Library and Information Sciences Research Literature in Sri Lanka: A Bibliometric Study

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Abstract

This paper presents a bibliometric study of LIS research literature emanating from Sri Lanka over 141 articles from the two LIS journals for the period from 1997 to 2007.Data collected from the two journals namely Journal of University Librarian's Association (JULA) and the Sri Lanka Library Review were analyzed to examine the type of LIS research , areas of LIS research and research strategies and data collection methods used by the LIS researchers in Sri Lanka. This paper also

attempts to present an analysis of the authorship pattern, author productivity and prominent contributors, citation pattern, length of papers , language wise and year wise distribution of articles ,growth and direction of LIS research papers over a period of ten years. The study is quantitative oriented and longitudinal in character. Sri Lanka LIS research output seems to concentrate in the area of "LIS Activities" and " Information Seeking" . Some of other important findings are most articles (94%) are single authored , author productivity is not in agreement with the Lotka's Law. There is no definite growth pattern or positive growth in the area of LIS research in the country . English is the most widely used language. Average citation per article was 9 while average length of an articles was 12.

Key Words: Bibliometrics, Library and Information science, LIS Literature, LIS Research and Development

Introduction

Bibliometrics is associated with the quantitative measurement of documentary materials .It provides measurement that are useful for studying scholarly communication. Traditionally bibliometric studies are used to measure the usage of materials and services within a library or to analyze the historical development of a specific body of literature.

History of Bibliometric studies

The history of bibliometrics go back more than a century yea.. The statistical analysis of scientific literature began more than 50 years before

the term "bibliometrics" even was coined in 1969. The emerging field was described in terms such as "Statistical Bibliography". (Parnell,2008)

The word "Bibliometrics" has been derived from Greek words, Biblio means Book and Metrikos meaning Measurement, referring to the science of measurement relating to
Books.(Dhiman,2000)

Allan Pritchard first introduced the term bibliometric in 1969 to denote the "the application of mathematical methods to books and other media of communication". According to him definition and purpose of bibliometric is to shed light on the process of written communication and of the nature and course of a discipline (in so far as this is displayed through written communication) by means of counting and analyzing various facets of written communication. Quantitative analysis can measure the growth , scattering of articles in different journals or to measure the obsolescence of literature in different discipline. (Prtitchard ,1969)

According to British standards Institution, it is the study of the use of documents and pattern of publication in which mathematical and statistical methods have been applied (British standards institution, 1976)

More recently Sengupta had defined this term as the "organization, classification and quantitative evaluation of publication pattern of all macro and micro communications along their authorships by mathematical and statistical calculus. (Senguptha,1990)

Fairthome defines bibliometrics as the " Quantitative treatment of properties of recorded discourse and behavior appertaining to it"(Fairthome,1969) According to Potter, it is the study and measurement of the publication pattern of all forms of written communication and their authorship" (Potter,1981) Many definitions covering various aspects of bibliometrics are available, but the common feature noted in all these definitions is the emphasis on quantitative aspect.

Bibliometric is a major sub-discipline of quantitative research. This tool traditionally used by the library and information science professionals for studying the communication process, information flows, and the others for better understanding and effective management and dissemination of information. (Rajendran, 2007) It has extensive application in the field of LIS particularly with regard to studying the trends in a subject. It helps in formulating need based development policy and provides objective data to inform managers to take timely decisions. (Jena , 2006) The European information science journals, bibliometrics investigations began to popular in the 1970s and 1980s.Hungary, eastern Germany and Switzerland were the countries which started to do research in bibliometrics since the beginning of the research era

Although famous Bradford's law (1934) of scattering ,Lotka's Law (1926) of scientific productivity are regarded as milestones in bibliometrics, but bibliometric research actually started in late sixties. Later in the seventies and eighties, bibliometrics research took a distinct shape and emerged as a prominent discipline. With the advent of information and communication technology (ICT), web technology and availability of different databases online, the field of bibliometrics gain a momentum.

