

Collaboration in Social Science Research in India

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Abstract

Presents the authorship pattern and collaborative research in six social science subjects viz. Anthropology, Economics, History, Political Science, Psychology and Sociology in India based on the data collected from CD-ROM version of the Wilson Social Sciences Abstracts of H.W. Wilson Co., US for the year 1989-1991 and 1997-1999. The proportion of collaborative publication has shown a consistent growth with time in all the four subjects except Political Science and Sociology. The trend in the computed values of Collaboration Index (CI) and Degree of Collaboration (DC) of different period blocks is almost consistent, reflecting growing collaboration and pointing towards increasing professionalisation in social sciences in India with time.

Introduction

Organization of science has changed dramatically during the present century. Due to interdisciplinary growth of subject, the universe of knowledge is very dynamic and is ever-growing. Scientists in any field are no longer able to carry out their work in isolation. Modern science and social science are also becoming increasingly interdisciplinary and problem oriented, often requiring the coming together of a group of people who complement each other in terms of function and expertise. The scientists achieve more and more specialization in the subject, which is in fact, the result of increased participation of group of researchers of different expertise. Collaborative research is the effort of intellectual sharing of two or more persons. The practice of collaboration is spreading very fast due to the globalization of information. The days of individual research are gone. It will no longer be possible for the scientists to refrain themselves from collaborating with others. Earlier studies reveal that collaboration in research varies from discipline to discipline, and in the same discipline it varies from time to time and from one country to another. This need for the study of authorship pattern and also for the change from 'little science' to 'big science' has resulted in the shift from solo research to team research as reflected in single and multiple authorship papers. Some of the notable studies were by Glanzel(2002), Kretschmer(1999), Egghe and Rousseau(1996), Sangam (2000) etc.

Method and Data

The authorship data was collected on six subjects viz. Anthropology; Economics; History; Political Science; Psychology and Sociology, from the CD-ROM version of the Wilson Social Sciences Abstracts of H.W. Wilson Co., US for the year 1989-1991 and 1997-1999. The data was tabulated and analysed for the purpose of interpretation and discussion.

Results and Discussion

Single vs. Collaborative Publications

The total number of publications and collaborative publications considered in 2 block periods (consisting of 3 years) is presented in table-1. With regard to single authorship, there is a consistent decreasing trend during 1989-1991 and 1997-1999 in the fields of Economics, History, and slightly in Sociology, while there is an increasing trend of single authorship in the fields of Anthropology, Political Science and Psychology (Table No. 1, 2 and 3 are not included in the paper).

However, the proportions of collaborative publication have shown a consistent growth with time in all four subjects except Political Science and Sociology.

The table-2 reveals that in social science as a whole, comparatively speaking, the proportion of two author publications was more in History (25.55%), which was followed by Economics (22.22%), Psychology (16.66%) and sociology (14.44%). Higher percentage of three author publications were found in Psychology (25.45%), followed by Anthropology (21.81%), Sociology (16.36%) and Economics (10.90%). Relatively a higher proportion of more than four author publications were found

to be in History (21.87%) and it was followed by Sociology (18.75%), Anthropology (15.62%), Economics (15.62%) and Political Science (15.62%).

The table-3 reveals that growth rates of co-authored publications are of different types. A systematic change is observed in all the categories of co-authored publications. The different growth rates are as follows:

- i. The proportion of single-author publications has increased from 37.58 per cent during 1989-1991 to 62.42 per cent during 1997-1999, the average per cent being 58.78 per cent for the entire period.
- ii. The proportion of two author publications has increased from 40 per cent during 1989-1991 to 60 per cent during 1997-1999, the average per cent being 17.75 per cent for the entire period.
- iii. The proportion of three-author publications has increased from 27.27 per cent during 1989-1991 to 72.73 per cent during 1997-1999, the average per cent being 10.85 per cent for the entire period.
- iv. The proportion of four-author publications has increased from 31.25 per cent during 1989-1991 to 68.75 per cent during 1997-1999, the average per cent being 12.62 percent for the entire period.

The Relative Growth of Single-author vs. Multi-author Publications

As shown in the table-4, the relative growth of single author and multi author publications were analysed in terms of the relative frequency of publications by number of authors for two period blocks from 1989-1999. The relative frequency of individual type of co-author publications by number of authors (e.g., the total number of single author publication in the field of Anthropology, and the relative frequency for 1989-1991 would be $6/29 = 0.205$) was calculated. It reveals the change in the frequency of all types of co-author publications by number of authors in different proportion, in all subjects as we move from single author to four & above author publications. In Anthropology the single author publications and multi author publications relative frequency has increased except in double author publications. In Economics, History and Political science multi author publications relative frequency has increased year by year. In Psychology there was no much difference between three and four & above author publications relative frequency. In sociology the single and multi author publications relative frequency has increased in all block periods.

Table 4: Relative frequency of publications by number of authors in period blocks during 1989-1991 and 1997-1999

Subjects	1989– 1991				1997- 1999			
	1	2	3	4	1	2	3	4
Anthropology	0.205	0.60	0.332	0.30	0.791	0.40	0.666	0.70
Economics	0.489	0.35	0.166	0.30	0.508	0.65	0.832	0.7
History	0.411	0.408	-	0.284	0.587	0.589	0.999	0.713
Political Science	0.198	0.5	0.2	0.3	0.799	0.5	0.8	0.7
Psychology	0.250	0.399	0.499	0.375	0.750	0.599	0.498	0.375
Sociology	0.265	0.229	0.222	0.332	0.735	0.767	0.777	0.666

Legend: 1 = One author 2 = Two authors 3 = Three authors 4 = Four and above authors

Collaboration Measures

In the earlier studies, some authors applied some mathematical measures to determine the extent and size of co-authorship, as reflected in publications. They are:

- a. Degree of Collaboration (DC) suggested by Subramanyam(1983), which takes the proportion of co-author publications in total publications

b. Collaboration Index (CI) first suggested by Lawani(1973), which takes the mean number of authors per publication.

