Status and Reflections on Intellectual Property Information Services in Chinese University Libraries: Postprint

Authors: Zhou Jing, Zhang Libin, Gu Wenhao

Date: 2023-07-26T00:00:00+00:00

Abstract

[Purpose/Significance] In the context of the "Internet Plus" environment and the advancement of university innovation capabilities to support the "Double First-Class" construction initiative, this study investigates the current status of intellectual property information services in university libraries possessing Ministry of Education Science and Technology Novelty Search Workstations, and analyzes existing problems, aiming to enhance their capacity to adapt to the new environment and leverage new technologies to serve a broad user community. [Method/Process] Employing web access, literature research, telephone interviews, QQ consultation, and expert consultation methodologies, this study surveys the implementation of intellectual property information services across 102 university libraries with Ministry of Education Science and Technology Novelty Search Workstations in China. Based on the survey data, it analyzes current problems and proposes corresponding recommendations for conducting intellectual property information services within the "Internet Plus" environment. [Results/Conclusion] Chinese university libraries can utilize the "Internet Plus" concept to improve intellectual property information services through the following measures: perfecting institutional safeguards, strengthening interactive service promotion, constructing a "one-stop" intellectual property information service platform, establishing unified business norms and service standards, and enhancing talent team development.

Full Text

Current Situation and Reflections on Intellectual Property Information Services in Chinese University Libraries

Zhou Jing, Zhang Libin, Gu Wenhao *Nankai University Library, Tianjin 300071*

Abstract

[**Purpose/Significance**] Against the backdrop of the "Internet Plus" environment and the drive to enhance university innovation capabilities in support of the "Double First-Class" university initiative, this study investigates the current state of intellectual property (IP) information services in 102 Chinese university libraries that host Ministry of Education Sci-Tech Novelty Search Stations, analyzing existing problems to improve their capacity to adapt to new environments and leverage new technologies to serve users. [**Method/Process**] Through online research, literature review, telephone interviews, QQ consultations, and expert consultations, this paper examines the implementation of IP information services in 102 university libraries with Ministry of Education Sci-Tech Novelty Search Stations. Based on the analysis of survey data, it identifies current problems and proposes recommendations for developing IP information services under the "Internet Plus" framework. [**Result/Conclusion**] Chinese university libraries can utilize the "Internet Plus" concept to improve IP information services in the following areas: enhancing institutional guarantees, strengthening interactive promotion, constructing a "one-stop" IP service platform, establishing unified business specifications and service standards, and strengthening talent team development.

Keywords: intellectual property information service; university library; "Internet Plus"; survey analysis

1. Introduction

With the in-depth implementation of the national intellectual property strategy, IP information services have become a crucial direction for service transformation in Chinese university libraries. In December 2016, the State Intellectual Property Office, Ministry of Education, and China National Institute of Standardization jointly drafted and released the national standard *Intellectual Property Management Specifications for Higher Education Institutions* (GB/T 33251-2016), which significantly promoted the development of IP information services in universities. In December 2017, the State Intellectual Property Office and Ministry of Education jointly issued the *Implementation Measures for the Construction of University Intellectual Property Information Service Centers*, encouraging universities to establish IP information service centers independently. Among these, 21 centers are hosted at libraries with Ministry of Education Sci-Tech Novelty Search Stations, marking the transition of university library IP information services from fragmented and disorderly development to a stage of scaled and standardized growth. To gain deeper insights into the current state and future trends of IP information services in Chinese university libraries, this study selected 102 university libraries with Ministry of Education Sci-Tech Novelty Search Stations for investigation. While this scope has certain limitations, these libraries possess rich information resources, high-level professional service

teams, and relevant experience in information retrieval, reference consultation, selective dissemination of information, sci-tech novelty search, and IP training, making them highly representative and suitable as a research focus. This paper examines their current practices, analyzes existing problems, and proposes recommendations for improving IP information services based on "Internet Plus" theories and technologies.

In recent years, university libraries have seized market opportunities and aligned with policy directions, building upon foundations of sci-tech novelty search, subject services, and intelligence analysis to actively explore new directions for IP information services, achieving certain results. By December 2018, 26 universities including Tongji University, Peking University, and Tsinghua University had joined the University Intellectual Property Information Service Center Alliance. On January 28, 2019, the State Intellectual Property Office and Ministry of Education launched the first batch of national university IP information service centers. After a rigorous selection process involving self-nomination, material submission, preliminary screening, expert evaluation, and on-site defense, 23 universities including Peking University, Tsinghua University, and Tongji University were selected as the first batch of national university IP information service centers, with recommendations to affiliate them with libraries. This development has further elevated enthusiasm for IP information services in Chinese university libraries.

---

2. Research Overview of IP Information Services in Chinese University Libraries

According to the *Intellectual Property Management Specifications for Higher Education Institutions* released in 2017, university intellectual property refers to rights legally enjoyed by natural or legal persons over the results of their intellectual activities, primarily including patent rights, trademark rights, copyright, layout-design rights of integrated circuits, geographical indication rights, new plant variety rights, and rights to undisclosed information. Among these various forms of IP protection, patents play the most prominent role for Chinese universities; therefore, this paper focuses on patent-related IP information services that university libraries can provide.

