Research Advances in Evidence-Based Science in Library and Information Science (LIS): A Post-print

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Abstract

[Purpose/Significance] To understand the research progress of evidence-based science in the field of Library and Information Science (LIS) from a literature content perspective, with a focus on analyzing the main research topics and recent research directions, while conducting an international and domestic comparison.

[Method/Process] Research on evidence-based science in the LIS field was retrieved from the core collections of Web of Science, CNKI, and Wanfang databases. Using content analysis, statistical analysis was conducted on the target literature collection in terms of annual publication volume and disciplinary fields, and the research topics and those of the past five years were analyzed from two perspectives: interdisciplinary research, and LIS disciplinary functions and their research objects, while simultaneously conducting international and domestic comparisons.

[Results/Conclusions] Evidence-based science research in the LIS field involves multiple disciplinary areas including medicine, nursing and health care, policy science, information systems, and education. The main research topics on evidence-based science in the LIS field were ultimately summarized into ten categories, among which “services of library and information institutions and professional development of librarians” and “evidence sources and acquisition methods/techniques” constitute the core topics. In terms of both the breadth of disciplinary fields and topics involved and the depth of research on each topic, domestic research is relatively weak.

Full Text

Research Progress on Evidence-Based Science in Library and Information Science (LIS)

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Abstract

[**Purpose/Significance**] This study examines the research progress on evidence-based science in Library and Information Science (LIS) from a literature content perspective, focusing on analyzing major research themes and recent directions while comparing international and domestic developments.

[**Method/Process**] We retrieved evidence-based science research in LIS from the Web of Science Core Collection, CNKI, and Wanfang databases, limiting our search to core journals. Using content analysis, we conducted statistical analyses of publication years and disciplinary fields, then examined research themes from two perspectives: interdisciplinary research and LIS disciplinary functions/research objects. We also analyzed recent five-year trends and compared international versus domestic research.

[**Result/Conclusion**] Evidence-based science research in LIS involves multiple disciplines including medicine, nursing and healthcare, policy science, information systems, and education. We identified ten major research themes, with "Library and Information Institution Services and Librarians' Professional Development" and "Evidence Sources and Acquisition Methods/Technologies" as the core themes. Domestic research lags behind international research in both the breadth of disciplines and themes covered and the depth of investigation into each theme.

Keywords: Library and Information Science (LIS); evidence-based science; content analysis

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1 Introduction

Evidence-based practice (EBP) refers to the process of obtaining the best available evidence from worldwide sources using scientific research techniques and methods, and applying it to decision-making and best practice development within specific contexts. Its essence is practice grounded in evidence. EBP originated from the empirical sciences that emerged in the 18th and 19th centuries [1] and gradually took shape with the incubation and rise of evidence-based medicine (EBM) from the 1970s to 1990s [2]. Its advantage lies in combining best evidence with actual scientific research and practice, helping to improve pro-

fessional practice and enhance research quality. As scientific decision-making increasingly demands transparency and accountability, EBP has expanded across broad domains of humanities and social sciences, including education, policy research, sociology, management, library and information science (LIS), and economics. This has given rise to evidence-based education, evidence-based policy and practice (EBPP), evidence-based librarianship (EBL), evidence-based information practice (EBIP), evidence-based library and information practice (EBLIP), and other discipline-specific evidence-based research. Evidence-based science has now attracted considerable research interest in LIS. From medical librarians' involvement in EBM to libraries actively introducing EBP into professional practice for evidence-based library management and services, scholars are now attempting to construct evidence-based knowledge service models and conduct research on science and technology intelligence work based on evidence-based concepts. The evidence-based philosophy is gradually integrating into LIS's disciplinary system. For example, a 2009 Australian focus group survey project listed evidence-based practice as one of the attributes of "Librarian 2.0" [4], while domestic scholar Jin Shengyong regarded EBL as an important branch and development area of library science [5-6], and Zhang Keju defined the effectiveness of intelligence research by drawing on EBM thinking [7].

Current research on evidence-based science in LIS primarily consists of empirical surveys or narrative reviews. Whether discussing EBL, EBIP, or EBLIP, the focus revolves around what evidence-based practices should exist within the LIS profession [12]. In contrast, this paper examines evidence-based science in LIS from the perspective of evidence-based science itself, using literature on evidence-based science research in LIS as its basis. Through content analysis, we reveal research progress and trends in LIS regarding evidence-based science, focusing on methodological and theoretical dimensions.

