Constructing a Library Knowledge Service System in the Context of World-Class University Development—A Case Study of Beijing Institute of Technology Library (Postprint)

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Abstract

Purpose/Significance: Addressing the critical period of intelligent transformation and connotative development that university libraries are entering, this study explores the construction of a knowledge service system aligned with the development of world-class universities, leads innovative development in the new era from a transdisciplinary perspective, achieves a leapfrog transformation of university library endeavors, and supports the high-quality development of higher education.

Method/Process: By analyzing the current status and demands of library knowledge services, clarifying the connotation and implementation pathways of knowledge services, and using the exploratory practice of knowledge services at Beijing Institute of Technology Library as a case study, this paper constructs a knowledge service system for world-class universities from perspectives including construction objectives and positioning, service platforms, and management operation mechanisms, and expounds upon considerations for the future development direction of library knowledge services.

Results/Conclusion: World-class university libraries must seize the development opportunities of the new era, center on knowledge, innovate institutional mechanisms, construct a knowledge service system that supports the development of world-class universities, establish a knowledge innovation platform capable of unleashing digital productivity, and contribute to the digital transformation of higher education and the building of a culturally strong nation.

Full Text

Constructing a Library Knowledge Service System in the Context of Building First-Class Universities: A Case Study of Beijing Institute of Technology Library

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Abstract:
[Purpose/Significance] As university libraries enter a critical period of intelligent transformation and connotative development, this paper explores the construction of a knowledge service system aligned with the development of first-class universities. From an interdisciplinary perspective, such a system can lead innovative development in the new era, achieve a leapfrog transformation of university libraries, and support the high-quality development of higher education. [Method/Process] By analyzing the current state and needs of library knowledge services and clarifying their connotation and implementation pathways, this paper constructs a knowledge service system for first-class universities using the exploration and practice of Beijing Institute of Technology Library as an example. The system is developed from three dimensions: construction goals and positioning, service platforms, and management operation mechanisms, with reflections on the future development direction of library knowledge services. [Results/Conclusion] First-class university libraries must seize the opportunities of the new era, take knowledge as the core, innovate institutional mechanisms, build a knowledge service system that serves first-class university construction, create a knowledge innovation and development platform that can unleash digital productivity, and contribute to the digital transformation of higher education and the building of a culturally strong nation.

Keywords: university library; library transformation; knowledge service; system construction
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The Association of College & Research Libraries (ACRL) *2023 Environmental Scan* report indicates that trends in higher education continue to shape the development landscape of university libraries [1]. In his late 2021 report *Accelerating the Modernization of University Libraries to Support High-Quality Development of Higher Education*, Vice Minister of Education Wu Yan (then Director of the Department of Higher Education) emphasized the need to accelerate the modernization of university libraries, comprehensively improve information service levels, contribute to cultural inheritance, firmly establish a student-centered philosophy, activate document and space resources, provide precise and visualized knowledge services and support for teaching, research, and discipline construction, and transform libraries into important positions for campus cultural

construction [2]. Based on functional, service, and management characteristics, university library development has generally experienced three stages: the first stage centered on print collections with separated collection and utilization, using card catalogs for retrieval; the second stage placed business management at the center, integrated collection and utilization, emphasized resource and space openness, and began using integrated library systems with the emergence of the internet; the third stage is user-centered, establishing themed libraries and developing multi-system, multi-service integrated knowledge service platforms. Currently, university libraries are no longer collection-centered but are gradually becoming knowledge-centered, with all business activities revolving around human needs [3-4].

The *Compass Report on the Modernization of University Libraries* points out that Chinese university libraries are currently at a critical juncture of modernization transformation and connotative development, facing both opportunities and challenges [5]. The university library community should actively explore and consider how to assess the situation and adapt to needs, promoting the overall development of domestic university libraries and the entire industry. As libraries of national "Double First-Class" universities under key construction, they should possess a forward-looking consciousness for proactive change, actively plan the path of connotative transformation and development, and become pioneers in library transformation. As the first science and engineering university founded by the Communist Party of China and a key university in national construction initiatives including Project 985, Project 211, and the Double First-Class initiative, Beijing Institute of Technology adheres to the fundamental task of fostering virtue and cultivating people, strengthens "three-all education," builds an integrated talent cultivation model of "value shaping, knowledge development, and practical ability," and is committed to cultivating leading and leadership talents with "lofty aspirations, moral integrity, refined skills, innovative inclusiveness, and contemporary responsibility." This also poses higher and newer requirements for the library's knowledge innovation services. The question of how libraries can fully leverage their advantages in literature, information, and intelligence resources to build an intelligent comprehensive academic service system centered on knowledge, create a knowledge innovation and development platform that can unleash digital productivity, and promote innovative development of library knowledge services to meet the needs of top innovative talents and scientific research constitutes an important research topic.

