

Methods and Practice of Independent Third-Party Discipline Evaluation Services: A Case Study of Evaluation Analysis by Peking University Library Supporting International Pharmacy Assessment Postprint

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Abstract

[Purpose/Significance] Since 2002, numerous universities in mainland China have successively launched independent international discipline evaluation initiatives, aiming to conduct a comprehensive examination of their discipline positioning, talent cultivation systems, scientific research capabilities, and international influence from an international perspective. As a vital platform for information services in universities, libraries play an active role in assessing discipline development trends. Summarizing the methodologies and practices of libraries serving as third-party evaluators in this domain holds significant reference value. [Methods/Process] Based on a thorough understanding of the characteristics of international discipline evaluation, we construct an independent third-party discipline evaluation analysis report system oriented toward user needs and employing bibliometric methods as the primary means, to effectively support universities in conducting independent international evaluations. Using the third-party evaluation analysis report for Peking University's Pharmacy international evaluation as a case study, we elaborate on key tasks including benchmark institution selection, basic data acquisition, and evaluation indicator design, providing precise reference support for discipline international evaluation initiatives. [Results/Conclusion] The third-party evaluation analysis report prepared by Peking University Library for international evaluations objectively analyzed the research layout, development trends, and influence of participating institutions and disciplines, and compared them with international benchmark universities to demonstrate the competitiveness of the evaluated universities among international peers. Going forward, libraries should fully leverage their information service advantages, expand their service scope, and provide objective, reasonable, and scientific analysis reports from a third-party perspective

to assist various evaluation efforts.

Full Text

Abstract

[Purpose/Significance] Since 2002, many universities in mainland China have successively launched autonomous international discipline evaluations aimed at comprehensively examining their disciplinary positioning, talent cultivation systems, scientific research strength, and international influence from a global perspective. As a crucial hub for university information services, academic libraries play an active role in assessing disciplinary development trends. Summarizing the methodologies and practices of libraries serving as independent third parties in this domain holds important reference value.

[Method/Process] Based on a thorough understanding of the characteristics of international discipline evaluation, this study constructs an independent third-party evaluation report system oriented toward user needs and employing bibliometric methods to effectively support universities in conducting autonomous international evaluations. Using the third-party evaluation report for Peking University's pharmaceutical science international assessment as an example, this paper elaborates on key tasks including benchmarking institution selection, basic data acquisition, and evaluation indicator design, providing precise reference support for international evaluation work.

[Result/Conclusion] The third-party evaluation report prepared by Peking University Library for the international assessment objectively analyzed the research layout, development trends, and influence of the evaluated institutions and disciplines, and compared them with international benchmarking universities to demonstrate the competitiveness of the evaluated universities among global peers. Going forward, libraries should fully leverage their information service advantages, expand their service scope, and provide objective, reasonable, and scientific analysis reports from a third-party perspective to assist various evaluation efforts.

Keywords: International evaluation; Bibliometric analysis; Research evaluation; User-oriented information service

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Higher education plays a pivotal role in social development and scientific advancement, and educational internationalization represents an inevitable path toward becoming an education powerhouse. One of the primary objectives of the “Double First-Class” initiative is to establish a group of world-leading disciplines, and international discipline evaluation serves as a crucial mechanism for identifying disciplinary standing on the global stage. As the main provider of information services in universities, academic libraries can leverage their expertise in intelligence analysis to provide robust support for international discipline

evaluation efforts.

1 Concept and Connotation of International Discipline Evaluation

International discipline evaluation (hereinafter referred to as “international evaluation”) involves university research management departments actively inviting top domestic and international experts in a specific discipline to form evaluation committees, which conduct comprehensive assessments of disciplinary development status and future plans through document review and on-site visits. Also known as international peer review or medium-to-long-term international departmental evaluation [3], China’s university international evaluation work possesses three substantive characteristics: First, the university’s research management functions as the organizer, establishing the evaluation team and designing the process, with departments cooperating in the evaluation. Second, the evaluation benchmarks against international leading levels in the field. Third, evaluation conclusions directly influence disciplinary development.