Bibliometric studies on LIS research Literature

The literature of library and information science as a discipline has been extensively researched from a variety of perspectives. The systematic study of subject trends in L IS literature has been justified as a self – reflexive exercise to determine the historical roots of present library practice (Atkins,1988) and to predict research trends in future. Wersing and Neveling (1976) presented one early reflexive analysis of LIS .Their normative view of LIS has been contrasted with empirical analysis where subject classifications, and methodological approaches were derived from an examination of literature samples.(Cano,1999) Various contact analyses of LIS research publications have been made by many scholars around the world. These content analysis of LIS research publications can be roughly divided into two types in several ways: One method distinguishes between analyses, analyzed samples published in the short term (generally in one year) and in the long term: these analyses can also be divided at the national and international levels: or, in the comprehensive fields of LIS and in the limited fields of LIS. Although these studies have some kind of deficiencies , they all have contributed to the development of this research subject.(Cheng,1996)

For this study mainly used as a base of the research articles of two well known scholars in this felid Jarvelin and Vakkari in 1990.In general, the content analysis model of Jarvelin and Vakkari consists of three parts:

1. The distribution of the articles over the topic
2. The approaches: viewpoints on information dissemination and social levels; and,

3. The methods: research strategies and data collection methods (Cheng,1996)

It is difficult to identify the categories of the authors of LIS articles in Sri Lanka. Therefore only two parts of Jarvelin's and vakkari model use for data analyzing in this study.

1. The distribution of the articles over the topic
2. The methods: research strategies and data collection methods

At present, it is difficult to derive an adequate understanding of the development of particular LIS subject areas, their theoretical foundations, and preferred methodological approaches because results reported in the literature are not comparable.(Jarvelin and Vakkari, 1990)

Though bibliometrics has quite long history in the world very few studies on bibliometrics in LIS research literature found in Sri Lanka.

Objectives of the study

The aim of this study is to study the growth and related aspects of LIS research literature for the period from 1997 to 2007 in Sri Lanka .The objectives of the study are:

1. to examine the characteristics of LIS research, research strategy used and data
   collection method
2. to assess the growth of literature

3. to study the Authorship pattern , authorship productivity ,
4. to study citation pattern and self citations
5. to find length of papers
6. to find most productive authors
7. to study author's affiliation

Methodology and data collection

Criteria for journal selection

In order to examine the characteristics and trend of the LIS research in Sri Lanka two reputed journals have been selected and the criteria for selection these two journals was regularization of publication which was necessary for longitudinal data analysis.

This study focused the articles published in the Journal of University librarian's Association (JULA) publish by the University librarian's Association in Sri Lanka and the Sri Lanka Library Review publish by Sri Lanka Library Association. The database of the study comprised 141 articles published in these two journals from 1997 to 2007.In the study each individual article was scanned , checked, examined and tabulated for necessary data in to separate sheets in terms of subject of article, research strategy and date collection method used ,names of authors, number of authorship, author's institutional affiliation, number of references, author's self citation, length of article, year of article etc.

Classification Scheme

The classification scheme for topics of LIS by Jarvelin and Vakkari (1990) was constructed of LIS and it's subfield (Appendix 1) was adapted in

order to examine the nature of LIS research in the country. The data were collected and classified using the classification scheme devised by them. The main classes of LIS topics as follows:

1.The Profession
2.Library History
3.Publishing and book history
4.Education in LIS
5. methodology /Analysis of LIS
6. Library and information service activities
7. Information storage and retrieval
8. Information seeking
9. Scientific and professional communication
10.Other LIS topic (other aspect of LIS)
11. Other Study (other disciplines

Since the focus of this paper is not analyzing the contents of the articles, the author used only the classification headings mentioned above. The classification scheme divides LIS topics into 11 major classes with their respective subclasses.(Appendix I) Each article was classified under only one main subclass. When an article dealt with more than one topic, only its main topic is considered.

