Analysis of the Development Direction of a Conceptual Academic Library Resource Sharing Service based on a Case Study of DXY

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Abstract

Under a global environment characterized by open and complex information networks, academic library resource sharing practitioners should observe the information services market beyond their "library-oriented" settings and rethink the development directions of their services. To investigate this issue, this paper presents an analysis of the development trajectory and characteristics of DXY, a Chinese information service enterprise. This study also discusses the development of academic library resource sharing service from three dimensions: namely, service targets, service contents, and service roles. Findings show that the academic library resource sharing practitioners should break through the traditional cognitive frameworks of "academic users on campus" and "document providers," and furthermore, consider upgrading services to assume a comprehensive role as information sharer, information connector, and platform operator simultaneously. This change will enable the move toward a knowledge service orientation.

Keywords: Resource sharing, Open access, Interlending and document supply (ILDS), Information mining, Information connection

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Introduction

With the development of the Internet, the global academic information environment has changed remarkably. The evidence is in the rapid development and worldwide attention attracted by the open access (OA) movement. Two primary vehicles, namely, OA journals and OA archives or repositories (Suber, 2009), are used to deliver OA research articles. The

representative platforms of OA journals include Public Library of Science,[1] BioMed Central,[2] and the Directory of Open Access Journals.[3] The representative platforms of OA archives or repositories include arXiv,[4] PubMed Central,[5] the Directory of Open Access Repositories,[6] and institutional repositories that belong to universities or research institutes. For the decentralization of OA resources, OA search engines such as Socolar[7] and CiteSeerX[8] or plug-in tools such as Kopernio[9] and Unpaywall[10] have emerged. OA not only removes paywall barriers for users but also accelerates academic information communication. In addition, the academic community's ResearchGate[11] and Academia.edu[12] as well as the online database Sci-Hub,[13] which aim to remove barriers to knowledge access in science, also play an important role. Compared to Western countries, although the development of institutional repositories is slow in China (Zhong & Jiang, 2016), this does not mean it is difficult for users to access to OA resources. For example, some database vendors directly provide fast document delivery service to end users; this service is available by searching and simply filling in an email address. In summary, the information environment has become increasingly convenient and open for users in terms of discovering and accessing academic information, thereby influencing the provision patterns for global academic information.

At present, the trends in interlending and document supply (ILDS) services are not optimistic. For instance, service requests in France and Britain are on a downward trend (Schöpfel & Gillet, 2011; Appleyard, 2015). Muhonen and Saarti (2016) reported that ILDS services are the least used channel for instructors in obtaining necessary documents. The China Academic Library & Information System,[14] as the largest resource sharing platform among academic libraries in the country, received approximately 120,000 requests in 2014; this number dropped to 50,000 in 2018. In 2016, academic libraries in the United States reportedly loaned 10.5 million documents and borrowed approximately 9.8 million documents (Rosa & Storey, 2016). The Rosa & Storey report did not describe trends for ILDS services, but suggested that increasing globalization and socialization of information creation and distribution were some of the most important factors that affected the performance of U.S. libraries.

Currently, academic information supply exists in an open and complex global information environment. Libraries, OA resources, academic communities, social networks, enterprises, and even online databases established by individuals are all part of the academic information chain. The Internet promotes academic information access and exchange, causing an obvious loss of users for traditional ILDS services in academic libraries. To ensure future development, ILDS services should step out of their "library-oriented" perspectives, observe other academic information providers in the market, and rethink the direction of service reformation. This paper presents a case study of DingXiangYuan (DXY)[15] , an information service operator in China. Through observations of DXY, including its development

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[1] https://www.plos.org/ [2019-6-7]
[2] https://www.biomedcentral.com/ [2019-6-7]
[3] https://doaj.org/ [2019-6-7]
[4] https://arxiv.org/ [2019-6-7]
[5] https://www.ncbi.nlm.nih.gov/pmc/ [2019-6-7]
[6] http://v2.sherpa.ac.uk/opendoar/ [2019-6-7]
[7] http://www.socolar.com/ [2019-6-7]
[8] https://citeseerx.ist.psu.edu/index [2019-6-7]
[9] https://kopernio.com/ [2019-6-7]
[10] https://unpaywall.org/ [2019-6-7]
[11] https://www.researchgate.net/ [2019-6-7]
[12] https://www.academia.edu/ [2019-6-7]
[13] https://sci-hub.shop/ [2019-6-7]
[14] http://www.calis.edu.cn/index.html [2019-6-9] (business data are from an interview with CALIS staff)
[15] http://www.dxy.cn/ [2019-6-9] (relevant information and data on DXY are mainly collected from its own website and other websites)

trajectory and operation characteristics, this study analyzes the transformation of ILDS service targets, contents, and roles.

