

An analysis of research strategies of articles published in Library Science journals: the example of *Library and Information Science Research*

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Abstract: The aim of the present study is to investigate the general trends of LIS research, using as source material the articles published in *Library and Information Science Research* in a five-year period (2005-2010). *Library & Information Science Research* was chosen because is a cross-disciplinary and refereed journal, which focuses on the research process in library and information science, covers a wide range of topics within the field, reports research findings and provides work of interest to both academics and practitioners. The authors review the findings from an examination of research articles published in the journal, giving emphasis on articles that used quantitative and/or qualitative research methods as an integral part of the author's work. The paper examines the major topics and problems addressed by LIS researchers, the research approaches and the types of quantitative and qualitative research methods used in articles published during this period, in an effort to understand the characteristics of LIS research activities and to get an insight into the research perspectives of the field.

Keywords: Library and information science, research methods, library and information science periodicals

1. Introduction

Scholarly journals have traditionally been one of the most significant channels for published research. The periodical literature of any discipline reflects the issues of importance to that field of study and profession. According to this approach, regular analysis of the published literature of LIS is valuable, because it can reveal the evolution, the state-of-the-art, the theoretical base, the maturity and future directions of the discipline. In addition, the systematic study of LIS literature provides indicators of "librarians' and information workers' professional thinking, practice and priorities" (Kajberg, 1996, p. 28), of popular research methods and of the main trends in library science education.

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2. Literature review

Library and Information Science (LIS) periodical literature has been extensively analysed over the past years from several points of view. Some studies focused on particular countries in order to identify local trends in LIS research. Kajberg (1996) carried out a content analysis of the Danish serial literature published during a period of thirty years. His objective was to explore the topics researched and the distribution of topics over library types, in an effort identify possible subject trends, major developments and influences in Danish LIS in the period of investigation. The results showed that the majority of the articles were focused on the traditional library activities and on public library related topics, whereas the theoretical issues of information communication processes had been neglected.

Cano (1999) reviewed a total of 354 articles published in two Spanish LIS periodicals in order to determine the preferred topics, the methodological approaches and the authorship patterns of LIS literature in Spain. The articles were classified according to their theme, the research methodologies, and the data collection methods. Results revealed a concentration in the areas of information retrieval, scientific and professional communication, and library services and a domination of empirical, descriptive and discussion papers.

Other examples of country-oriented analysis of LIS journals include the work of Alemna (1996) and Ocholla and Ocholla (2007), who studied the LIS literature in Africa; Cooper (1987) who employed content analysis methodology to draw comparisons between three leading periodicals published in Mainland China and the LIS literature published in the West; Chu and Wolfram (1991) who surveyed Canadian information science literature; Naseer and Mahmood (2009) who presented the subjects covered, strategies employed and author characteristics of LIS literature published in Pakistan; Yontar and Yalvac (2000) who analysed LIS research articles published in Turkey by topics, research strategies and methods of data collection.

Other studies are limited to a particular library type, specialty or area of interest. For instance, both Dimitroff (1992) and Haiqi (1995) conducted bibliometric studies of research articles concerning medical libraries and medical librarianship, while Goodall (1995), and Hersberger and Demas (2001) examined journal articles regarding public libraries. Dimotroff (1995) reported on a content analysis of the literature of special librarianship. Her study sought to find out what had been published, subjects covered and author profiles. A series of articles have used content analysis to empirically analyse the information needs and uses literature published in scholarly and professional journals from 1984 to 2008 (Julien, 1996; Julien & Duggan, 2000; Julien, Peckoskie & Reed, 2011). One of the main purposes of the authors was to test the research methodologies employed. Results indicated little change over time in research methods, a predominance of survey methods (questionnaires and interviews) and a growing tendency towards triangulation of methodologies. These findings are similar to those reported later by McKechnie et al. (2002)

who analyzed the use of methods in information behaviour literature for the period 1993-2000. A descriptive analysis of Spanish information needs and uses literature (Gonzales-Teruel & Abad-Garcia, 2007) revealed that the majority of articles reported results of empirical studies on information seeking of various user groups, and that the survey was the preferred methodological strategy. Contrary to the studies mentioned above, this study reported little use of the triangulation method in the works examined, a finding that, according to the authors, indicates lack of maturity of LIS research in Spain.

