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# Bibliometric studies on single journals: a review

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## ABSTRACT

*This paper covers a total of 82 bibliometric studies on single journals (62 studies cover unique titles) published between 1998 and 2008 grouped into the following fields; Arts, Humanities and Social Sciences (12 items); Medical and Health Sciences (19 items); Sciences and Technology (30 items) and Library and Information Sciences (21 items). Under each field the studies are described in accordance to their geographical location in the following order, United Kingdom, United States and Americana, Europe, Asia (India, Africa and Malaysia). For each study, elements described are (a) the journal's publication characteristics and indexation information; (b) the objectives; (c) the sampling and bibliometric measures used; and (d) the results observed. A list of journal titles studied is appended. The results show that (a)bibliometric studies cover journals in various fields; (b) there are several revisits of some journals which are considered important; (c) Asian and African contributions is high (41.4% of total studies; 43.5% covering unique titles), United States (30.4% of total; 31.0% on unique titles), Europe (18.2% of total and 14.5% on unique titles) and the United Kingdom (10% of total and 11% on unique titles); (d) a high number of bibliometrists are Indians and as such coverage of Indian journals is high (28% of total studies; 30.6% of unique titles); and (e) the quality of the journals and their importance either nationally or internationally are inferred from their indexation status.*

**Keywords:** Single journal study; Bibliometrics; Journal productivity

## INTRODUCTION

When a single journal is studied bibliometrically, it creates a portrait of the journal, providing a description that offers an insight that is beyond the superficial. It can indicate the quality, maturity and productivity of the journal in any field, in a country or region. It also informs us about the research orientation that it supports to disseminate and its influence on author's choice as a channel to communicate or retrieve information for their research needs. Almost always, the journal being studied is regarded as important or significant in the field, important enough to be studied, to make inferences that the journal speaks for authors who publishes in the field and somehow reflect the activity of research in the field. The journal being studied is often assesssed on its quality characteristics, the degree of impact it achieves in a field, its ability to diffuse knowledge, the authorship and collaboration pattern it projects in the field, its national or international standing and its popularity in being the sounding board for certain areas of research in the field. In other words, single journal studies have been

undertaken for various reasons transcending across various disciplines and region.

Nebelong-Bonnevie and Frandsen (2006) indicated that single journal studies provided a detailed multi-faceted picture of the characteristics of a single journal. The assessment tool used for single journal studies is almost always bibliometric indicators to uncover the characteristics, quality and status of the journal. This paper will review bibliometric studies on single journals categorized under broad subject areas.

The first review on single journal studies was written by Tiew (1997). The objective of the review was explicit, that is "to survey the bibliometric studies conducted with a single scholarly journal since 1969 till date". The review arranged its 102 literature under four categories; (a) bibliometric study on single journals (40 items); (b) citation analysis of single journals (45 items); (c) content analysis of single journals; and (d) other aspects of bibliometric study on single journals (6 items). Under each section, the studies were described by the discipline of the journals (library and information science, medicine, science and technology, humanities and the social sciences). The majority (84%) of articles were written in the English language. The number of single journal studies in the field of library and information science was comparable to those in the sciences, technology and medicine (41% and 40% respectively). Over 50% of the active authors on single journal studies came from the United States, followed by India, Russia and Europe. This paper will cover bibliometric studies on single journal published for the years following 1997, that is between 1998 and 2008.

## THE SAMPLE AND THE JOURNALS STUDIED

Searching the various databases provided us with 82 journal articles using bibliometric methods to study single journals. The journals studied are listed under broad subject areas as follows, Arts, Humanities and Social Sciences (12 items, 15.0%); Medical and Health Sciences (19 items, 23.0%); Sciences and Technology (30 items, 36.0%) and Library and Information Sciences (21 items, 26.0%). Under each subject, the studies are described in accordance to the geographical location of the journal's publisher in the following order, United Kingdom, United States and Americana, Europe, India, Africa and Asia. For each study, elements looked for and described are (a) the journal's publication and indexation characteristics; (b) the objectives; (c) the sampling and bibliometric measures used to collect data; and (d) the results observed. A list of journal titles being studied is listed in the Appendix. Single journal studies identified in references but which could not be located will be mentioned but not described.

## ARTS, HUMANITIES AND SOCIAL SCIENCES

In these subject fields, we found 12 bibliometric studies on single journals with one study of a journal published in the United Kingdom, eight from the United States, one from India and two from Malaysia.

In the United Kingdom McElwee and Atherton (2005) undertook a bibliometric study on

the *International Journal of Entrepreneurship and Innovation (IJEI),* to determine the publication trends and pattern of research in the field of entrepreneurship. A total of 70 articles published between 1999 and 2003 were analysed and indicators looked for were (a) the models used and (b) the methodologies, techniques and data utilised in the articles. From these data, the theoretical, methodology trends and themes were determined. The study used the Westhead and Wright (2002) categorization to group topics covered by the articles. Other indicators studied include the research philosophy, geographical locations of contributors, policy implications and keywords assigned. They observed that in the field of entrepreneurship, quantitative methodology out-numbered qualitative approaches, articles published were mainly authored by those from the United Kingdom, United States, Australia and Scandinavia. The analyses of keywords revealed emerging trends in this field. *IJEI* is published in the United Kingdom by IP Publishing and is being indexed by *ABI Inform* and *EBSCO*.

The United States provided eight bibliometrics studies on single journals. In the field of business and management, Phene and Guisinger (1998) studied 11-year issues (1981 to 1991) of the *Journal of International Business Studies (JIBS)* with the objective of determining the standing of the journal among other scholarly business journals. The bibliographic data analysed were (a) the citation analysis; and (b) the journals's influence and reputation determined by the Prestige Index, which is a modified impact factor and Trajectory Index. The Trajectory Index calculates the citations to articles in *JIBS* appearing in the 4 years immediately following the publication of an issue of *JIBS*. The Trajectory Index would indicate the speed with which *JIBS* citations appear in other journals. The score was then compared to the journals' impact factor, immediacy index and cited half life score provided by the *Journal Citation Report* published by the Information Science Institute (ISI). The main contribution of this study is the new approach to measure impact and influence of a journal publication. *JIBS* is published by PalgraveMacMillan, USA and is indexed amongst others by *ABI Inform, EconLit. Scopus* and the *Social Science Citation Index.* It achieves an impact factor score of 2.283 (*JCR,* 1998) and is ranked 7/72 amongst journals in Business and 10/81 in Management.

In the field of music, four single journal studies were located. The *Journal of Research in Music Education (JRME*) was analysed by Humphrey and Stauffer (2000), Ebie (2002) and Yarbrough (2002). Humphrey and Stauffer (2000) focused on the editorial characteristics of the journal and examined whether these characteristics affect the type of papers published. The study examined 112 editorial committee members in the first 40 years of its publication, noting their gender, the institution from which each member obtained their doctorate degree, the geographical distribution of the doctoral degree granting institution and their institutional affiliation. Contributions by women to the journal was 43% when women's editorial composition was only 28%. The study showed that editorial committee members had contributed at least one article in *JRME* before their appointment. Certain institutions dominated in terms of contributions. This study proposed that the characteristics of editorial committees may influence the content of articles published. In 2002, *JRME* was again revisited by Ebie, who analysed the subject coverage of the journal to ascertain the active and poorly research areas of study in

music. Ebie analysed 819 articles in volumes published between 1953 and 2002. Bibliographic data analysed included the authors' level of schooling, major in school, specific music courses, professions, race, gender and geographical locations. The study reported a lack of contributions on choral or vocal music, string or orchestral groups and non-performance music education at elementary and secondary levels. In the same year Yabrough (2002) analysed the content of 1124 articles published in *JRME* to determine the quantity and quality of the journal based on the contents of articles published especially the research methods used. The average number of articles published was 24 per year. The active authors contributed five or more articles and most were one-time authors. The articles published mainly used quantitative research method and saw a decrease in historical and philosophical studies. It was observed that *JMRE* accepted less non-research articles and imposed a strict acceptance requirement. The acceptance rates for the years 2000 and 2001 were 27% and 29% respectively and the acceptance time to publication was 3 to 6 months. *JRME* is published by Sage, USA for the National Association for Music Education. This journal is being indexed amongst others by the *Arts and Humanities Citation Index, EBSCO, ERIC, PsycINFO* and *Music Index*.

Another journal in music was bibliometrically studied by Goldenberg (2006). Goldberg analysed the contents of 393 articles published in the *Journal of Music Theory.* The articles were classified according to their type, theoretical aspect, period of repertiore and major composers or theorists being covered. Major focus of studies were identified. Other aspects highlightred were its importance, its editors and contributors. This journal was first published by Yale School of Music and has since been published by Duke University Press. The journal is indexed by *International Index to Music Periodicals*, *Arts and Humanities Citation Index*, *Music Index*, and *RILM: Abstracts of Music Literature*.

The international characteristics of a journal is one of the main concern of bibliometric studies. One such study was carried out by Damrosch (2006) who analysed the national (American) or international standing of *American Journal of International Law (AJIL)* by evaluating qualitative data such as (a) the expressed editorial policy from the initial founding of the journal to the present day, b) the composition of the editorial board members, (c) the composition of themes written by authors, and (d) the involvement of authors from other discipline. The study found that there was a shift from being American centered to an international perspective; the increasing international contribution; the increasing views written about the law and legal systems from other than an American point of view, showing an increase in contributions from the Latin American countries and Asia (China, Africa, Middle East); and broadening of horizons and emergence of joint disciplines such international law and international relations. *AJIL* is published by the American Society of International Law since 1907 and is indexed amongst others by *Current Law Index, Index to Foreign Legal Periodicals, Index to Legal Periodicals,* and *Social Sciences Index*.

In 2002, Phelan, Ferreira and Salvador examined 994 articles published in the *Strategic Management Journal* to determine the trend of articles published in the journal. The

indicators used were article types, number of authors, pages and refrences, the trend in international collaboration, categorization between non-empirical and empirical articles. It was observed that the articles in Business were generally longer, more empirical, cited more references, used larger samples in their studies, and more likely to be co-authored. It was proposed that the results could be used by the editorial to shape the future of the journal. This journal is published 13 issues per year for the Strategic Management Society by Wiley, United States. It is indexed by a host of databases including, *ABI Inform, Business Periodical Index (H.W.Wilson), Cambridge Scientific Abstracts, Compendex, Current Contents: Social Sciences & behavioural Sciences (ISI), Inspec, Scopus* and the *Social Science Citation Index*.

The performance of a subfield in the field of management was studied by Casilas and Acedo (2007) for the field of family business through a journal entitled *Family Business Review (FBR*). Articles published from 1988 to 2005 form the sample of the study. The bibliometric data used was co-citations analysis to map the intellectual structure of the literature in family business. The sudy found that the average number of references per paper was 29.7 citations and the average citation per article was 25.6 references. More journals were referenced by family business articles (73.5%) followed by books (20.4%). This journal is published by Wiley-Blackwell on behalf of the Family Firm Institute Inc., USA. It is being indexed by *Social Science Citation Index* and *Current Contents: Social & Behavioral Sciences.* It recorded an impact factor of 0.675 in the *JCR* 2007.

Only one Indian journal bibliometric study was located in 2003. Batthini and Madnani studied *the Journal of Entrepreneurship*. No abstract about this study could be located. This journal is published by the Entrepreneurship Development Institute in Ahmadabad, India and is indexed by *ABI Inform*.

