

A Comparative Study of Patent Information Services in Chinese and American University Libraries and Its Implications: Postprint

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Abstract

[Purpose/Significance] Sustained and effective delivery of user-centered patent information services is of significant importance for university libraries to achieve service transformation and innovative development under the new circumstances. [Method/Process] This study employs comparative analysis to examine and compare the patent information service content provided by university libraries affiliated with the U.S. Patent and Trademark Resource Center (PTRC) and China's first batch of university national intellectual property information service centers. [Results/Conclusion] Drawing upon the practical experience of the U.S. PTRC, this paper proposes pathways for enhancing the level of patent information services in Chinese university libraries: rationally defining the scope of patent information services, attaching high importance to patent information service work, effectively improving the accessibility and utilization rate of patent information resources, strengthening patent information literacy education through multiple approaches, deepening patent information consulting services, promoting the dissemination and utilization of patent information through diverse channels, and collaboratively carrying out in-depth patent information services.

Full Text

Preamble

[Purpose/Significance] Continuously and effectively providing user-demand-oriented patent information services is of great significance for university libraries to achieve service transformation and innovative development under the new circumstances. [Method/Process] This study employs comparative analysis to examine and compare the patent information service offerings of U.S. Patent and Trademark Resource Centers (PTRCs) in university libraries with

those of China's first batch of University National Intellectual Property Information Service Centers. **[Result/Conclusion]** Drawing on the practical experience of U.S. PTRCs, this paper proposes pathways to enhance the level of patent information services in Chinese university libraries: reasonably defining the scope of patent information services, attaching great importance to patent information service work, effectively improving the accessibility and utilization of patent information resources, strengthening patent information literacy education through multiple channels, conducting in-depth patent information consulting services, promoting the dissemination and utilization of patent information through various channels, and carrying out deep patent information services through multi-party collaboration.

Keywords: patent information service; university library; Patent and Trademark Resource Center; University National Intellectual Property Information Service Center

In recent years, against the backdrop of national innovation-driven development and intellectual property powerhouse strategies, the intellectual property information services of university libraries in China have received sustained attention and emphasis. The *13th Five-Year Plan for National Intellectual Property Protection and Utilization* (State Council Document [2016] No. 86) requires increasing intellectual property information service outlets and strengthening the capacity building of intellectual property information services in university libraries and other organizations [1]. The *13th Five-Year Plan for National Education Development* (State Council Document [2017] No. 4) explicitly states that "university libraries should be supported in building intellectual property information service centers to provide services for promoting university innovation" [2].

Driven by relevant national policies, major university libraries across China have successively launched patent knowledge lectures, patent literature searches, patent information retrieval, patent information dissemination, and patent information analysis services [10]. However, overall, a significant gap remains between the patent information services offered by university libraries and actual user needs [6]. Due to a shortage of high-level professional talent, many libraries can only focus their main efforts on producing patent analysis reports [11], resulting in services whose breadth and depth need further expansion and enhancement. Through investigation, the author also found that while many university library websites list multiple patent information service items, actual communication with peers reveals that the scope of work already carried out is very limited, service quality needs improvement, and patent information services remain at a primary stage. Some university libraries even face difficulties in sustaining and effectively developing their patent information services. Therefore, analyzing the problems in library patent information services and exploring solutions is of important practical significance for effectively advancing the sustainable development of library patent information services and truly fulfilling the role of China's University National Intellectual Property Information

Service Centers.

American university libraries have over 100 years of practice in patent information services and have accumulated rich experience that holds important reference value for Chinese university libraries. However, no existing research has conducted comparative analysis of patent information services between Chinese and American university libraries. Based on this, through comparing the development of patent information services in Chinese and American university libraries, this study analyzes the deficiencies in domestic university library patent information services, draws on the experience of U.S. PTRCs, and proposes recommendations for advancing patent information services in Chinese university libraries.

2 Research Design

2.1 Research Objects

The author conducted comprehensive investigations of 45 PTRC university libraries in the United States, selecting 16 PTRC university libraries with well-developed patent information services and detailed website content (see Table 1) as research objects. Additionally, China's first batch of 23 University National Intellectual Property Information Service Centers (hereinafter referred to as Chinese Intellectual Property Information Service Centers, see Table 2) were selected as survey subjects. These 39 university libraries basically represent the highest level of patent information services in both countries.

