

A Survey and Analysis of Research Support Services in World-Class University Libraries - Post-print

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Date: 2023-08-26T00:00:00+00:00

Abstract

[Purpose/Significance] Providing research support services represents a requirement and emerging trend for university libraries to deepen their service offerings in the e-Research and big data environment in recent years. Investigating and analyzing the current landscape of research support services among world-class university libraries can furnish valuable references for university libraries in China, thereby facilitating the advancement of the “Double First-Class” initiative through the refinement of research support services.

[Method/Process] This study selects libraries from universities ranked within the top 100 of the QS 2017 World University Rankings as survey subjects, examines the implementation of their research support services through website investigation, and analyzes the primary categories of service projects along with their corresponding content and modalities.

[Results/Conclusion] The survey indicates that research support services in university libraries primarily encompass research data management, open access, scholarly publishing, research impact measurement, research navigation, research consultation, and research tool recommendation. To accelerate the achievement of “Double First-Class” construction goals among more Chinese universities, university libraries should: formulate strategic plans for research support services; provide support services tailored to different stages of the research lifecycle; establish dedicated organizational structures for research support services and enhance team capacity building; conduct needs assessments and training programs targeting researchers; and create research support portals to integrate and navigate service offerings.

Full Text

Preamble

Vol. 62 No. 8 April 2018 ChinaXiv Cooperative Journal

Survey and Analysis of Research Support Services in World-Class University Libraries

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Abstract

[Purpose/Significance] In the era of e-Research and big data, providing research support services has become a key trend for academic libraries seeking to deepen their services. Investigating and analyzing the current state of research support services in world-class university libraries can offer valuable references for Chinese academic libraries and advance the “Double Tops” initiative by improving these services. **[Method/Process]** This study selected libraries from the top 100 universities in the QS World University Rankings 2017 as survey subjects, using website investigation to understand their research support service provision and analyzing the main service types along with corresponding content and forms. **[Result/Conclusion]** The survey reveals that research support services in academic libraries primarily include research data management, open access, scholarly publishing, research impact measurement, research guides, research consultation, and research tools recommendation. To help more Chinese universities achieve “Double Tops” status, academic libraries should formulate strategic plans for research support services, provide stage-specific support based on the research lifecycle, establish dedicated organizational structures with strengthened team building, conduct needs assessments and training for researchers, and create integrated research support portals with navigation for service programs.

Classification Number: G250

Keywords: Academic Library; Research Support; e-Research; Research Lifecycle; World-Class University

DOI: 10.13266/j.issn.0252-3116.2018.08.004

Introduction

Scientific research capacity is a core indicator of university quality and has always been a priority in higher education. In recent years, universities worldwide have promoted scientific development and innovation through policy formulation and increased funding. China’s “Overall Plan for Promoting the Construction of World-Class Universities and First-Class Disciplines” (hereinafter “the Plan”), issued in 2015, identified “enhancing scientific research capacity” as one of ten

key tasks, emphasizing that universities should “orient toward national strategic needs, improve high-level research capabilities, enhance capacity to address major issues and original innovation, and promote innovation in research organization models” [1]. With the release of the “Double Tops” university and discipline list on September 21, 2017, selected institutions entered the implementation phase, facing considerable challenges in enhancing research capacity and impact.

As academic institutions, university libraries bear the important responsibility of providing quality academic resources and services, and should become active participants and facilitators in academic research and learning [2]. In the e-Research environment, emerging technologies and innovative research tools have become mainstream. Researchers must continuously update their knowledge systems and digital research skills to improve efficiency. Meanwhile, as the internet becomes the primary medium for knowledge production and dissemination, digital academic resources and born-digital materials have surged, directly driving the formation of data-intensive scientific discovery. Researchers’ information needs and behaviors have changed accordingly: on one hand, big data has increased demands for data curation, analysis, visualization, and publishing; on the other hand, funding agencies’ requirements for data management plans compel researchers to prioritize data management [3].

