

Methodologies and Methods Applied in LIS Research

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Abstract

The use of appropriate methodology is a necessary component of reliable and valid research. A comprehensive methods used in library and information science (LIS) research was conducted using quantitative systematic review. Exhaustive searching techniques were employed to gather relevant literature. This review used three taxonomies to categorize methods. The findings reveal that empirical, descriptive, and quantitative research methodologies were used in majority of LIS research. Survey was the most widely research method and descriptive statistics were used by majority of LIS authors for data analysis. This paper gives a comprehensive list of methodologies and methods used in LIS research and can help to identify strengths and gaps in the use of methodology. Documentation of methods used in LIS research can help the research community make decisions about future practice in the areas of methods, measures, and reporting.

Keywords: Methodologies, Library and Information Science, Bibliometric, Literature Reviews, Quantitative, Empirical

Introduction

The application of methodologies and methods in library and information science (LIS), as with other disciplines, has changed a great deal during the last four decades. The development of LIS as a discipline “was strictly connected to descriptive methodologies, aimed at meeting the challenges posed by professional practice through empirical strategies of a professional nature” With the passage of time, LIS authors have started to use more sophisticated methodologies.

Studies which explore the use of methodologies typically take two approaches. Firstly, individual studies are selected and examined for their use of methods by using content analysis, systematic review, or bibliometrics. In the second approach, the findings from the literature are reviewed and synthesized. In studies in LIS, the majority of authors have examined individual pieces of published research (first approach) when exploring the use of methods. Only a few authors have

reviewed and synthesized the results, but these largely report the state of methodological trends in sequential narrative sections

The research questions of the study:

1. What types of Library and Information Science literature are explored in studies of methodologies and methods?
2. What time span has been explored?
3. What research methodologies are applied in LIS research?
4. What methods are used for collection and analysis of data?
5. What kinds of statistical analyses are adopted?

Literature review

Methodology and method

Somekh & Lewin, (2005) states that, Methodology is “the collection of methods or rules” applied to conduct research about a particular problem and the aggregation of “principles, theories and values” that govern the entire path to research.

Research methodology, research strategy, research design and research approach are different terms used interchangeably for methodology. Research design or methodology “serves as the architectural blueprint of a research project, linking data collection and analysis activities to the research questions and ensuring that the complete research agenda will be addressed” by Bickman & Rog, (2008).

Research methods are “specific strategies and procedures for implementing research designs including samplings, data collection, data analysis and interpretation of findings” Teddlie & Tashakkori, (2009).

According to Blaxter, Hughes, and Tight, (2006) , method mainly relates to the tools and techniques related to collection and analysis of data (such as questionnaires or interviews) but methodology takes a philosophical view of the problem and is an “approach or paradigm that underpins the research”

Reviews of use of methodologies and methods

Rochester and Vakkari (1998) compared national trends in the use of research methods in LIS literature and further compared these with the methods used in the international literature explored by Järvelin and Vakkari (1993). Of the seven studies compared by Rochester and

Vakkari, five reported on the use of methods in Spain, Turkey, Australia, China, and the UK, one looked at Nordic countries, and one was not restricted to any specific region. They found that “survey method was popular internationally and nationally, as was the historical method and the conceptual” (Rochester & Vakkari, 1998, p. 172). Experimental or qualitative methods, which are frequently used in other disciplines, were found to be less frequently used in LIS.

Research design

Methodology and methods

A quantitative research approach was used, and a secondary data analysis method was adopted to synthesize findings across different studies. Secondary data analysis allows researchers to focus on analysis rather than data. Secondary data about the use of methodologies and methods was extracted from published literature reviews. Different kinds of reviews analyze and report secondary data in different ways.. In the present study, systematic review was used in order to promote an objective review of the numerical data related to use of methods. Defining the specific research questions, adoption of a replicable search strategy for collection of material, and stating pre-set inclusion and exclusion criteria for selection of the data set are important features of systematic review are applied in this study to reduce personal bias and enhance consistency and objectivity in findings.

Literature search

Multiple strategies, including searching multiple databases, tracking citations from relevant studies, seeking recommendations from experts, and citation pearl growing were applied in gathering a comprehensive collection of relevant literature on the application of research methods in LIS research.. Many studies were conducted using content analysis and bibliometrics. Interactive scanning of search results revealed that the three terms research, content analysis, and bibliometric were used more frequently in the titles of articles rather than methodology or methods.

Using the advanced search option available in Google Scholar (GS), four combinations of these terms (research, library and content analysis; research, LIS and content analysis; research, library and bibliometric; and research, LIS and bibliometric) were used to retrieve articles. These combinations retrieved 45, 5, 84 and 10 articles respectively. The

combination of the three terms research, method, and library was also searched in titles in GS, yielding 149, of which the majority were related to discussions about methods. After the perusal of all of the results, 35 relevant articles were identified.

Inclusion and exclusion criteria

When building a data set for examination, appropriate inclusion and exclusion criteria must be established to answer the question being asked. The following inclusion criteria were applied for selection:

- ✓ journal articles which reported the use of methodologies and methods in LIS or a sub-domain;
- ✓ empirical research articles which used quantitative design for eliciting evidence about methodology and methods;
- ✓ in the English language; and
- ✓ published in scholarly journals, or as pre-print versions shared by authors on social media platforms or in repositories.