2.2 Research Content

Given that both U.S. PTRCs and Chinese Intellectual Property Information Service Centers primarily focus on patent information services, to make the comparative study more targeted, this article focuses on investigating and comparing the service providers, patent resource construction and utilization, patent information consulting services, patent information dissemination and promotion, patent information literacy education, and in-depth patent information services offered by these 39 Chinese and American university libraries, and explores how to improve the level and effectiveness of patent information services in Chinese university libraries.

2.3 Survey Methods

The investigation was conducted from November 20, 2019, to April 25, 2020, with revisions made to some content during the paper writing process. The author employed literature review, website visits, telephone calls, emails, online real-time consultation software, and social media to conduct comprehensive investigations of patent information services at the 39 Chinese and American university libraries.

3 Survey Results and Comparative Analysis

3.1 Patent Information Service Providers

U.S. Patent and Trademark Resource Centers evolved from Patent and Trademark Depository Libraries (PTDL). In 1871, the U.S. Patent and Trademark Office (PTO), based on Section 12 of the U.S. Patent Code (35 U.S.C. §12), designated 22 PTDLs across libraries nationwide. The number of PTDLs has now reached 85, including 45 university libraries and 40 other types of libraries. In 2011, PTDLs were renamed PTRCs [12]. The mission of U.S. PTRCs is to promote the dissemination and utilization of patent and trademark information and meet public demand for intellectual property information. Their main functions include: (1) providing free public access to patent and trademark information resources; (2) conducting education on patent and trademark information utilization; (3) assisting users in patent or trademark information retrieval; and (4) providing consulting services on patent search and application procedures [8]. PTRCs typically designate 1-2 PTRC librarians who specialize in intellectual property information consultation, retrieval method guidance and training, and intellectual property information dissemination and promotion. To improve the capacity and quality of PTRC patent and trademark information services, the PTRC Program Office provides support to all member libraries, including timely guidance from PTO experts, online access to all PTRC program publications and related information, annual in-depth training seminars for PTRC representatives hosted by the PTO, and access to official guides, search tools, and internal materials from the PTO and European Patent Office [12]. PTRCs fulfill both their social responsibility to provide free basic patent information services to the public and offer in-depth patent information services according to user needs.

Chinese Intellectual Property Information Service Centers are primarily established to meet the intellectual property information service needs of universities, providing whole-process services for the creation, utilization, protection, and management of university intellectual property, especially patents, supporting collaborative innovation and advantageous discipline construction, and promoting the transformation of university scientific and technological achievements [3]. They are typically built upon the foundation of library science and technology novelty search and subject service teams, with staff generally numbering more than 10. In addition to patent information services, they also undertake science and technology novelty search and subject service work.

Notably, in terms of establishment purpose, there are differences in the role positioning of intellectual property (patent) information service personnel between U.S. PTRCs and Chinese Intellectual Property Information Service Centers. The U.S. positions them as information experts who have received systematic training, while China's positioning is as all-around professional technical talents. This positioning in China creates a significant gap with reality, as current library personnel engaged in intellectual property information services mostly share the

same team as science and technology novelty search and subject service staff, with single professional backgrounds and lack of intellectual property knowledge and skills, making it difficult for them to meet the competency requirements for whole-process patent information services.

3.2 Patent Resource Construction and Utilization

Most U.S. PTRCs not only list comprehensive patent resources on their websites but also provide very detailed search assistance. For example, the University of Maine Fogler Library provides users with patent resources including: (1) free patent databases; (2) PubEAST and PubWEST search systems used by patent examiners (available only by appointment within the library); (3) commercial patent databases or databases containing patent literature purchased by the library (limited to university faculty and students); (4) patent database navigation links providing detailed links to patent search system websites; (5) official PTO guides, manuals, search tools, publications, and internal materials; and (6) other patent-related resources. Simultaneously, the website provides detailed retrieval assistance materials for commonly used resources, including the U.S. Patent 7-Step Search Strategy Guide and workbooks, online retrieval tutorials and help documents for the European Patent Office, World Intellectual Property Organization (WIPO), and PTO CPC patent classification numbers, as well as search assistance information for other technical reports and unpublished conference literature (grey literature) [13]. These measures not only improve the accessibility and utilization of patent resources but also reduce the volume of consultation questions. In terms of commercial patent search and analysis tool construction and resource utilization, nearly one-third of U.S. PTRC libraries have purchased the Derwent Innovations Index (DII) database, and only Pennsylvania State University Library has purchased the Innography patent analysis tool. For resources with account access control, such as PubEAST and PubWEST, PTRCs typically establish patent resource search and consultation rooms within the library equipped with patent search computers installed with PubWEST and PubEAST search software, which users can reserve via telephone or email [14].