To address these challenges, academic libraries have gradually transformed their services, moving beyond traditional subject services, citation verification, and novelty searches to provide more innovative, comprehensive, and systematic research support services. Research support refers to the various literature and information services that academic libraries provide throughout multiple stages of research activities, including topic selection, research development, data management, paper writing, and results dissemination [4], spanning the entire research lifecycle. In recent years, libraries in the United States [5] and Australia [6] have prioritized research support in their strategic planning.

Our preliminary investigation found that world-class university libraries widely offer research support services, assisting scientific research through various programs and formats with potential reference value for other libraries. However, systematic research is lacking on what specific services top international libraries provide, their content, and delivery formats. To answer these questions, we surveyed libraries from the top 100 QS-ranked universities in 2017 via website investigation, summarizing practical experiences and improvement strategies to inform Chinese academic libraries in enhancing research support services, promoting knowledge innovation, and accelerating “Double Tops” construction.

Literature Review

2.1 Research Support Service Programs in Academic Libraries

Research support services encompass activities such as research data management, scholarly publishing, and bibliometric services, with numerous scholars

conducting in-depth studies on specific services. For instance, A.M. Cox launched a “Research Data Management” special issue in *Program: Electronic Library and Information Systems* in 2015 [7], where R. Higman and S. Pinfield examined data sharing’s role in institutional policy and practice [8], E. Mattern et al. used participatory design and visual narrative inquiry to identify researchers’ data challenges [9], and A.L. Whitmire et al. analyzed variables in research data management practices through a survey of Oregon State University researchers [10]. Additionally, K. Riddle discussed issues in developing institutional repository publishing policies and libraries’ responsibilities [11].

As technology advances and investment increases, research support services have become more systematic. Huang et al. surveyed 40 Australian university libraries, finding most base their services on the LibGuides platform, offering institutional repository construction, IT skills training, research data management, research impact measurement, research ethics training, and research output publishing [12]. Meng Xiangbao categorized research support services at 23 UK universities into literature resource acquisition and management, research information management, research data management, open access and scholarly publishing, and research evaluation [13]. Projects also show different priorities and trends over time. In 2012, S. Corral et al. surveyed 140 higher education institutions in the UK, Australia, New Zealand, and Ireland, finding bibliometric services dominated, including bibliometric literacy/training, research impact statistics, citation reports, disciplinary trend reports, h-index statistics, and grant application support, with research data services showing growing development [14]. T. Koltay argued that academic libraries should provide information literacy education (especially data literacy), research data services (emphasizing data quality and citation), awareness services on hot topics, and personalized services [15]. In program development, librarians face new role challenges; for example, the University of Melbourne Library established a dedicated research information management group to consolidate and enhance cohesive, visible research support services in response to evolving scholarly communication environments [16].

2.2 Research Support Service Models

Research support services emphasize meeting researchers’ knowledge and information needs at different stages. Xiao Long proposed that academic libraries should provide corresponding support services across the research lifecycle: idea/concept formation, project initiation/planning, research start/planning, research implementation, project completion, publication/dissemination/sharing, and management/evaluation [17]. Xue Jingjing et al. summarized a lifecycle-based model: “Research Ideation (consultation, guides, workshops) → Research Process (data management, tools, analysis, writing assistance) → Publication and Sharing (scholarly publishing, open access, citation management, intellectual property) → Long-term Preservation (institutional repository)” [18]. E Lijun, based on surveys of 10 university libraries including Harvard, Stanford,

and Columbia, proposed two perspectives for service classification: (1) services for the entire research process, including research support, technical, and literature acquisition services; and (2) services for specific research stages, including grant application support, data management, paper writing, and results dissemination [4]. Chen Zhuoxin surveyed 40 UK and US university libraries, categorizing services into design and discovery, planning and funding, research and experimentation, management and maintenance, and dissemination and publishing [19]. Stage-based service provision better facilitates organized research work.