Through the CNKI platform, we retrieved 107 relevant papers using the search strategy: "university library AND (intellectual property information service OR patent information service)" as subject terms, with a cutoff date of February 25, 2019. Further analysis of these papers reveals that existing research primarily concentrates on three aspects:

2.1 Necessity and Feasibility of IP Information Services in University Libraries Research on necessity examines whether university libraries need to provide IP information services, while feasibility research explores ad-

vantageous conditions such as policy orientation, resource concentration, and social demand. For instance, Xiao Long, Deputy Director of Peking University Library, noted in a study on innovative trends in university library services supporting "Double First-Class" construction that continuous national promotion and growing teaching and research needs jointly drive the development of IP information services in university libraries. Wang Huili argued that providing IP information services in universities is necessary for implementing national and regional IP strategies, enhancing universities' comprehensive IP capabilities, and transforming library services. Shen Jinhua, former Director of Tongji University Library, pointed out that as university libraries' resources, personnel, and facilities continuously improve, their service scope expands and service levels increase, gradually creating conditions for providing patent information services. Li Feng suggested that rich database resources, professional talent, relevant business experience, and the need for service transformation make patent services an excellent opportunity for libraries to develop new business areas.

2.2 Current State of IP Information Services in Chinese University Libraries **(1) Comparative studies:** These studies analyze the current state of IP information services in domestic university libraries through website investigations from various dimensions and perspectives, identifying problems and proposing countermeasures. For example, Shen Jinhua et al. surveyed 664 university libraries and proposed that future patent information services would develop toward more multi-level content, broader service targets, and more diversified service methods. Li Zhenliang et al. analyzed the current state of patent information services and patent database platform construction through sampling surveys, proposing a "decentralized and cooperative" patent information service model. Zhao Hong and Wang Ling investigated patent information services provided by "985 Project" university libraries through their portals, analyzing the current situation and proposing measures to strengthen patent information services.

(2) Case studies: These examine typical cases of IP information services in domestic university libraries, focusing on pioneering practices. For instance, a study on Peking University Library's patent information service exploration and practice elaborated on the models and content of patent services. Nanjing University of Technology Library provided a series of diversified patent information services to support its university science park. Tianjin University Library explored and constructed a patent intelligence service model for university libraries, adopting one-on-one service forms with enterprises to provide specialized services including pre-application novelty searches, legal status retrieval, IP guidance and consultation, and thematic IP training. Shanghai Maritime University Library has consistently provided patent information services for the surrounding marine industry park, offering precise one-on-one services for logistics industry authorities, large logistics enterprises, and R&D institutions.

2.3 Problems and Countermeasures in IP Information Services Problems in university library IP information services mainly include weak service awareness, inadequate service capabilities, and uneven service quality. Corresponding countermeasures involve establishing specialized and part-time patent information service teams, building a training system for patent information librarians, enhancing proactive service awareness for both internal and external users, and conducting diverse patent information promotion activities. For example, Shen Jinhua investigated the needs of university researchers and research managers, explored the professional knowledge and skills required for various patent information services, constructed a competency framework for university librarians in patent information services, and proposed suggestions for improving librarians' competencies. Wang Liping et al. analyzed patent information services in university libraries in the new era, identified existing problems, and constructed a four-layer content system: patent information literacy education, patent information retrieval and analysis services, embedded R&D team patent information services, and decision-support patent information services. Zhang Shanji et al. addressed the issues of single content and lack of systematic approaches in current patent information services for industrial technology innovation, proposing strategies from five aspects: improving the service business system, building online and offline platforms, strengthening cooperation, establishing guarantee mechanisms, and forming service brands.

Overall, existing research primarily focuses on the current state, content, models, and strategies of IP information services. While some surveys examine the status of patent information services in university libraries, systematic investigations of the 102 libraries with Ministry of Education Sci-Tech Novelty Search Stations remain absent. Although suggestions for building online and offline platforms have been proposed, few studies integrate "Internet Plus" theories and technologies with IP information services in university libraries—precisely where this research contributes value.

---

3. Research Design

3.1 Research Methods This study primarily employed online research and literature review methods, supplemented by telephone interviews, QQ consultations, and expert consultations, to investigate IP information services in Chinese university libraries from early November to late December 2018.

3.1.1 Online Research Method: Online research consisted of two components: (1) Visiting the official websites of 102 domestic university libraries with Ministry of Education Sci-Tech Novelty Search Stations to obtain IP information service-related information from sections such as digital resources, information services, teaching and training sub-pages, including digital resource copyright announcements, IP information service content, lecture materials, instructor resources, and contact information; (2) Visiting the homepages of novelty search

stations to obtain information about their IP information services, personnel introductions, and contact details.

3.1.2 Literature Review Method: This method investigated IP information service practices in some university libraries, identified relevant academic resources, and systematically analyzed them through literature reading to extract theoretical and practical experiences as the research foundation.