In recent years, with the rise of patent information services in Chinese university libraries, 各高校图书馆 have increased their investment in patent search databases and tool platforms. Common patent resources include: (1) free patent databases; (2) commercial patent databases and analysis tools; (3) commercial databases containing patent literature purchased by libraries; and (4) websites of major national intellectual property offices. In terms of commercial patent resource construction, all 23 Chinese Intellectual Property Service Centers possess commercial patent search databases and analysis tools, with 15 owning Derwent Innovations Index (DII), 7 owning Innography patent analysis tools, 3 owning Derwent Innovation (DI) or Thomson Data Analyzer (TDA), and 8 owning two or more types of resources.

By contrast, Chinese Intellectual Property Information Service Centers invest

far more funds in patent resource construction than U.S. PTRCs. However, in terms of resource utilization, for patent analysis tools controlled by accounts such as Innography, DI, incoPat, and WIPS, 19 libraries limit use to patent librarians only, with only 3 libraries providing access to university faculty and students. Through communication with peers, the author learned that due to the limited development of in-depth patent analysis work in various centers—some have not even started—this results in low utilization of high-priced resources. Additionally, in the resource lists of the 23 Intellectual Property Information Center libraries, no resources with usage rights provided by the China National Intellectual Property Administration were found. Regarding resource usage help information, except for Nanjing Tech University and Beijing Jiaotong University, which provide help documents introducing international commonly used free patent databases and retrieval guides on their patent websites, other libraries have no retrieval assistance information.

3.3 Patent Information Consulting

U.S. PTRCs provide consulting services including those offered by PTRC librarians and specialized consulting services provided by the PTO for inventors.

(1) Consulting Services Provided by PTRC Librarians. The scope of consulting services mainly includes: (1) helping solve problems related to patent and trademark application procedures and how to find application materials and forms, but not providing legal advice; (2) providing guidance and assistance on patent and trademark retrieval resources and methods, such as PubWEST/EAST retrieval appointment guidance, but not providing search services or evaluating search results [15]. Consultation methods include email, telephone, face-to-face consultation, real-time consultation, and self-service. Face-to-face consultation generally requires advance appointment by telephone and email or submission of appointment requests through reservation systems. In the appointment system of the University of Central Florida Hitt Library, users can select consulting librarians and specific consultation times, and input research questions in advance [16] (see Figure 2 [Figure 2: see original paper]). During library closure due to COVID-19, Hitt Library canceled face-to-face consultations and adjusted consultation methods to email and Zoom video conferencing [17].

To improve consultation timeliness, many libraries such as the University of Maine Fogler Library [18], Pennsylvania State University PAMS Library [19], University of Michigan Art, Architecture & Engineering Library [20], University of Washington Engineering Library [21], and New Mexico State University Branson Library [22] have set up Chat with a Librarian, Ask a Librarian, and Ask Us windows on their PTRC websites to provide real-time consultation services. When the author opened the Ask a Librarian window at the University of Michigan Art, Architecture & Engineering Library, consultation revealed that instant consultation services are provided by librarians and graduate student staff. The library recruits graduate students to assist in answering consultation

questions during non-working hours. When encountering questions they cannot answer, graduate students advise consultation users to send emails to relevant library personnel. Additionally, Wright State University Dunbar Library also uses Twitter social media for patent consultation services [23]. In addition to providing manual consultation services, U.S. PTRC consultation websites also provide very detailed self-service and help information on frequently asked questions, including PDFs, web pages, and video materials related to patent search methods, patent application procedures, and research guides.

(2) Specialized Consulting Services Provided by PTO for Inventors.

Professional consulting services mainly target issues beyond the scope of library consultation services. PTRC librarians typically direct users to contact PTO experts. Users can obtain one-on-one virtual assistance from PTO patent examiners through WebEx video conferencing at PTRC libraries and exchange and discuss patent application issues with PTO experts [24].