Two journal articles studying single Malaysian journals was retrieved. In the field of Asian history the *Journal of the Malaysian Branch of the Royal Asiatic Society (JMBRAS*) was studied by Tiew (1998). This journel is indexed by *Anthropological Index* and *Historical Abstracts*. The bibliographic data evaluated was collected from volumes published between 1987 and 1996. The study traced the history of the journal, its administration, editorials and policy. Besides these qualitative data, the study also described article productivity of the volumes, page lengths of articles, words in titles, the citations referenced; the authorship pattern in terms of gender, author's occupation, author affiliation and collaboration; and the contents of the journal in terms of subject coverage, acknowledgements, appendixes and abstracts. The norm is single authored articles (94.9%) who were mainly written by academicians (69%), mainly male (77.5%) who used books as the preferred source of reference (38%), followed by journal articles (20.4%) and government documents (18.6%). The geographical distribution of authors indicate the international nature of the journal with 34% from Malaysia compared to Australia (21%), United Kingdom (16%), Singapore (11%) and the United States (5%). Another unique feature was the high number of acknowledgements (64%) and notes in articles (70%).

Another Malaysian study in the field of law was carried out by Kaur (2006) who analysed a total of 479 articles published in the *Malayan Law Journal (MLJ*). This journal was first published in 1932, is the oldest legal journal in Malaysia and published by Malayan Law Journal Sdn Bhd. It is being indexed in *Perind-periodical Index* and *Lexis-Nexis*. Bibliometric measures was used to (a) assess the total articles published in two sets of a 3-year volumes published under three different editors, 1957-1959 and 1970-1972 (editor 1), 1973-1975 and 1985-1987 (editor 2) and 1988-1990 and 2000-2002 (editor 3); (b) the citations referenced in the volumes; (c) the authorship productivity, pattern, geographical affiliation and professions; (d) the subject covered by the articles; and (e) journal self-citation in the articles. The results indicated that the number of articles published increased in recent volumes. The average number of citations were mainly to law reports and legistlations which varied from 6.47 to 62.4 with an average of 19.2. On the whole, legal authors used a large number references where the 479 articles generated 984 citations. Single authorship is the norm (93.1%) and more of the authors were Malaysians (53.7%) and Singaporeans (40.5%). The other geographical affiliations represented in the journal were Australia, United Kingdom, Borneo, Hong Kong and the United States. About two-thirds of authors were academicians (54.9%) and practicing lawyers (28.8%). The subject covered by the articles were diverse and indicated no specific focus. Journal self-citation is high (59.3%) which increases in the recent years indicating the infuence of this journal to the legal professionals in Malaysia.

## MEDICAL AND HEALTH SCIENCES

There were 16 unique journal titles which were bibliometrically studied and was covered by 19 articles as some of the journals were revisited by more than one article. The geographic location of the journals studied were three from the United Kingdom and United States / South America respectively, and five from Europe.

The British journal, *Psychotherapy Research (PR)* was studied by Borkenhagen et al (2000) who examined five volumes of the journal. The study compared European and North American contributions to the journal in terms of total output, hypotheses, research tradition, methodological approaches, leading authors and its representation in the international state of research. About 60% of articles were co-authored, the average of citations per paper was 35.5, authors referenced more journals (58%) than books (36%) and *PR* comply with the criteria of variability, quality and recency of referenced literature in the field. The journal's articles were also cited by authors publishing in high impact factor journals inferring the quality and citability of articles published in *PR*. This journal is published by Taylor and Francis for the Society of Psychotherapy Research in the United Kindom. It is indexed by *Medline*, *Scopus*, *Social Science Citation Index*, *Psychological Abstracts*, *PsycINFO*, *PsycLIT* and *Innovation & Research.*

Zubeidat (2004) studied another British journal, *Journal of Sex Research* who analysed a total of 774 articles published in volumes produced between 1980 and 2003. Bibliometric data analysed includes (a) article productivity; (b) authorship productivity,

authoship pattern and citability, and the (c) content of the journal (to ascertain strong and weak research areas). The results showed co-authorship being the norm and the most productive authors were also the most cited. This journal is published by the Society for the Scientific Study of Sexuality, United Kingdom and is being indexed by several major databases such as *PsycINFO, Abstracts in Anthropology, Applied Social Sciences Index and Abstracts, Bibliosex, Child Development Abstracts and Bibliography, Communication Abstracts, EBSCOhost, Index Medicus, Current Contents: Social & Behavioral Sciences*, and the *Social Sciences Citation Index*.

The third British journal studied was *Tropical Medicine and International Health (TMIH)* Glover and Bowen (2004). The bibliometric indicators used to study the standing of the journal were articles and author productivity and pattern, article contents and geographical analyses of articles published. The largest number of authors who contributed articles to this journal were from Europe, followed by Africa, the United Kingdom, Asia, United States and others. Papers authored by African authors received more citations. British authors had the highest mean citation rate of 8.079 and the average citation however was low (5.496). *TMIH* has represented fairly the research and views from scientists from all parts of the world reflecting a truly international journal. *TMIH* is published by Wiley-Blackwells London on behalf of the Belgian Society of Tropical Medicine; Prince Leopold Institute of Tropical Medicine, Antwerp; the Bernard-Nocht-Institute for Tropical Medicine, Hamburg; the Foundation for Tropical and Geographical Medicine, Amsterdam; the London School of Hygiene, and the Swiss Tropical Institute, Basell. This journal is being indexed by *PubMed* and the *Social Science Citation Index*.

There were three bibliometric studies of single journals published in the United States. The issue of international contributions was investigated by Chen, Jenkin and Elster (2003) who studied the *American Journal of Roentgenology (AJR)*. This journal is published in the United States by the American Roentgen Ray Society and the focus is on radiology. It is indexed by *Inspec and the Science Citation Index*. This journal ranked 21 in terms of impact factor among the list of radiology journals reported by the year 2000 *Journal Citation Report*. The authors gathered and compared three sets of a three-year data; 1980-1982; 1990-1992 and 2000-2002. The results revealed a gradual increase in international contributions from 10% in 1980-1982; 25% in 1990-1992 and 37% in 2000-2002 (<0.001 level of significance). Among the international contributors, the Japanese, South Koreans and Germans were the largest contributors. It was observed that there was a decrease in contributions from Canada and the United States. Even though the volume from international contributors have increased the rate of accepted papers was low when compared to American contributions. However, among the international authors those from Switzerland, Austria, United Kingdom, Canada and Singapore achieved higher acceptance rate than the average (33%). The authors foresee increasing contributions from international authors in the future. The study has indicated that *AJR* typified high impact factor journals which characteristically published more foreign than national articles. The bibliometric data collected includes (a) count of article contributions by country and region of origin; (b)types of articles contributions (major

papers, case reports, technical notes); (c) subject coverage of articles; (d) age of patients; and (e) radiologic techniques used (methods).

A journal is also used to assess its impact in a field. Price and Jeffrey (2006) studied the *Journal of School Health (JSH)* and assess its impact factor and its relationship to making the journal sought after by researchers to communicate their research. This journal is published by the American School Health Association. The results indicated that *JSH* ranked 9$^{th}$ out of 32 amongst journals on nursing and 34$^{th}$ out of 60 among occupational health journals. Journals in the field of school health have a relatively low impact factor count. Price and Jeffrey suggested that the impact factor of a journal could be improved by (a) publishing high-quality review articles, (b) encouraging authors to cite previous articles published in the journal; (c) drawing the public's attention to selected articles published; and (d) increasing the number of pages per issue and the frequency per year. The journal is currently being indexed by a number of indexing and abstracting services, which includes *Biological Abstracts*, *Current Contents*, *Education Index*, *ERIC, Index Medicus*, *International Nursing Index*, *Psychological Abstracts*, *Social Science Citation Index, Adolescent Mental Health Abstracts*, *Biological Index*, *Current Index to Journals in Education (C.I.J.E), CINAHL* database, *Cumulative Index to Nursing and Allied Health Literature* and *Nursing Abstracts*.

Another Americana journal studied was *Revista Brasileira de Psiquiatria (RBP).* Kieling and Goncalves (2007) indicated that it was possible to assess the quality of a journal through two indicators, namely its (a) indexation and (b) impact factor as measured by the number of citations received over a specified period. The study found that the indexation of *RBP* in two major databases has helped give to increase the number of citations received. Indexation here refers to the journal's coverage by two databases, *Science Citation index* since 2005 and *Medline* since 2003. The results indicate that the journal has attained an international status, has widened its potential audience and has received an increase in the number of submissions. In order to ascertain the quality of the journal, the following data was collected: (a) the number of citations to *RBP* for 2004, 2005 and 2006, which revealed an increase of 22, 66, 133 in the respective years; (b) the country affiliation of citing authors (Brazil versus foreign, which revealed 66% from Brazil, 23% from the United States, 6% from England, 5% from Canada); (c) the language of citers (which revealed 79% were English language, 18% were Portuguese, and 2% were Spanish); (d) the journals which carried the citing articles (which indicated leading journals in the field of Psychiatry); (e) the acceptance rate (referred to as operational index), which is 40% of total submission); (f) the number of requested article; and (g) the number of days from submission to acceptance and publication (which is 130 days).This journal is also being indexed by *Excerpta Medica, Biological Abstracts (Biosis*), and the *Psychological Abstracts (PsychoInfo).* The authors believed that the Impact factor (IF) provided by the ISI may not accurately measure the true IF of *RBP* since citations from most foreign language sources were not included in the ISI database

From the European countries, five bibliometric studies on single journals were located.

Calafat, Becona and Bobes (2003) assessed the degree of international recognition achieved by the journal *Adicciones* which, as at 2003 was 15 years old. *Adicciones* is a Spanish language journal in the field of psychology. The data used to assess this journal were (a) coverage in relevant databases, which in this case was *Medline, Current contents,* and *Psychinfo (*not being included in these databases would result in being less visible); (b) clear publication standards and (c) broad editorial committee which indicates a commitment to raise the quality of articles published in the journal.

Dinkel et al (2004) studied the language factor of journals and its effect on internationalization and enabling it to disseminate German research internationally. They found that the switch of *Zeitschrift fur Experimentelle Psychologie / Experimental Psychology* to the English language resulted in an increase in the rate of foreign authors' contributions from 14.6% and 8.7% to 52.7%. This journal is indexed by the ISI *Web of Science* and is published by Keip & Von Delft GmbH.

There are three European single journal studies located in the year 2007. Burdorf and Viikari-Juntura (2007) reviewed the results from the past 10 year volumes of the *Scandanavian Journal of Work, Environment and Health (SJWEH)*. This journal is published by the Finnish Institute of Occupational Health, National Research Centre for the Working Environment, Denmark and the National Institute of Occupational Health, Norway. According to *JCR* 2006, *SJWEH* achieved an impact factor of 1.735. The journal is being indexed in *Current Contents*, *Science Citation Index*, *Biological Abstracts, Excerpta Medica*, *CAB International*, and the *Cambridge Scientific Abstracts* amongst others. The study presented the distribution of citations relative to the source of publication using the Lorenz curve, which is a graph representation of the cumulative distribution, showing that the bottom x% of the publication contributes y% to the citations. There was inequality in the citability of articles published in *SJWEH* in 2004 being cited between 2005 and 2006. Over the 10-year period, the journal had attracted at least 5 citations per year with a maximum average of 18.6 citations per year.The study have successfully indicated that certain topics and types of papers tended to be cited and believed in the law of nature, that good articles would attract readers, citations and prestige to a journal.