Library literature is also rich in general analyses of journal articles which are not confined to a particular geographic region, library type or aspect of LIS. These studies examine a wide variety of topics, including:

- trends of LIS research over time,
- proportion of research-based articles
- subject focus of the articles
- research methodologies employed and use of statistics
- references and bibliographies following each article
- characteristics of authors, such as age, sex, occupation, affiliation and geographic distribution.

One of the earliest studies was done by Peritz (1980) who conducted a bibliometric analysis of the articles published in 39 core LIS journals between 1950 and 1975. She examined the methodologies used, the type of library or organization investigated, the type of activity investigated and the institutional affiliation of the authors. The most important findings were a clear orientation towards library and information service activities, a widespread use of the survey methodology, a considerable increase of research articles after 1960 and a significant increase in theoretical studies after 1965.

Nour (1985) followed up on Peritz's (1980) work and studied research articles published in 41 selected journals during the year 1980. She found that survey and theoretical/analytic methodologies were the most popular, followed by bibliometrics. Comparing these findings to those made by Peritz (1980), Nour (1985) found that the number of research continued to increase, but the proportion of research articles to all articles had been decreasing since 1975.

Feehan et al. (1987) described how LIS research published during 1984 was distributed over various topics and what methods had been used to study these topics. Their analysis revealed a predominance of survey and historical methods and a notable percentage of articles using more than one research method. Following a different approach, Enger et al (1988) focused on the statistical methods used by LIS researchers in articles published during 1985. They found that only one out of three of the articles reported any use of statistics. Of those, 21% used descriptive statistics and 11% inferential statistics. In addition, the authors found that researchers from disciplines other than LIS made the highest use of statistics and LIS faculty showed the highest use of inferential statistics.

An influential work, against which later studies have been compared, is that of Jarvelin and Vakkari (1990) who studied LIS articles published in 1985 in order to determine how research was distributed over various subjects, what approaches had been taken by the authors and what research strategies had been used. The authors replicated their study later, to include older research published between 1965 and 1985 (Jarvelin and Vakkari, 1993). The main finding of these studies was that the trends and characteristics of LIS research remained more or less the same over the aforementioned period of 20 years. The most common topics were information service activities, and information storage and retrieval. Empirical research strategies were predominant and of them the most frequent was the survey. Kumpulainen (1991), in an effort to provide a continuum with Jarvelin and Vakkari's (1990) study, analyzed 632 articles sampled from 30 core LIS journals with respect to various characteristics, including topic, aspect of activity, research method, data selection method, and data analysis techniques. She used the same classification scheme and she selected the journals based on a slightly modified version of Jarvelin and Vakkari's (1990) list. Library services and information storage and retrieval emerged again as the most common subjects approached by the authors and survey was the most frequently used method.

More recent studies of this nature include those conducted by Koufogiannakis and Slater (2004), and Hider and Pymm (2008). Koufogiannakis and Slater (2004) examined research articles published in 2001 and they found that the majority of them were questionnaire-based descriptive studies. Comparative, bibliometrics, content analysis and program evaluation studies were also popular. Information storage and retrieval emerged as the predominant subject area, followed by library collections and management. Hider and Pymm (2008) describe a content analysis of LIS literature "which aimed to identify the most common strategies and techniques employed by LIS researchers carrying out high-profile empirical research" (p. 109). Their results suggest that while researchers employ a wide variety of strategies, they mostly use surveys and experiments. They also observed that although quantitative research accounted for more than 50% of the articles, there was an increase in the use of most sophisticated qualitative methods.

In summary, the literature shows a continued interest in the analysis of published LIS research. Approaches include focusing on particular publication years, geographic areas, journal titles, aspects of LIS and specific characteristics, such as subjects, authorship and research methods. Despite the abundance of content analyses of LIS literature, the findings are not easily comparable due to differences in the number and titles of journals examined, in the types of the papers selected for analysis, in the periods covered, and in classification schemes developed by the authors to categorize article topics and research strategies. Despite the differences, some findings are consistent among all studies:

- The percentage of research articles is significantly lower compared to non-research articles

- Information storage and retrieval and library and information service activities (mainly collections and management issues) are among the most common subjects studied
- Descriptive research methodologies based on surveys and questionnaires clearly predominate
- Data analysis is usually limited to descriptive statistics, including frequencies, means and standard deviations.