Investigation of the websites of 23 Chinese Intellectual Property Information Service Centers found that except for the University of Electronic Science and Technology providing intellectual property information consultation services, 12 only left business contact telephone numbers, email addresses, and office locations on their websites, 4 had not established patent or intellectual property service web pages, and 6 provided no contact information on their web pages.

In contrast, it is evident that U.S. PTRCs attach great importance to providing consultation services and assistance to users, offering not only basic patent information consultation but also professional consultation support through PTO experts, with diverse and convenient consultation methods for users to choose from. Chinese Intellectual Property Information Service Centers, apart from providing general business consultation, have not truly carried out patent information consultation services overall.

3.4 Patent Information Dissemination and Promotion

Conducting patent information dissemination and promotion services is an important responsibility of U.S. PTRCs. The pathways and content are as follows:

- (1) **Cooperating with PTO or PTO University Outreach Programs** to hold intellectual property series promotion activities for university faculty, students, and the public. For example, the Georgia Tech Library has held a series of intellectual property seminars and forums in recent years with PTO experts, lawyers, and enterprise management personnel participating, covering topics including PTO patent public welfare projects, patent infringement litigation, technology licensing, and patent application training [25].
- (2) **Actively cooperating with other internal and external institutions** and extensively participating in school or community innovation and entrepreneurship activities, seminars, training lectures, etc. For ex-

ample, Northern Kentucky University PTRC cooperated with the local Small Business Development Center to hold multiple entrepreneurship seminars for entrepreneurs and inventors [26]. West Virginia University PTRC collaborated with the university's Law School Entrepreneurship and Innovation Legal Clinic, Technology Transfer Office, and independent inventors to develop a YouTube series patent classification search system [27]; provided patent search guidance for innovation and entrepreneurship competition participants [28]. Wichita State University PTRC cooperated with the university's Technology Transfer Office and entrepreneurship departments to provide intellectual property information consultation for users and assistance for small business innovation research; organized or participated in patent series seminars and promotion activities in cooperation with PTO experts, patent examiners, or Small Business Development Centers; and provided patent basics, resources, and search method introductions through multi-faceted participation in enterprise, community, and rural innovation and entrepreneurship activities [29].

- (3) **Opening special columns on websites to popularize intellectual property basics** and provide electronic tutorials, guides for patent information utilization, or links to relevant institutions. For example, Northern Kentucky University Library's website has a "Patent and Trademark Basic Information, Tutorials" section, including: (1) intellectual property introductory knowledge; (2) patent and trademark search assistance; (3) links to internal and external innovation resources and business service institutions; and (4) recommendations for patent and trademark-related books and electronic journals [30].
- (4) **Writing LibGuides and reference materials related to intellectual property and search guides.** For example, Clemson University PTRC moved patent and trademark guides to library LibGuides and created six guide modules including patent search and patent business research [38].

U.S. PTRC patent information dissemination and promotion activities are diverse in form, rich in content, and extensive in cooperation partners. Event speakers include PTO experts, patent examiners, lawyers, enterprise management personnel, and university experts and managers. These promotion activities featuring expert interaction are well-received by users with broad participation. The activities not only promote the dissemination and utilization of patent and trademark information, enhance the influence of PTRCs in schools and local communities, but also meet public demand for intellectual property information.

In contrast, Chinese Intellectual Property Information Service Centers are not very active in patent information dissemination and promotion. Website investigations found that only a few libraries such as Peking University, South China University of Technology, Nanjing Tech University, and Harbin Institute of Technology have reports on intellectual property information dissemination and promotion activities. For example, Peking University held intellectual property

knowledge sharing and book recommendation activities during World Intellectual Property Day series activities [31]; South China University of Technology held intellectual property popularization series activities including intellectual property information service and utilization lectures [32]; Nanjing Tech University held intellectual property-themed creative competitions [33]. Other Intellectual Property Information Service Centers only have training lecture information on intellectual property knowledge and information utilization in their library training lectures. Chinese university libraries should learn from U.S. PTRC practices and make full use of professional talents from national and provincial intellectual property offices, universities, and intellectual property information service institutions to carry out diverse patent information dissemination and promotion activities.