From Spain the journal *Farmacia Hospitalaria (FH)* was studied by three articles, all of which was published in 2007. Ferriols et al. (2007) bibliometrically analysed 416 articles by 1,515 authors in volumes produced by *Farmacia Hospitalaria* between 2001 and 2006. This journal is published by Asociacion De Prensa Profesional in Spain. It is indexed in *Medline* via *Index Medicus*. The study assess the relative position of the journal with respect to other journals in the field of hospital pharmacy and its development as a result of the editorial strategies and policies. The main bibliometric indicators used in this study were the calculation of article production, journal circulation and productivity index, distribution and sales, authorship productivity, subject matter of articles, types of articles, number of references per article, publication delays and accumulated growth. The study indicated an increase in publications and a decrease in citing references.

About 70% of sources referenced were journal articles and self-citation was constant at below 10%. The journal published mainly original articles with a growth of 30%. There were between 4.6 to 2.3 authors per article. Most of the authors were affiliated to the Community of Valencia, Catalonia, Madrid and Andalusia. Conference proceedings amounted to only 14% of resource referenced and 17% of articles had funding. The main subject covered by the articles was on drug treatment and safety. The publication delay remained constant. There was a circulation index of 0.74 in *Medline*. There has been an increase in the publication of original articles and letters to the editor over recent years and this increase was in line with the journal's strategies. There has also been a decrease in literature reviews. The active authors remained the same over the years.

Another Spanish study by Alaixandre-Benavent et al. (2007) analysed the citation patterns and impact factor of articles published in *Farmacia Hospitalaria (FH)* between 2001 and 2005. The study found that *FH* made 1,370 citations to 316 different journals. The percentage of self-citation was 9% and the national impact factor increased from 0.178 in 2001 to 0.663 in 2005 and the international impact factor increased from 0.178 to 0.806 for the same period. The study concluded that *FH* is multidisciplinary in nature.

The letters to the editor published in *Farmacia Hospitalaria* between 1995 and 2006 were analysed by Pradas and Navarro (2007). The study analysed 82 letters published, the content, the number of authors and their professional status, the institutions the authors were affiliated to, the number of bibliographic references and their origin. The results indicated that a mean of seven letters were published per year and 1.1 per volume. The majority of the letters (63%) covered the subject of clinical cases, 28% were related to publications or replies to previously published comments. The mean number of authors of the letters were three and 14% (12) of the letters exceeded this number of authors. The majority of the letters were written by pharmacists (64%), followed by hospital doctors (32%) and 20% of the authors were affiliated to multiple institutions. The 82 letters contain 411 references with the mean being five citations per letter. About 60% of the citations were to foreign publications. The number of letters to editors was found to be increasing over the years. The letters mainly came from Valencia, Catalonia, Madrid and Andalisia.

Another Spanish journal studied was *Nutricion Hospitalaria (NH)* which is published by Sociedad Espanola de Nutricion Parenteral y Enteral, Spain. This journal is indexed by *Medline* and the *Science Citation Index.* Vazquez, Culebras and Lorenzo (2001) assessed the authors, institutions and articles published in *NH* and found that Spanish authors were predominant and they mainly came from Madrid. The subject area most written on was health care in general hospitals (75.8%) . Culebras and Lorenzo (2007) later revisited the journal with the information about the journal being indexed in *Science Citation Index* and the impact factor achieved.

From the Indian and African continents, five journals were studied bibliometrically and only a mention is given to studies that cannot be located. The first study located was by Halkar, Senapati and Salek (1998) who analysed the *Journal of Family Welfare*. This

journal is published by the Family Planning Association of Indian since 1954 and is being indexed by *IndMed, Current Contents* and *Index Medicus*. In 1998 Singh and Mukherjee analysed bibliometrically articles published in the *Indian Journal of Nematology* between 1981 and 1986. This jourrnal is published by the Nematological Society of India since 1971 and is curreently indexed by the *Science Citation Index*. The third bibliometric study was by Das and Sen (2000, 2001) who analysed the citation pattern of 43 research articles published in the *Indian Journal of Medical Research (IJMR). IJMR* is published by the Indian Council of Medical Research and is being indexed by a host of international abstracting and indexing databases whch include *Currents Contents, Science Citation Index, Biological Abstracts, Chemical Abstracts,* and *Dental index*. The journal has an impact factor of 1.670 as reported by the JCR, 2007. The study analysed 781 citations referenced by 43 research articles published in the January to June 2000 issues of volume 109. Single authored works were small (15%) compared to multi-authored articles (85%). The number of authors involved was regarded as a reflection of the size of the research team involved. About 88.7% of resources referenced were to journal articles. Out of the 43 articles analysed, 38 were by Indian authors, two by foreign authors and two jointly by Indian and foreign authors. Author self-citations occured about 9.4% and journal self-citation is 7.3%. The authors admitted that the number of sample was too small to provide conclusive inference that this pattern generally reflects those of medical journals published in India.

From the African continent, one biblometric study was located which was carried out in the field of psychology by Omotayo (2004). The volumes of *Ife Psychologia* published from 1993 to 2002 were subjected to content analyses especially in terms of the format and recency of citation. This journal is published in Nigeria, Africa and is being indexed by *Phychological Abstracts*, *PsyLIT*, and *PsycINFO.* The study indicated an increase in the number of foreign contribution from 21.7% in the first six years for the volumes under study to 52% in the last four years. The subject coverage of the journal was broad (14 subfields) and there was roughly equal reference to journals (47.7%) and books (45.2%). The journal self-citation was low at 1.2%.

A more recent single journal study analysed a total of 571 articles published by the *Journal of Ayub Medical College (JAMC)* published between 1997 and 2006 by Ullah, Butt and Haroon (2008). This journal is published in Pakistan and is being indexed by *Index Medicus* and is in *Medline*. The study showed the growth of article publication by volume per year, the average distribution of citations per article (17.43), by volume and by year, by geographical area (the majority of citations were from foreign journals) the authorship publishing pattern (two and three-authored works ranked the highest), indicating the collaborative nature of medical research, the subject covered by the articles published, and journal self citations. In general, Pakistani authors seldom cite Pakistani literature as most preferred to cite works in foreign journals.

## SCIENCE AND TECHNOLOGY

There were 25 unique journals out of a total of 30 single journals bibliometrically

studied in the field of sciences and technology, out of which 16 were from Asia, five from the United State and Cuba, and two each were from the United Kingdom and Europe. Out of the 16 journals studied in Asia, 14 were from India and two from Malaysia, indicating active bibliometric studies in these countries.

Two single journals bibliometrically studied were published in the United Kingdom. Sarasvady and Pichappan (2001) analysed the journal *Nature* to determine its discipline orientation and to ascertain the standing of this journal in the sub-field of immunology. *Nature* is published weekly by the Nature Publishing Group, United Kingdom and was first published in 1869. The study tested an algorithm which produced a discipline contribution score (DCS) indicating the journal's standing in a field. This is done by analysing the citations given by immunology journals to *Nature.* The DCS score obtained by *Nature* placed it in the 12th place out of a total of 119 immunology journals listed in the *Journal Citation Report.* In this instance *Nature* does not only performed well as a multi-disciplinary journal in science but equally well in the discipline's sub-field of immunology. The contribution of this study is an improved calculation method to determine the DCS of a journal. Arkhipov (1999) reviewed 300,000 reports in *Nature* during the period 1869 to 1998 and categorized the reports by subfields. It was observed that *Nature* had given priority to earth sciences in the early twentieth century and have shifted to analytical chemistry and biomedical sciences in the later part of the twentieth century.

In 2008, Pilkington studied the *IEEE Transactions on Engineering Management (IEEE TEM*). This journal is being indexed by *Science Citation Index, Social Sciences Citations Index, Compendex, ABI/Informs, and INSPEC*. The author had collected data from volumes 41 to 51 published between 1994 and 2004, which provided 526 articles authored by 822 different authors. This is a citation, co-citation study using the network analysis rechnique. The findings indicated the most frequently cited publication titles in general and specifically in the subfields of engineering management and management of technology, the wide range of subjects covered by the articles, the highly cited authors indicating the influence of individual writers in the discipline, keyword co-occurrence network (to examine the way that authors select words for their article titles and the relationships between different areas were represented diagrammatically), author co-citation analysis network (to investigate the subject of interest in this discipline and whether the ideas from different disciplines were being intergrated to synthesis new subjects or approaches), journal co-citaion network (to establish the coverage and academic entecedents of the discipline covered by the journal itself), and individual publication co-citations network (to investigate the central ideas of engineering management and management of technology and the relations amongst topics). The study had identified the main interests and sub-fields covered by articles in the journal.

In the Americana and the United States five bibliometric single journal studies were located. The first was by Torricella-Morales et al. (2000) who studied the *Cuban Journal of Agricultural Science (CJAS*) covering issues published between 1988 and 1999. This Cuban research journal is indexed by ISI's *Web of Science*. The study examined the

articles published in *CJAS* , the journal's impact factor, citing journals, self-citation, cited authors, co-citation patterns and the frequent keywords used by cited authors. Self-citation rate for *CJAS* was high (>70%). The high level of self-citation may be attributed to the highly specialized area of the journal.

Another American single journal study was undertaken by Onodera (2001) who analysed the contents of *Journal of Chemical Information and Computer Sciences (JCICS*). This journal is published by the American Chemical Society and is being indexed by *CAS, SCOPUS, Proquest*, *PubMed, ISI Web of Science*, and *SwetsWise*. The study analysed the trends in subject and topics covered by the journals, the international standing of *JCICS* compared to other journals in the field and those published by the American Chemical Society. The results indicated that *JCICS* have published more articles on molecular information science then the traditional coverage of information science and computer applications to chemistry, inferring a shift in research interest.

In 2006, Crawle-Low (2006) analysed citation patterns of researchers publishing in the *American Journal of Veterinary Research (AJVR*). This journal is published by the American Veterinary Medical Association since 1965 and is indexed by *BIOSIS Previews*, *Science Citation Index* and *Medline (PubMED*). The outcome of this single journal study is a core list of veterinary medicine journals which served as a useful tool for medical librarians. The study analysed a total of 25,000 bibliographic references referenced by articles in the *AJVR* published between 2001 and 2003. The citations were analysed in terms of material type, date of publication (to determine recency) and frequency of journals cited, The cited journals were than ranked in order of decreasing productivity to create a core list of journals most frequently used by veterinary medical researchers. The majority of cited items were journals (88.8%), followed by books (9.8%) and grey literature. The Bradford's zonal distribution of productive journals was indicated as 24 (core): 139 : 1,409 producing 7,361 : 7,414 ; 7,422 cited articles respectively. The study highlighted that 65% of co-citations to journals and 77% citation to books were published since 1990, indicating the age of resources which researchers in this field found relevant.

In Chemistry, Willett (2007) studied the American *Journal of Molecular Graphic and Modelling (JMGM)* (formerly known as *Journal of Molecular Graphics*). This journal is available fulltext from ScienceDirect and is indexed by *Biotechnology Citation Index, Chemical Abstracts, Chemistry Citation Index, Computer and Information Systems Abstracts Journal, Current Contents, Elsevier BIOBASE ISI, Index Medicus, Medline,* and *Science Citation Index*. The analyses was based on volumes 2 to 24 of *JMGM*. The following bibliometric analyses was made (a) author productivity using Lotka's law; (b) subject coverage; (c) citation analyses; (d) journals closely associated with *JMGM*; and (f) articles distribution by geographical area and institutional affiliation. The study highlighted the most highly cited papers were those describing systems or algorithms. However, this type of articles was descreasing as more applications of molecular graphics and molecular modelling were reported, indicating a change in the journal's contents over the years under study. The journal is international in scope with high

contributions from non-US authors. Papers were also contributed by a mixture of authors affiliated to academicians, government, non-profit and commercial organizations.