3.1.3 Telephone Interviews, QQ Consultations, and Expert Consultations: These three methods supplemented the online research and literature review. Using published telephone numbers and QQ contacts from university libraries and novelty search stations, we contacted personnel responsible for sci-tech novelty search or subject services at 29 libraries (primarily those without online IP information service information) to obtain relevant data through telephone interviews and QQ consultations, and solicited expert opinions and suggestions on developing IP information services.

3.2 Research Content The survey covered six main areas: geographical distribution, service content, service methods, service effectiveness, supporting teams, and supporting resources. Understanding the geographical distribution of the 102 libraries provides an overall grasp of the development level of IP information services in China.

Service content, methods, and effectiveness are crucial indicators for evaluating IP information service levels. Theoretically, service content can be divided into traditional basic services and high-end in-depth services. Basic services primarily include patent novelty search for project establishment, evaluation, acceptance, and awards (hereinafter referred to as patent novelty search), patent retrieval, and IP training—the main forms currently provided by most university libraries. In-depth services mainly refer to patent analysis, patent agency, and patent strategic layout. Service methods reflect librarians' service awareness and can be categorized as proactive or reactive. Service effectiveness is measured by client satisfaction with IP services, representing an important dimension for service quality assessment.

Supporting teams and resources form the foundation and backbone of IP information services, comprising information resources, analytical tools, and talent teams. High-quality information resources and their effective integration with analytical tools ensure service quality and depth, while professionally structured talent teams are core elements and quality guarantees for efficient service operation. Personnel are key to IP information services, and their competency development is a decisive factor affecting service effectiveness.

4. Research Results

4.1 Overall Status Analysis presents the overall situation of IP information services in 102 university libraries with Ministry of Education Sci-Tech Novelty Search Stations.

The results show that IP information service levels vary significantly across Chinese university libraries. Twenty-one libraries (approximately 20.59%) have almost never provided any form of IP information services; 52 libraries (approximately 50.98%) provide IP information services through their novelty search stations. Among these, 33 stations (approximately 32.35%) offer basic services such as patent retrieval and IP training, 19 stations (approximately 18.63%) provide patent novelty search, only 12 stations (approximately 11.77%) explicitly offer patent novelty search in their service scope, and 7 stations (approximately 6.86%) provide in-depth services like patent analysis and high-end IP consultation. Twenty-nine libraries (approximately 28.43%) have established specialized IP information service departments or patent information service teams/centers, offering not only basic services but also high-end in-depth information services such as patent early warning, patent layout, and IP review, leading the field in IP information service practice.

4.2 Detailed Analysis 4.2.1 Geographical Distribution

shows that among the 102 university libraries, 81 provide IP information services, accounting for 79.41% of the valid sample. From a regional perspective, libraries in the Southeast and Northeast have the highest proportion of IP information services, followed by East China, South China, and Northwest China. In terms of service content, 36 libraries provide in-depth IP information services, representing 35.29% of the valid sample. The Northeast, South China, East China, and South China regions have higher proportions of libraries offering in-depth services, leading the development direction of IP information services in university libraries.

4.2.2 IP Information Service Content

Further statistical analysis of service content across 81 libraries reveals diverse forms of IP information services. Overall, services are divided into two levels: traditional basic services and high-end in-depth services. Basic services include patent consultation (covering IP basics, patent resource retrieval, and legal status), IP training, patent retrieval, and patent novelty search. In-depth services encompass patent analysis (including technology trend analysis, competitiveness analysis, early warning analysis, infringement analysis, and value assessment), patent strategic layout, high-end IP consultation (strategic, policy, management, and practical consultation), patent agency, patent navigation, and IP review. details the specific service content.

The data indicate that patent retrieval, patent novelty search, and IP training are the primary services offered, while very few libraries provide in-depth ser-

vices such as patent agency, patent navigation, IP review, strategic layout, or high-end consultation. This suggests that IP information services in Chinese university libraries remain in the exploratory stage.

Notably, Peking University Library not only provides patent-related services but also offers training and general consultation on trademark and copyright basics, taking the first step toward exploring trademark and copyright services. To popularize IP knowledge and enhance IP awareness, China Agricultural University offers a public elective course *Intellectual Property Protection and Utilization* for graduate students, South China Agricultural University offers *Fundamentals of Intellectual Property*, and Shandong University of Science and Technology provides public required courses like *Fundamentals of Intellectual Property* for professional master's, MBA, and EMBA students, along with electives such as *Patent Application Practice*, *Patent Strategy*, *Competitive Intelligence*, and *Information Retrieval*.

4.2.3 IP Information Service Methods

Investigation of 81 libraries' official websites and communication with IP service personnel revealed that existing patent retrieval and novelty search services primarily adopt a passive, commissioned, and fee-based model. In contrast, IP training and some in-depth services like patent analysis employ proactive, push-based, and free models. Specifically:

Traditional basic services such as IP training are mainly free, targeting faculty and students to enhance IP awareness, popularize IP knowledge, and improve retrieval skills, typically delivered as public required courses, electives, or thematic lectures. Patent retrieval and novelty search are routine library operations, primarily commissioned, passive, and fee-based. IP consultation is mainly provided free of charge through email, telephone, online messaging, and face-to-face communication. For application procedures, document drafting, legal consultation, and high-end services such as IP strategy, policy, management, and practical consultation, only a few libraries including Peking University, University of Science and Technology Beijing, China Agricultural University, and Nanjing University of Aeronautics and Astronautics have ventured into these areas, while most have not.

