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Author Productivity and Collaboration: An Investigation of the Relationship Using the Literature of Technology

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Previous studies of author productivity and collaboration have established that productive, active and prolific authors, especially in the field of science, are also highly collaborative. The purpose of this study is to determine whether the most productive authors in the literature of technology, for the three-year period 1993–1995, are also the most collaborative. The study used the weighted-average method to determine the extent of author collaboration and the Spearman rank correlation coefficient was employed to determine the correlation between productivity and collaboration. The study however, found that while the degree of collaboration in the literature of technology was very low, the productive authors correlated positively with the collaborative authors in the field.

Introduction

Information dissemination is one of the principal duties of librarians and information officers, therefore it is pertinent for the librarians and information officers to have a clear knowledge of productive as well as collaborative authors. Knowledge of productive authors in a particular subject field helps the librarians to identify prolific authors in a field so they can refer researchers to these authors for more information. Also knowing the journals in which the most productive authors publish their papers helps the librarians give relevant and positive service to users based on these journals. It is also a basis on which to recommend for purchase such journals to meet the current developments in the field. Furthermore contact could be made between the libraries and the productive authors to create an avenue for the librarian to have access to the personal collections of the authors. These might be used for their researchers and library users.

Therefore it is quite pertinent for a study of the literature of technology to be undertaken with the sole purpose of identifying the current developments in the subject literature. Bibliometrics is a tool for conducting such a study. It refers to the application of statistical techniques to the literature of a given subject. Bibliometrics studies the patterns of communication between documented information and the potential users of information. It therefore has different dimensions, which can be applied to different situations. One of these dimensions is the study of authorship patterns in the literature of a subject. Authorship is one aspect that plays a great role in communication activity. Therefore authors contributing to a subject literature always constitute a population. Within the population, patterns emerge such as single, joint and multiple authorship. However, the literature of technology comprises all aspects of technology, including the engineering discipline that is growing exponentially.

However, little is known about collaboration in the field of technology. Therefore this study seeks to determine the pattern of authorship as it relates to collaboration and productivity in the literature of technology. The study will answer the

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following questions: What is the extent of author collaboration in the literature of technology? What is the extent of correlation between productive authors and collaborative authors?

Author collaboration is the act whereby two or more people agree to execute a certain project, be it intellectual or non-intellectual. Among the previous studies of author collaboration were those of Gupta (1986) who reported increase in author collaboration in the literature of exploration geophysics. Price (1963) also reported some incidence in collaboration in science. Clarke (1964) also reported collaboration among the biomedical writers. Frame and Carpenter (1979) studied international collaborative behaviour among scientists and reported a higher degree of collaboration in the basic fields of science rather than in applied fields. Price and Beaver (1966) found that most productive member was by far the most collaborative in the literature of oxidative phosphorylation and terminal electron transport. Mullins (1968) described groups of collaborators as "solidarity groups". Goffman (1977) related authorship patterns to the Shannon entropy measure. Hirsch and Singleton (1968) showed that the amount of multiple authorship in a subject field is closely related to the amount of financial support. Pao (1982) studied patterns in computational musicology from 1949 to 1975 and concluded that even though a small number of authors were co-authors, the heavy collaborators were also the most prolific in the field. Weintraub (1980) provided a theoretical generalisation that whereas scientists collaborate, humanists rarely collaborate. Show (1979) reported that co-authorship establishes a relation among authors which is a measure of the extent to which they communicate directly and that the strength of this relationship between two authors may be computed by counting the number of papers they produce jointly. Subramanyam (1983) reported that collaboration has also been found to affect the visibility and productivity of scientists. He went further and identified six types of author collaboration: teacher-pupil collaboration, collaboration among colleagues, supervisor-assistant collaboration, researcher-consultant collaboration, collaboration between organisations and international collaboration. He also observed that the degree of collaboration varies from one discipline to another. It is high in the scientific and technical fields but low in the humanities. Lawani (1972) introduced the term collaborative index to describe the average number of authors per paper for a given set of papers. He stated that "the greater the collaborative index of a set of papers, the higher the proportion of quality papers in the set" and that the collaborative index can be used to measure quality in the aggregate.

Table 1: Author productivity list showing the 26 most productive authors in technology literature from 1993–1995.