DXY case study: development trajectory

DXY originated from a peer-to-peer (P2P)-based academic document searching and sharing service in the medical field and has developed into a connector and digital service provider in China's healthcare industry. DXY connects researchers, physicians, patients, hospitals, pharmaceutical firms, and insurance payers by providing information and knowledge services for health professionals and public users. The development trajectory of DXY can be divided into the following four stages:

Initial stage (2000–2002): P2P-based academic document searching and sharing
Li Tiantian, a medical postgraduate and the founder of DXY, had tried to search for documents on the Internet and was inspired by PubMed because he was dissatisfied with the inefficient and fee-based document services in libraries. In 2000, Li launched a public welfare bulletin board system (BBS) that enabled (1) sharing and discussion of medical documents; (2) discussion of medical databases, document searching methods, and skills; and (3) participation in competitions for medical database searches and applications among medical students or workers. The BBS not only provided document information for learners and researchers in medicine but also built a communication channel that gathered the first group of DXY followers (Zhang, 2015).

Transition period (2002–2006): establishing a professional academic community
Li thought that by only enabling users to share and discuss medical documents, the BBS would not develop further and would even lose users. Thus, the founder attempted to transform the BBS into a professional academic community that was oriented toward discussions on the latest research results and special cases in the medical field. This transformation brought the number of DXY users to a million in 2006, representing a peak in user growth.[16] Furthermore, DXY began to recommend potential academic partners to registered users based on back-end data analysis of the academic community. At this stage, DXY successfully transformed itself into a comprehensive platform for academic information exchange, not limited to an academic document supply service. Since then, the platform has been guiding users in producing professional content that promotes communication among them.

Commercialization (2006–2011): promoting profitability
As a larger number of users joined the DXY academic community, additional financial aid was needed for sustainable development. Thus, DXY drove the community toward commercialization. To maintain academic neutrality of the community, DXY established a top management organization that was independent of the commercial team. At present, DXY provides recruitment information, enables procurement of experimental materials, and offers online course services for professional users; the platform also provides business advisory services such as medicine marketing solutions for enterprises,[16] Thus, besides being the operator of an academic community, DXY has become an information connector and

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[16] https://www.huxiu.com/article/2013/1.html [2019-6-10]

information provider. DXY currently has 5,500,000 professional users, including 2,000,000 doctors.[17]

Socialization (2011 to present): surpassing academic community and serving society
After 2011, DXY expanded its target users from medical professionals to the public. To adapt to the mobile internet era, DXY has implemented changes to become "public user-oriented" and "marketing-oriented," and to offer "mobile products."[18] For example, DXY has launched several applications to provide answers to medication inquiries, parenting knowledge, and health information consulting services to the public. Furthermore, DXY has been using WeMedia with WeChat to upgrade the operation and promotion of DXY services since 2012. Through WeMedia, DXY advocates "knowledge-driven" marketing that integrates marketing information into academic contents and plans topics according to data. Thus far, DXY has gathered numerous WeChat fans, including 30 million public users and 20 million professionals.[18]

DXY case study: development characteristics

Key points

The development of DXY has been characterized by the following features alongside the pace of change in the information environment:

· Focus on content: From being a BBS-based system focused on document search to becoming a commercial information-service platform, DXY has upheld a "user-centered" framework and focused on the development of high-quality and professional content, the basic foundation for promoting user interaction and enhancing user engagement.

· Focus on user behavior: In the big data era, DXY attaches great importance to user behavioral analytics, including likes, comments, forwarding, searching, and information exchange. "User analysis" is an important basis of service improvement, product research and development (R&D), and precision marketing.

· Focus on platform and marketing: The platform is an important provider of content dissemination and user interaction. With the development of 4G technology and smartphones, DXY has expanded its presence from web to mobile platforms. DXY has also used the WeChat social network to accelerate content and service marketing, thereby enhancing the brand's influence and expanding its user groups.

Changes in roles

The role of DXY has changed constantly over a 19-year period. Initially, DXY was the organizer of a public welfare BBS where users shared documents and searched for skills. Thereafter, as a professional academic community operator, DXY provided users with information services such as knowledge resource acquisition, professional information exchange, and research support. Furthermore, as a connector, DXY linked information

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[17] http://www.dxy.cn/pages/about.html [2019-6-10]
[18] https://vcbeat.top/MzRmYmFmNzFhYWNkMDkzNTI0Nzg1YzZkMTU5OTU2MzY= [2019-6-10]

demanders and information providers to enable the provision of academic courses for professional users and information consulting services for public users, thereby helping to address information asymmetry and accelerating the conversion of knowledge value. As an information provider, DXY offers business marketing consultancy services based on data analysis for enterprise users. Evidently, DXY has transcended the scope of a document information service by providing comprehensive information consulting services to professionals, enterprises, and the public.

Discussion

The traditional ILDS services provided by academic libraries face marginal risks in a pluralistic, open, and convenient global information environment. Thus, information professionals must redefine traditional services to adapt to future digital realities (Healy, 2015), and ILDS services should implement changes.