2. Development Environment and Current State of Library Knowledge Services

2.1 Development Process of Library Knowledge Services

At the turn of the century, the concept of "knowledge service" was introduced into China's library and information science research field, subsequently triggering a research boom in the library community. It is widely regarded as the core

capability and primary pursuit of library and information work, with university libraries being the main entities and arenas for delivering knowledge services [6-10]. Thanks to the rapid development of modern information environments represented by networking and digitalization, libraries have transformed from simply providing document services to information services, then to knowledge services, and are now striving toward intelligent services [11]. Over the past two decades of this century, the development of knowledge services has gone through three stages: initial birth, rapid growth, and stable maturity. Its concept has evolved from vague and broad to clear and specific; its service subjects have developed from singular to pluralistic. Continuous changes in technology and user needs have also driven knowledge service content toward diversification, specialization, digitization, personalization, intelligence, and smartification, with service content continuously expanding to include embedded subject services, knowledge consulting, intelligence analysis and research, data management and services, library publishing and publishing services, think tank research and services, and intelligent and smart services [11-13].

2.2 Evolution of the Connotation of Library Knowledge Services

Domestic experts and scholars have provided different definitions of library knowledge service connotation. At the beginning of this century, Zhang Xiaolin proposed that knowledge service is based on the knowledge and ability to search, organize, analyze, and reorganize information and knowledge. According to users' problems and environments, it integrates into users' problem-solving processes to provide services that can effectively support knowledge application and knowledge innovation [9]. In 2010, Chen Jianlong proposed that knowledge service is a collection of service behaviors with strong knowledge dependence among different forms including R&D services, legal services, financial services, market services, engineering services, and management consulting services [14]. In 2021, Chu Jingli proposed that knowledge service is value-added service with knowledge and creativity that directly faces user needs and user processes [12]. These definitions by renowned library experts in different eras are highly representative, reflecting the dynamic evolution of knowledge service following the development of social material civilization and changes in knowledge resources and environments throughout this century.

The knowledge service discussed in this paper refers to the value-added, interdisciplinary research-oriented services provided by university libraries based on literature resources, library space, subject librarians, and technology applications to support talent cultivation, scientific research, management decision-making, and collaborative innovation in the context of promoting high-quality development of higher education in the new era. These services include education and teaching, intelligence analysis, sci-tech novelty search, and intellectual property services. They can also promote knowledge identification, exchange, creation, sharing, and inheritance.

2.3 Development Environment for Library Knowledge Services

In recent years, while global library undertakings have faced challenges such as funding shortages and growth stagnation, China's library industry has grown against the trend under the promotion and support of central and local governments and through the courageous exploration and innovation of libraries at all levels and types. China has taken the lead globally in both technological equipment and applications. Spiritual culture is also an important factor in the sustainable and rapid development of China's library undertakings. Not only has the entire society given support and tolerance to library transformation and innovation, but promoting reform and embracing challenges has become the conscious awareness of library practitioners, and the entire industry maintains a strong innovative will, which is the driving force for sustainable development [15]. The 2021 basic statistical data analysis of university libraries shows that compared with the previous year, the average total funding and literature resource procurement fees slightly decreased, average paper literature procurement fees slightly increased, electronic resource procurement fees slightly decreased, average building area remained flat, and the average number of staff continued to decline, but educational qualifications improved significantly, with the number of staff holding doctoral and master's degrees continuing to grow [16]. Separate statistics on the basic data of first-batch Double First-Class university libraries from 2017 to 2021 show consistency with the overall investment and construction environment trends of domestic university libraries in recent years [16].