3. The present study

The aim of the present study was to describe and analyze patterns of LIS research activity as reflected in the articles published in *Library and Information Science Research* (LISR) between 2005 and 2010. LISR was chosen because is a prominent, well established journal, with high level of SSCI impact factor in the LIS area, it contains peer-reviewed full-length research articles, it is international in scope and general in its coverage.

The articles were explored and analyzed by gathering data in response to the following questions: what was the proportion between research and theoretical articles; what topics were studied; what methodologies had been used; what kind of statistical analysis had been employed; what was the affiliation and country of the first author. Articles that reported use of specific research methodology and presented specific findings were considered research articles. On the other hand, works that reviewed theories, theoretical concepts or principles, discussed topics of interest to researchers and professionals or described research methodologies were regarded as theoretical articles (Gonzales-Teruel and Abad-Garcia, 2007). Editorials, book reviews, letters, interviews, commentaries and news items were excluded from the analysis.

A total of 163 articles were examined by both researchers for content. We employed content analysis, which has been defined as “the intellectual process of categorizing qualitative textual data into clusters of similar entities, or conceptual categories, to identify consistent patterns and relationships between variables or themes” (Julien, 2008, p. 120). Objectivity in the analysis of the data being studied is achieved through the establishment of explicit criteria of selection, before the actual examination of the content (Berg, 2001). During the development of these criteria, certain categories emerge, into which content elements are being coded. Content analysis is a systematic, rigorous and flexible research method that “has been widely used in library and information science (LIS) studies with varying research goals and objectives” (White and Marsh, 2006, p. 22).

In the present study, each article was classified according to its subject, a task not always easy, “because too narrow a definition makes the results almost meaningless and too broad a definition produces a bewildering mass of material” (Haiqi, 1995, p. 240). After thorough examination, each article was allocated to one of the 22 subfields in a classification scheme which presented a systematic and analytical breakdown of LIS discipline. Research articles were then classified according to research strategies and data collection techniques.

The strategy classification included 20 research strategies and 12 categories were used to classify data collection. The taxonomies used in the present study were based on previous studies (Hider, 2008; Jarvelin and Vakkari, 1990; Jeong and Kim, 2005). Finally, a distinction was made among quantitative, qualitative and mixed methods. Quantitative methodology refers to the systematic empirical investigation of quantitative properties or phenomena and their relationships. Qualitative research can be broadly defined as “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification” (Strauss and Corbin, 1990, p. 17). It is a way to gain insights through discovering meanings and explaining phenomena based on the attributes of the data. In mixed model research quantitative and qualitative approaches are combined within or across the stages of the research process.

4. Results

Authors' profile

As shown in Table I, first authors were classified as faculty in 73% of the cases and as researchers in 22,7% of the cases. The remaining 4,3 % were practitioners. With regard to the country of origin, United States came out as the most prolific in the number of contributions in LISR for the 6-year period of the study.

Table I. First author characteristics

Affiliation	N	%
Faculty	119	73
Researcher	37	22,7
Practitioner	7	4,3
Total	163	100
Region		
USA	95	58,3
Asia	22	13,5
Europe	21	12,9
Canada	14	8,6
Australia	9	5,5
Africa	2	1,2
Total	163	100

Topics

Table II presents the distribution of articles over the various topics. The largest body of research articles focused on problems of Information storage and Retrieval/ (IS&R) Information Searching process. The second most popular area of interest was Information and reference services, followed by Other aspects of

LIS, a category containing articles that could not be classified anywhere else. Examples include articles on museum professionals or media and journalism. Other subjects were underrepresented with considerably fewer articles.

Table II. Distribution of topics in LISR articles (2005-2010)

Topic	N	%
IS&R/Information Searching	37	22,7
Information/Reference Services	17	10,4
Other aspects of LIS	15	9,2
User education	14	8,6
Information user study	11	6,7
Bibliometrics/Infometrics	10	6,1
Research Methods/Methodology	10	6,1
Education in LIS	8	4,9
Administration or Planning	7	4,3
General aspects of LIS	6	3,7
Information System/Technology/Database	5	3,1
Scientific/Professional publishing	4	2,5
Abstracting/Indexing	3	1,8
Collection Development/Collection Management	3	1,8
Internet Information Resources/Multimedia	3	1,8
Publishing/Copyright	3	1,8
Digital Library	2	1,2
Circulation/Interlibrary loans	1	0,6
Information network/Cooperation	1	0,6
Library buildings and facilities	1	0,6
Use of information	1	0,6
Use/Users of channels/sources of information	1	0,6
Total	163	100