2.3 Research Support for Specific Groups or Fields

While providing broad, foundational research support services, academic libraries also address the particularities of certain groups or fields. M.K. Hensley et al. surveyed 758 US academic library directors about undergraduate research support, with 281 respondents (85.4%) indicating such services, most commonly faculty mentoring (87%), research symposia (81.6%), and funding for fieldwork or academic activities (61.9%) [20]. In 2016, the University of Georgia Library and 18 others participated in an Ithaka S+R project on agricultural research support; through in-depth interviews with agricultural scholars, N. McMurry and L. Holds-worth concluded that libraries should strengthen disciplinary database construction, provide online journal access, develop professional training programs, and offer data management guidance for field-specific research [21]. M. Winston noted that crime-related research involves sociology, psychology, law, criminal justice, forensics, public health, and urban studies, requiring social science and law libraries to provide census data and GIS support [22]. L.M. Johnson argued that health sciences librarians should develop medical terminology knowledge bases, ontologies, and bioinformatics projects to fully support clinical and translational research [23].

Existing research covers programs, formats, and purposes of research support services. This study differs in three aspects: (1) **Sample size and development level:** Most previous studies are limited to small-scale surveys within individual countries, with the largest being Corral et al.'s 2012 survey of 140 institutions across four countries. Our study selects the top 100 QS-ranked universities, ensuring broader geographic coverage and higher service prioritization. (2) **Currency:** Research support services evolve rapidly; this study captures the latest global trends for more relevant service upgrading. (3) **Purpose:** While previous work focused on specific groups or disciplines, this study aims to inform Chinese libraries' contributions to overall university research development and "Double Tops" advancement.

Methodology

Although the concept of "world-class university" has long existed, no consensus on its definition has emerged [24]. This study selected libraries from the top 100 universities (101 institutions due to a tie at 98th place) in the QS 2017 rankings

as samples. These universities represent strong educational and cultural capabilities, high academic reputation, and international research frontiers, meeting world-class standards. Due to language limitations, 18 libraries were excluded, and 4 were inaccessible, leaving 79 preliminary survey targets.

We conducted website investigations, visiting each library site to identify research support service sections. Three libraries provided no relevant information, yielding a final sample of 76 libraries. Most libraries have dedicated sections integrating research-related services with navigation, though section names vary. Among the 76 libraries, 27 (35.5%) used “Research Support,” 14 (18.4%) used “Research,” and 13 (17.1%) used “Services.” We then collected detailed service information including types, content, and formats. Initial data collection occurred May 3–June 4, 2017, with verification and supplementation January 10–17, 2018.

Results and Analysis

4.1 Geographic Distribution of Survey Samples

Among the 79 preliminary samples, 76 libraries (96.2%) provided research support service information, demonstrating that world-class university libraries universally prioritize research support as a major strategic direction. Figure 1 [Figure 1: see original paper] shows the country distribution: the top three are the United States, United Kingdom, and China, though numbers vary significantly, with US libraries particularly outstanding in research support services.

4.2 Types of Research Support Services

Services varied across libraries but showed considerable commonality. We compiled all service names, removed generic terms like “Librarian,” “Library,” “Office,” and “Researchers,” and created a tag cloud using WordItOut (Figure 2 [Figure 2: see original paper]), where tag size indicates frequency.

Based on website investigation and tag cloud analysis, we categorized research support services into seven main types: Research Data Management, Open Access, Scholarly Publishing, Research Impact Measurement, Research Guides, Research Consultation, and Research Tools Recommendation. Table 1 shows the distribution and statistics.

4.3 Service Content and Formats

4.3.1 Research Data Management Data management represents a major challenge for research institutions [25] and a key service area for libraries adapting to data-intensive science. Many libraries are developing new data management policies and services as essential future components [26]. Among 76 libraries, 62 (81.58%) offered data management services. Note that by management level (national, institutional, or library), some universities like Edinburgh have prominent institutional-level practices not captured here.