2.4 Current Research Status of Library Knowledge Services

Driven by the knowledge economy and knowledge innovation, research on knowledge service practices by domestic library and information institutions has advanced in depth and continues to develop, maintaining close exchanges with foreign literature institutions [11,17]. In the past decade, research on "library knowledge service" has seen "smart library" as the term with the strongest burst intensity, and "smart library" has become a hot research scenario in applications, indicating that library knowledge service has moved from theory to multi-dimensional practice, forming a virtuous cycle between theory and practice [12]. Currently, libraries have entered the post-knowledge service era centered on smart services [18]. In this era, not all knowledge has value; only in specific fields can knowledge generate new value. Libraries must establish fields suitable for knowledge innovation and provide smart contextual services. The focus of library knowledge service innovation will continue to become more contextualized, refined, technical, and intelligent [12,18]. Conducting various new knowledge services based on disciplinary needs has become a common service content of university libraries, enabling more precise support for talent cultivation, scientific research, and management decision-making. Providing comprehensive, multi-level knowledge services to support Double First-Class construction and address practical problems of teachers and students in different

disciplines has become a key focus area for current knowledge service innovation in university libraries [19].

For example, Peking University Library has established a research support service system based on the research lifecycle, releasing knowledge service products such as disciplinary competitiveness analysis reports, disciplinary frontier reports, academic newsletters, and digital humanities forums for the university, industry, and society, and participating in international disciplinary assessments to provide knowledge services [20]. With the continuous advancement of Double First-Class construction and the impact of COVID-19, many university libraries have begun providing electronic textbooks and teaching references to support teaching needs. Most Double First-Class university libraries have also built information literacy education systems around freshman library orientation, information literacy instruction, and lecture training. Traditional knowledge services such as citation retrieval, sci-tech novelty search, and SDI services provide important intelligence for research output, academic impact measurement, research innovation evaluation, and research status clarification, forming an important foundation for research support [21].

Moreover, the emergence of the metaverse has significantly changed the connotation and extension of knowledge ecosystems. Diverse knowledge and multiple types of knowledge subjects have extended the boundaries of knowledge management to virtual domains. Knowledge service providers such as university libraries will provide more multi-source and integrated knowledge services to users, and inclusive multi-source heterogeneous knowledge from both virtual and real sources will become the main knowledge type in knowledge services [22]. AIGC large models such as ChatGPT, Wenxin Yiyan, and Xinghuo Cognitive Model bring technological opportunities that will further provide new ideas for library knowledge service transformation, empowering more humanized, refined, intuitive, and personalized smart application scenarios for library knowledge services [23].

2.5 Main Problems in Library Knowledge Services

Currently, knowledge service is in a transition period driven by two major forces: demand-driven and technology-driven [24]. As mentioned above, under the background of first-class university construction and rapid information technology transformation, both the extension and connotation of knowledge services are continuously expanding. However, in specific practice, three prominent problems still exist in most universities: Due to constraints in management mechanisms and departmental barriers, data, information, knowledge, and intelligence management and application in most universities remain scattered and fragmented, making it difficult for departments to interconnect and achieve effective resource sharing; Although libraries have increasingly abundant digital resources and more convenient access to open resources, it is currently difficult to achieve precise push and effective utilization of massive resources. Since services are individual-based, many resources remain “dormant” and have not

played their proper value; For new technologies such as general artificial intelligence, technology developers often conduct R&D around what they can do and want to do, while demanders can only adaptively match based on developed services, making it difficult to achieve true organic integration of technology and demand. With the deepening of connotative construction of Double First-Class universities, there is an urgent need to build a brand-new knowledge service system and operation management model to comprehensively support the construction of world-class universities.