Research Strategies and methods

By far the most frequently used research strategy was empirical research, accounting for 82,8% of all articles (Table III). Theoretical papers, employing conceptual research strategies accounted for 11,7% of the articles examined. Finally, 5,5% were literature reviews. Nearly half of the empirical papers were surveys. The second- and third-ranking strategies were content analysis of textual information and citation analysis. The class Other Strategy was used for research not classifiable into any of the distinguished categories. Evaluation of

systems and services was less frequently used. Studies using more than one type of research strategies were also rare.

Table III. Use of research strategies

Research strategy	N	%
Empirical research strategy		82,8
Survey	66	40,5
Content analysis	19	11,7
Citation analysis	10	6,1
Other	9	5,5
Evaluation	5	3,1
Mixed strategies	5	3,1
Case-study	4	2,5
Experiment	4	2,5
Secondary data analysis	3	1,8
Concept mapping	2	1,2
Discourse analysis	2	1,2
Historical research	2	1,2
Action research	1	0,6
Ethnography	1	0,6
Observation	1	0,6
Transaction log analysis	1	0,6
Conceptual research strategy		11,7
Verbal argumentation	12	7,4
Methodological	5	3,1
Concept analysis	2	1,2
Literature review	9	5,5
Total	163	100

Articles' analysis revealed that the researchers in almost half of the cases (42,9 %) employed quantitative research methods while 25,2 % employed qualitative methods and 14,7 % mixed methods either within or across the stages of the

research process. The rest 17,2% refers to theoretical papers and literature reviews that research methods are not applicable.

Data Collection Techniques and use of statistics

The choice of data collection technique generally reflects the research strategy selected by the investigator. The widespread use of questionnaires (25,8%) in empirical research articles can be explained by survey’s prevalence. Next in the order of popularity was the combination of two or more methods (15,3%) and the third more popular technique was content analysis (11,7%). Pre-existing data was utilized in 9,8% of the articles. Rarely used methods of data collection were content analysis, bibliometrics, interviews, focus groups, transaction logs, observation, and experiment (Table IV). In the “not applicable” category are contained non empirical research articles, namely conceptual articles and literature reviews.

Table IV. Data collection techniques

Technique	N	%
Questionnaire	42	25,8
Two or more	25	15,3
Content analysis	19	11,7
Use of pre-existing data	16	9,8
Bibliometrics	11	6,7
Interview	10	6,1
Focus groups	5	3,1
Transaction logs	4	2,5
Experiment	1	0,6
Observation	1	0,6
Other	1	0,6
Not applicable	28	17,2
Total	163	100

Of the 135 empirical research papers examined 96 (71%) reported any use of statistics. Of those, 43,8% used descriptive statistics such as frequencies, means, std deviations; 24,0% used inferential statistics such as ANOVA, regression or factor analysis; and 32,3% used both descriptive and inferential.

Topics across research strategies and methods

Another issue we would like to address was the distribution of research strategies and methods within topics. Towards this end, we examined (a) the most common type of research strategies reported for the five most popular topics; and (b) the distribution of research methods (quantitative, qualitative or mixed) over the five most famous topics. Survey emerged as the most frequently used strategy, especially in information user studies. The second most frequent research strategy varied across topics. Literature review was used in almost 16% of the articles addressing Information Storage and Retrieval problems. Information/Reference services were most frequently analysed through evaluation and verbal argumentation. Research on user education was based on case studies while secondary analysis in addition to ethnography were most frequently used in research on user study (Table V).

Table V. Application of strategies on topics

LIS Topic	Research Strategies			
	Most frequent (%)		2nd most frequent (%)	
Info storage and retrieval /Info Searching	48,6	Survey	16,2	Literature review
Reference Services	47,1	Survey	17,6	Evaluation Verbal argumetation
Other aspects	40	Survey	20	Content Analysis
User education	57,1	Survey	14,3	Case study
User study	81,8	Survey	9,1	Secondary analysis Ethnography

Quantitative approaches were employed in the majority of information user studies. The percentage was lower in Information/reference services and Other aspects of LIS (about 40%) and even lower in Information storage and retrieval. On the other hand research on user education was mainly conducted using qualitative methods. Mixed methods were quite frequent in Information/reference services and user education and less popular in the other topics (Table VI).