Author	1993	1994	1995	Total	Ranking
Colloms, Martin	33	31	30	94	1
Warwick, Graham	27	27	24	78	2
Evans, Barrie	27	28	23	78	3
Bartlett, Tim	21	24	20	65	4
Jones, Tony	20	20	24	64	5
Kessler, Ken	24	15	21	60	6
Robinson, Peter	31	11	16	58	7
Macneil, James	19	21	18	58	8
Slessor, Catherine	15	22	20	57	9
Bassett, Geoff	18	17	21	56	10
Allcock, Andy	16	10	25	51	11
Chadwick, John	14	17	20	51	12
Furniss, Tim	22	16	12	50	13
Clark, Toby	14	16	20	50	14
Dawson, Susan	14	23	11	48	15
Crawley, Geoffrey	19	03	25	47	16
Ridout, Graham	17	13	17	47	16
Chevin, Denise	20	15	06	43	17
Cropley, Steve	23	11	07	41	18
Field, Marcus	22	04	15	41	19
Darling, Peter	16	21	02	39	20
Coomber, Matthew	19	14	05	38	21
Richards, M	11	19	07	37	22
Learmount, David	14	10	12	36	23
Lester, Pater	22	03	00	25	25
Ford, Roger	14	06	02	22	26
Total	501	398	407	1,334	

Methodology

The data for this study were gathered from Current Technology Index (CTI). This index contains comprehensive abstracts on technology literature. Multi-authored papers were counted and analysed to be able to determine the most productive authors as well as the most collaborative authors. The number 26 was chosen to serve as a yardstick for measuring the most productive as well as the most collaborative authors. The 26 most productive and the 26 most collaborative were counted. The weighted-average method was also used to determine the extent of author collaboration among the 26 most collaborative authors in the

literature of technology. The Spearman rank correlation coefficient was adopted for correlating ranked data in order to determine the correlation between the productive authors and the collaborated authors.

Findings

Table 1 represents the rank list of the 26 most productive authors in technology literature over the three-year period of the study, 1993–1995. From this table, one notes that the most productive person among the list was Martin Colloms who published 94 articles. This is followed by Graham Warwick who produced 78 articles.

Table 2 represents the top twenty-six authors collaborating in the field of technology. It reveals that Tony Jones was the most collaborative author followed by Graham Warwick.

Table 3 represents the comparison between productivity and collaboration among the 26 most productive authors in the literature of technology. The ranked data of both the productivity and collaboration parameters were correlated using the procedure for correlating ranked data. The correlation produced a rho of 0.5. This result indicates positive correlation between the twenty-six most productive authors and twenty-six collaborative authors.

Discussion

The findings of the study are that writers in the literature of technology maintain a continuous record of publishing. This confirms that authors in technology literature are very active in publishing articles, i.e. prolific writers. Authors in the literature of technology maintain a high productivity pattern.

The calculated degree of author collaboration is 1.2. This value is very low and clearly indicates that single authorship dominates the literature. In fact, this is lower than the 2.9 degrees found by Lawani (1986) in his study of cancer research. It is also lower than Harande's (1997) 2.2 degrees in his study of seed science literature. The positive correlation between the collaborative and productive authors corroborates similar findings by Pao (1982) that the heavy collaborators were also the most prolific in the field.

Table 2: Author Collaboration Rank List among the 26 most productive authors in the field of technology

Rank	Name	Frequency of collaboration
1	Jones, Tony	14
2	Warwick, Graham	13
3	Bartlett, Tim	12
4	Field, Marcus	8
5	Dawson, Susan	7
6	Chevin, Danise	6
7	Macneil, James	6
8	Learmount, David	6
9	Ridout, Graham	5
10	Evans, Barrie	3
11	Cropley, Steve	3
12	Colloms, Martin	2
13	Robinson, Peter	2
14	Kessler, Ken	2
15	Coomber, Matthew	2
16	Bassett, Geoff	2
17	Crawley, Geoffrey	1
18	Allcock, Andy	1
19	Slessor, Catherine	1
20	Chadwick, John	1
21	Clark, Toby	1
22	Richards, M	1
23	Furniss, Tim	–
24	Lester, Peter	–
25	Darling, Peter	–
26	Ford, Roger	–

Table 3: A Comparison of productivity Ranking with Collaboration Ranking of 26 most productive Authors.

Name in Alphabetical Sequence	Productivity Ranking	Collaboration Ranking
Allcock, Andy	11	18
Bartlett, Tim	4	3
Bassett, Geoff	10	16
Chadwick, John	12	20
Chevin, Denise	17	6
Clark, Toby	14	21
Colloms, Martin	1	12
Coomber, Matthew	21	15
Crawley, Geoffrey	16	17
Cropley, Steve	18	10
Darling, Peter	20	24
Dawson, Susan	15	5
Evans, Barrie	3	9
Field, Marcus	19	4
Ford, Roger	25	25
Furniss, Tim	13	22
Jones, Tony	5	1
Kessler, Ken	6	14
Learmount, David	22	8
Lester, Peter	24	23
Macneil, James	8	7
Ridout, Graham	9	5
Richards, M	22	1
Robinson, Peter	7	13
Slessor, Catherine	9	19
Warwick, Graham	2	2

Conclusion

This study demonstrates that the degree of author collaboration in the literature of technology is very low. Single-authored papers dominate the entire literature over the three-year period of the study, 1993–1995. Also the collaborative authors correlated positively with the productive authors. This statement further confirms the study of Pao in which he concluded that the heavy collaborators were also the most prolific in a given subject field.

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