3. Beijing Institute of Technology Library Knowledge Service System

As the first science and engineering university founded by the Communist Party of China, Beijing Institute of Technology has been providing patent intelligence knowledge services to the university since the 1980s when the Patent Law was enacted. It has successively established knowledge service institutions such as the Intelligence Teaching and Research Section, Reference Department, Institute of Information Resource Management, Subject Service and Sci-Tech Novelty Search Department, and Strategic Intelligence Research Department. Facing new situations, new goals, and new challenges, Beijing Institute of Technology Library is focusing on building a brand-new knowledge service system to provide more precise intellectual support for talent cultivation, scientific research, and management decision-making. During this period, the library has been approved to confer master's degrees in Library and Information Science, first-level discipline master's degrees in Library, Information and Archives Management, and has obtained qualifications for several national-level knowledge service platforms including the Ministry of Education Sci-Tech Novelty Search Workstation, University National Intellectual Property Information Service Center, and National Intellectual Property Pilot Demonstration Universities. Since 2000, the library has entered a rapid development stage, placing greater emphasis on talent introduction and cultivation, and has begun systematically introducing professional talents with doctoral degrees to form a high-quality, professional knowledge service team to provide strong support for top talent cultivation, first-class discipline construction, and high-level scientific research. According to the *2021 Basic Statistical Data Analysis of Chinese University Libraries* published in *Journal of Academic Libraries* No. 6, 2022, Beijing Institute of Technology Library ranked 5th nationally in the number of doctoral staff and continues to maintain an upward trend [16]. To more efficiently and accurately focus on the construction goals and positioning of a first-class university and excavate the connotation of knowledge services for different needs, the library established more flexible and efficient management and operation mechanisms. In early 2022, the library merged and reorganized its internal departments including the Sci-Tech Novelty Search and Subject Knowledge Service Department, Strategic Intelligence and Knowledge Innovation Institute into a Knowledge Service Department, aiming to build a knowledge innovation and development platform that can unleash digital productivity.

3.1 Positioning of Knowledge Services

The positioning of Beijing Institute of Technology Library's knowledge services is to base itself on major national development strategies, aim at the frontiers of world science and technology, and be guided by serving first-class university construction. According to the needs of talent cultivation, scientific research, management decision-making, and collaborative innovation, through four levels of information acquisition, association, integration, mining, transformation, and value-added application—data, information, knowledge, and intelligence—the library provides scientific, intelligent, and diversified interdisciplinary research-oriented services to universities, government departments, research institutes, and innovative enterprises. The goal is to build the knowledge innovation and development platform into a hub for featured academic resources, a cultivation ground for top innovative talents, a source of original knowledge achievements, and a gathering place for world-class scholars.

3.2 Connotation of Knowledge Service Construction

In the process of constructing its knowledge service system, Beijing Institute of Technology Library has built five platforms according to the actual situation of the university and the characteristics of user groups, main content, and service scenarios of knowledge services: a featured resource integration platform for supporting first-class university development, an information literacy curriculum platform for first-class top talent cultivation, a strategic intelligence analysis platform for supporting first-class innovative output, an international study and exchange platform for gathering first-class academic masters, and a metaverse super-spatiotemporal platform for creating infinite possibilities.

3.2.1 Featured Resource Integration Platform for Supporting First-Class University Development: Focusing on Double First-Class Construction Tasks Knowledge services emphasize user-centeredness, user demand orientation, and the principle of co-construction and sharing of various knowledge resources [12]. The featured resource integration platform coordinates paper resources, digital resources, and other carrier resources, reprocesses and utilizes resources, and builds a resource guarantee service system that integrates paper and electronic formats, multi-source fusion, open sharing, and smart acquisition. This provides precise resource support for talent cultivation, intelligence research, think tank services, and academic exchange.

The platform focuses on two types of resources: purchased resources and open access resources. Previously, resource construction focused on purchased resources, but now both types are placed in equally important positions, with greater emphasis on the acquisition and construction of open resources. For purchased resources, the library first focuses on the university's construction goals of "top engineering, high-quality science, boutique liberal arts, and emerging medical engineering," following the concept of "prioritized, demand-based, characteristic, and continuous" development. Second, it has established a sci-

entific, efficient, and demand-oriented resource framework through integrated paper-electronic procurement, management, and discovery to meet teaching, research, and personalized resource needs of teachers and students. In terms of open access (OA) resource construction, dedicated staff continuously monitor OA developments, process and dynamically update various required academic OA resources to help teachers and students access literature in real-time and without barriers, promoting knowledge dissemination and knowledge innovation.

Additionally, the platform performs secondary classification and aggregation of various resources to achieve one-stop retrieval, intelligent recommendation, and convenient acquisition. It also draws resource knowledge graphs to empower smart education by establishing knowledge associations between resources and professional knowledge graphs in teaching, helping students achieve mastery from knowledge units to knowledge chains, knowledge surfaces, and knowledge spaces. Furthermore, relying on modern information technology and artificial intelligence technology, it provides conversational answers to readers' questions during resource use, breaks down service barriers, and establishes an interconnected and open resource ecosystem.

