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Analysis of Citation Verification and Retrieval Services Based on University Talent Evaluation

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Abstract

Purpose/Significance: Library citation verification and retrieval services provide decision-making intelligence information for university talent evaluation processes, including professional title assessment and appointment, discipline evaluation, and various scholar application procedures. **Method/Process:** This study investigates library websites of 39 “Project 985” universities, taking citation verification and retrieval services as a starting point to explore issues of indicator one-sidedness and limitation in university talent evaluation; it employs VOSviewer knowledge graph clustering analysis methods to conduct intelligence analysis from the perspective of researchers and collaborators, thereby expanding paper evaluation metrics. **Results/Conclusion:** The aim is to promote high-quality development of library services and provide decision-making support for talent evaluation work.

Full Text

Analysis of Index and Citation Checking Services Based on University Talent Evaluation*

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Abstract

[Purpose/Significance] The index and citation checking service of libraries provides decision-making intelligence for university talent evaluation processes, including professional title appointments, discipline assessments, and various scholar award applications. **[Method/Process]** This study investigates the library websites of 39 “Project 985” universities, using index and citation checking services as a starting point to examine the problems of one-sided and limited indicators in university talent evaluation. Utilizing VOSviewer knowledge graph

clustering analysis, this research conducts intelligence analysis from the perspectives of researchers and their collaborators to expand the evaluation indicators for academic papers. **[Result/Conclusion]** The aim is to promote the high-quality development of library services and provide decision support for talent evaluation work.

Keywords: Index and Citation Checking; Talent Evaluation; University Library; VOSviewer; Knowledge Graph

1 Introduction

On November 8, 2018, the General Office of the Ministry of Education issued the “Notice on Launching the Special Campaign to Clean Up ‘Paper-Only, Title-Only, Position-Only, Education-Only, and Award-Only’” (the “Five-Only” cleanup), requiring universities to carry out this cleanup and deepen institutional reform, covering project reviews, talent evaluations, and institutional assessments [1]. On September 28, 2021, President Xi Jinping attended the Central Talent Work Conference and delivered an important speech, emphasizing the need to improve the talent evaluation system by rapidly establishing an evaluation system oriented toward innovative value, capability, and contribution, and to create and implement an evaluation system conducive to scientific and technological personnel focusing on research and innovation [2]. As hubs for talent, universities continuously reform their talent evaluation systems, striving to eliminate the entrenched problems of “paper-only” evaluation and “SCI supremacy” while moving toward more scientific, systematic, and comprehensive approaches. Index and citation checking services involve retrieval agencies searching for the inclusion and citation status of published articles in reference databases based on information provided by clients (such as title, author, journal name, publication date, etc.) and issuing corresponding indexing and citation reports [3].

2 Current Status of Index and Citation Checking Services

The scope of index and citation checking reports issued by university libraries varies considerably, and the evaluation indicators employed are not uniform. This analysis examines eight aspects: policy and regulations, service systems, journal source verification, document types, author order, citation strategies, evaluation indicators, and extended services.

2.1 Policy and Regulations

Currently, there are no dedicated standards or specifications for index and citation checking services. Most such services operate through university science and technology novelty search stations. Consequently, libraries formulate their own work procedures and service specifications based on relevant standards such

as the “Technical Specification for Scientific and Technological Novelty Search” (GB/T 32003-2015) and the “Library Reference Service Specification” (WH/T 71-2015). As a result, the scope, criteria, and format of reports differ across libraries.

2.2 Service Systems

Among the 39 universities surveyed, Minzu University of China does not offer index and citation checking services, four universities have inaccessible service webpages or restrict access to internal users, and 11 universities do not use any system. Twenty-four universities employ specialized systems developed jointly or by third-party vendors, including the index and citation checking system developed by the CALIS Management Center and Peking University Library, the WITS Scientific Achievement Information Service Platform developed by Shaanxi Zhongke Chuangyuan Information Technology Co., Ltd., the Hongshenghuiyin system developed by Zhuzhou Tianxin Information Technology Co., Ltd., and the system developed by Baohe Data Co., Ltd. The intelligence of these systems facilitates both client submission of requests and librarians’ acquisition of statistical information, while also providing necessary support for integration with talent evaluation systems and data extraction.