The following items were excluded:

- ❖ Conference papers, dissertations and theses;
- ❖ Articles which investigated the use of specific research methods or group of research methods such as ethnographic, theory use, cohort studies, etc.; and
- ❖ Articles in which frequency or percentage was not presented. For example, frequencies about the use of methodologies and methods cannot be calculated from Zhang, Zhao, and Wang (2016), Yontar and Yalvac (2000) and Buttlar (1991), and so these were excluded.

Categorization and coding of results

Most authors categorized results directly by method, such as content analysis, interview, and bibliometric. Some authors used more elaborate taxonomies, including sub-categories. Categorization and coding in this study were based largely on the taxonomies and codes used by authors in the articles, with modifications made so as to present results in an integrated manner.

For example, interviews are categorized under one heading whether structured or un-structured, but focus groups are categorized separately.

Quantification

Authors presented their results typically as percentages, frequencies, or both. In cases of percentage only, percentages were converted into frequencies for the purpose of the present study. The data were entered into a spreadsheet. The overall frequency for each category of methodology and method was entered into one column. Frequencies were cumulated to illustrate the overall use of any methodology or method. The percentage for each category of methodology and method was also calculated to compare results in terms of percentages.

Results

Types of literature

Of the 58 reviews, more than 75% focused exclusively on journal articles (Table 1). Half of the remaining studies also included conference papers, books, and book chapters. Conference papers and dissertations were rarely selected alone to explore methodology use.

Table 1. Types of literature.

Type of material	Frequency	%
Articles only	44	76
Articles, conference papers, books, etc.	8	14
Conference proceedings	3	5
Dissertations and theses	2	3
Article abstracts	1	2
Total	58	100

Time span during which methods are used

The time period covered by the selected reviews ranges from 1980 to 2016 (Table 2), with most studies looking at the use of methodologies and methods between 1991 and 2016.

Table 2. Time span.

Period covered	Frequency	%
1980–1990	4	7
1991–2000	22	38
2001–2016	32	55
Total	58	100

Research methodologies: Quantitative, qualitative, and mixed

Only 14 of the 58 reviews categorized the literature into the broad categories of quantitative, qualitative, or mixed, with a majority of articles falling into the quantitative category (Table 3).

Table 3. Research methodologies: Qualitative, quantitative, etc.

Methodology	Review articles that reported	Frequency of usage	% of usage
Quantitative	14	2999	49
Qualitative	14	2005	33
Mixed or multi methods	13	707	12
Other	4	383	06
Total	14	6094	100

Research methodologies: Descriptive, comparative, exploratory, etc.

Only 5 of the 58 reviews classified the methodologies on the basis of the aim or purpose of the studies (Table 4). Most studies (50%) were descriptive, followed by comparative (11%), exploratory (8%), evaluative (7%), explanatory (5%), and a small handful of other categories, with 5% of articles reporting the use of multiple approaches. A sizable proportion (12%) of research methodologies are placed in the category called other, unidentified by authors.

Table 4. Research methodologies: Exploratory, etc.

Methodology	Review articles that reported	Frequency of usage	% of usage
Descriptive	5	688	50
Comparative	2	158	11
Exploratory	4	111	08
Evaluative	3	87	07
Explanatory	2	71	05
Model building	1	8	0.6
Prescriptive	1	2	0.1
Predictive	1	2	0.1
Multiple	2	81	06
Other	3	168	12
Total	5	1380	100

Research methodologies: Empirical, etc.

A taxonomy which categorized methodology as empirical or non-empirical was used by nearly one third of the reviews (Table 5). Empirical research strategies were used predominantly, followed by the category identified as description, descriptive, opinion, opinionated. Variations in approaches used by authors to categorize methods into empirical or other categories affected the counts in Table 5. Gunasekera (2008) classified empirical strategy, survey method, content analysis, historical analysis, and case or action research and so on separately, but for the current analysis all these are included as empirical. Multiple methods, mixed methods, and other are placed together. For articles in which research methodologies

Table. 05 Research methodologies; empirical etc.,

Methodology	Review articles that reported	Frequency of usage	% of usage
Empirical	19	2414	48
Description, descriptive, opinion, opinionated	9	999	20
Conceptual, verbal argumentation, criticism, concept analysis	9	541	11
System and design analysis	8	236	4.7
Literature review	10	125	2.5
Discussion	3	117	2.3
Case study	6	89	1.7
Historical analysis	6	84	1.6
Mathematical	5	79	1.5
Theoretical	3	41	0.8
Bibliographic	3	46	0.9
Methodological	3	25	0.5
Multiple, other	12	221	4.2
Total	19	5017	100

Dominant research methods

Thirty-eight of the 58 reviews categorized results by method (Table 6). Survey was the most dominant method used (33%), followed by theoretical analysis and content analysis (7% each). Other frequently used methods include historical analysis, bibliometric, information system analysis and design, and experiment.