3.2.2 Information Literacy Curriculum Platform for First-Class Top Talent Cultivation: Deepening Education Model Reform and Comprehensively Improving Student Comprehensive Literacy First, for different cultivation levels and different disciplines, the library has built a three-dimensional curriculum education system covering data literacy, information literacy, and intellectual property literacy for undergraduates, masters, and doctoral students (see Figure 8 [Figure 8: see original paper]): for top innovative talents such as Xu Teli Honors Program students and "Camel Peak Navigation" program participants, it offers customized and embedded information literacy courses; for science and engineering majors, it offers customized courses on theories and methods of sci-tech intelligence monitoring; for humanities and management disciplines, it enhances students' data analysis and utilization capabilities and offers research literacy courses related to academic resource utilization; for scientific research innovation projects, it offers training services on patent intelligence analysis and patent navigation capabilities; for data information competitions, it offers training services on data analysis and patent intelligence analysis.

Second, relying on the Academic Growth Data Collection Project for Senior Scientists collection base, it builds a typical case database of scientist spirit, and relying on academicians' ideological and political education open courses, the Yanhe University Talent Alliance, and ideological and political education demonstration bases, it constructs an ideological and political education material database to provide material support for curriculum ideology and politics and ideological and political courses.

Third, it carries out the "Fragrant Books of BIT · Living Library" series of brand activities, creating three series of "living books": "Masters' Talks" (masters and

renowned experts in various fields), "Craftsmanship Show" (craftsmen, inheritors of traditional culture, and handicraft artists), and "Youth Songs" (excellent young teachers and students around us) to help improve students' knowledge and cultural literacy.

Finally, relying on key laboratories, it builds a student sci-tech innovation platform. For top talents such as Xu Teli Honors Program students, it provides whole-process service and support for student innovation and entrepreneurship through a "project-funding-platform-mentor" four-linkage model.

3.2.3 Strategic Intelligence Analysis Platform for Supporting First-Class Innovative Output: Leveraging the Interdisciplinary Advantages of Library and Information Science to Empower Key University Tasks Different from other platforms, the strategic intelligence analysis platform integrates professional skills in library and information science with other disciplines to create an intelligent knowledge service engine that interconnects four levels: data, tools, knowledge, and application. It forms a data fusion system of diverse and heterogeneous resources, develops an intelligent tool system based on data mining, builds a knowledge discovery system supporting deep mining, and implements a multi-level application system for decision support (see Figure 9 [Figure 9: see original paper]). From the dimension of application service orientation, it can be divided into three levels:

First, at the strategic level, it provides sci-tech strategy analysis and policy research analysis to support scientific decision-making. It provides intelligence analysis such as strategic research, consultation and evaluation, situation assessment, and policies and regulations for university research institutions to empower their high-quality development. It leverages the interdisciplinary advantages of library and information science to serve the construction of characteristic think tanks. It leverages big data resource advantages to serve the talent-strong university strategy by drawing talent maps and precise talent portraits to help target and accurately attract talents and discover potential talents for targeted cultivation.

Second, at the disciplinary level, it provides research field situation analysis to serve disciplinary layout and planning. It focuses on national strategic directions such as manufacturing power, cyber power, and dual carbon goals, mainly tracking directions such as medical engineering, medical technology, high-end chips, intelligent networking, artificial intelligence, marine information, intelligent manufacturing, energy storage technology, and frontier intersections. It conducts competitiveness analysis of the university and its secondary research institutions from multiple dimensions including papers, patents, projects, awards, talents, and cooperation. It focuses on medical-engineering integration strategy research to promote the connotative construction of emerging medical engineering and drive deep integration of "medical-engineering + industry-university-research-medicine."

Third, at the industrial level, it conducts patent status analysis, patent navigation, key competitor tracking, technology competitive intelligence analysis, patent mining and layout, pre-application patent evaluation, and "full-chain" intellectual property services to promote achievement application (see Figure 10 [Figure 10: see original paper]). Simultaneously, it provides intellectual property training, consulting, and education for various innovation entities such as university disciplinary companies and external enterprises, as well as intellectual property management personnel.