2 Research Design

2.1 Question Design

LIS is a "meta-discipline" that connects with subjects from other disciplines in socially valuable ways [13]. Therefore, LIS research has an interdisciplinary nature, yet as an independent discipline, it also has its own research objects and boundaries. Accordingly, this study analyzes the progress of evidence-based science research in LIS from two perspectives: the interdisciplinary nature of LIS, and LIS's disciplinary functions and research objects.

This study addresses the following questions: (1) What are the trends in annual publication volumes of evidence-based science research in LIS journals? (2) From the interdisciplinary perspective of LIS, which disciplinary fields does evidence-based science primarily involve, and what research themes exist in each field? (3) From the perspective of LIS disciplinary functions and research objects, what aspects does evidence-based science mainly include? What differences exist between international and domestic research?

2.2 Data Sources

2.2.1 Literature Retrieval We used Web of Science, CNKI, and Wanfang Data as data sources. To ensure literature quality, we selected the Web of Science Core Collection (SCI and SSCI), core journals from CNKI and CSSCI for Chinese literature, with a cutoff date of end-2017. Using "evidence-based" as the topic term, we searched the Web of Science platform and refined results by "Category: (INFORMATION SCIENCE LIBRARY SCIENCE) AND Document Type: (ARTICLE OR REVIEW) AND Language: (ENGLISH)," yielding 535 results. In CNKI, using "循证" and "实证" as topic terms with literature category limited to library and information science, we obtained 1,481 results. We supplemented this with 2 additional results from the Journal of the China Society for Scientific and Technical Information in Wanfang.

2.2.2 Literature Screening Since we limited sources to high-quality domestic and international LIS journals, all retrieved literature was considered high-quality. The screening task involved removing irrelevant studies through a three-step process: (1) To further focus on LIS disciplinary content, we categorized collected literature by journal and excluded articles from medical information journals with weak LIS attributes; (2) We browsed article titles to remove non-research items such as calls for papers, conference notices, and journal prefaces, and eliminated duplicates; (3) We read abstracts and full texts to exclude literature unrelated to evidence-based research, such as database introductions and bibliometric analyses unrelated to evidence-based research. The final dataset comprised 45 Chinese articles and 93 English articles (138 total).

2.3 Analysis Methods

To address our research questions, we designed the following analytical approach:

First, we categorized target literature by year to analyze research trends through annual publication volumes. Then, based on LIS's interdisciplinary nature, we classified studies by disciplinary field and conducted statistical analysis. On this foundation, we analyzed research themes in each disciplinary field. Finally, from the perspective of LIS disciplinary functions and research objects, we summarized major research themes on evidence-based science.

Coding Method: We coded literature according to the classification scheme above, using two-letter abbreviations for disciplinary categories, numbers 1 and 2 for research type classification, and Arabic numerals for specific theme categories, separated by hyphens. For example, "PS1-1" indicates the evidence source theme in policy science conceptual research.

3 Results

3.1 Overall Publication Trends

Figure 1 [Figure 1: see original paper] shows annual publication volumes on evidence-based science in major LIS journals. International publications show an overall upward trend, while domestic trends are less clear but more volatile. In our dataset, the earliest international article appeared in 1995, with peak years in 2006, 2009, and 2016. The earliest domestic article appeared in 1999, with publications increasing annually from 2006-2009, peaking in 2009, then declining. This suggests international scholars maintain sustained research on evidence-based science, while domestic research peaked in 2009 then declined sharply, indicating insufficient attention to evidence-based science in China's LIS field.

The earliest international and domestic articles respectively discussed information resources available to healthcare professionals for EBM [14] and EBM information sources, retrieval methods, and information organization, processing, and storage methods [15], showing that evidence-based science research in LIS began with information resource services for EBM.

3.2 Disciplinary Field Classification

Based on research perspectives, we classified each article's disciplinary field. For example, studies from broad library and information work perspectives were classified as LIS, evidence-based policy research as policy science, and philosophical interpretations of EBP as philosophy of science. Since medical library and hospital library literature predominantly focuses on EBM research, we classified medical library evidence-based science research under medicine. We ultimately divided LIS evidence-based science research into nine disciplinary fields, shown in Figure 2 [Figure 2: see original paper].