To establish a sound university discipline evaluation system, China launched discipline evaluation work in 1985 [1], during which various attempts have been made: (1) Government-led discipline evaluation, such as the first-level discipline evaluation conducted by the Ministry of Education’s Degree and Graduate Education Development Center [2]; (2) Third-party evaluation, where agencies like ShanghaiRanking Consultancy release global discipline rankings and China’s best discipline rankings, scoring and ranking target disciplines based on indicators including research projects, outputs, talent cultivation, and international cooperation; (3) University self-evaluation, where institutions autonomously conduct evaluations to understand their disciplinary construction status, clarify development goals, and allocate resources rationally. Building on these various evaluation forms and responding to the call for building world-class universities, an increasing number of institutions are conducting high-level international evaluations within their self-evaluation frameworks to identify gaps with leading global universities.

2 Foundation and Current Status of International Evaluation

China’s autonomous international evaluation draws on foreign disciplinary evaluation experiences. The U.S. higher education accreditation system began in the late 19th century, organized by the Council for Higher Education Accreditation (CHEA) and the U.S. Department of Education (USED), covering both institutional and specialized accreditation. By 2016, over 8,300 higher education institutions and 23,900 programs had received accreditation from U.S. agencies [5-6]. The UK’s Research Excellence Framework (REF) evaluates disciplines as units, employing peer review to assess various research outputs submitted by participating universities [7-8]. Additionally, major university ranking systems

include discipline-specific rankings, such as Times Higher Education (THE), U.S. News & World Report, Quacquarelli Symonds (QS), and ShanghaiRanking's Academic Ranking of World Universities (ARWU).

Multiple studies have discussed specific methods and indicator systems used in various evaluation programs [9-11]. Although emphases differ, evaluations typically consider three categories of indicators: (1) Input indicators reflecting resources available for disciplinary construction, such as funding, donations, and infrastructure; (2) Process indicators demonstrating operational mechanisms for converting resources into outcomes, covering instructional design and research management; and (3) Output indicators reflecting disciplinary achievements, including quantifiable explicit outcomes and intangible reputational factors. The four major international ranking systems mentioned above all incorporate bibliometric analysis (e.g., publication counts, citation impact, author collaboration) as essential components of output analysis, with varying indicator configurations. For instance, QS rankings include four first-level indicators: academic reputation, employer reputation, citations per paper, and H-index [9]. ARWU's global discipline rankings consider total papers, normalized citation impact, international collaboration ratio, top journal publications, and faculty awards. In China's university-led international evaluations, expert committees typically investigate these dimensions through multiple approaches to formulate professional opinions.

China's universities have accumulated extensive practical experience in autonomous international evaluation. Tsinghua University pioneered this practice in 2002 with its physics department evaluation, which significantly advanced the establishment of a tenure system. Since then, the practice has evolved through three stages: embryonic (2002-2006), exploratory (2007-2012), and rapid development (2013-present) [12]. Over a dozen universities including Peking University, Tsinghua University, Fudan University, Shanghai Jiao Tong University, Beihang University, and Chang'an University have completed international evaluations, providing valuable references for building world-class universities .

**** Characteristics of Mainland Universities Conducting International Evaluation Across Different Stages

Stage	Main Participating Universities	Characteristics
2002-2006	Tsinghua University	Established basic methodology of autonomously inviting international experts for on-site evaluation

Stage	Main Participating Universities	Characteristics
2007-2012	Peking University [16], Shanghai Jiao Tong University, Beihang University	Expanded applicable disciplines; international evaluation received policy-level recognition [13]
2013-Present (Rapid Development)	Shanghai Municipal Universities, Shanghai Jiao Tong University, Harbin Institute of Technology, Beihang University	First government-organized international evaluation [14]; rapid expansion of participating institutions; “Double First-Class” policy incentivized international evaluation [15]

The procedures for autonomous international evaluation are generally similar across Chinese universities, all employing comprehensive expert panel reviews. The process typically involves six stages [5]: (1) Discipline selection: The research management department identifies recently internationally competitive disciplines as evaluation subjects; (2) Expert panel formation: 5-7 renowned international experts are selected, with foreign experts comprising at least 80%; (3) Self-evaluation report: The evaluated department drafts a report covering funding, student composition, faculty strength, operational mechanisms, and research outputs (though current reports often provide subjective descriptions and publication lists); (4) On-site evaluation: A 3-day visit involving facility tours, faculty-student forums, and self-evaluation report review; (5) Report submission: Experts compile findings and recommendations into an evaluation report; (6) Implementation: The university organizes departments to address issues and revise development plans.