In addition to the classification scheme ,Jarvelin and Vakkari also presented a classification of research strategies.

M 10. Empirical research strategy
M 20. Conceptual research strategy
M 30. Mathematical /logical method
M 40. System/software analysis design

M 50 Literature Review

M 60 Discussion paper

M 70 Bibliographic method

M 80 Other method

M 90 No method/Not applicable

Each methodological category was subdivided into more specific method, for example, the empirical research strategy subdivide into 11 more specific methodologies such as Historical method ,Survey method, Qualitative method, Evaluation method etc.(Appendix II)

The classification of research methods scheme is further developed as the scheme of data collection methods. In this scheme Jarvelin and Vakkari identified 10 data collection methods such as:

C1. Questionnaire, interview

C2. Observation

C3. Thinking Aloud

C4. Content analysis

C5. Citation analysis

C6. Historical source analysis

C7. Several method of collecting

C8. Use of data collected earlier

C9. Other method of collecting

C10. Not applicable

Each article published in the two LIS journals chosen was read and classified according to theme, methodology employed and data collection method used and noted down according to the year of publication.

Authorship as productivity variable

The following variables were identified per articles.

1. Name of author
2. Number of author per article
3. Author's affiliation
4. Author's self-citations
5. Most productive authors in the field

Other variables

In order to presenting comprehensive overview of LIS research literature following variables were also identified per article and noted down according to the year.

1. Literature growth (Year wise distribution of paper)
2. Citation pattern (No .of citations per article and self citations of author)
3. Length of article (Pages of article)
4. Language of article

Results and discussion

Growth of LIS literature

Table 1 depicts the growth of research literature of LIS.

Table 1: Year wise distribution of papers

Year	No. of articles	Cumulative of articles	% of articles
1997	9	9	6
1998	20	29	14
1999	10	39	7
2000	15	54	11
2001	7	61	5
2002	15	76	11
2003	15	91	11
2004	13	104	9
2005	12	116	8.5
2006	12	128	8.5
2007	13	141	9

Table I does not indicate any definite growth pattern of the literature. During the ten year period the high decline of literature has been observed in year 1997 and 2001. The reason may be only one journal published (Library review) in these years. The highest number of articles (20) was published in year 1998 and there after a gradual decline is seen. However in last four years the growth of literature static with 12/13 articles per year which appear to be insignificant in terms of world LIS research literature.

Language of publication

It is also important to note the language of publication. As usual English is the predominant language of publication. (Table 2)

Table 2: Language wise distribution

Year	Language English	Sinhalese	Tamil	Total
1997	7	1	1	9
1998	16	3	1	20
1999	9	1		10
2000	14	1		15
2001	6	1		7
2002	12	2	1	15
2003	12	2	1	15
2004	11	1	1	13
2005	8	3	1	12
2006	11	1		12
2007	11	2		13
Total	117	18	6	141

Table 2 indicates that out of 141 articles, English occupies the first position with 117 articles.(83 %)

Distribution of research articles over topics

Table 3 presents the distribution of articles over the topics.

Table 3: Distribution of research articles over topics

			YEAR										
Subject	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total	%
Profession	1	3	1	2	1	1		1	3			13	9
Library History		1			1				1		1	4	3
Publishing and book history						1		2				3	2
Education in LIS			2			1				1		4	3
Library and information service activities	2	7	2	7	2	5	5	6	2	3	3	44	31
Information storage and retrieval	2	2	1	2	1	2	3		2	2	2	19	14
Information seeking	1	4	1	2		1	2	2	2	4	7	26	19
Scientific and professional communication		1				1		1				3	2
Other aspect of LIS	3	2	3	2	2	3	5	1	1	2		24	17
Other study / disciplines									1			1	0
Total	9	20	10	15	7	15	15	13	12	12	13	141	100

The Table 3 shows that the highest number of articles covered within the period of this study is under the heading of Library and information service activities with 44 articles (31%). Information seeking is the second most popular topic with 26 articles while other aspect of LIS is in the third with 24 articles. The analysis reveals that the information retrieval is in fourth place with 19 articles.