LIS evidence-based science research involves library and information science (studies conducted purely from an LIS perspective without interdisciplinary involvement, such as library management and decision-making, EBL/EBLIP research), medicine, nursing and healthcare, policy science, information systems, education, social sciences, life sciences, law, and philosophy of science. This demonstrates the broad applicability of evidence-based science. Beyond LIS itself, medicine, nursing and healthcare, and policy science account for larger proportions. Other fields have fewer than 10 articles, with domestic literature covering only these three fields. Since evidence-based science originated from EBM and EBL derived from evidence-based medical librarianship, LIS research on EBM information theory and information/knowledge services is relatively comprehensive, while research on information and services for other fields' evidence-based science remains insufficient. Moreover, domestic research should actively explore the breadth and depth of evidence-based science applications, conducting theoretical and applied research from information science, information/knowledge service, and intelligence research perspectives.

3.3 Thematic Analysis: Interdisciplinary Research Perspective

As a practice philosophy and framework that applies best evidence to specific practices, EBP has broad applicability in medicine and humanities/social sciences [16] and can be applied to any research field in LIS. Therefore, analyzing the coverage of applied research themes has limited practical significance; we focus our analysis on conceptual research themes in each disciplinary field.

After literature coding and statistical analysis, we identified 102 conceptual research articles across disciplinary fields.

3.3.1 LIS Discipline Themes We summarized evidence-based science research themes from a pure LIS perspective into ten categories, shown in Table 1 .

The most researched themes by total literature volume are "EBL/EBLIP Review Research," "EBL Evidence Sources and Acquisition," and "Evidence-Based Intelligence Research and Knowledge Services," each with more than five articles. Review research comprehensively introduces and discusses EBL/EBLIP concepts, origins, development, implementation principles, problems, and challenges. Domestic review research on evidence-based science was concentrated before and in 2009, when EBL was being introduced to China's intelligence community, with most studies focusing on EBL's emergence, meaning, and specific content. EBL evidence includes traditional library statistics, journal usage data analysis, bibliomining, qualitative or quantitative research results from LIS, and professional knowledge based on practical experience. Data mining techniques and tools play important roles in bibliomining. "Evidence-Based Intelligence Research and Knowledge Services" refers to analyzing intelligence research and knowledge service work from an evidence-based perspective, including constructing science and technology intelligence evidence-based decision-making service systems [17], analyzing relationships between intelligence research and EBPP [18], evaluating intelligence research effectiveness using EBM theories [19], and constructing evidence-based knowledge service practice models [20].

Significant differences exist between domestic and international publication volumes in these three themes. Domestic literature has zero articles on "EBL Evidence Sources and Acquisition," while "EBL/EBLIP Review Research" and "Evidence-Based Intelligence Research and Knowledge Services" have higher domestic than international volumes. This indicates domestic EBL research remains largely conceptual, lacking systematic research on evidence sources that occupy the core position in evidence-based science. Meanwhile, evidence-based intelligence research focuses on science and technology intelligence, reflecting China's research characteristics and showing domestic scholars consciously introduce evidence-based science into intelligence research to explore distinctive Chinese approaches while expanding evidence-based philosophy applications in LIS. However, relevant research institutions are limited, primarily the National Science Library, Chinese Academy of Sciences.

In the past five years (2013-2017), the most published themes are "EBL Evidence Sources and Acquisition," "Evidence-Based Intelligence Research and Knowledge Services," and "Empirical Investigation of Librarians' EBP." Research on "EBL Evidence Sources and Acquisition" is most numerous, while "Empirical Investigation of Librarians' EBP" studies all originate from Australia. A. Gillespie developed an empirical model of EBLIP through semi-structured interviews, field observations, logs, and background data collection with Australian school librarians [21]; Gillespie et al. studied EBLIP experiences of professionals in Australian public libraries using ethnographic methods [11]; and F. Miller et al. constructed an EBLIP theoretical model in academic library contexts using constructivist grounded theory [22].

3.3.2 Medicine-Related Themes As shown in Table 2 , in medicine, nursing, and healthcare, research on "Library and Information Institution Services in EBM" far exceeds other themes, demonstrating that library and information professionals are important participants in EBM. Services in EBM can be categorized into four types: (1) Education and training services, providing information technology training to healthcare workers to improve evidence-based information retrieval capabilities; (2) Reference services, supporting clinicians' daily diagnosis, practice, and theoretical research, including necessary knowledge extraction and processing services [23]; (3) Evidence-based information resource construction services, involving medical information collection, classification, evaluation, organization, storage, management, and provision to support EBM, comprehensively utilizing internal and external organizational resources such as sharing information and databases with multiple medical/health organizations [24], searching and classifying, evaluating, and organizing rich web resources including EBM databases, integrated databases, and online information to establish various EBM thematic databases [25]; (4) Evidence-based information tool development services, including developing medical literature guidelines, formulating efficient literature search strategies, creating standardized formats for journal article abstracts and guidelines, and developing related software tools [14].