Regarding in-depth services like patent analysis, patent agency, strategic layout, patent navigation, and IP review, only a small number of libraries provide such services to faculty, students, external enterprises, and government decision-making departments. These services mostly originate from proactive initiatives or occasional individual demands, offered as point-to-point free services.

4.2.4 IP Information Service Effectiveness

Service effectiveness is measured by client satisfaction with IP services. As basic IP information services have long existed, many clients have become regulars with long-term relationships. Therefore, this study primarily examines the effectiveness of in-depth IP information services. In recent years, some well-

equipped libraries have gradually extended patent retrieval and novelty search to provide more in-depth patent intelligence analysis services to meet diverse internal and external demands. For example, Peking University Library provides not only basic IP training and consultation but also patent competitiveness analysis, topical patent analysis, and core technology analysis based on patent data for the university. Tsinghua University Library maintains a steady pace of "multi-directional exploration and steady progress," practicing across different user needs and report types while exploring cooperation channels among various functional departments. It has completed institutional patent analysis reports such as *Tsinghua University Patent Analysis Report* and *Patent Analysis Report of Tsinghua University's Automotive Engineering Department*, as well as technical thematic reports like *OLED Light-Emitting Materials Patent Analysis Report* and *Distributed Power Generation Technology Patent Analysis Report*, and industrial patent analysis reports including *Global Patent Observation of Intelligent Connected Vehicles* and *Patent Analysis on "Increasing Water Resource Utilization."* Shanghai Maritime University Library has consistently provided IP information services for the "marine and logistics industry," offering patent support throughout the product innovation lifecycle. To date, it has completed reports such as *Research on Patent Mapping in Deep-sea Oil Extraction Tree Domain*, *Research on Development Trends of AIS Ship Automatic Identification System Patents*, and *Research on Domestic and International Development Trends in Intelligent Underwater Robot Domain*, as well as the *Annual Report on China's Logistics Technology Development* published since 2011. Tongji University Library also provides services such as patent trend analysis, core patent mining, and patent early warning tracking for both internal and external users, producing reports like *Patent Technology Trend Analysis Based on Function-Oriented Search* and *Patent Analysis Report on Multiple Sclerosis Drugs*.

These services have not only met client needs and enhanced libraries' influence, status, and service effectiveness but also enabled some libraries to seamlessly integrate into university decision-support systems by providing personalized, multi-level, and comprehensive high-end intelligence services for disciplinary development planning, evaluation, and talent recruitment, thereby helping universities make more rational arrangements in discipline construction, talent development, and resource allocation.

4.2.5 Supporting Teams for IP Information Services

Personnel are key to IP information services and constitute the core element and quality guarantee. Supporting teams include four main types:

(1) **Specialized IP information service teams:** Twenty-nine libraries (approximately 28.43%) have established patent information service centers or IP information service centers with professional teams offering high-quality services. These libraries have designated IP librarians to support IP information services for internal and external users. For example, Peking University Library has IP service specialists fully responsible for IP information services; Tongji University Library has IP librarians coordi-

nating specific IP service affairs; Southeast University Library established a patent information service team with IP librarians providing support using IP analysis and review methods and tools; and University of Science and Technology Beijing's IP Information Service Center has one director, two deputy directors, and 19 service personnel providing comprehensive IP information services.

(2) **Novelty search teams:** Fifty-two libraries (approximately 50.98%) provide IP information services through their sci-tech novelty search stations, offering patent retrieval, patent novelty search, and IP training. For instance, Henan University's novelty search station explicitly includes patent application and analysis in its service scope, while Changsha University of Science and Technology established an IP information service center within its novelty search station to vigorously develop patent navigation and innovation talent cultivation services based on rich experience in novelty search and IP information services.

(3) **Subject service teams:** Subject services have been a key component of university library information services for nearly two decades. Most libraries have established full-time and part-time subject service teams where subject librarians with professional backgrounds provide corresponding IP information services. For example, Hunan University's Subject Service and Literature Evaluation Center offers patent services including topical retrieval, industry patent navigation, industry patent trend analysis, institutional patent competitiveness analysis, patent early warning and infringement analysis, and patent strategic layout.

(4) **Intelligence analysis and research personnel:** Some universities provide IP information services through intelligence analysis and research personnel. For example, Zhejiang University offers patent information services under its intelligence analysis services, while Tianjin University has a professional team composed of intelligence analysis librarians and information science graduate supervisors providing specialized services including pre-application novelty search, legal status retrieval, IP guidance and consultation, thematic IP training, and patent information talent cultivation.

4.2.6 Supporting Resources for IP Information Services

To better provide comprehensive IP information services for faculty, researchers, students, and enterprises, some libraries have processed and integrated free IP information resources and purchased patent information resources to create patent resource navigation with relevant links on their websites. Typically, supporting resources include patent retrieval and download resources, patent affairs query resources, and patent information analysis resources.