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2.3 Journal Source Verification

There is often a time lag between the publication of academic literature and its inclusion in databases. For documents that have been published but not yet indexed, many libraries issue journal source certificates as supporting evidence. However, databases such as SCI, EI, and CSSCI suffer from indexing delays and undergo dynamic changes annually in their journal lists, with not all journal content being fully indexed. Therefore, journal source certificates cannot be simply equated with indexing certificates during talent evaluation processes.

2.4 Document Types

The Web of Science Core Collection categorizes documents into 42 types, including Article, Book, Proceedings Paper, Letter, Poetry, and Script. Engineering Village classifies documents into 16 types, such as Journal article, Conference article, and Conference proceeding. CNKI includes 18 types, including academic journals, dissertations, conferences, patents, books, and newspapers. Since different document types carry varying academic value, libraries should specify the

document types examined in their retrieval certificates to help talent evaluation institutions make informed judgments, thereby reducing disputes similar to the Miao Xin case [4].

2.5 Author Order

First author and corresponding author status represents a form of content-based academic evaluation. Libraries at Sun Yat-sen University, South China University of Technology, and others can annotate author contributions in their indexing reports. Zhou Baiyu [5] suggests that co-authors provide contribution statements quantifying each author's contribution as percentages. Evaluation institutions could consider assigning weights to authors based on their order and contribution degree, thereby establishing evaluation system indicators to support talent evaluation.

2.6 Citation Strategies

Researchers often request reports for both standard and non-standard citations, such as requiring citations from SCI databases, Web of Science Core Collection, or all Web of Science databases for SCI-indexed documents. Thirteen universities, including Chongqing University, provide standard citations (SCI database only); thirteen universities, including Tsinghua University, provide citations from either SCI or Web of Science Core Collection; and three universities, including Beijing Normal University, provide citations from SCI, Web of Science Core Collection, or all Web of Science databases. Beyond database scope, principles for excluding self-citations also vary, including excluding all authors, first authors, clients, or team members. Excluding all authors of cited documents represents a more objective and rigorous approach. Talent evaluation processes must consider these differences in citation strategies while maintaining unified evaluation standards.

2.7 Evaluation Indicators

Quartile rankings and impact factors are commonly used journal evaluation indicators. Two ranking systems are widely employed: the JCR quartile developed by Clarivate Analytics and the JCR quartile formulated by the National Science Library of the Chinese Academy of Sciences. Ten universities, including Tsinghua, Peking, and Renmin Universities, issue JCR quartiles; seventeen universities, including Beihang, Wuhan, and Jilin Universities, can provide both CAS and JCR quartiles, all supporting data from either the most recent year or the publication year. Additional indicators have emerged, such as the CNCI and JNCI values used by Xiamen University Library (metrics from the InCites database referring to Category Normalized Citation Impact and Journal Normalized Citation Impact) [6]. In 2021, Clarivate's JCR introduced a new metric—Journal Citation Indicator (JCI)—which claims to standardize across different research fields, document types, and citation rates to facilitate interdisciplinary interpretation and comparison [7]. Zhu Hui et al. analyzed the application of

Altmetrics and H-index in evaluating academic achievements and influence [8]. Other metrics such as five-year journal impact factor, CNKI composite impact factor, CiteScore, and Chinese Science and Technology Journal Citation Indicators (CSCD-JCR) also serve as evaluation indicators for journals or scholars. In summary, university libraries should promptly monitor changes in academic evaluation indicators, research the combined effects of diversified metrics, break the limitations of fixed indicators, and assess the applicability of various metrics.

2.8 Extended Services

Building upon index and citation checking services, universities are exploring ways to expand service breadth and depth. Zhejiang University offers quantitative analysis services for the impact and competitiveness of representative achievements. Based on bibliometrics, this service analyzes representative papers' impact (covering citing countries, institutions, authors, journals, paper percentiles, and journal relative impact) and research field competitiveness (covering publication volume/contribution peer comparison, patent volume/contribution peer comparison, and citation volume peer comparison) [9]. Sichuan University conducts academic influence evaluation and analysis by examining citation patterns, journal quality, and citations by high-level scholars and top journals, providing quantitative evidence and data support for faculty to select representative works. Using WOS, InCites, and other retrieval platforms and research analysis tools, the library provides analysis reports on faculty contributions to disciplines and research field competitiveness [10].

3 Problems Facing Index and Citation Checking Services in Talent Evaluation

The above investigation reveals that library index and citation checking services, based on objective bibliographic data, provide certain evaluations of researchers' achievements and essentially reflect their intrinsic attributes. However, several problems remain in supporting the establishment of talent evaluation systems.