3.5 Patent Information Literacy Education

In the United States, the most time-consuming and important work of PTRC librarians is offering patent search courses and training lectures. The main methods include:

- (1) **Offering patent courses.** For example, Georgia Tech PTRC librarians continuously offer short-term patent search courses at fixed times—two-hour online patent classes every Tuesday for four consecutive months each year, using BlueJeans to meet remote learning needs of inventors, entrepreneurs, researchers, and students. The patent course has always been the most popular [34].
- (2) **Cooperating with faculty or relevant school institutions** to conduct embedded teaching, training, or lectures in courses or projects. For example, the University of Wisconsin-Madison PTRC teaches patent search in professional courses such as engineering mechanics, astronautics, and mechanical engineering; creates patent modules in the school's Moodle course management system containing patent basics and patent search videos [35].
- (3) **Conducting patent training lectures for internal and external users.** For example, Oklahoma State University PTRC provides patent information support not only for students, faculty, and inventors but also training support for departments such as the New Product Development/Inventor Assistance Center and Technology Transfer Office [36]. The University of Nevada PTRC, in addition to offering intellectual property courses and patent and trademark resource lectures, also conducts training for community users and public and university librarians [37].
- (4) **Writing LibGuides and reference materials related to intellectual property and search guides.** For example, Clemson University PTRC moved patent and trademark guides to library LibGuides and created six guide modules including patent search and patent business research [38].

Chinese Intellectual Property Information Service Center websites mostly have patent training service sections. Education and training methods mainly include: (1) offering intellectual property courses or remote intellectual property education. The University of Electronic Science and Technology Library offers courses such as “Intellectual Property Management” and “Intellectual Property and Information Retrieval” relying on the university’s School of Economics and Management, with online learning available [39]; Harbin Institute of Technology established a Chinese Intellectual Property Remote Education branch site, incorporating more than 200 free courses from WIPO Chinese courses and the Chinese Intellectual Property Remote Education main platform into the HIT branch site, providing organization and coordination of branch class management, course management, and assessment [40]. (2) Intellectual property series training lectures. Shanghai Jiao Tong University opened a “Patent School” column to hold intellectual property series lectures, using Zoom live streaming during the COVID-19 pandemic and recording patent knowledge micro-lectures [41]; Nanjing Tech University produced intellectual property series micro-lectures [42]. (3) Offering intellectual property lectures in library series training lectures or promotional activities, such as at Tsinghua University, Peking University, Tongji University, and Huazhong University of Science and Technology libraries. (4) Providing links to or courseware for intellectual property online courses. Beijing Jiaotong University has a “Beijing Jiaotong Patent Information” MOOC on its website, providing MOOCs on patent basics and patent search platform usage methods [43].

In contrast, U.S. PTRCs place great emphasis on layered, classified, and customized patent information literacy education, characterized by diverse education forms and broad training audiences. Although Chinese Intellectual Property Information Service Centers have generally carried out various forms of intellectual property education and training, most libraries offer relatively single education forms with audiences generally limited to university faculty and students. Both training forms and audience scope need to be expanded.

3.6 In-depth Patent Information Services

Different from the basic patent information services mentioned above, in-depth patent information services refer to applying patent information services to specific scientific research activities, intelligence analysis, and decision-making support processes. U.S. PTRCs generally focus on basic patent information services, but some PTRCs also conduct in-depth patent information services, mainly characteristic patent information services based on university user needs. For example, the University of Massachusetts PTRC focuses on plant patents as a key and characteristic service, establishing the MassAggie Seed Library [44]; Rice University PTRC built its own Rice Patents database and added it to the government LibGuide and the university’s institutional repository [45].

Chinese Intellectual Property Information Service Centers place greater emphasis on providing deep-level patent information services, stressing one-on-one ser-

vices for key users. Some libraries with strong patent information service capabilities, such as Shanghai Jiao Tong University, Tongji University, Peking University, and Nanjing Tech University, have conducted patent competitiveness analysis for specific technologies or industries, institutions, and teams, as well as deep-level patent information services such as patent navigation databases and university patent competitiveness analysis platform construction [10]. However, due to insufficient high-level professional technical talent and limited high-end patent information service capabilities, most libraries' patent analysis reports focus on macro-level analysis and cannot provide more valuable micro-level technical analysis information.