Libraries with patent resource links primarily rely on domestic and international patent retrieval and download resources such as CNKI Patent Database, Wanfang Patent Database, State Intellectual Property Office Patent Search

Database, Innography, Innojoy Sci-Tech Innovation Search Platform, China Patent Information Center Patent Star Search System, Intellectual Property Publishing House Patent Information Service Platform, Guangdong Intellectual Property Big Data Platform, European Patent Office, and EIPQ. Patent affairs query resources include the USPTO US Patent Full-Text Database, EPO European Patent Search System, JPO Japan Patent Information Platform, CIPO Canada Intellectual Property Office, and official IP websites of 25 countries and 9 organizations. Patent information analysis resources mainly include Innography patent search and analysis database, China Intellectual Property Big Data and Intelligent Service System, Soopat Patent Search, and State Intellectual Property Office Patent Search and Analysis System.

4.3 Problems in IP Information Services 4.3.1 Weak IP Awareness and Misconceptions Requiring Correction

An investigation of 102 university library homepages found that only 58 libraries (56.86%) have formulated IP management policies such as digital resource copyright announcements. Regarding IP ownership, most libraries make no mention, with only Northeast Forestry University explicitly stating in its copyright announcement that the library holds full IP rights over all self-developed or co-developed information content and services published on its website. This indicates insufficient attention to IP protection and weak IP awareness among university libraries. Furthermore, communication with IP service personnel revealed that many consider IP information services as simple extensions of sci-tech novelty search work or equate them with novelty search station functions, representing a misinterpretation of IP information services. According to the *Implementation Measures for the Construction of University Intellectual Property Information Service Centers*, IP information services encompass collecting and organizing university IP information, constructing and maintaining IP information resource platforms, providing university IP management consultation, serving major research projects, promoting IP transfer and transformation, conducting IP information literacy education, disseminating IP knowledge and skills, and providing venues and professional guidance for innovation activities.

4.3.2 Weak Service Awareness and Incomplete Service Methods

IP information service awareness refers to the enthusiasm, thoughtfulness, consciousness, and initiative demonstrated by service personnel during service delivery, representing an internalized sense of responsibility. Its strength directly affects service behavior and outcomes. Communication with librarians revealed that a significant proportion lack enthusiasm and initiative, exhibiting weak service awareness. Most libraries provide only traditional basic services without in-depth patent information services, primarily through passive commissioned methods. This passive, wait-for-clients approach inevitably affects service effectiveness.

4.3.3 Fragmented Service Content and Need for Quality Improvement

The survey of 102 libraries found that most are in the initial stage of IP information services, offering only basic services such as patent retrieval, novelty search, and IP training with simple, fragmented content lacking in-depth analysis, standardization, and systematization. With the implementation of the *Intellectual Property Management Specifications for Higher Education Institutions* and evolving external demands, university library IP information services need to expand toward more personalized, professional, systematic, and standardized value-added services such as patent technology trend analysis, competitiveness analysis, early warning analysis, infringement analysis, value assessment, strategic layout, patent navigation, and IP review. Therefore, improving service content, strengthening standardization, and enhancing service quality are imperative.

4.3.4 Single Service Target and Need for Expanded Service Domains

Currently, the primary service targets are internal faculty and students, with only a few well-reputed and capable libraries also serving government decision-making departments, enterprises, and research institutions with high-end patent intelligence analysis. This limited service scope affects service effectiveness. Faced with growing IP information service demands, university libraries should expand service targets and domains, gradually opening up to society and serving local industrial development and economic construction.

4.3.5 Uneven Regional Development and Need to Reduce Geographic Disparities

As previously mentioned, significant regional disparities exist in IP information services across Chinese university libraries. The Southeast, East China, and South China regions, with stronger economic and technological capabilities, have more fully developed IP information services, offering both basic and high-end in-depth services. In contrast, the Northwest and Southwest regions lag behind, with few providing in-depth services and 18.18% and 33.33% of libraries respectively having never provided any IP information services. As the state attaches great importance to the IP service industry, university libraries have welcomed development opportunities. While early adopters have seized these opportunities to vigorously promote patent information services, less-equipped libraries remain 观望 due to internal constraints. Faced with widening gaps, university libraries urgently need to establish communication platforms to share advanced experiences and drive the gradual development of IP information services in lagging regions, thereby reducing regional disparities and improving overall service levels.

4.3.6 Unreasonable Talent Structure and Lack of Compound, International High-End Talent

The survey of IP service personnel revealed that 52 libraries (50.98%) rely entirely on sci-tech novelty search teams for IP information services, while many others use subject service teams and intelligence analysis personnel. These individuals, mostly master's and doctoral graduates in library and information

science or other fields, possess strong retrieval and novelty search skills, capably performing basic tasks such as sci-tech novelty search, subject analysis, patent retrieval, and IP training. However, due to their single professional backgrounds and lack of multi-disciplinary knowledge reserves, most lack capabilities in patent mining, early warning, layout, and navigation analysis. This personnel configuration—one team serving two systems with a single knowledge background—greatly affects service effectiveness. University libraries urgently need to strengthen training for existing staff and introduce compound, international high-end talent to enhance service capabilities.