Table. 06 Dominant methods;

Methods (sub-types and variants)	Review articles that reported	Frequency of usage	% of usage
Survey (survey-2665, questionnaire-2141, Interview-696, consultation with experts-2, focus group-113)	38	5623	33.0
Theoretical analysis (theory, theoretical approach, analytical, model development and validation)	7	1230	7.2
Content or protocol analysis	29	1209	7.0
Historical analysis (historic, biographic)	17	1038	6.0
Bibliometric (webometric, informetric)	21	852	5.0
Information system analysis and design	7	664	4.0
Experiments (experiment, investigations)	27	658	3.8
Conceptual approach (verbal arguments, criticism, concept analysis, discussion)	7	588	3.4
Description	1	497	3.0
Descriptive	3	489	2.8
Case study (case study single)	14	424	2.5
Observation (observation and description)	15	298	1.7
Transactional log analysis (computer log analysis)	11	260	1.5
Comparative study	6	226	1.3
Citation analysis	12	222	1.2
Case or action research	10	208	1.2
Evaluation	8	192	1.1

Methods (sub-types and variants)	Review articles that reported	Frequency of usage	% of usage
Qualitative	5	145	0.8
Descriptive example	1	143	0.8
Secondary analysis	11	138	0.8
Literature review	8	127	0.7
Operation research	4	81	0.5
Mathematical and logical method	3	72	0.4
Ethnography	6	45	0.3
Think aloud or verbal protocol	2	34	0.2
Delphi	6	17	0.1
Other, multiple	15	1290	8.0
Total	38	16,728	98

Rarely used methods

Many research methods were identified in only one or two review articles (Table 7) and for a small number of articles. The results, combined with Table 6, show a wide variation in the use of methods. It has to be noted that variations in categorization and aggregation have some affect on the counting reported in Table 6, Table 7. Survey and questionnaire are treated separately by some authors. Interviews were categorized separately by some authors while others merged interview and questionnaire into survey, and some included focus group.

Table. 07 Rarely used methods

Methods (sub-types and variants)	Frequency of usage	% of usage
Cross sectional	1	50
Descriptive bibliography	1	38
Need assessment	1	25
Metadata analysis	1	22
Case series	1	19
Class room research	1	16
Diary research	1	13
Usage study	1	12
Task analysis	1	10
Literature analysis	1	9
Cohort	1	8
Grounded theory	1	7
Patron requests (ILL and reference)	2	6
Statistical analysis	1	6
Research summaries	1	5
Desk research, statistical analysis	1	5
Meta-analysis	2	5
Bibliographic	1	4
Longitudinal	1	4
Key tracking	1	3

Methods (sub-types and variants)	Frequency of usage	% of usage
Research portfolio	1	3
Student journal or papers	1	3
Consensus seeking technique	1	2
Control trials	1	2
Discourse analysis	1	2
Grey relational analysis	1	2
Phenomenology	1	2
Student journal or paper	1	2
Research summaries	1	2
Card sorting	1	1
Contextual inquiry	1	1
Critical incident technique	1	1
Cluster analysis	1	1
Field simulation	1	1
Naturalistic inquiry	1	1
Participatory action research	1	1
Testing, unobtrusive	1	1
Workshop	1	1
Total	38	347 (2%)

Methods (sub-types and variants)	Frequency of usage	% of usage
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Statistical methods

Only 10 of the 58 reviews reported the statistics used to analyze results (Table 8). Most articles used descriptive statistics (73%) while inferential statistics (24%) were used in 24% of the analyzed research. Multiple analytical techniques were identified as having been applied in a few articles. Frequencies of different types of descriptive statistics were given in only one study while frequencies of different categories of inferential statistics were given in four. Types of inferential statistics identified include correlation such as Pearson, Spearman, Kendall's Tau-b, etc.; t-tests; ANOVA and ANCOVA; chi square, Mann-Whitney-Wilcoxon; multiple regression; Shapiro-Wilk; factor analysis; Cramer's V; Kruskal-Wallis; and Kruder-Richardson estimates.

Table.8 Statistical Methods

	Review articles that reported	Frequency of usage	% of usage
Type of statistics			
Descriptive statistics	10	1779	72
Inferential statistics	10	604	24
Multiple statistics	4	100	04
Total	10	2483	100

Conclusion

The findings of the study represent a comprehensive review of methodologies and methods, and demonstrate that there appears to be a wide range and variety in methods used in LIS. Having a complete list such as this is useful, as it can serve as the toolkit from which LIS researchers and the library community can select when making decisions about method, measures, and reporting practices (Kelly & Sugimoto, 2013). This study has also revealed that there is a core of

approaches that predominate in almost every aspect studied. While it could be the case that these predominant methodologies and methods are just the most appropriate in LIS, it is also possible that researchers do not give enough thought to other possibilities, or are not aware of them. A comprehensive list such as the one provided here could inspire researchers to consider new approaches, especially when exploring new kinds of research questions. Finally, this research highlights the need for the research community and higher education community (in which researchers learn their craft) to come to agreement on how terms and taxonomies are used when describing the various aspects of the research process, in any discipline.

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