3.2.4 International Study and Exchange Platform for Gathering First-Class Academic Masters: Comprehensively Supporting International Academic Exchange and Creating a Platform for Gathering Top Scholars The library fully utilizes high-quality academic and space resources to create an international academic exchange platform using a new combination mode of "space + resources + librarians + scholars" to attract top scholars from home and abroad, promote knowledge dissemination and innovation. This platform has three characteristics: from the academic resource dimension, it can provide high-quality and distinctive academic resources; from the knowledge service dimension, it can provide academic frontier foresight and sci-tech intelligence services; from the space guarantee dimension, it can provide exchange and sharing spaces for different groups including masters, young scholars, and teams (see Figure 11 [Figure 11: see original paper]). For example, the platform has collaborated with the International Cooperation Office to create the "Highland Club," providing young scientists with free academic space and high-quality academic resources to help them conduct international academic exchange activities. It has also collaborated with the Human Resources Department to provide short-term exchange office spaces for Nobel laureates, dual-appointed academicians, and renowned scholars, and to organize and build academic exchange platforms with different specifications. Through this "four-gathering" combination mode, the connotation of knowledge services becomes richer, making the library more popular and more academic, truly becoming an energy field where "knowledge creates knowledge."

3.2.5 Metaverse Super-Spatiotemporal Platform for Creating Infinite Possibilities: Building Fields to Lead Innovation and Using Knowledge to Create Knowledge Innovation is the main theme of the new era, and supporting innovation is one of the development goals pursued by knowledge services [25]. The *Guiding Opinions on Accelerating Scenario Innovation to Promote High-Quality Economic Development through High-Level Application of Artificial Intelligence* issued by the Ministry of Science and Technology and six other ministries and commissions in 2022 pointed out that promoting AI scenario innovation is significant for promoting higher-level AI application and better supporting high-quality development. It is necessary to strengthen the supply of AI scenario innovation elements, cultivate scenario innovation talents through multiple channels, stimulate students' scenario imagination, and

enhance students' scenario innovation literacy and capabilities [26]. Based on this trend, while building the above four knowledge service platforms, Beijing Institute of Technology Library is constructing a metaverse library with a "one library, five groups" model [27] and has introduced AIGC large model intelligent services such as ChatLibrary, further deeply integrating these two technologies in library knowledge services to create a metaverse "Future Innovation Space" (see Figure 12 [Figure 12: see original paper]), leading the future development direction of library knowledge services. As a carrier to meet the needs of different innovation scenarios, the "Future Innovation Space" uses the metaverse platform and embedded AIGC large models to carry out diverse innovation activities. Through "leading, observing, listening, speaking, thinking, doing, and using," it comprehensively promotes teachers and students to carry out knowledge innovation, allowing them to fully participate in the entire process of knowledge services and innovation, and providing contextualized, refined, technical, and intelligent knowledge service experiences.

3.3 Knowledge Service Management and Operation Mechanisms

The construction of a first-class university library knowledge service system requires a corresponding complete management system to comprehensively manage and monitor the content, service methods, and service effects of knowledge services to achieve innovative value and continuous improvement. Therefore, Beijing Institute of Technology Library ensures that its knowledge service system can meet user needs and maximize the value of knowledge services by implementing efficient, collaborative, open, and integrated management operation mechanisms and personnel incentive mechanisms based on actual work conditions.

3.3.1 Efficient Collaboration Mechanism To fully leverage the library's resource and intelligence advantages, university library knowledge services should first become intelligent assistants to main functional departments such as disciplinary planning, teaching management, research management, human resources management, and international exchange and cooperation, supporting relevant decision-making. Therefore, libraries cannot develop independently but must actively interface with relevant departments to help complete various tasks of first-class university construction while securing relevant construction resources. The *2023 ACRL Environmental Scan* report points out that university library managers should cooperate with university administrators to formulate and implement policies that are socially responsible and support academic freedom [1]. In recent years, Beijing Institute of Technology Library has actively promoted the orientation of knowledge services, taken the initiative to promote efficient collaboration with relevant functional departments, professional schools, and research institutions, forming a tightly coupled service operation model that comprehensively supports first-class university construction tasks in discipline construction, talent cultivation, team building, and scientific research.