4.3.7 Monotonous Internet Application Technology and Need for Improved Service Means

Internet technology can expand the influence of IP information services. However, investigations of library IP websites show that only 26 libraries (25.49%) have established secondary IP information service pages. Current applications of Internet technology in IP information services mainly focus on website establishment and service notifications (primarily through website announcements, official Weibo, and WeChat public platforms), with limited use in raising IP awareness, accelerating service promotion, or improving service efficiency and levels. This weakness in responding to the Internet environment and leveraging new technologies for development hinders progress.

---

5. Improving IP Information Services in Chinese Universities

On March 5, 2015, Premier Li Keqiang proposed the "Internet Plus" action plan in the government work report, advocating the use of modern information technology to integrate mobile Internet, cloud computing, big data, and the Internet of Things with modern manufacturing. Characterized by cross-boundary integration, innovation-driven development, structural reshaping, interactive emphasis, and open implementation, the "Internet Plus" environment presents university IP information services with policy tailwinds. University libraries should seize this opportunity to utilize "Internet Plus" concepts such as openness, transparency, interaction, participation, and integration to build convenient, integrated, interactive, and open service models, driving the transformation and upgrading of traditional IP information services.

5.1 Improving Institutional Guarantees for IP Information Service Development The successive promulgation of the *National Intellectual Property Strategy Outline*, *State Council's Opinions on Accelerating the Construction of an Intellectual Property Powerhouse Under New Circumstances*, and the *13th Five-Year Plan for National Intellectual Property Protection and Application* has significantly promoted China's IP service industry. Subsequently, the *13th Five-Year Plan for National Education Development* and *Implementation Measures for the Construction of University Intellectual Property Information*

Service Centers explicitly supported the establishment of university IP information centers, implementing the national innovation-driven development strategy, improving the public IP information service network, and enhancing university innovation capabilities—providing excellent development opportunities for university libraries. However, the "Internet Plus" era is a double-edged sword for IP information services. On one hand, new mobile Internet technologies provide more efficient and convenient means for optimizing IP information services and developing the IP service industry. On the other hand, the booming Internet environment, characterized by virtuality, openness, and online-offline integration, makes strict IP protection more challenging. While the Internet disrupts traditional service models, its ability to meet "Internet Plus" demands for IP protection and services will significantly impact the sustainable and healthy development of China's future Internet industry. Although China has issued the *"Internet Plus" IP Protection Work Plan*, no guiding document exists on providing IP information services in the "Internet Plus" environment, leaving these services facing numerous challenges. Therefore, relevant departments should promptly issue guiding documents for IP information services and university IP information services under the "Internet Plus" framework, providing legal and institutional guarantees to chart new directions for university IP information services and promote their development.

5.2 Strengthening Interactive Promotion and Building Quality Service Brands As previously discussed, current patent information services fail to meet evolving user needs in their information and research environments. Under "Internet Plus," university libraries should further expand IP information service promotion through multiple channels.

5.2.1 Improving Service Content, Building a Business System, and Enhancing Service Quality: With the implementation of the *Intellectual Property Management Specifications for Higher Education Institutions* and the establishment of university IP information service centers, more libraries are prioritizing IP information services as a key transformation direction. To provide more standardized and systematic services and improve quality, this paper constructs a business system ranging from traditional basic to high-end in-depth IP information services based on survey practices and user demand changes, integrating IP basics and service processes to create an IP information service navigation system ([Figure 1: see original paper]). To facilitate convenient, efficient user access, libraries can produce QR code brochures placed at entrances for users to access anytime. By scanning QR codes, users can learn about IP basics, service content, and processes while easily communicating with staff. This interaction provides genuine user feedback, promotes library services, and helps identify and stimulate demand. Through proactive service, libraries can accumulate successful cases and experiences, gradually building a strong service image and creating quality service brands.

5.2.2 Changing Traditional Service Models, Strengthening Promo-

tion, and Expanding Service Domains: Under "Internet Plus," university libraries can leverage various promotional channels such as information retrieval courses, thematic lectures, reading festivals, and quality service months through multiple media platforms including library websites, WeChat public platforms, official Weibo, and intelligent campus systems to comprehensively and multi-dimensionally promote IP information services. Currently, services are primarily passive and commissioned. Libraries can also utilize IP Day and Reader Service Month activities for online and offline promotion. For example, Northeast Forestry University Library conducted a patent service month themed "Patent Information Services Assisting Double First-Class Discipline Construction," including training courses on "University Student Innovation, Entrepreneurship, and Intellectual Property" and "Patent Document Writing Practice," exhibitions on library patent services and common knowledge, and on-site consultation activities. Such diverse promotional activities enable more people to understand IP information services, master essential patent knowledge and legal common sense, enhance IP awareness, help service personnel identify potential users, and cultivate potential user groups through follow-up demand and service development, thereby expanding service domains.