3.1 One-sided Evaluation Indicators

Index and citation checking services primarily verify the indexing and citation of journal and conference papers, lacking verification of books, monographs, patents, and other research outputs. Evaluation content generally covers highly cited papers, hot papers, citation frequency, journal quartiles, and impact factors, but lacks declarations of author order and assessment of document types, particularly the value of correction-type documents. Review materials typically require proof of publications within a specified timeframe, necessitating consideration of early access dates, publication dates, database indexing dates, and verification dates. Beyond quartile and IF metrics, there is also a lack of application for emerging indicators such as JCI and CiteScore.

3.2 Limited Evaluation Indicators

Retrieval certificates that include publication counts, document types, citation patterns, journal quartiles and impact factors, highly cited/hot papers, and scholar H-index, or even add new metrics like JCI and CiteScore, have enriched evaluation indicators. However, these essentially remain auxiliary evaluations based on single or multiple additive indicators. Although some services conduct impact evaluation and research field competitiveness analysis, expanding existing indicators to some degree, they still operate at the level of linear combinations of metrics, performing superficial analysis of scholars' paper indicators without adequate examination of the systematic, continuous, and in-depth nature of scholars' research careers.

4 Recommendations

4.1 Enhancing Professional Capacity

4.1.1 Mastering Retrieval Knowledge and Improving Professional Competence Cui Ming [11] analyzed abnormal cases in Web of Science Core Collection index and citation checking from perspectives such as author fields, journal name retrieval, citation data, impact factors, and erroneous data. Li Xin [12] discussed common problems and solutions in SCI/SSCI/A&HCI databases. Wang Yanxiu [13] explored pathways for improving retrieval literacy from both basic professional competence and specialized retrieval competence. Librarians must continuously read literature, exchange ideas with peers, familiarize themselves with characteristics of different databases and evaluation indicators, master indexing principles and retrieval techniques, think critically, and accumulate practical experience to improve professional competence, service quality, and business depth.

4.1.2 Establishing Institutional Alliances and Perfecting Evaluation Systems By establishing index and citation checking institutional alliances and organizing thematic forums and salons, libraries can exchange and share business models, management practices, workflows, and report formats, exploring industry standards and norms for index and citation checking services. Based on this foundation, through standardization of service definitions, management, and processes [14], libraries can adopt appropriate retrieval strategies (indexing and citation retrieval scope), citation standards (non-self-citation principles, citation deduplication), evaluation indicators (multi-angle), certifiable document types, and author order specifications. Using rigorous and standardized language to form relatively unified report formats provides auxiliary support for establishing standardized, objective, and fair evaluation systems in talent evaluation processes.

4.1.3 Establishing Diversified Evaluation Indicators First, implement categorical evaluation by establishing different indicator systems for degree ap-

plications, scholarship applications, professional title appointments, discipline assessments, fund evaluations, and Changjiang Scholar applications, refining the weight of different items in retrieval reports to cover author order, publication date, document type, citation strategy, and journal/scholar evaluation indicators. For professional title appointments, beyond issuing retrieval certificates for journal papers, conference papers, and book citations, libraries can conduct in-depth analysis of scholars' academic influence and competitiveness during the evaluation period based on bibliometrics, while also considering technology transfer, peer review, and exchange cooperation indicators to comprehensively establish evaluation metrics compatible with position characteristics, disciplinary features, and research nature. Second, implement field-specific evaluation by establishing applicable indicators based on disciplinary differences. For example, science and engineering fields should use SCI, EI, CPCI-S, Scopus, and CSCD databases as evaluation tools, with biomedical fields adding MEDLINE data; humanities and social sciences should use SSCI, A&HCI, CPCI-SSH, and CSSCI databases. Additionally, interdisciplinary research represents an emerging development direction, requiring further investigation to develop appropriate evaluation indicators for such fields.

4.2 Deepening Evaluation Indicators

Leveraging information retrieval advantages and based on fundamental data, libraries should, on one hand, conduct clustering analysis of researchers' systematic, continuous, and in-depth research directions from perspectives including papers, patents, books, standards, and projects. On the other hand, they should analyze collaborators, including institutional distribution of co-authors, to conduct in-depth intelligence analysis from both researcher and collaborator perspectives, obtaining information on research fields, interdisciplinary intersections, and exchange cooperation, thereby breaking through traditional journal evaluation or simple quantitative evaluation. This analytical content should be submitted to domain experts to assess the importance of research in national strategic development directions or its problem-solving effectiveness, providing decision-making assistance to talent evaluation agencies such as colleges and personnel departments.