Further table 3 indicates that there is no definite growth pattern for any topic covered by the articles.

Research strategies used in the articles

The distribution of the research strategies in the articles from 1997 to 2007 is shown in the table 4.

Table 4: Research strategy used in the articles

Research method	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Empirical research strategy									1			1
Conceptual research strategy	8	8	6	2	2	4	6	4	5	4	3	52
Mathematical/logical method					1							1
System/software Analysis/ design						1	1				1	3
Historical method				1								1
Discussion paper	1	10	2	7	3	8	4	5	3	4	5	52
Case/action research				2				1	1			4
Bibliographic method						1	2	1				4
Survey Method		1	2	1			2	2	2	4	4	18
Content/protocol analysis				1								1
No method/Not applicable		1		1	1	1						4
Total	9	20	10	15	7	15	15	13	12	12	13	141

The most popular research strategies used by LIS researchers were conceptual research method and the discussion paper which was in equal number (52) of articles. Table 4 further shows that a continuous increase in the use of the survey method from the year 2003. Mathematical/Logical method and content or protocol analysis method are less likely to be used in research literature in Sri Lanka.

Data Collection method used for LIS research

Data collections methods used for the research strategies are given in table 5.

Table 5: Data collection method in research strategies

Method	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Questionnaire, interview		1	2				3	5	2	4	6	23
Observation						1						1
Thinking Aloud	8		2	9	3	1		5	5	2	1	36
Content analysis		1		1			1			1	4	8
Historical source analysis			1	1	1	1			2			6
Several method of collecting		5	2	1	1	5	1		2	2	2	21
Use of data collected earlier				1	1		1			1		4
Other method of collecting		1		1		1	2	1	1	1		8
Not applicable	1	12	3	1	1	6	7	1		1		33
Total	9	20	10	15	7	15	15	13	12	12	13	141

Table 5 shows that the Thinking aloud is the most frequent data collection method was used for LIS research in Sri Lanka. The Questionnaire , interview and the Several method of collecting were also used for the LIS research. Surprisingly, 23% of studies (33) were not applied any data collection method for the study. (Not applicable)

Authorship pattern and author productivity

Table 6 shows the authorship pattern of the articles.

Table 6: Authorship pattern

Year	Single	Joint	Three	Four	Total
1997	9				9
1998	20				20
1999	10				10
2000	13	2			15
2001	7				7
2002	15				15
2003	13	2			15
2004	13				13
2005	12				12
2006	11		1		12
2007	8	3	1	1	13
Total	131	7	2	1	141

Table 6 reveals that 131 articles (93%) out of 141 are of the single authorship. Seven articles (5%) were written by two authors and 2 articles (1.3%) by three authors. Only one article was written by multiple authors (4 authors) which is 0.7% of the total contribution.

Author Productivity

Lotka's Law has been used to measure the productivity of authors. It states that " the number of authors making "*n*" contributions is about 1/n2 of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent." This means that in a given subject out of all authors, about 60 percent will have just one publication and 15 percent will have two publications, 7 percent of authors will have three publications and so on. According to Lotkas's Law of scientific productivity, only six percent of the authors in a field will produce more than 10 articles .Table 7 presents author productivity.

Table 7: Author Productivity

Se. no	No. of articles	No. of authors	Observed (%)
1	1	45	63
2	2	11	15
3	3	7	10
4	4	3	4
5	5	2	3
6	6	2	3
7	9	1	1
8	10	1	1

A total of 72 authors contributed 141 articles over the period of study. Of these authors, 45 contributed one article each, 11 contributed two articles each , 7 contributed 3 articles each and 3 contributed four articles each. Two sets of two different authors contributed 5 and 6 articles each. Lastly two sets of different authors contributed 9 and 10 articles each.