5.3 Building a "One-Stop" IP Service Platform to Gradually Eliminate Regional Disparities Under "Internet Plus," with the rapid development of big data analytics, cloud computing, and artificial intelligence, demand for IP information services has increased. Due to insufficient personnel numbers and limited professional coverage, individual libraries struggle to meet diverse user needs. Therefore, these 102 libraries should unite under the leadership of the University Intellectual Property Information Service Center Alliance to build a "one-stop" IP service platform based on principles of "open compatibility, complementary advantages, resource sharing, and mutual benefit." This platform would aggregate diverse service entities and resources to promote open sharing of resources and services, gradually breaking regional imbalances. The platform would integrate resource, service, and user management platforms to provide "one-stop" IP information services ([Figure 2: see original paper]).

(1) **IP Resource Retrieval Platform:** Based on big data and cloud computing, this platform would analyze, integrate, and discover free online patent resources and purchased patent resources, saving funds wasted on duplicate purchases, improving resource utilization, and providing users with convenient "one-stop" retrieval experiences that completely solve resource discovery difficulties.

(2) **Service Platform:** This includes: (a) IP service navigation and commissioning: As mentioned, the IP navigation system would detail available services, guiding users to commission services according to their needs; (b) Proactive push and "one-stop" customized services: Using big data mining, analysis, and AI to analyze stable and potential user groups' behaviors, interests, and locations, the platform would identify specific user

needs and provide personalized information push and customized services; (c) Online IP training platform: Aggregating and organizing IP-related training from various universities, enabling users to access all IP training lectures through one platform to learn about IP basics, patent retrieval, analysis, and review, saving time and improving efficiency; (d) Patent analysis system: Providing full-process support for patent analysis, including data acquisition, management, processing, and analysis, allowing users to conduct multi-angle in-depth mining and analysis from trends, applicants, inventors, and technical content perspectives by providing keywords.

(3) **User Management Platform:** This includes: (a) Personal account management: Users can view their behavioral footprints, collections, customization, and follow-ups while performing personalized operations; the system also extracts and pushes content of interest based on users' reading and retrieval habits; (b) Interactive communication system: Establishing user communication systems for open interaction between system-users and user-users, enabling better understanding of demand changes for customized services while strengthening communication and mutual assistance among users. User feedback mechanisms allow users to provide feedback anytime, helping service personnel identify problems, improve services, and enhance satisfaction.

5.4 Strengthening Communication to Establish Unified Business Specifications and Service Standards As previously noted, some libraries provide industry patent trend analysis and early warning services for faculty, external enterprises, and government departments, but these lack unified business specifications and service standards, failing to form widely recognized service brands. The "Internet Plus" environment and the "one-stop" platform require strengthened standardization to elevate industry service concepts.

(1) **Standardize main IP information service operations:** Main operations include basic services (patent retrieval, novelty search) and in-depth services (patent analysis, agency, strategic layout, navigation, review). Multi-level service content requires libraries to use the latest information technology to build online exchange platforms for IP service personnel to share experiences. Based on extensive practice and multi-industry case accumulation, libraries should promptly establish business specifications and service standards covering all IP service content, including personnel service standards, process document formats, fee standards for different materials, and standardized service content and processes, thereby improving service quality and image.

(2) **Standardize IP consultation services:** IP consultation includes basic consultation on IP fundamentals and business, as well as high-end consultation on strategy, policy, management, and practice, delivered both online and offline. The diversity of content and methods necessitates accelerated development of IP consultation service standards.

(3) **Standardize IP training services:** As mentioned, establishing an online IP training platform requires standardizing training content from various universities. Accelerating the introduction of IP training service standards will further regulate training work and enhance the IP information service brand image.

5.5 Strengthening IP Talent Cultivation and Establishing a Professional Training System Currently, numerous training courses and seminars on IP basics and patent analysis skills exist, improving certain competencies to some extent. However, the lack of systematic and continuous training makes it difficult to acquire all necessary knowledge and skills for IP services. Under "Internet Plus," to enhance service capabilities, libraries should prioritize talent team construction.

5.5.1 Strengthening IP Talent Cultivation

(1) **Popularize IP knowledge and improve IP literacy among faculty and students:** Qualified universities can adopt embedded IP literacy education models by adding IP basics to elective courses like *Legal Foundations* and offering separate IP courses for undergraduates and graduates. Professional courses in engineering design, innovation practice, and artificial intelligence can incorporate *Intellectual Property Protection and Utilization* and *Patent Strategy*, with professional instructors participating in teaching and design guidance to cultivate students' patent awareness, capabilities, and information ethics.

(2) **Promote cultivation of patent practice talent:** First, encourage universities to improve discipline settings and offer patent practice courses to strengthen talent cultivation. Second, innovate talent practice models by encouraging patent agencies and national/regional IP training bases to become practice platforms for university talent cultivation, smoothing channels between talent training and utilization.

5.5.2 Establishing a Professional IP Information Service Talent Training System

In accordance with the *Intellectual Property Management Specifications for Higher Education Institutions*, libraries should develop an IP information service talent competency framework and organize classified and graded practical training for IP service support institution personnel and IP specialists. A national or industry-level training system for university library IP information service talent should be established, comprising:

(1) **IP training for all library staff (support institutions):** This online training would focus on popularizing IP basics, business systems, and processes to enhance overall IP awareness and library service levels.