Comparatively, domestic research themes appear more singular, primarily focusing on "Library and Information Institution Services in EBM." Due to limited total publication volume, "Library and Information Institution Services in EBM" has the most literature in recent five years, followed by "Evidence Sources and Acquisition" and "EBM Development and Review" in the same period. W. W. Yim et al. proposed using natural language processing to automatically extract and classify attribute information from radiology reports for cancer patients to support clinical decision-making and improve evidence-based research traceability [26]; reference [2] visually analyzed EBM development histories in China and Western countries using bibliometric methods.

3.3.3 Policy Science Themes As shown in Table 3 , policy science research most frequently addresses evidence sources for evidence-based policy. These

sources include social statistics, social media data, research literature, and bibliometric results, with grey literature being important documentary evidence—three papers specifically addressed grey literature collection, management, and utilization [27-29].

Most literature was published after 2010, indicating evidence-based science was introduced to policy science only recently. Existing research identifies evidence-based policy as an important direction for Policy Making 2.0 and smart government [30-31]. Evidence-based policy evaluation includes ex ante appraisal (assessing research utilization and whether policies are based on scientific evidence rather than policymakers' subjective ideas) and ex post evaluation (assessing policy implementation effects based on factual evidence, which may include existing research data, newly collected supplementary data, or entirely new data collection) [32]. P. Edwards et al. discussed challenges in establishing a provenance framework supporting evidence-based policy assessment and explored an e-social science virtual research environment using Web 2.0 and semantic grid technologies to provide digital resource management functions [32]. S. R. Makkar et al. developed SAGE, a tool to evaluate policy makers' engagement with and use of research in health policy making [33].

3.3.4 Other Disciplinary Themes As shown in Table 4 , LIS evidence-based science research on information systems, education, law, and other disciplines is limited, with relatively dispersed themes across fields. Notably, all three education-related articles address library roles, suggesting that providing information and technology training to faculty is libraries' primary participation mode in evidence-based education. Both information systems and life sciences involve evidence acquisition research, reflecting that evidence is the core of evidence-based science.

3.4 Thematic Analysis: LIS Disciplinary Functions and Research Objects

From LIS's own perspective, library science's research object is "information organization for information retrieval," while its function is providing diverse information and knowledge services to other disciplines. Intelligence science is a meta-science about scientific research and related fields, studying "information development based on information organization" and providing multi-domain reference consulting services [6, 34]. This section summarizes LIS research themes on evidence-based science from the perspective of LIS functions and research objects. We identified ten major themes encompassing 95 of the 102 conceptual research articles; the remaining seven had limited relevance to LIS and were excluded. As shown in Table 5 :

Table 5 shows themes sorted by total publication volume. Both in total and recent five-year publications, themes LIS-0 "Library and Information Institution Services and Librarians' Professional Development" and LIS-1 "Evidence Sources and Acquisition Methods/Technologies" significantly exceed others, in-

dicating these remain hot topics closely related to LIS's information and knowledge service functions. Evidence source research ranks second, with recent five-year volume comparable to LIS-0, showing relatively high recent interest in evidence acquisition for multidisciplinary evidence-based science. As important representations of research results, literature (including both published and grey literature) constitutes crucial evidence sources across disciplines. Recently, meta-analysis, research synthesis methods (RSM), systematic literature reviews (SLR) [35-40], and qualitative/quantitative synthesis integration [41-43]—a series of literature review methods based on empirical research philosophy—have been studied and applied across multiple disciplines including LIS.

International publication patterns match overall characteristics, while domestic patterns differ. Domestically, LIS-0 has the highest volume, followed by LIS-2 "Evidence-Based Science Review Research" and LIS-3 "Evidence-Based Intelligence Research and Knowledge Services." In recent five years, domestic research concentrates on LIS-0, with limited attention to other themes. Comparing domestic and international volumes across themes, international publications exceed domestic in LIS-1, LIS-4, LIS-7, and LIS-8, while domestic exceeds international in LIS-2 and LIS-3. These differences show international emphasis on methodological, applied, and empirical research, while domestic research tends toward theoretical and review studies.

Further analysis of "international vs. domestic" and "theme-discipline field" distributions reveals clearer patterns. Figure 3 [Figure 3: see original paper] shows comparisons of international and domestic publication volumes across major themes and discipline field distributions within each theme. International coverage clearly exceeds domestic across all themes except LIS-3. Theme LIS-1 covers the most disciplines, further proving evidence's importance across evidence-based research fields, followed by theme LIS-0. This confirms that LIS-0 and LIS-1 are core research themes in LIS evidence-based science.