3.3.2 Operation and Development Mechanism As channels for information resource acquisition become increasingly diversified, library knowledge services not only focus on campus services but also emphasize external cooperation and exchange, building an open and cooperative knowledge service development management mechanism. Beijing Institute of Technology Library's knowledge services mainly adopt a project management system and conduct in-depth cooperation with external industry-university-research institutions. It implements a project team leader responsibility system, establishes project teams, signs project management target responsibility letters through undertaking external projects and internal tasks, clarifies project organization and incentive mechanisms, standardizes project operation methods, and controls project objectives to ensure effective project implementation. Undertaking external projects is also an important source of self-raised funds for the library, with income used for hiring part-time knowledge service personnel and operating the knowledge service system.

3.3.3 Personnel Incentive Mechanism High-quality knowledge services cannot be separated from high-quality librarian teams. To fully unleash the potential of librarians, effective classified management and incentive measures must be implemented. Guided by intelligent transformation and connotative development, Beijing Institute of Technology Library has classified all staff into "three teams": a knowledge service team mainly composed of research librarians, a support service team mainly composed of service support librarians, and a basic guarantee team mainly composed of outsourced labor personnel, thereby achieving rationalized structure and professionalized personnel. The librarian promotion incentive mechanism is a powerful tool for high-quality services. Seizing the opportunity that the original first-level discipline of "Library and Information Science" has been officially renamed "Information Resource Management" [28], the library has actively interfaced with relevant departments to promote the addition of a researcher series for information resource management in the librarian professional title promotion sequence, with separate promotion conditions and separate review processes, opening up talent promotion channels and providing effective guarantees for the development of knowledge service talents. Based on these three teams, part-time research teams can also be established as needed by introducing renowned experts, scholars, and project-based personnel to form strong support for high-quality knowledge services.

4. Conclusion and Outlook

In the process of constructing a knowledge service system, university libraries should: first, be teacher and student-centered and focus on user needs. By deeply understanding users, excavating user needs, and emphasizing user experience, they should provide personalized, diversified, intelligent, and scenario-based knowledge service content more accurately and efficiently. Second, they should integrate information resources and optimize service structures. By integrating purchased resources, open access resources, and self-built resources, they

should provide richer and higher-quality resources and advanced smart resource acquisition methods. Third, they should innovate technology applications and improve service levels. Through big data, metaverse, AIGC, and other artificial intelligence technologies, they should conduct deep information mining and analysis, provide users with more precise knowledge recommendations, create new knowledge innovation spaces, expand knowledge service channels and forms, and enhance the connotation of knowledge services. Fourth, they should strengthen exchanges and cooperation to enhance core competitiveness. Through various forms of cooperation and exchange such as academic activities, collaborative research, and international training with university departments, domestic and foreign universities, research institutes, and enterprises, they should share resources, create advantages together, broaden knowledge service fields, and enhance influence and competitiveness.

The widespread application of metaverse and AIGC technologies provides university libraries with increasing opportunities to participate more and play greater advantages in policy formulation, practice, and theoretical research in emerging fields of higher education. Researchers can explore how to build more open and shared academic environments in the metaverse to promote global academic cooperation and knowledge dissemination, and explore more efficient AI algorithms for information retrieval and knowledge recommendation. At the same time, library managers and researchers need to pay attention to ethical and privacy issues that AIGC technology may bring, and explore how to promote the rational application of technology while protecting user rights and interests. Facing the problem of unethical applications such as using the technology to spread misinformation and false information, they should address these challenges through research, teaching interventions, policy formulation, or promoting interdisciplinary dialogue on the topic. Library managers need to continuously learn and update relevant knowledge, cultivate knowledge, skills, and abilities, guide libraries to keep pace with the times, and adapt to the knowledge service needs of the metaverse and AI era, thereby making important contributions in open data, intelligent information acquisition, and many other fields.

General Secretary Xi Jinping has repeatedly emphasized the importance of higher education, noting that the Party and country's development needs for scientific knowledge and outstanding talents are more urgent than ever. As an important component of higher education, university libraries should actively adapt to the trends of new era development and provide better support and services for the development of higher education. First-class university libraries should possess the ability to recognize changes in advance, respond to changes proactively, and actively seek changes. While keeping pace with the development trends of the times, they should integrate into the university development process, support the development needs of higher education, build knowledge service systems based on their own characteristics, enhance the depth and breadth of knowledge services, promote knowledge innovation, unleash digital productivity, achieve intelligent transformation and connotative development of library

undertakings, and make positive contributions to promoting the digital construction of national higher education and the building of a culturally strong nation.

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