4 Conclusions and Recommendations

Through the above comparative analysis, it is found that U.S. PTRCs give full play to the information expertise of patent librarians, attach importance to basic patent information services, utilize external expert resources to conduct in-depth patent information services, and emphasize providing users with information and methodological guidance. Therefore, although the number of patent librarians is small, they can serve numerous university faculty, students, and external users, achieving good service results overall. Chinese Intellectual Property Information Service Centers, to demonstrate support for university scientific research and discipline construction, propose diversified whole-process patent service content and emphasize providing deep-level one-on-one services for key users. Constrained by various factors, the development and effectiveness of patent information services are unsatisfactory, with a large gap from the purpose of establishing Intellectual Property Information Service Centers. To solve this problem, in addition to national and provincial intellectual property offices and the Ministry of Education providing strong support in resource construction, service standards, talent training, and expert consultation, Chinese university libraries should also learn from U.S. PTRC experience, combine their actual conditions, reasonably define service content based on user needs and librarians' capabilities, bring patent services down from the "cloud," attach importance to basic patent information services, expand service audiences, and maximize the promotion of patent information dissemination and utilization.

4.1 Reasonably Define the Scope of Patent Information Services

As mentioned earlier, the U.S. PTO positions PTRC librarians as information experts who have received systematic training and provides corresponding suggestions for the scope of patent information service work carried out by PTRC libraries based on librarians' knowledge and abilities, which is operable and effective. In contrast, China's National Intellectual Property Administration and Ministry of Education position intellectual property information center staff as professional technical talents and suggest that the work scope should be something that all-around professional technical talents can handle, which seriously deviates from the actual knowledge level and practical skills currently possessed

by Chinese library staff.

It is recommended that national authorities learn from the PTO's provisions on PTRC library responsibilities and propose practical and specific work guidelines based on in-depth understanding of actual library service capabilities. University libraries should also combine their actual conditions, reasonably define service scope based on user needs and librarians' capabilities, and effectively improve patent information service quality and expand service audiences.

4.2 Attach Great Importance to Patent Information Service Work

In terms of driving forces for patent information services, U.S. PTRC libraries are driven both internally to actively provide services and by explicit external demand, with many services provided at the invitation of university management departments or colleges, indicating that U.S. PTRC services have received high attention and recognition from relevant university departments. Chinese Intellectual Property Information Service Centers, however, are mostly established due to policy orientation, and their recognition and support from host universities need improvement.

With the continuous promotion and implementation of national innovation-driven development and intellectual property powerhouse strategies, there is huge social demand for patent information services. Undoubtedly, intellectual property information services with patent information services at their core will become an important direction for the transformation of information services in Chinese universities. Therefore, university decision-makers and library leaders should establish the concept of sustainable development and construction of patent information services, providing lasting policy, resource, personnel, and organizational guarantees for libraries to carry out patent information services.

4.3 Effectively Improve the Accessibility and Utilization of Patent Resources

Chinese university libraries typically provide free and commercial patent database access to university faculty and students, but for patent analysis tools controlled by accounts such as Innography and DI, except for a few libraries where users can make telephone or form appointments, the rest are limited to librarian use. To avoid low utilization of high-priced resources, Chinese libraries can learn from U.S. PTRC practices: (1) establish patent resource search and consultation rooms in libraries equipped with patent search computers. For resources with account access control, automatic login with account passwords can be set up for user convenience. At the same time, consultation staff should be configured in the search room to provide timely retrieval guidance and assistance. (2) provide online retrieval tutorials and help documents for patent databases and tools on library websites for users to view and use, improving the accessibility and utilization of patent resources while also reducing consultation volume.

4.4 Conduct In-depth Patent Information Consulting Services

To timely answer users' patent information questions, Chinese university libraries should learn from U.S. PTRC experience and strengthen patent information consulting services: (1) for basic patent information knowledge and common questions, such as intellectual property environments, laws and regulations of major countries (regions), patent resources and retrieval methods, and patent application procedures, libraries can provide FAQ self-service, training material help document downloads, and relevant knowledge information guide links on their websites. (2) provide Ask a Librarian manual consultation services, including telephone, email, face-to-face consultation, and real-time consultation, to timely answer and help users solve patent information consultation problems. (3) provide timely answers to basic patent information questions; for complex and in-depth questions, such as guidance and consultation on patent database and tool retrieval methods and in-depth information consultation for specific research projects, provide consultation guidance by appointment. (4) provide expert consultation services. For questions beyond librarians' consultation capabilities, contact internal and external intellectual property experts to help answer user questions.