4 Summary and Discussion

4.1 Conclusions

This paper analyzed evidence-based science research progress in LIS through annual publication volumes, disciplinary fields, and theme classifications from two perspectives, comparing international and domestic differences. From the LIS disciplinary functions and research objects perspective, we summarized ten major themes, identifying "Library and Information Institution Services and Librarians' Professional Development" and "Evidence Sources and Acquisition Methods/Technologies" as core themes.

International-domestic comparisons reveal five main differences: (1) Publication volume and trends reflect insufficient domestic LIS attention to evidence-based science research; (2) In research breadth, domestic studies cover significantly fewer disciplines and themes than international research; (3) In research depth, domestic research requires further exploration of evidence acquisition-

related themes; (4) Domestic scholars have conducted preliminary research on evidence-based science and technology intelligence, combining China's intelligence research characteristics; (5) Theme volume comparisons show international emphasis on methodological, applied, and empirical research versus domestic theoretical and review focus.

4.2 Discussion

Evidence-based science bridges the gap between research and practice, emphasizing the use of best evidence to guide decision-making and practice or evaluate implementation results, with evidence acquisition at its core. The expansion of evidence-based science across disciplines provides important development opportunities for library and information institutions as information and knowledge service centers. Based on our findings, we propose the following recommendations for evidence-based science research and practice in LIS:

(1) **Establish multidisciplinary evidence-based information repositories** for collecting, organizing, storing, maintaining, and providing evidence-based information. In conjunction with relevant disciplinary characteristics, widely collect research papers, statistical data, expert knowledge, and internal survey statistics and work records from academic databases, thematic websites, web information, and other network resources. Use information classification, feature extraction, standardized representation, and data association for information organization and storage, providing rich evidence sources for disciplinary evidence-based practice and decision-making.

(2) **Actively participate in RSM-related method research and application.** Research literature constitutes important evidence sources in any field. Empirical literature reviews based on RSM and other methods have changed how researchers in various disciplines interact with literature, data, and information infrastructure [36]. Library and information professionals should actively explore RSM and related methods while deeply participating in applications to provide best evidence for more disciplinary evidence-based practices.

(3) **Develop integrated platforms fusing multiple information sources.** Faced with the disruptive transformation "from the information age to the data age, and from the data age to the computing age," libraries' main information services can no longer remain at simple document provision but must provide users with "computable and analyzable knowledge resources and corresponding knowledge tools and mining analysis methods" [44]. Integrated platforms need automatic recognition and extraction functions for multiple information types, providing meta-analysis, cluster analysis, and other statistical methods and visualization technologies to generate systematic analysis reports for professional researchers' synthesis work.

(4) **Domestic LIS should strengthen exploration of evidence-based science practice and application.** Under evidence-based philosophy guidance, conduct specific methodological and technological exploration and systematic platform design and development around evidence acquisition, management, evaluation, and synthesis, integrating theory with practical operation.

This study has limitations: our target literature represents only a few representative journals in the field, so conclusions may not fully apply to all LIS literature. However, using content analysis based on abstracts and full texts allows relatively in-depth and detailed analysis of research themes, giving our findings reference value.

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Abstract: [Purpose/significance] The paper aims to learn about the progress of the studies on evidence-based science in library and information science (LIS) discipline from the literature content, with a focus on the major research themes and research directions in recent years, and the domestic and international research progress is compared. [Method/process] From the core collection of Web of Science and Chinese core journals from CNKI and Wanfang database, a search for the evidence-based science research in the field of LIS is performed. Utilizing content analysis method, the paper makes statistical analysis on the target literature from the year of publication and the subject area; then the paper puts its focus on the research theme analysis and hot topics in the past five years from two perspectives of interdisciplinary research, and the subject function of LIS and the objects. [Result/conclusion] Researches on evidence-based science in the field of LIS involve a number of subject areas including medicine, nursing and healthcare, policy science, information systems and education. The main research themes on evidence-based science in LIS are summarized into 10 categories in the end, of which "Services of LIS Institutions and Librarians' Professional Development" and "Evidence Sources and Its Access Methods or Technologies" are viewed as the core topics. China is relatively weak whether in terms of the breadth of subject areas and themes covered or the depth of research on each theme.

Keywords: library and information science (LIS); evidence-based science; content analysis method

Note: Figure translations are in progress. See original paper for figures.