Another single journal study published in the United States in 2007 was *Economic Botany (EB)* by Biswas, Roy and Sen (2007). This journal is published by the Society for Economic Botany and is published by Springer, New York and indexed by *Biosis Previews* and *Science Citation Index*. Biswas, Roy and Sen analysed 358 contributions published in *EB* between 1994 and 2003. The study examined the: (a)distribution of articles over the years under study; (b) the authorship pattern; (c) the citations referenced by the articles; (d) length of articles in terms of pages; (e) types of illustrations included in articles, (f) institution-wise distribution of the articles; (g) subject breakdown of the articles; and (h) geographical distribution of the articles. On average nine articles were published per issue and 36 articles per volume. The average length of articles was 11 pages. About 30.4% of articles were single-authored and 48.6% were authored by two or three authors. The average number of citations per article was 38 and books were cited more (59%) than journals (41%). E-resouces began to be cited from 1998 and the percentage remains low (1%). Authors from academic institutions contributed most of the articles (60.6%). There were higher contributions from the United States (27.9%) followed by United Kingdom (10.1%), Mexico (9.2%) and India (4.5%).

A total of two single journal studies on European journals were located. The first was by Kortelainen (2001) who had studied the extent of innovation diffusion supported by the Finnish journal *Annales Zoologici Fennici* (*AZF*) over a period of 25 years. This journal is published by the Finnish Zoological and Botanical Publishing Board, University of Helsinki, Finland and indexed by *Biological Abstracts*, *Elsevier BIOBASE/Current Awareness in Biological Sciences* and the *Science Citation Index*. It recorded an impact factor of 1.537 based on *JCR* 2007. Innovation was defined as an idea represented by a publication. The diffusion of innovations is characterized by the following attributes, observability, compatibility and complexity based on Roger's theory of diffusion of innovation (1995). The observability of an article was gauged by its international visibility of the journal which published it (impact factor value of the publishing journal) as this was also considered a factor that influenced author's choice in using the journal as a channel to communicate their research. The compatibility of *AZF* was studied on the basis of its geographical task definition. The complexity of an innovation will reduce the number of adopters. Complexity in this case is related to the language of the article where articles published in the English language tend to receive more citations (Thorp, et al, 1988; Liu, 1997) than those articles in languages other than English. Non-English language articles made access and adoption difficult and complex. To measure diffusion innovation, information gathered from the journal are as follows: (a) authorship productivity and pattern; (b) authors's country of origin to determine international diffusion; (c) the editorial policy to support the observability of the journal; (d) the publishing language and information about authors to determine the complexity of *AZF*; (e) the availability of the journal in secondary sources was used to establish the journals accessibility to international audience; and (f) the citation and impact factor counts

published in the *Journal Citation Report* to indicate awareness of *AZF* and citations from new areas. Citations were considered domestic if one of the citing authors is Finnish. This data is used to determine observability. The study provides an introductory exploration into diffusion research using informetric and bibliometric methods.

Another single journal study published in Europe was carried out in 2004 on the *Journal of Structural Chemistry* (JSC) by Buznik, et al. (2004). This journal was published by the Siberian Branch of the Russian Academy of Sciences since 1960 and is being indexed by *Chemical Abstracts Service (CAS),* and *SCOPUS.* The characteristics of the journal was analysed in terms of article productivity, types of submissions published, topics covered, the most active authors, authors' affiliation, citation totals, average and pattern. Review articles form less than 3% throughout the issues under study, despite being more widely cited. On average, about 150 articles were published per year, three to four authors were a typical character of submissions in this field and most of them were affiliation to the Russian Academy of Sciences. It was observed that as *JSC* published 12 issues per year, its ability to accomodate more articles have also increased. The paper suggested the need to accomodate more foreign papers to help increase the journal's rating, citation and impact factor.

From Asia there were 16 bibliometrics study on unique single journals and 14 were published in India. Vij and Bedi (1999) bibliometrically studied ten years issues published in *Defense Science Journal*. This journal is published bi-monthly by the Defence Scientific Information and Documentation Centre (DESIDOC), New Delhi, India. The journal is indexed by *Chemical Abstracts, INSPEC, Physics Abstracts, International Aerospace Abstracts, Electrical and Electronic Abstracts, Current Mathematical Publications, BIOSIS, Compendex, Engineering Index, Indian Science Abstracts,* and *Cambridge Scientific Abstracts.* However, this article could not be located.

In 2000, Sivasubramanian analysed *Indian Coffee*, a journal, which is published monthly by the Coffee Board Bangalore, India. There was no indexation information of this journal and as such it is assumed to be more national than international in nature. The results revealed that (a) the number of papers published was relatively high ranging between a low of 15 in 1991 to as high as 72 in 1998; (b) most were written by single authors (64.08%) with two authors being 16.5%; (c) the papers published were relatively short with over 64% between 1-3 pages and 29% between four to six pages; (d) the majority of papers had no references (81%), with 8% listing 10 or more references; and (e) the subject covered by the articles are mainly concerning plantation, cultivation and processing (22%), standards and quality (15%), pest and diseases (13%) and economic aspects (12%). The results infer that coffee researchers in India mainly use this journal to publish and the lack of citations may be due to non-access to new research publications and therefore reseachers failed to use the latest information in their research communication.

Also in 2000, Dhiman studied the journal *Ethnobotany*, analysing 175 articles produced between 1989 and 1998. This journal is published by the Society of Ethnobotanists, India

and is indexed by *Medicinal & Aromatic Plants Abstracts* and *Indian Science Abstracts*. The study examined article productivity and distribution by year, article distribution by institution and country; the authorship productivity and pattern; the range of references cited and length of the articles. The publication output in the journals fluctuated ranging from a low of eight articles to 29 per year. Academicians from universities and colleges were the largest contributors of articles (77.7%). Most of the articles were by Indian authors (81.7%), indicating that the journal in more national in orientation. Single authorship was higher (39.6%) than two-authored (35%) and three-authored (17.8%) works. The number of citations per article ranged between one to ten citations (42.7%), followed by 11 to 20 citations (25.1%) and the average length of articles was six pages.
Another Indian study was by Das and Sen (2001) who analysed the 1049 citations referenced in 34 research articles published in issues numbers two to four of volume 20 of the *Journal of Bioscience* for the year 2000. This journal is published quarterly by the Indian Academy of Biosciences in Bangalore, India and is being indexed by *Science Citation Index* since 1982. The authors found that the authorship pattern of the citations were mainly two or three authored works (52.7%) compared to single authored works (18.6%) and four or more authored works (28.6%). This indicated that research team size in bioscience was large and on top of that, about 25 articles were mega-authored (ten or more authors). The sources referenced by the bioscientists were mainly journal articles (85.8%) and monographs (10%). Most of the works cited were by foreign authors with only 5.53% to Indian authors. Author self-citation is about 10.8% and journal self-citation is 0.57%.

In the same year, Dutta and Sen (2000; 2001) analysed 1011 citations referenced in 27 research articles published in the January to March issues of the *Indian Journal of Chemistry Section A* contributed by 61 authors. The average number of citations was about 37.4. This journal is published by the National Science Academy India and is indexed amongst others by the *Science Citation Index* and *Scopus.*

In the field of agriculture, a bibliometric study was carried out by Ramesh and Nagaraju (2002) on *International Journal of Tropical Agriculture (IJTA)*. This is an Indian journal published quarterly by Vidya International Publishers, Haryana Agriculture University. No indexation information is available and as such it is expected that the journal is more national in nature. Analyses of the journal were based on 464 papers published in ten volumes from 1991 to 2000. Bibliometric indicators looked at were (a) total articles published; (b) the authorship pattern; (c) degree of collaboration; (d) affiliation status of authors; (e)the geographic location of authors; (f) the length of articles; and (g) the total references used by authors. As suspected, *IJTA* plays a more national role for Indian agricultural research community. The results indicated that (a) the number of articles published per year fluctuated and was inconsistent from a low of 35 articles in 1998 to as high as 64 in 2000; (b) joint authorship was the norm (89.6%) and only 10.3% were single-authored; (c) authors from academic institutions contributed the most (75%) followed by research institutions (19%) and government departments (2%); (d) Indian authors form the majority of contributors (87%) while the rest (13%) were from foreign authors with the highest contributions from Nigeria (4.1%) and Bangladesh (3%); (e)

over 94% of articles were between one to ten pages long, and (f) over 58% of authors cite between one to ten references.

In the field of forestry Hazarika, Goswami and Das (2003) studied articles published in the journal *Indian Forester*. This journal is a primary journal in the discipline of forestry in India, published by the Society of Indian Forester. It is indexed by *Scopus*. The results indicated that the number of articles published ranged from a low of 114 in 1992 to a high of 156 in 1996. The main contributors were affiliated to research institutes (51.3%) especially from the indian Council of Forestry Research and Education followed by the Indian state forest departments (26.8%) and academic institutions (13.3%); the number of foreign contributions is very small at about 2% inferring the national status of this journal; the percentage of multi-authored works was about 64.5%; the most popular area of research was silviculture (30.6%), ecology, environmental biodiversity (8.4%) and wildlife and nature coservation (8.2%); over 50% of articles cited were published within the last 10 years and the average length of the articles was four to six pages and seven to nine pages. Also in the field of forestry, Hazarika (2005) analysed 3798 citations referenced in 252 research papers published in the *Indian Journal of Forestry (IJF)* published between 2000 and 2002. The highest citation was to journals (60%) followed by books and monographs (28%) and technical reports (5%). The obselecence rate of forestry literature was 17-18 years. Forestry literature complied with Bradford's law of scattering based on the number of citations received and the core list of forestry journals preferred by forestry scientists was compliled. *IJF* is published quarterly by Dehradun in India and no indexation information was located.

In 2003 Senapati bibliometrically analysed *Journal of Rock Mechanics and Tunnelling Technology.* This journal was published by the Indian Society of Rock Mechanics and Tunnelling Technology. The article could not be located and no indexation information can be found.

In the field of mathematics three bibliometric studies were undertaken on the *Indian Journal of Pure & Applied Mathematics (IJPAM*). This journal was first published quarterly in 1970 by the Indian National Science Academy and in 1973, it became bimonthly. *IJPAM* is indexed by *Science Citation Index* and a host of other indexing databases. The first two studies were by Dutta and Sen (2000, 2001) who focussed on analysing citations referenced by articles. The third study was by Narang (2004) who analysed 807 articles published in 1970 (the initial year) and those published in 1998 to 2002. The journal published a large number of articles each year ranging from 118 in 1998 to 172 in 2002 indicating an increasing trend. The authors in this field collaborated with 65% of articles being written jointly. Academic institutions contributed the most articles (58%). The average items referenced was 11 and journal articles were used the most (74.50%), indicating that journals were the main channel for communicating and referencing. The study also revealed 50.5% of article contributions was from India and 49.5% was from abroad with China topping the list. The number of pages per volume had increased over the five years.

Biradar (2006) studied the references used in articles published in *Indian Journal of Environmental Protection* volumes 14, 19 and 24 for the years 1994, 1999 and 2004. This journal is published by Scientific Publishers and indexed by the *Science Citation Index.* The study found that most articles were jointly authored rather than singly authored. The degree of collaboration varies from year to year and is found to be 0.78 to 0.95. The overall degree of collaboration is found to be 0.85. Articles in the journal on an average had 11.59 references. Authors affiliated to universities were the major contributor (31.62%) followed by colleges (24.05%) and research institutions (23.78%). The proportion of single-authored papers have decreased from 20.29% in 1994 to 4.76% in 2004.