Based on our institution's experience in daily index and citation checking work, we propose a simplified yet operational scheme for deepening evaluation indicators. Taking Author Z from University X as an example, we constructed a search query using various name variants and institutional addresses/postal codes. A search of the Web of Science Core Collection (retrieval date: April 28, 2023) yielded 486 records. After exporting complete records and filtering out non-author documents, 419 records remained. Processing the "Publication Year" field produced Author Z's publication trend chart [Figure 1: see original paper] and document type distribution [Figure 2: see original paper]. The figures show that Author Z published few papers before 2008, representing an accumulation phase, but has published more than 15 papers annually since 2008, entering a

growth phase with a peak in 2018. Journal articles constitute the majority at 78.76%, followed by conference papers at 18.62%.

Processing the “Funding Name Preferred” field revealed the top ten funding agencies (with two tied for tenth place) . The data shows that the National Natural Science Foundation of China (NSFC) provides the most support, followed by the Fundamental Research Fund for the Central Universities and the National Basic Research Program of China, indicating that the scholar’s research aligns with national strategic development and research planning requirements.

Importing the cleaned WOS results into VOSviewer (Version 1.6.19) and setting the minimum co-occurrence threshold to 5 for keyword analysis produced a keyword clustering map [Figure 3: see original paper]. The map reveals that the author’s early research focused on silicon carbide (with larger nodes for 4H-SiC and silicon carbide), primarily investigating voltage characteristics, temperature characteristics, power consumption, simulation modeling, mobility, crystal growth, design, and manufacturing. Over two decades, the scholar systematically studied the entire process of silicon carbide chip design, manufacturing, and technology, demonstrating sustained and systematic research addressing critical “bottleneck” issues in chip technology and fulfilling the role of scientific researchers. In recent years, the research direction has shifted from silicon carbide to gallium oxide (Ga₂O₃, gallium oxide).

Using VOSviewer’s journal analysis function with a minimum co-occurrence threshold of 3 produced a journal clustering map [Figure 4: see original paper]. Ranking by total link strength (representing co-occurrence frequency with other journals) and querying the Chinese Academy of Sciences Journal Ranking Table (Upgraded Version) revealed the top ten journals by publication volume and disciplinary distribution . The data shows that Chinese Physics B (merged with Chinese Physics after its split in 2008) is the most frequent publication venue with 71 papers. The scholar’s research primarily concentrates in physics, materials science and engineering technology, and computer science.

Similar methods can analyze collaborators and their institutions to evaluate researchers’ cooperation with experts in the same or different fields, as well as collaboration with universities, enterprises, government agencies, and foreign institutions, providing comprehensive assessment of scholars.

4.3 Developing English Academic Journals and Index Databases in China

China is a major research nation but also suffers the most severe outflow of research achievements, primarily due to two factors: erroneous research evaluation orientation and systemic bias in domestic evaluation systems, and the influence and appeal of scientific journals from developed countries, particularly the United States [15]. Although China has established the Chinese Science Citation Database, it primarily includes Chinese-language documents with insufficient international influence and lacks coverage of international English-

language literature. Consequently, evaluation indicators depend on international database metrics, which often raise questions when evaluating domestic scholars. Therefore, China should actively develop its own English-language academic journals and construct its own international science citation index [16] to create a suitable research environment, encourage researchers to publish in domestic journals, and reduce the outflow of research achievements.

5 Conclusion

As a component of the talent evaluation mechanism system, library index and citation checking services can enhance evaluation of scholars' research content through retrieval of objective factual data, cluster analysis of the systematic, continuous, and in-depth nature of scholars' research, and analysis of collaborators and citers' research profiles to ultimately construct scholars' social network relationships and knowledge graphs. Expanding from traditional paper-based evaluation (weighting paper counts, quartiles, IF, citations, document types, author order, etc.) to comprehensive evaluation based on scholars' research content breaks the "evaluate paper by journal" approach. Through in-depth intelligence analysis, these services provide decision support for the high-quality development of talent evaluation work, including academic promotion, talent incentives, and fund project applications.

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Author Contributions

Yang Lan: Topic selection, data collection, and paper writing; **Meng Rui:** Paper revision; **Yang Xianyan:** Paper revision

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

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