Therefore, in order to study the extent of collaboration in block periods in social science research literature in India, the values of CI and DC were computed for publications and the results obtained are presented in table-5. It reveals that in Anthropology the mean number of authors per publication decreased from 2.21 during 1989-1991 to 1.87 during 1997-1999.

Table 5: India's collaboration obtained from publications in different sub-disciplines of social sciences in block periods

Subjects	1989-1991		1997-1999	
	CI	DC	CI	DC
Anthropology	2.21	1.89	1.87	1.30
Economics	1.51	0.82	1.88	1.38
History	1.25	0.40	1.46	0.70
Political Science	2.33	2.08	2.21	1.78
Psychology	2.45	2.25	2.08	1.73
Sociology	2.35	2.00	2.23	1.87

The growth in the proportion of collaborated publications is clearly reflected in the decreasing value of DC. In Economics, the value of CI increased from 1.51 during 1989-1991 to 1.88 during 1997-1999 and the value of DC increased from 0.82 during 1989-1991 to 1.38 during 1997-1999. In History, the value of CI increased from 1.25 during 1989-1991 to 1.46 during 1997-1999, and the value of DC also increased from 0.40 to 0.70 in respective block periods. In Political Science, the value of CI is decreased from 2.33 during 1989-1991 to 2.21 during 1997-1999 and value of DC decreased from 2.08 during 1989-1991 to 1.78 during 1997-1999. In Psychology the value of CI decreased from 2.45 during 1989-1991 to 2.08 during 1997-1999 and the value of DC also decreased from 2.25 during 1989-1991 to 1.73 during 1997-1999. In Sociology, the value of CI decreased from 2.35 during 1989-1991 to 2.23 during 1997-1999 and the value of DC also decreased from 2.00 during 1989-1991 to 1.87 during 1997-1999. The trend in the computed values of CI and DC of different period blocks is almost consistent, reflecting growing collaboration and pointing towards increasing professionalization in social sciences in India with time.

Applicability of Selected Probability Distribution to the Distribution of Authorship in Publications
 Here the applicability of selected statistical probability distributions is explored for their goodness-of-fit in publication data on distribution of authorship in different block periods in social science from 1989-1999. As a result, there were two data set under consideration pertaining to block periods 1989-1991 and 1997-1999 as presented in table-6. The applicability of Lotka's Law and two other statistical probability distributions namely, Geometric and Truncated Poisson were explored in the above two data sets.

The tables-6 and 7 represent the basic statistics and parameter values obtained from the application of selected probability distribution in two data sets on distribution of authorship in different block periods.

It may be observed from the table-6 that in the field of Anthropology the mean number of authors decreased from 2.2105 to 1.8750, in Political Science from 2.333 to 2.2143, in Psychology from 2.4500 to 2.0882 and in Sociology from 2.257 to 2.2308, which indicates a declining team work in these fields whereas in the field of Economics the mean number of authors increased during the year 1989-1999 i.e. from 1.5143 to 1.880, and in History from 1.2530 to 1.4621, which indicates the increasing trend of collaborative research. The degree of variance for authors varies from subject to subject. During the year 1989-1999, the degree of variance decreased consistently in Anthropology

(3.7071 to 3.3555), Psychology (3.95 to 3.61) and in Sociology (4.31 to 3.92), whereas it increased in Economics (2.50 to 3.27), History (1.79 to 2.46) and Political Science (4.04 to 4.10). It indicates that the frequency of research publications is more in Economics, History and Political Science.

Table 7: Parameter values obtained from application of selected probability distribute one to the distribution of authorship in publications in different subject in block periods

Subjects	Parameter values					
	1989-1991			1997-1999		
	α Lotka	P Geom	Q Poison	α Lotka	P Geom	Q Poison
Anthropology	0.8242	0.3114	2.2105	1.0785	0.6885	1.875
Economics	2.2153	0.3973	1.5142	1.000	0.6022	1.88
History	1.5233	0.4438	1.2530	1.3295	0.5561	1.4621
Political Science	0.7598	0.30	2.33	0.9306	0.70	2.2142
Psychology	0.7071	0.2898	2.45	0.8694	0.7101	2.15
Sociology	0.8633	0.2978	2.3571	0.8650	0.7021	2.2308

Table-7 reveals that, in Anthropology, Political Science, Psychology and Sociology, the value of Lotka's inverse power law increased from 0.82 to 1.07; from 0.75 to 0.93; from 0.70 to 0.86; 0.8633 to 0.8650 during 1989 to 1991 and 1997 to 1999 respectively, whereas the value in Economics and History decreased from 2.21 to 1.00; from 1.52 to 1.32 during 1989 to 1991, and 1997 to 1999 respectively. In all the six subjects, the Geometric distribution value increased

Conclusion

The extent of collaboration between authors has been studied in almost all the branches of science and technology, social science and humanities. In view of this, it is suggested here that essential studies should be conducted in other fields of social sciences and humanities in order to identify the trends in collaborative research. The study should be both quantitative and qualitative so as to throw more light on the scientific communication process. The study of such nature may be found useful in understanding various disciplines, and hence would be helpful in planning more effective research and communication systems.

Present research project is still under progress. Further, it will make an attempt to study: 1) Growth of literature versus collaboration. 2) Funding versus collaboration, and 3) Internal collaboration, National collaboration and International collaboration.

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