Dixit and Katare (2007) studied the *Journal of the Indian Society of Cotton Improvement* published for the period 1995 to 2004. This journal is a leading Indian journal in the field of cotton science and is indexed by *Textile Technology Index*. The study found that joint authorship is a characteristic of articles published in this journal, where single authorship was only 11.6% compared to 35.5% three-authored and 28.1% two-authored works. The majority of articles were written by authors from academic institutions. Journals were the main source of reference whereby out of 3,521 citations, 72% were journal articles followed by 9% conference proceedings and 7% to books. About 74% of journal articles cited were from non-Indian journals. Web citations first appeared in 2001. The average citations per article was 10.76. To increase diversity of coverage, the authors proposed that apart from publishing works on basic research in cotton, other related areas should be considered for inclusion such as extension economics and agricultural engineering. Another study on textile related field is by Jena (2006) who studied articles published in *Indian Journal of Fibre and Textitle Research (IJFTR)* within the period 1996 to 2004. The study observed the trend of publication productivity over the years, bibliographical distribution of citations, authorship pattern, citation pattern, average length of articles, number of tables and figures, time lag in publication, geographical distribution of authors and subject areas covered. *IJFTR* is published by the National Institute of Science, Communication and Information Resources and is being indexed by amongst others the *Material Science Citation Index* and *Scopus*.

The field of food science in India was studied through the *Journal of Food Science and Technology (JFST)* published by Association of Food Scientists and Technologist, India by Vijay and Raghavan (2007). This journal is published bimonthly in 1964 and indexed by *AGRIS* (India), *BIOSIS*, *Chemical Abstracts*, Current *Contents – Agricultural, Biology and Environmental Sciences*, *CAB Abstracts*, *Food Science and Technology Abstracts*, *International Packaging Abstracts*, and *Science Citation Index*. Bibliometric analysis of 779 articles from 30 issues for the years 2000 to 2004 and the maiden issue in 1964 as well as the citations they carry was studied. The results indicated that India was the major contributing country in the 1964, 2000 to 2004 issues. However, foreign contributions increased from just the United States in the maiden issues to 32 foreign countries in the later issues (15%). On the whole the ratio of Indian and international contributions was 85 : 15. The contributions from the African and South American

countries was significant. Joint-authored works were evidenced by a hugh percentage of two-authored works with only 6.67% being single-authored. *JFST* was highly referenced in citations of articles submitted (>70%) indicating its status as a major source of reference for research in the field of food science. The articles published were shorter in length when compared to those in the 1964 issues, while the number of pages per volume had increased.

From Malaysia, one journal in the field of agriculture was studied by 3 articles. Tiew (2000) analysed the *Journal of Natural Rubber Research (JNRR)* published from 1988 to 1997. This journal is published by the Rubber Research Institute of Malaysia and indexed in *Excerpta Medica, Biological Abstracts* and *Chemical Abstracts* The study focused on the extent of journal and author self-citation. More than half of the contributions (53%) to the journal contained self-citation and 40% of the articles had at least one journal self-citation. The mean score of journal self-citation was 8.4. The majority (33.2%) of authors cited themselves at least once and 23% of authors cited themselves twice. The study highlighted problems brought about by the inconsistency in citing Chinese and Malay names. Tiew suggested that this perhaps could be avoided with a more detailed instruction to authors. *JNRR* was revisited by Tiew and Kiran (2000), using the same sample of articles but focusing on citation analysis and authorship pattern. A total of 256 articles were analysed and the average number of citations was 16.2. There was higher referencing to journal articles (71.8%) followed by monographs (13.11%) and conference proceedings (4.1%). More articles were single-authored (38.4%) compared to two (31.2%) and three (15.3%) authored contributions. The literature dated around 1978 to 1987 recorded the highest number of citations (55.7%). *JNRR* was again analysed by Tiew and Sen in 2002 and this time the bibliographic data studied was the acknowledgement types and occurences in articles. The Cronin-McKenzie-Rubio typology was used to classify the acknowledgements. The study reported that acknowledgements were quite common in the field of rubber studies as 74% of articles had included acknowledgements. The most common type of acknowledgement was the technical type (26%), gratitude for access to facilities (15%), for giving moral support (13%), for financial support (12%) and clerical support (7%).

Anyi (2008) undertook a bibliometric study on the *Malaysian Journal of Computer Science (MJCS)*. The sample comprises 272 articles, 4634 citations referenced by the articles published from 1985 to 2007 and citation data obtained from Google Scholar. The study found that the publication productivity of articles per year was consistent. The authorship pattern did not follow exactly the n value of Lotka's law, being n=2.85 and the most productive authors were academicians (89.2%) who had served as the journal's editorial members. A high percentage of articles was produced by members of the same faculty of the same university (65.1%). Male authors contributed more articles (76.18%). Co-authored works were increasing, especially three-authored works and Malaysians contributed more articles (66.9%).The average words per article was 9.22 and the averaged number of citations was 17. Journal articles were the main resource referenced (38.7%), followed by books (26.24%). The half-life of citations was six years and the journal self-citations occurred at 7.93%. Google scholar indicated 73 literatures

citing *MJCS* articles, 29 of which were from Malaysia and 44 from foreign works. Based on the citations obtained from Google Scholar, the impact factor of the journal was calculated to be 0.182 in 1999, 0.1250 in 1998 and 0.105 in the year 2000, indicating issues from 1996 onwards were attracting more citations. *MJCS* is currently being indexed in *Inspec, Scopus* and *Science Citation Index.* The limitations of using Google Scholar to obtain citation information was acknowledged.

## LIBRARY AND INFORMATION SCIENCE

The field of Library and Information Science is treated separately because of the larger number of bibliometric studies found on single journals. This was also revealed by Tiew's review on single journal studies (1997). There were 21 studies reported in literature on 11 unique journal titles since some journals were studied by more than one article. The studies will be described by the unique titles and the region which publishes the journal, the United Kingdom (one unique title), United States (5), Europe (2) and Asia (3) in that order.

From the United Kingdom, three studies were located which analysed the *Journal of Documentation (JDoc)* (Rowlands, 2002, Naqvi, 2005, Nebelong-Bonnevie and Frandsen, 2006). *JDoc* is published bimonthly by the Emerald Group on behalf of ASLIB, London. Its first issue was published in 1944. This journal is indexed by the *Social Science Citation index*, *Scopus* and host of other major LIS related indexing services.

Rowland (2002) studied the diffusion effect of *JDoc* in terms of its multi-disciplinary coverage (range of resources cited), its ability to export ideas (citations received) and the company it keeps (co-citations). Journal diffusion was calculated by totaling the number of citing journals that an average article is cited and dividing this by the total number of citations multiply by 100 or the average number of citing journals per 100 citations. *JDOC* achieved a journal diffusion factor of 9.6. This was regarded as comparatively low and indicated that *JDoc* did not diffuse as far into the scientific community. *JDoc* was also subjected to journal co-citation analyses. The journal's image was evaluated by the journals that were cited together with *JDoc* or the journal company it kept. It placed the journal in a network of similar journals and identify the journals co-cited with *JDOC* as well as revealed the fields in which ideas in *JDOC* were being diffused. Both indicators, citation identity and citation image helped to indicate not only the characteristics of a journal but also its position (core or peripheral) and its influence within its own field or other related fields.

Naqvi (2005) visited *JDo*c to bibliometrically analysed 251 articles obtained from issues published for ten years between 1994 and 2003. The results indicated that (a) the distribution of papers published per year ranged from 16 to 38, (b) over 55.8% of articles were single-authored with two works about 27.9%; (c) authors affiliated to academic institutions contributed 87.6% of articles; (d) the number of references used by the authors were high with 45% citing 21 to 50 references, and 33.4% citing 1 to 20

references; (e) 51.4% of papers were from the United Kingdom (country where the journal is published) and the rest came from other parts of the world.

*JDoc* was also studied by Nebelong-Bonnevie and Frandsen (2006) who used methods and theories from single-author analysis to obtain a bibliometric portrait of the journal. They focused on applying the concept of citation identity and citation image to *JDOC*. Citation identity (first used by White, 2001 and Cronin and Shaw, 2001, 2002 to analyse single authors) refers to analyzing references cited in *JDOC* in terms of: (a) citations/cite ratio or average references per article; (b) rate of unique and recitations of references; (c) document type of references (research articles, book reviews); and (d) the rate of self-citations. A low average citation/citor would infer greater diversity of resources and journals being referenced and a high average may indicate narrower diversity. A high rate of self-citations may be the norm for a particular field where multiple authorship is frequently practiced (Synder and Bonzi, 1998). Studies have indicated a gradual increase of journal self-citations (Peritz and Barllan, 2002) and low self citations may indicate either scientific influence or isolation (Rousseau, 1999). For *JDOC*, the citations/cite ratio was found to be 1.55 which is low and may indicate greater diversity of resources being used. *JDOC* achieved an average of 3.9 self-citing rate. This low self-citation rate indicated that the fields covered by the journal were less isolated, which was typical of a core journal. A high self-cited rate could signify either low visibility of a field or the journal may be peripheral in the LIS field. Rousseau (1999) hypothesized that a low self-citation rate meant higher visibility in the field and vice versa. Therefore, self-citation would be low for core journals and high for peripheral journals.

In the United States, the most analysed single journal in the field of library and information science is the *Journal of the American Society for Information Science (JASIS)* which later changed its title to *Journal of the American Society for Information Science and Technologist (JASIST*). Al-Ghamdi et al (1998) examined the authorship patterns of articles published in *JASIST* from 1970 to 1996. The trends in authorship were analysed in terms of authorship frequency, co-authorship pattern, author distribution by gender, geographical location and institutional affiliation. Lotka's law of author dispersion was confirmed when the results showed that the majority of authors contributed not more than two articles and only a small percentage of authors were highly productive. The majority of articles were also single authored (61%) indicating a field that is not highly collaborative although the number is increasing in recent years. The study also found an increasing trend of female authors, non-American authors and authors from Library and Information Science (LIS) schools.

In 1999, JASIST issued a number of special issues commemorating 50 years of its existance and as a result a number of articles were published which used bibliometrics to study the trends of publication, authorship and collaboration pattern of articles published and this includes studies by Lipetz (1999) and Nisonger (1999). Lipetz (1999) analysed various aspects of authorship of articles published in *JASIST*. One volume from each decade over 50 years of publication (1955, 1965, 1975, 1985 and 1995) were examined. Data collected were authors who contributed articles, their gender,

geographical location of authors not from the United States. The length, content, citations and self-citations were also evaluated. In summary, Lipetz revealed that the growth of LIS articles as reflected by contributions to *JASIST* was exponential, from 21 to 68 per year. Multiple-authored articles, female authors and submissions from foreign authors were increasing even though at both counts this was still not outstanding. Titles of articles were informative, but used more words as inferred from the increased use of colons in titles. All articles carried citations and the the average number of citations per paper had increased. There was a dramatic increase in contributions from academic authors and less from practicing professionals and hence the decreasing number of articles covering the applied aspects of LIS (less than 25% in 1955 to 90% in 1995). Journal self-citation increased from 23% in 1955 to 82% in 1995. Nisonger (1999) dealt with the issue of journal ranking explaining its theoretical and practical significance and proposed eight variables which could be used to classify journal ranking studies. Among other measures used included citation counts, article productivity and subject judgement. Nisonger analysed *American Documentation* and *JASIS* based on the measures and indicated the ranked positions achieved. It is noted that *JASIST* was often listed among "core" LIS journals in bibliometric studies.