4.5 Promote Patent Information Dissemination and Utilization Through Multiple Channels

In terms of patent information dissemination and utilization, Chinese university libraries should learn from U.S. PTRC experience and take measures to promote patent information dissemination and utilization through multiple channels. For example, by holding or participating in various forms of activities such as intellectual property seminars, forums, lectures, conferences, and exhibitions, strengthen patent information dissemination and sharing, popularize patent knowledge and skills, and enhance patent information awareness among faculty, students, and the public. Additionally, libraries can use characteristic activities such as reading promotion and special training lectures, as well as library publications and online platforms, to promote and publicize patent information.

4.6 Strengthen Patent Information Literacy Education Through Multiple Approaches

Due to limited capacity and energy of patent librarians, it is impossible to meet the patent information service needs of numerous users throughout the entire research process. The work focus should be placed on patent information utilization education and training—teaching people to fish is better than giving them fish—enabling more users to master patent information retrieval and analysis methods and expanding the service audience. Learning from U.S. PTRC experience: (1) offer short-term online intellectual property courses. Patent librarians can offer online short-term courses on patent knowledge and retrieval at fixed times, facilitating users to learn anytime and anywhere. This has become partic-

ularly relevant during the COVID-19 pandemic, when online education has been widely popularized and vigorously promoted. (2) conduct embedded patent information literacy education, with patent librarians cooperating with faculty to embed patent information literacy education into undergraduate and graduate professional courses. (3) disseminate and popularize patent knowledge and information utilization skills, including popular training on patent knowledge such as patent database and analysis tool usage methods, as well as expert lectures and professional seminars. These can be conducted through online and centralized education and training forms or by recording video teaching materials. (4) make full use of online classrooms for patent information literacy education and training, including establishing Chinese intellectual property remote education branch sites at universities, applying for and opening intellectual property remote education courses for user learning, providing links to patent-related online courses from domestic and international learning platforms on websites, and publishing information on various intellectual property public welfare lectures, such as those provided by the China National Intellectual Property Administration and online lectures provided by patent database vendors.

4.7 Conduct In-depth Patent Information Services Through Multi-party Cooperation

In recent years, social demand for in-depth patent information services has become increasingly significant. Chinese libraries should give full play to the role of intellectual property information service centers, strengthen cooperation with scientific research users, management departments, and intellectual property social service institutions, and conduct customized in-depth patent information services. Specifically: (1) for the patent information analysis and evaluation needs of university scientific research users, rely on resource advantages, give play to the information expertise of patent librarians, provide training on patent information, patent databases, and analysis tool usage methods for scientific research users, and assist them in completing patent information analysis and evaluation in technical fields. (2) for universities' needs to improve patent creation quality and promote transformation of scientific and technological achievements, strengthen cooperation with university management departments, inventors, scientific research institutions, and technology transfer centers, and provide support for intellectual property information services. (3) for small and micro enterprises without specialized intellectual property institutions, libraries can provide patent information and space facilities, build a "bridge" among library professionals, enterprise intellectual property consultants, and intellectual property social service institution personnel (patent agents, patent attorneys, etc.), facilitate third parties to provide problem solutions for users, including formulating and implementing intellectual property strategies for enterprises [9].

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A Comparative Study and Thoughts on the Patent Information Services of Chinese and American University Libraries

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Abstract: [Purpose/significance] It is of great significance for university libraries to provide user-oriented patent information services continuously and effectively to realize service transformation and innovative development under the new situation. [Method/process] Comparative analysis was performed on the patent information service items carried out by the US Patent and Trademark Resource Centers (PTRC) university libraries and China’s first batch of University National Intellectual Property Information Service Center libraries. [Result/conclusion] Based on the good practices of PTRC in the United States, it is proposed that Chinese university libraries should reasonably define patent information service items, attach great importance to patent information services,

make patent resources more accessible to patrons, diversify patent information literacy instruction, provide depth reference of patent information, promote the dissemination and utilization of patent information in multiple ways, and collaborate to carry out in-depth patent information services, to improve the level of patent information services.

Keywords: patent information service; university library; Patent and Trademark Resource Center; University National Intellectual Property Information Service Center

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

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