(2) **Training for IP service specialists:** To concentrate resources and expand services, libraries should establish specialized departments or full-

time IP service specialist positions. Training should combine online and offline, regular and irregular formats, covering: (a) Patent law and related knowledge through courses taught by State Intellectual Property Office experts; (b) International IP rules and foreign legal systems through internationally aligned curricula and "going global" programs; (c) Patent retrieval and analysis skills through collaboration with commercial information companies or database providers via project practice; (d) Patent data processing skills including collection, extraction, deduplication, and technical indexing through training by computer experts; (e) Intelligence analysis capabilities focusing on patent analysis and competitive intelligence research methods; (f) Frontier knowledge in various disciplines for IP subject service specialists to understand disciplinary trends and better serve users.

Both online and offline training content should be shared on training platforms to enable broader participation. Training activities should be organized under the leadership of the State Intellectual Property Office and Ministry of Education with planning, objectives, unified deployment, standardized criteria, strengthened assessment, strict admission, and step-by-step implementation to cultivate a large number of highly skilled compound IP service specialists, thereby improving service capabilities, expanding scope, and elevating standards.

References

[1] 2018 Annual Meeting and First Academic Symposium of University Intellectual Property Information Service Center Alliance Successfully Held at Shanghai Jiao Tong University [EB/OL]. [2019-02-03]. http://oldwww.lib.sjtu.edu.cn/index.php?m=content&c=index&a=show&catid=211&id=1967.

[2] Announcement of the First Batch of National University Intellectual Property Information Service Centers [EB/OL]. [2019-03-15]. http://www.cutech.edu.cn/cn/zxgz/2019/01/1539771

[3] Intellectual Property Management Specifications for Higher Education Institutions [EB/OL]. [2018-12-15]. http://kjj.yzcity.gov.cn/kjj/0201/201711/42ccb7f4e6864f24a8ef3ba2f19df939/fi

[4] Xiao L. Research on Innovative Trends in University Library Services Supporting "Double First-Class" Construction [J]. *Journal of Academic Libraries*, 2018(5): 43-51.

[5] Wang H L. Analysis of Necessity and Feasibility of Patent Information Services in Henan University Libraries [J]. *Innovation Science and Technology*, 2017(5): 94-96.

[6] Shen J H, Zhang G P. Trends and Reflections on Patent Information Services in University Libraries [J]. *Journal of Academic Libraries*, 2017, 34(6): 51-55.

[7] Li F. Exploration and Practice of Patent Information Services in University Libraries [J]. *Library Development*, 2016(7): 78-84.

[8] Li Z L, Meng J W. Research on Construction Paths of Patent Thematic Database Service Platforms in China [J]. *Journal of Beijing Administration Institute*, 2014(4): 91-95.

[9] Zhao H, Wang L. Investigation and Research on Patent Information Services in University Libraries [J]. *Library Work and Study*, 2015(6): 86-88.

[10] Li B B, Gao Y Y, Bao Z Y. Research on Patent Information Service Models for Collaborative Innovation in University Libraries [J]. *Modern Information*, 2018, 38(2): 101-105.

[11] Wang L, Li W L. Research on Patent Intelligence Services in University Libraries Under Market Competition—A Case Study of Tianjin University [J]. *Library Work and Study*, 2013(1): 67-70.

[12] Zhang S J, Chen W J, Lu Y K, et al. Patent Information Service Strategies for University Libraries Under Industrial Technology Innovation Demands [J]. *Library and Information Service*, 2017, 61(21): 64-70.

[13] Shen J H, Sun Q X. Research on Capacity Building of University Librarians for Patent Information Services [J]. *Journal of Academic Libraries*, 2018(5): 73-79.

[14] Wang L P, Yang B, Qin X, et al. Content, Models, and Trends of Patent Information Services in University Libraries [J]. *Library and Information Service*, 2015, 59(6): 113-119.

[15] Notice on Issuing the *Implementation Measures for the Construction of University Intellectual Property Information Service Centers* by the General Office of the State Intellectual Property Office and General Office of the Ministry of Education [EB/OL]. [2019-03-14]. http://www.sipo.gov.cn/gztz/1107796.htm.

[16] Ma H T. *Internet Plus: National Strategic Action Roadmap* [M]. Beijing: China CITIC Press, 2015: 45-62.

[17] Yang H J. How to Examine Internet Thinking [J]. *Corporate Culture*, 2015(7): 47-48.

[18] Northeast Forestry University Library. Patent Service Month Activities Successfully Concluded, Assisting "Double First-Class" Discipline Construction [EB/OL]. [2018-12-03]. http://lib.nefu.edu.cn/gk/pxyhd2/2018/01/9874.htm.

[19] Feng J. Practice and Enlightenment of Patent Information Services in American University Libraries—Based on Research of Libraries Designated as RTTCs [J]. *Library and Information Service*, 2017, 61(21): 56-63.

Author Contributions

Zhou Jing: Conducted the investigation, collected and organized materials, designed the paper framework, and wrote the manuscript.

Zhang Libin: Collected preliminary materials, provided topic guidance, and offered revision suggestions.

Gu Wenhao: Collected and organized materials.

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