Koehler, et al. (2000) revisited and referred to *JASIST* as an influential archival document that had inflenced the LIS discipline over a long period. The study analysed 2257 articles by 3518 authors published between 1950 (in *American Documentation*, previous name of *JASIS*) to 1999 (*JASIST*). The authors observed changes in terms of article characteristics (length, number of footnotes, types of footnotes), the authorship characteristics (number of authors, gender, corporate authorship, co-authorship and transnational authorship. It was observed that there was a shift from articles derived from non-funded research by single authors to articles which were increasingly funded and multi-authored from various regions or countries. The researchers suggested that this reflected a more complex and cross-fertilized research activity. The study found among others that (a) the number of issues and the number of articles per volume had increased over the period being studied; (b) there was change in the authorship pattern with increasing multi-authored works and more contributions from authors affiliated to academic institutions (66%) compared to those from corporations (17/79%); (c) the number of citations within the articles had increased, with a higher percentage referencing journals then to books and the number of Internet resources began to emerge after the 1990s; (d) there were more male authors (69.0%) compared to women (24.7%); and (e) there was an increase in foreign authored articles, even though American contributions still predominated. In summary, articles published in an influential journal could reflect the trends and emerging areas of research in a discipline. Also, the study of a journal addresses a range of variables and the changes that occur to the variables over time. These include changes in the authorship pattern, the emergence of multi-authored works, authors' gender and females as first authors as well the distribution of authors in accordance to affiliations, country and the shift from corporate and service oriented institutions toward university faculties. Koehler et al indicated that. "Journal articles offer many explicit and several implicit variables that point to the evolution of the *Journal* as well as the discipline it represents".

He (2001) and He and Spink (2002) analysed contribution from foreign authors in *JASIST* from 1950 to 1999. They found that there were 654 authors representing 52 countries and British and Canadian authors contributed most among the foreign authors. The studies had also compared the distribution of foreign authors contributing to *JASIST* and *JDoc*. The sample was all authors and their geographical locations of articles published in both journals. The study revealed that authors from the United Kingdom and Canada contributed most in *JASIST* and authors from the United States and Canada contributed most to *JDoc.*

In 2003, Liu revisited *JASIST* to find out the author productivity and co-authorship pattern of 208 research articles published between 2001 and 2002. There were 364 authors contributing articles in the two years under study, out of which 321 (88.0%) wrote only one article. Liu also found that the observed ratio of authors with two or more articles were lower than expected according to Lotka's law of author productivity. Also, single-authored works predominated (42.3%) followed by two authors (28.8%) and three or more authors (28.8%). However, the tendency for articles to be co-authored is increasing.

Recently, Rao and Bhusan (2008) compared *JASIST* with *Scientometrics* in their coverage of the subject "software studies". There was a trend towards two or more authored works in both journals both as a whole and also in articles on software studies. Tsay (2008) analysed the citations referenced in articles published by *JASIST* in 1980, 1985, 1990, 1995, 2000 and 2004 to analyse the characteristics of cited references in terms of the document type, the most cited resource, the country and subject distribution of the articles. Tsay's contention was that citations would reflect the documents preferred by researchers in the discipline, the journals and books most used, the subjects covered by the journals and books. Tsay found that (a) the article productivity in *JASIST* increased two to three times over the period studied with a trend to publish more issues and more articles per issue per year; (b) the average number of citations also increased over the years from 14.3 in 1980 to 28 in 1995 and 36.9 in 2004; (c) authors cited more journal articles (51%) compared to books and book chapters (23%), conference proceedings (15%) and electronic resources (5%); (d) journal self-citation was high (18.6%); (e) authors cited more journals published in the United States (63%), followed by those published in the United Kingdom (20%) and the Netherlands (6%) and the number of countries represented increased from nine to 26 over the years; (f) the subject areas covered by the journals were mainly library science (50%), science (22.7%) and social sciences (6.3%), and mainly covered subjects such as general bibibliography, machine methods in information and retrieval, mechanized bibliographic contriol.

There were three other bibliometric studies on single journals published in the United States. Wertheimer (2005) analysed and quantified bibliometrically the "goodness" of library history research based on articles published in four volumes of the *Journal of Library History/Libraries and Culture* published in 1967, 1977, 1987 and 1997. This journal is published quarterly by the University of Texas Press since 2006 as *Libraries and*

*the Cultural Record*. The journal is indexed by a host of LIS and historical indexes including the *Arts and Humanities Citation Index*. The author argued that most library historians used qualitative research methods in their research and this became problematic when evaluating the value of historical research. Bibliometric measures were adopted to study citations and references cited obtained from four volumes, which included author's gender, occupations, academic or other title, institutional affiliation, page length of articles, subjects of the study, number of distinct archival collections utilized, number of monographs and journals cited, their ages and the degree of self-citations. The study found that 73% of contributing authors were male and were students or academics affiliated to academic institutions. The journal had low percentage of self-citations, the average age of journals and monographs cited was 32 years and 40 years respectively, confirming the assertion that currency of literature is less important in the humanities. Articles tended to be lengthier, which allowed deeper analysi, offered theories and increased the use of secondary and primary literature.

Young (2006) explored bibliometrically *Library Quarterly (LQ)* covering the years 1956 to 2004. In the 48 years, there were 4226 articled covered. This journal is published by the University of Chicago Press since 1931 and is being indexed amongst others by *LISA, Social Sciences Citations Index* and *Inspec*. The journal's bibliometric dimensions analysed were contributor attributes, author rankings and citation impact. The author found that more than 50 percent of the top thirty contributors had served on the editorial board of *LQ* and a large majority of them were either from the University of Chicago (doctoral graduates or faculty or both). The study found a correlation between the most highly cited authors within *LQ* corpus and these authors' citations on the *Web of Science*. This confirmed the hypothesis that top contributors to a journal were more likely to generate higher citation counts in articles from external journals. The study also found that *LQ* continues to receive contributions from nearly one-half of the world's most cited LIS scientists, which infer that the journal is reputable and impactful. Young mentioned several bibliometric measures that could be used in future assessment of *LQ* such as journal attraction power (the proportion of articles written by authors outside the country), author associativity (collaborative authorship) and consumption index (popularity and citation factors of the journal from both its own and other scholarly journals).

Coleman (2006) conducted a study on the *Journal of Education for Library and Information Science (JELIS)*. *JELIS* is a quarterly journal published by H.W. Wilson for the Association for Library and Information Science Education and is being indexed by several indexing databases including *Current Contents, Current Index to Journals in Education, Education Index, Education Abstracts, Information Science Abstracts, Library and Information Science Abstracts, Library Literature* , *Social Science Citation Index*, and *Research into Higher Education Abstracts.* Coleman assessed the value of the journal by using three measures, (a) the journal attraction power (degree of foreign authored works), author associativity (degree of collaboration) and journal consumption power. Other measures used to determine a journal's value includes the number of references cited, number of articles submitted, subject coverage, affiliation and geographical

distribution and cited journal distribution.

Two bibliometric single journal study were found to be published in Europe. A number of studies was undertaken to analysed articles published in *Scientometrics. Scientometrics* is published by Springer fomerly Kluwer Academic Publishers (Impact factor: 1.472, 2007 JCI) with Akadémiai Kiadó, Budapest, Hungary. Amongst others, this journal is indexed by *Current Contents: Social & Behavioral Sciences, Information Science & Technology Abstracts (ISTA), Journal Citation Reports, LISA (Library and Information Sciences Abstracts), Science Citation Index, SCOPUS, Social Science Citation Index,* and *Sociological Abstracts*. Based on the 2007 *JCR* report, its impact factor was 1.472 and ranked 12 of 56 among LIS journals.

Schoepflin and Glanzel (2001) assessed whether bibliometrics have evolved from a soft science field towards harder sciences or whether it could be characterized as a social science field or a heterogeneous field. They have classified all 75 papers from the years 1980, 1989 and 1997 published in *Scientometrics* into six categories representing the main fields of approaches to bibliometrics. The indicators taken as measurement were all references cited in articles, notes and letters, and age of the references . The references were categorized into serials and non-serials. The price index per paper was calculated, that is the percentage of references not older than 5 years old and commonly used as a measure between the hard and soft sciences, the percentage of references to serials, the mean reference age (that is the age of references cited) and the mean reference rate (the ratio of the number of references cited by a journal and the total number of papers published in the journal). Case studies and empirical papers contributed 35 (47%) papers out of 75 and methodological papers which included applications were also well represented (25 articles). The results show that most papers in *Scientometrics* were 'harder' and the serial's share of distribution indicate a characteristic similar to that of a hard social science journal.

Bharvi, Garg and Bali (2003) analysed 1317 papers published in *Scientometrics* between 1978 and 2001. They revealed that the journal had focused on scientometric assessment, that American contributions in terms of papers seemed to be on the decline and those from the Netherlands, India, France and Japan was increasing. Single-authored works predominated but multi-authored works were increasing. The number of collaborative papers were also increasing.

In the same year Garg (2003) analysed articles published in Sci*entometrics* between 1978 and 2000. Garg provided a comprehensive review and listed all studies on cross national, national and institutional assessments using scientometric methods that has been published in the journal. In this instance, the articles in *Scientometrics* were categorized by types of study and under each type the works were listed under country of the author. This type of study is useful if carried out on highly influential journals such as *Scientometrics* and would be a good starting source for researchers undertaking, cross-national, national and institutional assessment. Garg undertook various assessments which include (a) technological capabilities as measured by domestic

patent applications, and economic size of the country in terms of GNP; (b) scientific capacity as measured by the number of scientific articles produced, (c) publication pattern as measured by multi-variate analysis over a period, and (d) geographical proximity and economic development. *Scientometrics* was compared to *JASIST* by Rao and Bhusan (2008) and this has been described above under the section that deals with studies on *JASIST*.

Persson (undated) posted a white paper on the Web entitled, *A bibliometric view of scientometrics* (http://www8.umu.se/inforsk/scientometrics/ index.html). This paper provided a series of bibliometric maps of 1062 papers published in *Scientometrics* from Volume 1 (1958) to Volume 58 (1999). The number of times a paper has been cited was obtained from the *SSCI* and the papers and books most cited. Persson mapped citation links among authors and indicated the dominant research institutes in Hungary and Leiden. The co-citation map was also derived indicating the closeness of authors in terms of shared cited references. When applied to countries, it indicated that the United States was at the centre with Hungary second. Co-citation map of *Scientometrics* as a journal was also created to show its position in relation to other LIS journals.

Another European journal in LIS being subjected to bibliometric analysis was *Knowledge Organization (KO*) (formerly *International Classification*) was studied by Haridasan and Kulshrestha (2007). *KO* is a quarterly journal published by the International Society for Knowledge Organization in 1974 under the former title and in 1993 under the new title by K.G. Saur Verlag of Munchen. It is indexed by *Information Science Abstracts, INSPEC, LISA, Library Literature* and *Sociological Abstracts.* The authors analysed the citations referenced in articles to understand the information needs, use pattern and use behaviour of library and information science researchers who were engaged in the field of knowledge organization. The sample comprises a total of 2462 references from each article published in *KO* from 1993 to 2001. The study revealed that the average number of citations was around 21 per article and the main source of citations was books and resources which were published between 1982 to 1991 (19 years). Authors from the United States, United Kingdom and Germany were the major contributors and among the Asian countries India ranked seventh in terms of contributions. English was the main language used by contributors even though the journal is published in Germany. The cited half-life of literature cited was 14 years. Authorship pattern showed a tendency towards single authorship (76.2%). The study had worked out a model citation index for the first seven cited authors and revealed the historical relationship between cited and citing documents. The authors indicated that the index could be used to identify the most cited authors as researchers currently working on special problems, to determine whether a paper has been cited, whether there has been a review of a subject, whether a concept has been applied, a theory confirmed or methods improved.