Table 7 reveals that the percentage of authors contributed only one article each was 63% (45) which is larger than the original 60% Lotka's data. On average 1.98 (Approx.2) articles published by each author. The Largest number of articles were contributed by an author is 10. As can be seen 15% of authors contributed to two articles which exactly match with the Lotka's Law. But in general the results do not match with Lotka's Law.

Ranking of most productive author

Table 8 presents the most productive authors in the LIS research area.

Table 8: Rank list of productive authors in the field

Name of Author	No.of contributions	Rank
N.U.Yapa	10	1
Sriyani Illeperuma	9	2
W.R.G.Silva	6	3
M.B.M.Farooz	6	3
Ruwan Gamage	5	4
Pradeepa Wijetunga	5	4
Sumana Jayasuriya	4	5
Sriyani Perara	4	5
Geetha Yapa	4	5
7 authors	3	6
11 authors	2	7
45 authors	1	8

Table 8 shows that the most productive authors are N.U.Yapa who contributed 10 articles and Sriyani Illeperuma with 9 articles. Followed by W.R.G.Silva and M.B.M.Farooz both with six articles each. Padeepa Wijetunga and Ruwan Gamage are ranked fourth with 5 articles each. Followed by Sumana Jayasuriya,Sriyani Perera and Geetha Yapa with 4 articles each . Seven authors who contributed 3 articles each have taken the sixth place of ranking. Eleven authors with 2 articles and lastly 45 authors with 1 article each. It is noted that the most of the top six rank authors were affiliated with higher education institutions.

Author's Institutional affiliation

Institutional affiliation of authors is divided into three categories namely higher educational institutions, government institutions and private organizations.

Table 9 presents the distribution of authors by institutional affiliation.

Table 9: Institutional Affiliation

Sequence .no	Institution	No. of contribution
01	Higher Education institutions (Universities)	93
02	Government institutions	33
03	Private organizations	6
04	Not mentioned (Not affiliated)	9
	Total	141

Above table reveals that out of 141 articles, the majority are written by authors affiliated to the universities with a total of 93 (66%) articles. Followed by government organizations 33 articles (24%) and only 6 articles (4%) by the private organizations. Institutional affiliation of 9 authors (6%) could not be ascertained.

Citation pattern

The distribution of citation pattern is given in table 10.

Table 10: Citation pattern

Year	No. of articles	Cumulative total of articles	No. of citations	Cumulative total of citations	Average citation per article	Cumulative average of citations
1997	9	9	25	25	2.78	2.78
1998	20	29	207	232	10.35	8
1999	10	39	134	366	13.4	9.38
2000	15	54	77	443	5.13	8.2
2001	7	61	33	476	4.71	7.8
2002	15	76	99	575	6.6	7.57
2003	15	91	156	731	10.4	8.03
2004	13	104	114	845	8.78	8.13
2005	12	116	139	984	11.58	8.48
2006	12	128	116	1100	9.67	8.59
2007	13	141	129	1229	9.92	8.72

The table 10 presents the year wise distribution of citations in the articles and the average of citations thereof, total number of citations and average citations per article. Table 10 reveals that total of 1229 citations distributed among 141 articles. It is also seen that the number of articles are increasing but not in a uniform manner. Similarly, the number of citations per year is varying from year to year. The highest number of citations per article is in the year 1999 and the lowest number of citations per article is in the year 1997.

Author self- citation

The frequency of author self citations in the references of the articles are identified in table 11.

Table 11: Author self citation

Self citation	Frequency	Percentage
Yes	11	8
No	130	92
Total	141	100

Out of 141 of total articles only 11 (8%) contained author's self citations. This indicated that some of the contributors of the two journals under study are quite productive and are continuously working towards contributing more articles to LIS journals.