Table VI. Application of research methods on topics

Topics	Research methods			
	Mixed methods	Not applicable	Qualitative	Quantitative

IS & R/ Searching	16,2%	21,6%	29,7%	32,4%
Info/Ref services	23,5%	17,6%	17,6%	41,2%
Other aspects	13,3%	13,4%	33,3%	40,0%
User education	28,6%	7,1%	35,7%	28,6%
User study	,0%	,0%	27,3%	72,7%

5. Discussion

In the present study the patterns of LIS research activity as reflected in the articles published between 2005 and 2010 in a well established, peer reviewed journal were described and analyzed. Despite the small sample, the findings are comparable to the results of previous studies. Over 33% of the articles dealt with Information Storage and Retrieval and Information/Reference Services, both of which are core areas of library science. Information retrieval has been rated as the most famous area of interest in research articles published between 1965 and 1985 (Vakkari, 1993). According to Dimitroff (1992), information retrieval was the second most popular topic in the articles published in the *Bulletin of the Medical Library Association*, while Cano (1999) argued that LIS research produced in Spain from 1977 to 1994 was mostly centred on information retrieval and library and information services. In addition, Koufogiannakis (2004) found that information access and retrieval was the domain with the most research. The emergence in the present study of the “Other” as the third- ranking topic might indicate that current research moves towards new directions that existing classification schemes developed some years ago cannot adequately accommodate.

With regard to research strategies, the present study seems to confirm the well-documented predominance of survey research methodologies in LIS research. According to Dimitroff (1992) the percentage related to use of survey research methods reported in various studies varied between 20,3% and 41,5%. Powell (1999), in a review of the research methods appearing in LIS literature, pointed out that survey had consistently been the most common type of study in both dissertations and journal articles. Survey reported as the most widely used research design by Jarvelin and Vakkari (1993), Crawford (1999), Hider and Pymm (2008). The majority of articles examined by Koufogiannakis, Slater and Crumley (2004) were descriptive studies using questionnaires/surveys. In addition, survey methods represented the largest proportion of methods used in information behaviour articles analysed by Julien, Pecoskie and Reed (2010). There is no doubt that survey has been used more than any other method in LIS research. As Jarvelin and Vakkari (1990) put it, “it appears that the field is so survey-oriented that almost all problems are seen through a survey viewpoint” (p. 416). Much of survey’s popularity can be ascribed to its being a well-known, understood, easily conducted and inexpensive method, which provides easy to analyze results (Koufogiannakis, 2004; Kumpulainen, 1991). However, our findings suggest that while survey ranks high, a variety of other methods have

been used in LISR research articles. Quite surprisingly, content analysis emerged as the second most frequent strategy. This finding suggests that qualitative methods are gaining increasing importance as a systematic means of data collection and analysis and have a role to play in LIS studies. The expanded use of qualitative strategies, such as content analysis, seems to go side by side with the raise of qualitative and mixed methods observed in the articles analyzed. These results are comparable to the findings of Hider (2008), who observed significant increases for qualitative research strategies and content analysis in contemporary LIS literature.

The data presented here show that above 70% of the research articles used some kind of statistics, either descriptive or inferential. Although nearly half of them used descriptive statistics such as frequencies, means, standard deviations, it is worth mentioning that the other half used either inferential statistical techniques or a combination of descriptive and inferential. These findings are similar to those reported by Crawford (1999), who found that 40% of the articles appearing in *College & Research Libraries* and *Journal of Academic Librarianship* used frequencies, and 21% used at least one inferential statistic.

In conclusion, the present study seems to support the general premise that “a large portion of L&IS literature is of a practical nature reflecting the problems faced by professionals engaged in current practice” (Cano, 1999, p. 675). Apparently, some areas contain more research than others. Issues related to information storage/retrieval/searching and service activities consistently attract the interest of the researchers, who prefer survey research designs. While qualitative and mixed research methods are gaining popularity, there is also evidence that both researchers and readers are getting more familiar with advanced statistical methods.

With regard to LISR, it can be argued that it is a vehicle for high-quality research. The considerable amount of research articles, the clear indication of research strategies and data collection methods in most of them, and the variety of methodological approaches and research designs, all denote that LISR responds positively to the need of creating a firm foundation for the development of LIS based on research.

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