From India, *Annals of Library and Information Studies (ALIS)* was studied by Chaurasia (2008). This journal is published by the National Institute of Science Communication and Information Resources in New Delhi. *ALIS* is indexed by the *Library and Information*

*Science Abstracts* and *Indian Library and Information Science Abstracts*, India. Chaurasia studied a total of 20 issues published between 2002 and 2006 and measures analysed were the number of articles per volume, authorship pattern, degree of collaboration, subject coverage of articles, institutional and geographical contributions in the journal, dispersion and types of references cited by articles. The average number of contributions per volume was 21.4 and the majority of papers were authored jointly. Chaurasia used the Degree of collaboration formulated by Subramaniam (1983) to determine the extent of collaboration in quantitative terms. Most of the papers were contributed by library professionals affiliated to university and college libraries and the majority of contributions were from India (96.2%). The sources cited were mainly journals (50.1%) followed by books (19.9%). The small sample of issues limits the validity of the results and may not represent LIS journals published in India.

Three published studies were found to bibliometrically study the *Malaysian Journal of Library & Information Science (*MJLIS*)*. *MJLIS* is published bi-annually by the Faculty of Computer Science and Information Technology, University of Malaya. It is indexed by *Scopus, Social Science Citation Index, Library Literature*, *and Library and Information Science Abstracts.* The earliest study was carried out by Tiew, Abrizah and Kiran (2002) who examined articles published from 1996 to 2000. The study determined the number of articles published per volume over the five years, type of articles, distribution of references per volume and per article; authorship pattern of articles; most prolific authors; affiliation and geographical distibution of contributing authors; page lengths of articles; subject coverage; extent of author and journal self-citation. The results showed that the average distribution of references per article was 22.5 citations. Most articles carried between one to ten references. Multi-authored articles (52.6%) slightly outnumbered single-authored articles (47.4%). The majority of authors were from Malaysia (45%), followed by India (31.2%) and Bangladesh (11.2%). Authors affiliated to library schools contributed the most articles, especially those attached to the library school at the Faculty of Computer Science and Information Technology, University of Malaya, the publisher of the journal. Out of a total of 76 articles, 39.5% contained author's self-citation and 27.6% contained journal self-citation.

*MJLIS* was revisited by Aryati and Wilson in 2008. They analysed publication and citation patterns of articles published in *MJLIS* from 2001 to 2006 and compared their findings with those obtained by Tiew, Abrizah and Kiran (2002). To make statistical comparisons with the previous study the $\chi^2$ test at the 0.05 level of significance was used. The authors carried out publication analyses (number of articles published, number of references per article, authorship patterns and productivity, author's geographical and institutional affliation, subject category of articles, author and journal self-citations and length of articles and citation analyses. They found that the majority of the articles have on average between 11 to 20 citations. Two-authored articles were more predominant and the most prolific authors were still the academics from the library school at the Faculty of Computer Science and Information Technology, University of Malaya. Most of the authors were from Malaysia, followed by India and Blangladesh. There was an increase contributions from authors affiliated to academic libraries. The number of self-citation

was 40% wherelse journal self-citation was only 15%. The authors concluded that there had been significant changes in the types of articles, number of references cited per article and length of articles published in *MJLIS.*

Another Malaysian journal studied was *Sekitar Perpustakaan [About Libraries*] by Tiew (2006). *Sekitar Perpustakaan* is one of the oldest Library and Information Science journal in Malaysia published by the National Library of Malaysia since 1981. Tiew analysed 148 articles published in 20 issues covering the period 1994 to 2003. He analysed the authorship pattern in terms of name, gender, status, affiliation, and language preference. The findings revealed that single-authored articles (79%) outnumbered multi-authored works. Female authors (65.7%) predominated compared to male contributors (34.2%), middle-level professionals were the largest contributors (59.3%), more articles were published in the Malay language (56%), and a high percentage of authors were affiliated to the National Library of Malaysia (28%). Tiew suggested that the journal should attempt to adopt a more international approach to become more visible.

## CONCLUSION

In summary, the 82 bibliometric studies on single journals indicated the following situations. Firstly, the number of bibliometric studies on single journals in the Sciences and Technology remained high with 36% and when this was combined with with studies on Medical and Health Sciences journals (19%), the proportion increased to 58%. The number of bibliometric studies on journals in the field of Library and Information Science (LIS) was also high at 26% and when this was combined with those in the arts, Humanities and the Social Sciences, the proportion increased to 41%. This was similarly indicated by Tiew (1997) when he reviewed bibliometric literature on single journals covering the years 1969 to 1997. The LIS fields indicated more journal revisits. *JASIST, JDoc* and *Scientometrics* were revisited several times during the pre and post 1998 years reflecting their continued influence and importance in sustaining the interests of bibliometrists over the years.

Secondly, out of the 82 studies, there were 62 unique journal titles as some journals were revisited in several studies. The majority of journals studied were published in the Asian and African countries (34, 41.4%), followed by those from the United States (25, 30.4%), Europe (15, 18.2%) and the United Kingdom (8, 10.0%). A high number of bibliometrists were Indian and as such there were more contributions from India (23/82, 28.0%). Out of the 62 unique journal titles studied, 19 (30.6%) were Indian journal titles. Bibliometric works also began to emerge in other Asian countries such as Malaysia which contributed six titles (9.6%). The results indicated that single journal study is of interest to bibliometrists who are fairly distributed worldwide and there is a shift of more contribution from the Asian-African countries instead of the United States as previously indicated by Tiew (1997), who found that single journal studies from the United States comprised the largest with 50%, followed by studies from India and Europe.

Thirdly, the journals analysed are important and have some influence in their various fields. All are indexed and abstracted by major databases such as *Scopus* and/or the *Science Citation Index* and/or the *Social Science Citation Index*. Most of the Medical and Health related journals studies were indexed by *Medline*. These journals are considered influential or important enough to be studied to identify publication productivity, authorship and citation patterns, as well as the extent of their influence in attracting national or international contributions.

Most importantly, the single journal studies have highlighted the variety of bibliometric measures that can be used to understand the characteristics or portrait of a journal which in turn may reflect the characteristics of the literature and communication behaviour in the fields they represent. In summary, the bibliometric measures used to study single journals are as follows.

(a) Article productivity
- Number of articles published by issues, volumes and years sometimes indicating trendlines. This helps infer the publication trend over a period and its influence as a channel for research dissemination amongst authors in the field.

(b) Author characteristics
- Authors' gender, profession, rank, academic title;
- Authors' geographical affiliations by institutional names and types of institutions (academic, professionals);
- Authors' location by region, or country.
  This helps provide a picture or profile of the authors, the institutions or country they are affiliated to and the degree of collaboration that exists.

(c) Author's productivity
- Rank list of core and active authors;
- Authorship productivity pattern may be tested with Lotka's law of authorship distribution.
  This helps to identify the key authors in a field and estimates whether the distribution of author productivity are different in the various subject areas.

(d) Co-authorship pattern
- Types of co-authored works;
- Degree of collaboration;
- Local and foreign collaboration activities among authors by country and institution;
- Internationalization status of the journal.
  This helps to highlight the preferred authorship number, the size of the research group in a field and percentage of foreign versus local contributions.

(e) Content analysis
- Subject areas of articles, keyword analysis, keyword co-occurrence network;
- Article title analysis, number of words, punctuation usage, word frequency and preposition usage;
- Number of pages per article;
- Journal circulation;
- Journal frequency;
- Types of research methodology used;
- Types of models, theories and framework used;

- Analysis of acknowledgement;
- Analysis of funding received;
- Analysis of article appendices;
- Analysis of article abstracts.;
- Acceptance rate;
- Analysis of indexation and abstraction information;
- Language of publication.

(f) Citation analysis

- Number and distribution of citations per article, volumes and years;
- Authorship pattern of citations;
- Author co-citation analysis network,
- Most cited author;
- Types of literature cited;
- Age of cited literature;
- Cited literature's half-life;
- Rank list of core journals using Bradford's law;
- Extent and growth of web citations;
- Journal citation identity, analysis of references in articles from the journal;
- Journal citation image, analysis of citations to the journal;
- Journal influence and diffusion in other subject areas;
- Geographical location and language distribution of cited literature;
- Journal self-citation;
- Author self-citations;
- Journal performance, quality and prestige as measured by journal impact factor, prestige index, trajectory index, immediacy index, journal attraction power, journal consumption power and discipline contribution score.

(g) Characteristics of the editorial board

- List and geographical distribution of editorial board members;
- List and geographical distibution of reviewers;
- Editorials and reviewer's gender, profession, qualification, academic rank, publication productivity prior and post appointment;
- Editorial policy.

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## APPENDIX I: List of Journals Studied

### I. Arts, Humanities and Social Sciences

(1) *American Journal of International Law (AJIL)*. Damrosch (2006). USA. American Society of International Law. Indexed amongst others by Current Law Index, Index to Foreign Legal Periodicals, Index to Legal Periodicals, Social Sciences Index.

(2) *Family Business Review (FBR)*. Casilas and Acedo (2007). USA. Wiley-Blackwell on behalf of Family Firm Institute Inc. Indexed by Social Science Citation Index, Current Contents: Social & Behavioual Sciences. IF:0.675.

(3) *International Journal of Entrepreneurship and Innovation (IJE)*. McElwii and Atherton (2005). UK. IP Publishing. Indexed by ABI Inform and Ebsco.

(4) *Journal of Entrepreneurship*. Batthini and Madnani (2003). India. Entrepreneurship Development Institute, Ahmadabad, India. Indexed by ABI Inform.

(5) *Journal of International Business Studies (JIBS)*. Phene and Guisinger (1998). USA. Palgrave MacMillan. Indexed by ABI Inform, Econlit, Scopus and Social Science Citation Index. IF score 2.283 (JCR 2007).

(6) *Journal of Music Theory (JMT)*. Goldenberg (2006). USA. Duke University Press. Indexed by International Index to Music Periodicals, Arts and Humanities Citation Index, Music Index, RIL, Abstract of Music Literature.

(7) *Journal of Research in Music Education (JRME).* Humphreys and Stauffer (2000); Ebie (2002) and Yarbrough (2002). USA. National Association for Music Education. Indexed by Arts and Humanities Cirtation Index, Current Abstracts, EBSCO, ERIC, PsycINFO and Music Index.

(8) *Journal of the Malaysian Branch of the Royal Asiatic Society (JMBRAS*). Tiew (1998). Malaysia. Malaysian Branch of the Royal Asiatic Society. Indexed by Anthropological Index and Historical Abstracts.

(9) *Malayan Law Journal (MLJ).* Kaur (2006). Malaysia. Malayan Law Jourbal Journal Sdn Bhd. Indexed in Perind-Periodical Index (Singapore), Nexis Lexis.

(10) *Strategic Management Journal (SMJ).* Phelan, Ferreira and Salvador (2002). USA. Strategic Management Society by Wiley. Indexed by ABI Inform, Business Periodical Index (H.W. Wilson), Candridge Scientific Abstracts, Compendex, Current Contents: Social Sciences and Behavioural Sciences (ISI), INSPEC, Scopus and Social Science Citation Index.