Length of articles

Table 12 contains distribution of articles according to their length.

Table 12: Distribution of papers according to length

Year	No. of articles	Cumulative total of articles	No. of pages	Cumulative total of pages	Average pages per articles	Cumulative average no. of pages
1997	9	9	61	61	6.78	6.78
1998	20	29	226	287	11.3	9.9
1999	10	39	114	401	11.4	10.28
2000	15	54	181	582	12.07	10.78
2001	7	61	76	658	10.86	10.79
2002	15	76	221	879	14.73	11.57
2003	13	91	177	1056	13.62	11.6
2004	13	104	149	1205	11.46	11.59
2005	12	116	150	1355	12.5	11.68
2006	12	128	168	1523	14	11.9
2007	13	141	209	1732	16.08	12.28

Table 12 reveals that the average length of articles is 12.28 pages. Further it has been observed that the average length of articles varied from a minimum of 6.78 pages to a maximum of 16.08 pages.

Conclusion

The following conclusions are drawn from the study.

1. It is seen that there is no definite growth pattern or positive growth of LIS research articles published from 1997 to 2007.

2. The subject wise analysis of the contents of the articles revealed that Library and Information services activities (LIS) was prominently studied (31%) in the LIS field.. LIS research literature in Sri Lanka seems to concentrate mostly in the area of LIS activities , Information seeking , other aspects of LIS and Information storage & retrieval. In combination they covered over 81% of research articles. In general the findings of the study indicate that the LIS research in the country has not changed greatly during the ten years period.

3. The research strategies most frequently used by LIS researchers were conceptual research and the discussion papers whereas the least frequent were empirical, mathematical and historical methods. These results indicate that the selection of research strategies by LIS researchers in Sri Lanka is more towards the survey types.

4. The most frequent data collection method used for the LIS research in Sri Lanka was "Thinking Aloud".

5. Single authorship is prominent in the LIS field.

6. It was found that the author productivity is not match with the Lotka's Law. The most prolific author is in the field was N.U.Yapa who contributed 10 articles. Majority of top ranked authors are affiliated to the Universities.

7. The average citations per article are 9 (8.72).

8. The articles have an average of 12 (12.28) pages which shows the reasonable length of a research article.

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APPENDIX 1

THE CLASSIFICATION SCHEME

- Professions
- Library history
- Publishing and book history
- Education in LIS
- Methodology/Analysis of LIS
- Library and Information service activities

    Circulation or interlibrary loans

    - Collections
    - Inf. or ref. service
    - User education
    - Buildings or facilities
    - Administration of planning
    - Automation (except when concerned with some particular activity)
    - Other L&I service activities
    - Other L&I service activities
    - Several interconnected L&I activities
- Information storage and Retrieval

    Cataloguing

    - Classification and indexing (process or languages)
    - Information retrieval
    - Bibliographic databases or bibliographies
    - Nonbibliographic data bases (textual, numeric...)

- information seeking

  Information dissemination

  - The use/users of information channels/sources
  - The use of L&I services (no other channels considered)
  - Information seeking behavior (focus on persons)
  - Information use (whether (and how) used)
  - Information management
- Scientific and professional communication

  Scientific or professional publishing

  - Citation patterns and structures
  - Other aspects of communication
- Other LIS Topic
- Other study (other discipline)

APPENDIX II

METHODS - RESEARCH STRATEGY

Empirical research strategy

- Historical method
- Survey method
- Qualitative method
- Evaluation method
- Case or action research method
- Content or protocol analysis
- Citation analysis
- Other bibliometric method
- Secondary analysis

- Experiment
- Other empirical method

Conceptual research strategy

- Verbal argumentation, criticism
- Concept analysis
- Mathematical or logical method

- System/software analysis/design
- Literature review
- Discussion paper
- Bibliographic method
- Other method
- Not applicable, no method