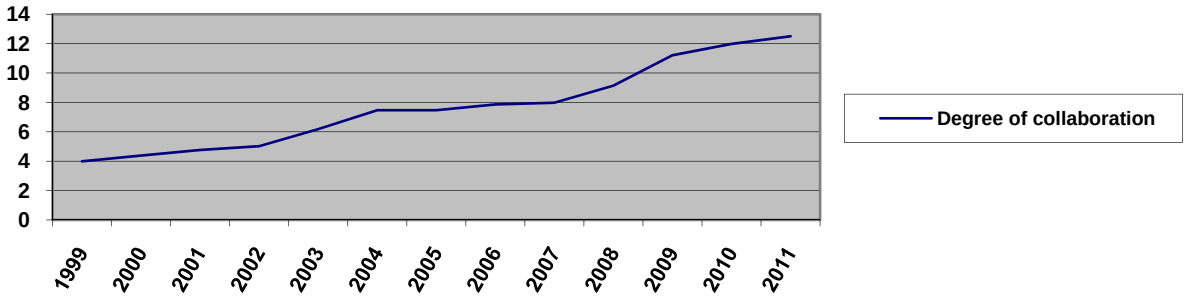

Fig -2 Degree of collaboration

Country-wise publications

Scientific literature being published in almost all countries in the world due to the international quality and realistic of scientific research in terms of new invention and adaptation new technology in research. In this context all peer-reviewed journals are categorized according to their country of origin to find out the most productive publications in India on par with developed countries. Table 5 presents the country-wise distribution of cited in web of Science. As revealed an Indian productivity is predominantly shown at 73.69 %. The collaboration rate of South Korea (8.83%) is next to India but it is hold less than 10 percent. The remaining 17% of publications are form 18 countries shows Fig-2.

Table-5 Countries-wise publications

S.No	Country	No. of papers	Percent
1	India	776	73.69
2	South Korea	97	8.83
3	Taiwan	84	7.99
4	Mexico	24	2.27
5	Japan	15	1.42
6	USA	13	1.23
	Other countries	44	41.78
	Total	1053	

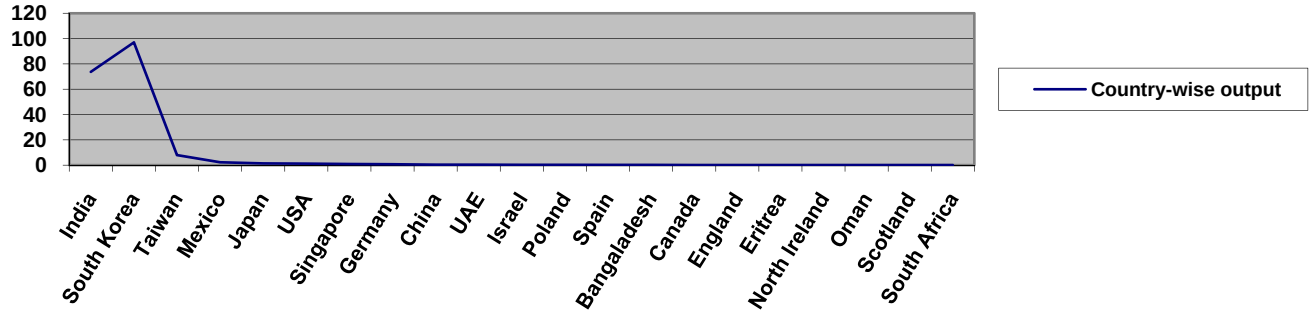

Fig-2 Country-wise distribution of publications

DISCUSSION:

The Data suggest that there was significant research productivity among the researcher in Alagappa University during the period. The contributors of publications and collaboration of research has healthy pattern of progress during the study. The year-wise research output of Alagappa University found to be publications growth gradually increased and sudden change is observed in growth rate shows higher after 2002.Relative Growth Rate (RGR) was found to be fluctuating during the period. The Doubling time (Dt) was found to be increased and decreasing trend during the period.

The Multi authored papers are more in number 750 (96.64%) and single authored papers 26 9 (3.35%) of the research publications of Alagappa University. The Degree of collaboration is fluctuating from 0.92 to 0.98 during the period also DC means observed as a whole 0.96 from 1999-2011.South Korea rank first by producing 7.61% of collaborative papers out of total research output. The Institutions–wise contribution of research output by Central Electro Chemical Research Institute publications reveal first rank with 129 (16.62%) of papers.

CONCLUSION:

This study analyzed the scientific collaboration is being most frequently among the academic community and professionals members. In this case of this study to examine trend and pattern of collaborations in Alagappa University an indexed in Web Of Science (WOS) from 1999-2011.

Among the Institutions, which are collaborating with Alagappa University, it has been observed that South Korea is high collaborative link with Alagappa University. The degree of collaboration of Alagappa University and degree of collaboration is found to be 0.963. The single author contributions of publications are 3.35 percent, while multi-authored papers contribute 96.64 percent of the total productivity. It could be observed that the number of collaborative nature of research is upward also the result of this type of study would be appeared to be great ambience in pursuing the research in the field of Science. The result of collaborative research can be emerged to the interdisciplinary nature of investigations, need of increasing cost and laboratory facilities and keen for carry out their research in the field of Science.

REFERENCES:

1. Bandyopadhyay. A.K. “Authorship pattern in different disciplines”. Annals of Library and Information Studies, Vol. 48 No.4 (2001) 139-147.

2. Fox., M.F and Faver., C.A. 1984. Independence and Co-operation in research. Journal of Higher Education, Vol. 55 (1984) 347-359.

3. Olson Gray., M and Luo Airong. Intra and Inter cultural Collaboration in Science and Engineering. Lecture Notes in Computer Science. Heidelberg: Springer, (2000) 249-259.

4. Nalimov., V.V and Mulchenko., B.M. Scientometrics, Nauka, Moscow (in Russian), 1969.

5. Pritchard., A. “Statistical bibliography or bibliometrics?”. Journal of Documentation, Vol. 24 (1969) 348-49.

6. Price., D.S. 1963. “Little Science: big Science. Columbia Press”, New York, (1963), p.78.

7. Subramanian., K. Bibliometric studies of research in collaboration: A review. Journal of Information Science, Vol. 6 (1983) 37.

8. Wagner Caroline., S. Six case studies of international collaboration in Science, Scientometrics, Vol. 62 No.1 (2005) 3-26.

---@@@----