World-class libraries' data management services show three characteristics:

- (1) **Comprehensive service items:** Stanford Libraries' services include data management planning, sharing and preservation, best practices, case studies, storage and backup, and consultation/training to help researchers organize, manage, and curate data [27]. Bristol University Library offers data management plan writing, data storage and use, data sharing, sensitive data handling, EPSRC compliance, and guidance on the data.bris repository [28].
- (2) **Lifecycle-based organization:** MIT Libraries structures services in three phases: (a) Planning—understanding preservation needs, writing plans, meeting funder requirements; (b) Preservation—organizing documents, ensuring security, using metadata, standardizing formats; and (c) Sharing—finding repositories, meeting journal requirements, understanding confidentiality and IP [29].
- (3) **Process-based design:** Imperial College London Library follows “understand policies → apply for funding → collect/process data → complete project → share data” [30]. The Australian National University Library provides services across: (a) research planning, (b) data management, (c) output publishing, and (d) policy compliance [31].

4.3.2 Open Access The 2002 Budapest Open Access Initiative defined OA as free online access allowing reading, downloading, copying, transmission, printing, searching, hyperlinking, indexing, and legal reuse [32]. OA has become an academic consensus. ACRL's *Environmental Scan 2017* identified scholarly communication as a key trend, emphasizing OA [33]. Among 76 libraries, 65 (85.53%) provided OA services—the highest proportion.

Libraries deliver OA services through three main approaches: (1) **Policy statements**—Caltech provides its OA policy with explanations of intent, scope, impact, and implementation [34]; (2) **OA platform links**—Cambridge University Library links to Google Scholar, OAster, CORE, BASE, Digital Commons Network, JURN.org, and Dissemin, with descriptions [35]; and (3) **Institutional repository construction**—Caltech's CaltechAUTHORS, CaltechTHE-SIS, CaltechCampusPubs, and CaltechDATA, and Toronto's TSpace help store and disseminate research [36].

4.3.3 Scholarly Publishing Academic library publishing involves organized production, dissemination, display, and preservation of books, journals, data, and repositories. ACRL's *Environmental Scan 2015* noted libraries' role as publishers [37]. Library publishing benefits researchers, promotes knowledge sharing, and enhances library competitiveness. Fifty-nine libraries (77.63%) offered publishing services.

With digital publishing growth, more libraries provide publishing services. The Library Publishing Coalition's *2017 Directory* shows active US libraries

(Columbia, Cornell, Michigan State, Northwestern, Ohio State, Penn State, UNC Chapel Hill) [38]. In the UK, UCL Press has been a library department since 2013 [39]. Purdue University Libraries' Publishing Division, integrated with Purdue University Press, supports high-quality output through four stages: (1) collaborative creation—publishing strategy, copyright, tools; (2) production—editing, design, printing; (3) dissemination—layout, marketing, discoverability; and (4) preservation—citability, archiving, evaluation [40].

Publishing involves copyright issues where existing law doesn't always reflect new paradigms. Imperial College provides targeted copyright services for researchers covering data/database rights, text/data mining, publishing agreements, Creative Commons licenses, academic networks, conferences, and theses [41].

4.3.4 Research Impact Measurement Libraries providing measurement tools and training help improve research quality and impact. Thirty-two libraries (42.11%) offered impact measurement services, with notable practices at NUS, Sheffield, Alberta, Leeds, UNSW, Toronto, and UCL. UCL Library focuses on bibliometrics, categorizing services into output metrics, author metrics, journal metrics, and altmetrics with corresponding training [42]. Toronto provides citation analysis tools (H-Index, Web of Science, Scopus, Google Scholar, Publish or Perish, ArnetMiner, CiteSeerX, EigenFactor) and altmetrics tools (ImpactStory, Scholarometer, Mendeley) [43]. Alberta also offers author name disambiguation (ORCID, Scopus Author Identifier, ResearcherID) and journal impact factors (Journal Citation Reports, Scopus Journal Analyzer, Eigenfactor.org, Google Scholar Metrics, SCImago Journal Rank) [44].

4.3.5 Research Guides Organizing academic resources improves retrieval efficiency. While traditional subject services use LibGuides, research guides build upon this with more diverse resources and organization. Forty-seven libraries (61.84%) provided research guides, typically as "Research Guides," "Topic Guides," or "Subject Guides." Stanford, Chicago, Cornell, and Penn offer multiple navigation methods. Chicago's "Help Guides" categorize resources by 18 formats, from common (journals, books, theses) to specialized (data, government documents, GIS, multimedia), preventing "information disorientation" [45]. Penn's "How-to Guides" provide tools, resources, and tutorials to enhance research capacity.