### II. Health and Medicine

(1) *Adicciones*. Calafat, Becona and Bobes (2003). Spain. Indexed by Medline, Current Contents, PsychInfo.

(2) *American Journal of Roentgenology (AJR).* Chen, Jenkin and Elster (2003). USA. American Roentgen Ray Society. Indexed by Medline, Science Citation Index.

(3) *Farmacia Hospitalaria Journal*. Ferriols et al (2007), Alaixandre-Benavent et al (207), Pradas and Navarro (2007). Spain. Asociacion De Prensa Profesional. Indexed by Medline, Scopus, Science Citation Index.

(4) *Ife Psychologia*. Omotayo (2004). Nigeria. American Psychological Association. Indexed by Psychological Abstracts, PsyLIT, PsycINFO.

(5) *Indian Journal of Medical Research*. (Das and Sen, 2000, 2001). India. Indian Council of Medical Research. Indexed by Current Contents, Science Citation Index, Biological Abstracts, Chemical Abstracts, Dental Abstracts and Scopus.

(6) *Indian Journal of Nematology*. (Singh and Mukherjee, 1998). India. Nematological Society of India. No indexation information could be found.

(7) *Journal of Ayub Medical College (JAMC).* Ullah, Butt and Haroon (2008). Pakistan. Indexed by Index Medicus, Medline.

(8) *Journal of Family Welfare.* Senapati and Salek (1998). India. Family Planning of India. Indexed by IndiaMed, Current Contents, Index Medicus.

(9) *Journal of School Health.* Price and Jeffrey (2006). USA. American School Health Association. Indexed by Biological abstracts, Education Indes, ERIC, Index Medicus, Biological Index, International Nursing Index, Psychological Abstracts, Adolescent Mental Health Abstracts, Biological Index, Social Science Citation Index, etc. IF 0.956 (JCR2007)

(10) *Journal of Sex Research (JSR).* Zubeida et al (2004). UK. Society for the Scientific Study of Sexuality. Indexed by PsychINFO, Abstracts in Anthropology, Applied Social Sciences Index, BiblioSex, Child Development Abstract and Bibliography, Communication Abstracts, EBSCOHost, EMBASE, Index Medicus, Current ContentsL Social & Behavioural Sciences, Social Science Citation Index.

(11) *Nutricion Hospitalaria.* Vazquez, Culebras and Lorenzo (2001), Culebras and Lorenzo (2007). Spain. Sociedad Espanola de Nutricion Parenteral Y Enteral. Indexed by Medline, Science Citation Index.

(12) *Psychotherapy Research (PR).* Borkenhagen et. Al (2002). UK. Taylor & Francis for the Society of Psychotherapy Research. Indexed by Medline, Scopus, Social Science Citation Index, Psychological Abstract, PsycINFO, PsycLIT, Innovation and Research.

(13) *Revista brasileira de Psiquiatria (RBP).* Kieling and Goncalves (2007). Brazil. Associação Brasileira de Psiquiatria, Asociación Psiquiátrica de la América Latina. Indexed by Excerpta Medica, Biological Abstracts, PsychInfo,

Medline and Social Sciences Citation Index.

(14) *Scandanavian Journal of Work, Environment and Health.* Burdorf and Viikari-Juntura (2007). Finland. Indexed by Current Contents, Science Citation Index, Biological Abstracts, Excerota Medica, CAB International, Cambridge Scientific Abstracts, etc.

(15) *Tropical Medicine and International Health (TMIH).* Glover and Bowen (2004). UK.Blackwells. Indexed by PubMed, Science Citation Index.

(16) *Zeitschrift fur Experimentelle Psychologie / Experimental Psychology.* Dinkel et al (2004). Germany. Keip & Von Delft GmbH. Indexed in Social Science Citation Index.

## III. Science and Technology

(1) *American Journal of Veterinary Research (AJVR).* Crawley-Low (2006). USA. American Veterinary Medical Association. Indexed by BIOSIS Previews, Science Citation Index, Medline.

(2) *Annales Zoologici Fennici* (*AZF*). Kortelainen (2001). Finland. Finnish Zoological and Botanical Publishing Board, University of Helsinki. Indexed by Biological Abstracts, BIOBASE, Current Awareness in Biological Sciences, Current Contents, Science Citation Index.

(3) *Cuban Journal of Agricultural Science (CHAS*). Torricella-Morales et al. (2000). Cuba. Indexed by BIOSIS Previews, FSTA, Science Citation Index.

(4) *Defense Science Journal.* Vij and Bedi (1999). India. Defence Scientific Information and Documentation Centre, New Delhi. Indexed by Chemical Abstracts, Inspec, Physics Abstracts, International Aerospace Abstracts, Electrical and Electronic Abstracts, BIOSIS, Compendex, Engineering Index, Cambridge Scientific Abstracts.

(5) *Economic Botany.* Biswas, Roy and Sen (2007). USA.New York Botanical Garden by Springer New York. Indexed by Biosis Previews, Science Citation Index.

(6) *Ethnobotany Journal.* Dhiman (2000). India. Society of Ethnobotanists. Indexed by Medicinal & Aromatic Plant Abstracts, Indian Science Abstracts.

(7) *IEEE Transactions on Engineering Management (IEEE TEM).* Pilkington (2008). UK. IEE-Inst Electrical Electronics Engineers. Indexed by Science Citation Index, Social Science Citation Index, Compendex, Inspec, ABI Inform.

(8) *Indian Coffee.* Sivasubramaniam (2000). India. Coffee Board Bangalore. No Indexation information.

(9) *Indian Forester.* Hazarika, Goswami and Das (2003). India. Society of Indian Forester. Indexed by Scopus, Science Citation Index.

(10) *Indian Journal of Chemistry:* Section A. Dutta and Sen (2000, 2001). India. National Science Academy. Indexed by Chemical Abstracts, Engineering Index, Science Citation Index, Inspec, Scopus, Current Contents, Cambridge Scientific Abstracts, Inspec, Indian Science Abstracts, etc.

(11) *Indian Journal of Environmental Protection.* (Biradar (2006). India. Scientific Publishers. Indexed by Scopus.

(12) *Indian Journal of Fibre and Textile Research* by Jena (2006). India. National Institute of Science Communication & Information Resources. Index by World Text Abstr, Text Technol Digest, Chem Abstr, Art and Archaeol Tech Abstr, Refrativnyi Zhurnal, Materials Sci Citation Index, Paper CLIPP, TEXINCON and Scopus

(13) *Indian Journal of Forestry.* Hazarika (2005). India. Dehradun India, No indexation information.

(14) *Indian Journal of Pure and Applied Mathematics*. Dutta and Sen (2000, 2001), Narang (2004). India. Indian National Science Academy. Index by Science Citation Index and Scopus.

(15) *International Journal of Tropical Agriculture.* Ramesh and Nagaraju (2002). India. Vidya International Publishers, Haryana Agriculture University. Indexed by Science Citation Index.

(16) *Journal of Bioscience.* Das and Sen (2001), 2India. Indian Academy of Bioscience. Indexed by Science Citation Index ans Scopus.

(17) *Journal of Chemical Information and Computer Science (JCICS).* Onodera (2001). USA. American Chemical Society, Washington. Indexed by CAS, Scopus, Science Citation Index, etc.

(18) *Journal of Food Science and Technology.* Vijay and Raghvan (2007). India. Association of Food Scientist and Technologists. Indexed byAGRIS (India), BIOSIS, Chemical Abstracts, Current Contents, CAB Abstracts, Food Science and Technology Abstract, International Packaging Abstract, Science Citation Index.

(19) *Journal of Molecular Graphic and Modelling (JMGM).* Willett (2007). USA. Indexed by Biotechnology Citation Index, Chemnical Abstracts, Chemistry Citation Index, Computer and Information Systems Abstracts, Current Content, BIOBASE, Index Medicus, Medline, Science Citation Index.

(20) *Journal of Natural Rubber Research.* Tiew (2000); Tiew and Kiran (2000) and Tiew and Sen (2002). Malaysia. Rubber Research Institute. Index by Science Citation Index Expanded

(21) *Journal of Rock Mechanics and Tunneling Technology.* Senapati (2003). India. Indian Society of Rock mechanics and Tunneling Technology. No indexation information.

(22) *Journal of Structural Chemistry (JSC).* Buznik, Zibareva and Piottukhpeletskii (2004). Russia. Siberian Branch of the Russian Academy of Science. Indexed by Chemical Abstract, Scopus, Science Citation Index.

(23) *Journal of the Indian Society of Cotton Improvement.* Dixit, S and Katare (2007). India. Indexed by Textile Technology Index.

(24) *Malaysian Journal of Computer Science.* Anyi (2008). Malaysia. Faculty of Computer Science & Information Technology, University of Malaya. Indexed by Inspec, Scopus and Science Citation Index Expanded.

(25) *Nature.* (Sarasvady and Pichappan (2001). UK. Nature Publishing Group. Indexed by Science Citation Index and others.

## IV. Library and Information Science

(1) *Annals of Library and Information Studies.* Chaurasia (2008). India. National Institute of Science Communication and Information Resources, New Delhi. Indexed by LISA, Indian Library and Information Science Abstracts.

(2) *Journal of Documentation.* Nebelong-Bonnevie and Frandsen (2005), Naqvi (2005). UK. Aslib. Indexed by Social Citation Index and Scopus.

(3) *Journal of Education for Library and Information Science (JELIS).* Coleman (2006). USA. H,W. Wilson. Indexed by Current contents, Education Index, Education Abstracts, Information Science Abstracts, LISA, Library Literature, Social Science Citation Index, Rsearch in Higher Education.

(4) *Journal of Library History/Libraries and Culture.* Wertheimer (2005). USA. University of Texas Press. Indexed amongst others by the Arts and Humanities Index.

(5) *Journal of the American Society for Information Science (JASIS).* Al-Ghamdi (1998), Lipetz (1999), Nisonger (1999). USA. American Society for Information Science. Indexed by Science Citation Index.

(6) *Journal of the American Society for Information Science and Technologt (JASIST).* He and Spink (2002), Liu (2003); Rao and Bhusan (2008), Tsay (2008). USA. American Society for Information Science and Technologists. Indexed by the Science Citation Index.

(7) *Knowledge Organization.*Haridasan and Kulshrestha (2007). Germany. K.G. Saur Verlag for the International Society for Knowledge Organization. Indexed by Information Science Abstracts, Inspec, LISA, Library Literature and Sociological Abstracts.

(8) *Library Quarterly.* Young (2006). USA. University of Chicago Press. Indexed by LISA, Social Science Citation Index, Inspec, etc.

(9) *Malaysian journal of Library and Information Science.* Tiew, Abrizah and Kiran (2002), Aryati and Willett (2008). Malaysia. Faculty of Computer Science & Information Technology, University of Malaya. Indexed by Library Literature, LISA, Ebsco Host, Scopus, Social Science Citation Index Expanded.

(10) *Scientometrics*. Persson (1999?), Schoepflin and Glanzel (2001), Bharvi, Garg and Bali (2003), Garg (2003). Hungary. Springer with Akademiai Jiado, Budapest. Indexed by Biological Abstracts, BIOSIS Previews, Chemical Abstracts, Current Contents, ISTA, Inspec, JCR, LISA, Science Citation Index, Scopus, Science Citation Index, Sociological Abstracts.

(11) *Sekitar Perpustakaan* by Tiew (2006). Tiew (2006). Malaysia. National Library of Malaysia. No Indexation information.