Specific procedures vary slightly among institutions. For example, Peking University’s evaluation of quantum materials science followed these six steps [17]. Fudan University invites experts for 2-3 day visits including presentations, forums, and facility tours, with its School of Life Sciences also experimenting with correspondence-based evaluation [18].

3 University Libraries as Third-Party Discipline Evaluators

In current Chinese practice, self-evaluation reports serve as the primary reference material for international evaluation. As noted, these reports provide primarily qualitative, subjective descriptions with superficial data analysis, mostly

listing resources and outputs. Few universities have engaged third-party evaluation agencies for analytical reports.

Broadly defined, a third party refers to an independent entity separate from two related parties, enhancing fairness and impartiality. Introducing third-party evaluation agencies into university discipline assessment has practical foundations—China’s “Double First-Class” policy explicitly advocates referencing influential third-party evaluations to establish long-term mechanisms. Third-party agencies refer to independent intelligence service organizations capable of completing commissioned tasks, separate from evaluation organizers and evaluated institutions.

University libraries conducting third-party international evaluation support services exhibit four characteristics: (1) **Objectivity**: Libraries independently access data and analyze situations objectively, revealing hidden problems; (2) **Disciplinary appropriateness**: Library staff from diverse disciplines understand disciplinary characteristics through daily collaborative services with researchers; (3) **Comprehensiveness**: Unlike individual experts who may assign personalized weights based on their specialties, libraries rely on publicly available information for holistic analysis; (4) **Institutional familiarity**: Libraries understand university and departmental specifics, enabling precise data correction. For instance, during departmental contribution analysis, librarians must track organizational structures, mergers, and name variations of schools, centers, and laboratories.

4 Peking University Library’s Support for Pharmaceutical Science International Evaluation

Commissioned by Peking University’s Discipline Development Office, Peking University Library first prepared bibliometric analysis reports for mathematics and information science international evaluations in 2017, subsequently producing annual reports for various disciplines. These reports prioritize user needs, incorporating international evaluation characteristics throughout design, data sourcing, benchmark selection, indicator systems, and analysis processes.

In 2018, Peking University conducted an international evaluation of its pharmaceutical science discipline. As a highly interdisciplinary field, the analysis utilized literature from multiple databases, employing trend analysis and content mining to examine the status of Peking University’s pharmaceutical science research output in the global context, analyzing its internal distribution and development trends.

4.1 Framework Design

As the evaluation organizer, the university’s functional departments had specific requirements. Through consultation with the Discipline Development Office, the library learned that Peking University’s pharmaceutical science achievements

primarily originate from the Health Science Center's School of Pharmaceutical Sciences, with additional contributions from affiliated hospitals and the College of Chemistry and Molecular Engineering. The analysis report therefore comprised two parts: pharmaceutical discipline evaluation and Health Science Center institutional evaluation, aiming to comprehensively assess the School of Pharmaceutical Sciences while evaluating international competitiveness.

4.2 Data Acquisition

Guided by big data thinking, the report integrated multiple data resources for comprehensive evaluation [19]. Considering that high-level pharmaceutical research is primarily published in international journals, Science Citation Index Expanded (SCI-E) was selected as the primary data source for analyzing academic output and impact, focusing on high-impact document types including Articles, Reviews, Letters, and Proceedings Papers. Given pharmaceuticals' strong application potential and technology transfer characteristics, patent data from Innography and PatSnap databases were also incorporated as supplements to academic papers.

Research shows that author affiliations are often inaccurate or non-standard [20], making data retrieval and cleaning critical. This retrieval process involved understanding researchers' naming conventions, confirming possible affiliation formats, using Web of Science address fields to search for the School of Pharmaceutical Sciences and key laboratories, and cross-verifying results against the Peking University Health Science Center Scholars Repository, faculty rosters, and research achievement statistics.

4.3 Benchmarking Institution Selection

International evaluation aims to identify gaps between university disciplines and global leaders, prioritizing top-tier institutions as benchmarks. Selection criteria included: (1) high international disciplinary or institutional rankings; (2) rapidly rising institutions with strong momentum; and (3) expert-recommended institutions with high potential. Considering these factors and ensuring geographic diversity, the final benchmarking institutions were Harvard University, National University of Singapore, University of North Carolina, University of California San Francisco, University College London, University of Michigan, University of Pittsburgh, University of Texas at Austin, University of Tokyo, and University of Toronto.