4.3.6 Research Consultation Researchers can consult librarians for guidance on grant applications, writing, methods, and resource discovery. Fifty-nine libraries (77.63%) offered consultation services. The Chinese University of Hong Kong Library helps identify information needs, locate relevant resources, build search strategies, and evaluate sources [46]. Carnegie Mellon and Cornell require online consultation appointment forms. Cornell's form requests basic information, library branch, research type, project description, and needed resources, with professional librarians responding within two business days or via

phone/email for urgent requests [47]. Peking University Library offers consultation on research projects, data management, patents, and intellectual property, including literature collection/analysis commissions, embedded support throughout the research cycle, and data storage/sharing guidance [17].

4.3.7 Research Tools Recommendation With big data development, researchers need tools for data analysis, management, and presentation. Thirty-eight libraries (50%) provided tools recommendation and guidance. Harvard offers EndNote, Zotero, RefWorks, Harvard Library Bookmarklet, Harvard LibX, Journals Search, and DMPTool.

Libraries primarily recommend: (1) **Data analysis/management tools**—UC Berkeley’s DataLab provides R, Python, Stata, SPSS, SAS, and training courses; Penn offers DMPTool. (2) **Citation management tools**—programs collecting records from databases to automatically create bibliographies. Chicago categorizes them as: (a) desktop software (EndNote, Papers), (b) web-based tools (EndNote Web, Mendeley), and (c) browser-based tools (Zotero) [48]. MIT also provides productivity tools like LibX browser plugin, mobile apps, and RSS feeds [49].

Strategies for Promoting Research Support Services in Chinese Academic Libraries

The “Double Tops” initiative requires Chinese universities to “orient toward national strategic needs, enhance high-level research capacity, and contribute to economic and social development.” Providing quality research support demonstrates library value in this context and represents a crucial future direction. Our survey of Chinese “985 Project” university libraries found that while some (Peking University, Shanghai Jiao Tong, Beijing Normal University, Zhejiang University, Huazhong University of Science and Technology, Tongji, Beijing Institute of Technology) offer detailed services aligned with user needs and institutional characteristics, most still focus only on novelty searches, citation verification, and subject services. Generally, Chinese academic libraries lack planning, offer single services, and have inadequate platforms and teams. Based on our findings, we propose five strategies:

5.1 Formulate Strategic Plans for Research Support Services

Service development requires comprehensive, long-term, sustainable strategic planning. As research environments change, libraries must highlight research support’s importance in strategic plans to ensure smooth research activities. Cornell University Library’s 2011–2015 strategic plan included three research-related goals, proposing to support researchers at every stage with high-level consultation and specialized tools for content management, analysis, and scholarly communication [50]. UCLA Library’s 2016–2019 plan made “fully promoting research prosperity” one of six goals, embedding organized, connected, scalable

services throughout the research lifecycle by enhancing staff skills, collaborating with researchers, facilitating publication production, providing robust data services, and continuous evaluation [51]. Modern strategic planning should emphasize concrete measures like open access, data management, research evaluation, and impact enhancement [6].

5.2 Provide Lifecycle-Based Support for Different Research Stages

Research activities follow a lifecycle with spiral connections, requiring support at each stage. Some libraries explicitly divide services by lifecycle: UNSW Library uses three stages (initiating research, publishing/sharing, managing/evaluating) [52]; UBC Library uses four (research planning, finding resources, evaluating/citing, publishing) [53]; ANU Library uses five (finding resources, writing/referencing, publishing/sharing, data management, copyright) [54]; and Sydney University Library uses five detailed stages: (1) Design & Discovery—consultation, strategy, funding advice, literature review; (2) Planning & Funding—impact measurement, data management plans, CVs, grant applications; (3) Research & Experimentation—specialized resources, document delivery, data storage, ethics; (4) Dissemination & Publishing—author identifiers, copyright, OA publishing, altmetrics; and (5) Curation & Preservation—using Sydney eScholarship repository [55]. Lifecycle-based division enables targeted services, ensuring organized research progress.

5.3 Establish Dedicated Organizations and Strengthen Team Building

Research support is a massive undertaking requiring concentrated human, financial, and infrastructure resources. Traditional fragmented services lack scale effects. Libraries need dedicated organizations with clear goals and staff to coordinate comprehensive, systematic services. Team capacity is critical for success. Ranganathan noted that library staff determine success. The *NMC Horizon Report: 2015 Library Edition* identified “rethinking librarian roles and skills” as a future challenge [56]. Traditional subject librarians are insufficient. A survey of Australian, New Zealand, UK, and Irish library professionals found that modern librarians need broader, deeper capabilities in academic culture, digital scholarship, education policy, IP, and research assessment [57]. The field supports developing more comprehensive LIS education to prepare professionals for expanded research support roles [58]. Libraries should build teams with diverse disciplinary backgrounds and skills, provide training opportunities, and continuously update knowledge systems.

5.4 Conduct Needs Assessments and Training for Researchers

User needs are fundamental to service development. When designing research support programs, libraries should consider institutional goals, disciplinary priorities, and collection strengths while surveying stakeholders (faculty, graduate students, research managers) to guide program design. Consultation, education, and training help researchers update knowledge and master new tools. In the

big data and e-Research environment, emerging tools create technical pressures, particularly for those less adept at new technologies. Research support should help researchers understand new workflows, provide appropriate tools, and offer guidance and training to accelerate mastery, enhance efficiency, and advance research. Many surveyed libraries offer training courses: LSE Library provides sessions on bibliometrics, data management, research ethics, copyright, poster design, and EndNote for research projects [59].

5.5 Create Integrated Research Support Portals

Among 76 libraries, 27 (35.5%) have dedicated “Research Support” sections, including MIT, Stanford, Harvard, Columbia, Duke, UC Berkeley, Carnegie Mellon, UNC Chapel Hill, UC Davis, Imperial College, King’s College London, Bristol, Nottingham, St Andrews, Hong Kong University, Peking University, Shanghai Jiao Tong, Sydney University, and Alberta. These portals integrate all research services with clear navigation, offering more specificity, standardization, and systematic organization than generic “Research” or “Services” sections, improving user efficiency. Currently, few Chinese libraries have dedicated “Research Support” portals; most use “Services,” “Reader Services,” or “Service Guides,” scattering research support items and hindering discovery. Libraries should create dedicated research support portals on their homepages with clear navigation for more scientific, standardized organization.

Conclusion

The 21st century is an era of data creation, analysis, and innovation, with research becoming digital, data-intensive, and collaborative. China’s “Double Tops” initiative emphasizes strategic, global, and forward-looking research, collaborative innovation around major projects, and optimized resource allocation, while its dynamic five-year selection cycle challenges research practice and management. Under these goals, academic libraries should leverage resource and service advantages to demonstrate deep service innovation, actively promoting normalized research support services.

Our website investigation reveals: (1) 76 of 79 libraries (96.2%) provide research support services, confirming this as a major strategic direction; (2) Services vary but mainly include data management (62 libraries, 81.58%), OA (65, 85.53%), publishing (59, 77.63%), impact measurement (32, 42.11%), guides (47, 61.84%), consultation (59, 77.63%), and tools recommendation (38, 50%); (3) Service quantity varies significantly—NUS, NTU, McGill, Sydney, UNSW, Carnegie Mellon, and Queensland offer all seven types, while Fudan and Glasgow offer only one, reflecting both limited services and incomplete website presentation; (4) Most libraries provide additional services like grant support and research integrity education, with services continuously optimizing.

Future research should summarize more successful cases, compare regional models, survey researcher needs, and empirically evaluate service effectiveness to

continuously improve research support efficacy, advance scientific discovery and knowledge innovation, and demonstrate library value in “Double Tops” construction.

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Author Contributions:

Si Li: Conceptualized the overall framework and revised the manuscript.

Zeng Yueliang: Conducted website investigation, collected data, and drafted the manuscript.

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

Source: ChinaXiv — Machine translation. Verify with original.