4.4 Indicator Design and Layout

The analysis report balanced institutional and disciplinary perspectives, objectively summarizing academic output and impact [21-22] with unique emphases for pharmaceutical evaluation .

**** Evaluation Indicator Layout in the Analysis Report

Analysis Dimension	Specific Indicators
Academic Output & Impact	Publication volume and trends; Citation impact and trends; Highly-cited paper output and proportion; Research field classification; Journal classification; Collaboration institutions and performance; International collaboration trends
Patent Output & Quality	Patent application and grant volumes; Geographic distribution; Legal status distribution; Patent strength distribution
Disciplinary & Research Field Analysis	Publication volume and trends (evaluated vs. benchmarking institutions); Citation impact and trends; Q1 journal performance; Authoritative journal performance; Highly-cited paper performance; International collaboration performance
Departmental Contribution	Publication distribution across departments (internal comparison); Citation impact distribution across departments

In addition to the four document types mentioned, the report emphasized patent analysis given pharmaceuticals' applied nature, examining application volumes, grant rates, and authorization cycles. The "patent strength" metric from Innography was used to assess patent quality [23], alongside patent portfolios, legal status, and commercialization potential.

The disciplinary analysis focused on Peking University's pharmaceutical science competitiveness, also addressing departmental contributions by analyzing author affiliations to map pharmaceutical research distribution across internal departments.

4.5 Benefits and Limitations

The library's third-party report, independent of organizers and evaluated departments, achieved two goals: (1) assessed the School of Pharmaceutical Sciences' five-year research output, identifying high-impact articles and quality patents while mapping collaboration networks; (2) evaluated Peking University's pharmaceutical science competitiveness through comparisons with global peers on

publication volume, citation impact, high-impact papers, international collaboration, and internal research distribution.

Compared to existing library discipline evaluation reports, this international evaluation-oriented report expanded service scope with unique advantages: (1) it integrated five years of papers and patents, providing macro-level analysis that supplemented group-centric self-evaluation reports; (2) through bibliometric comparisons with top global institutions, it reflected Peking University's comprehensive strength; (3) by cleaning affiliation data, it supported discussions on resource allocation and disciplinary layout; (4) it identified high-value patents lacking technology transfer, highlighting future commercialization opportunities.

However, limitations remain: the analysis focused on retrievable explicit outcomes like publications, neglecting implicit indicators such as graduate career paths; it lacked data on funding, facilities, and equipment; and data processing methods require further refinement, with indicators like research efficiency, interdisciplinary degree, and global frontier participation needing supplementation.

5 Summary and Reflection

5.1 Library Support for Third-Party International Evaluation

Peking University Library's commissioned bibliometric analysis reports provide independent third-party support for international evaluation, creatively expanding library information services and offering practical experience for user-oriented services. The reports serve as credible scientific references during evaluation, with frameworks that respond to user needs and yield readable, targeted conclusions.

5.2 Future Prospects for Library Information Services

Information services have become a core library mission, with intelligence products needing to support university decision-making and major research demands as think tanks and advisors [24]. Through two years of practice, Peking University Library's reports have gained high recognition and play an irreplaceable role. Future improvements should focus on:

1. **Expanding user groups** by establishing long-term partnerships and fixed collaboration models to ensure service continuity and reduce communication costs.
2. **Strengthening communication** to master disciplinary backgrounds and fully understand client needs. Information specialists, as knowledge discoverers and research partners, require both information management expertise and deep understanding of research practices [25]. This report's authors, holding advanced degrees in science and medicine, effectively communicated from a researcher's perspective.

3. **Enhancing training** for functional departments. While information literacy education primarily targets students and researchers, training for university administrators remains limited. Equipping clients with basic intelligence analysis knowledge can significantly improve project preparation efficiency and requirement precision.

As China's higher education increasingly integrates with international standards and more universities conduct autonomous international evaluations, this paper introduces the history and current status of international evaluation, using Peking University's pharmaceutical science case to detail report frameworks, indicator systems, and key findings. These experiences provide valuable lessons for designing intelligence products in information services, expanding library service objects. Academic libraries should fully leverage their intelligence analysis strengths to provide robust data support for disciplinary evaluation and precise references for institutional decision-making.

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