Increasing target audiences

Sari Feldman, former president of the American Library Association (ALA), stated that "cooperation, support, and outward development" are the keys to library transformation (Sari, 2015). According to Wu (2016), libraries have to strengthen their connection to society as a whole, to make themselves more widely open, and to expand cooperation during the current transitional period. DXY participates in social services and its users include professionals and the public. By contrast, at least in China, the main target audiences for academic library ILDS services are limited to university educators and research institutions. However, from the viewpoint of ILDS services, target users have changed considerably:

> ILDS defines its target readership as 'digital information researchers, [including] educators, knowledge professionals in education and cultural organizations, knowledge managers in media, health care, and government, as well as librarians.' With open science, society at large becomes the target of scientific communication [and] document supply is faced with a choice: either to limit its activity to scientists from universities, research institutes and corporate R&D, or to broaden its scope to 'society at large' (Schöpfel, 2016, p. 151).

With social media developments, many people have become keen on science exploration and participating in crowdsourcing scientific research projects. These people do not work at universities or research institutions but demand relevant information support. Compared with public libraries, academic libraries have more obvious advantages in supporting scientific research. Thus, academic libraries should re-recognize the relationship between library services and society. Academic libraries can draw upon the experience of DXY's development trajectory and role-changing processes and attempt to provide knowledge services for social users breaking through the focus on academic users. In addition, A certain scale of social user groups may also drive new business growth to academic libraries. Many academic libraries, which receive public funds or individual donations, should manifest the consciousness of serving society so that a greater numbers of people can have easy access to information and knowledge. By doing so, academic libraries can assist in social development.

Improving service content

Undoubtedly, further content, availability, and legal compliance are positive factors in the development of ILDS services. Thus, the following suggestions are proposed to improve ILDS service contents on account of the observation and analysis of DXY:

·   **Positive cognition of OA**: A large number of documents obtained by users from the DXY platform are OA resources, which are a part of the scholarly canon. Librarians should actively enhance the awareness of exploiting OA resources and integrate searching and utilization of OA resources into their daily workflows. Simultaneously, librarians should filter high-quality OA resources for users, and even incorporate OA resources into the discovery systems to promote the exchange and sharing of scientific achievements. For instance, the National Science Library of the Chinese Academy of Sciences has launched the GoOA project, which involves the selection, collection, storage, and discovery of OA journals in the natural sciences.[19] Overall, for ILDS services in academic libraries, deep mining and utilization of OA resources should be promoted.

·   **Efficiency:** Efficient information services are an important way to increase user engagement. According to a report by PricewaterhouseCoopers in November 2014, e-book sales in the U.S. were expected to exceed those of print books beginning in 2018,[20] which indicates a considerable change in peoples' reading styles. Approximately 31% of total global library investments were spent on e-books in 2015 (Healy, 2015). The academic resources on the DXY platform, whether papers, books, or reports, are transmitted online so that user information needs can be met in a timely manner. However, in terms of current ILDS services, most of the users' requests for borrowing e-books are not satisfied. By contrast, e-book lending is restricted by legal copyright and contract terms, and thus, this practice among libraries has not reached a large scale. Through a survey of e-book lending in U.S. libraries, Percy (2013) showed that 92.4% of interlibrary loan (ILL) departments (61 of 66 respondents) still did not lend e-books via the ILL process and argued that e-book licensing agreements need to be re-evaluated and that ILL staff should be involved in negotiations. Furthermore, even less attention has been paid to the study of e-book lending in developing countries (Muhonen & Saarti, 2016). Therefore, e-book utilization can be enhanced through the assistance of countries and collaboration among legal professionals, technicians, and libraries.

·   **Information mining and dissemination:** As an information provider, traditional ILDS services passively deliver document information to users according to users' applications. However, information dissemination is not limited to articles and books. Verbal communication is an important way to convey information. The essence of online courses and lectures on the DXY platform is also information sharing and exchange, similar to the concept of TED Talks, well-known idea-sharing platforms.[21] The users of academic libraries include experts from many fields and talented students who are potential information providers. By contrast, information demanders are from

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[19] http://gooa.las.ac.cn/external/index.jsp [2019-6-17]
[20] https://the-digital-reader.com/2014/11/18/pwc-claims-ebook-sales-will-exceed-print-2018/ [2019-6-17]
[21] https://www.ted.com/talks [2019-6-20]

universities and society. As a node, academic libraries can mine information supply and information demand and disseminate high-quality information in pluralistic and convenient forms. The China Academic Humanities and Social Sciences Library (CASHL), which is built upon an ILDS service, has been exploring information mining and dissemination since 2017. CASHL has also launched online academic lectures and invited scholars from various universities to deliver keynote speeches on the humanities and social sciences through live broadcasts and recommended related thematic resources to audiences. These lectures are open to the public. Through this approach, the service contents of ILDS in academic libraries can resemble information mining and dissemination.

Changing service roles

In a multilateral sharing environment, information is disseminated widely and rapidly instead of being spread through single-track delivery, which can enhance the efficiency of information access and the value of information utilization for users. Multilateral sharing requires an information commons platform.

Who constructs the information commons?
Any such platform must be constructed through collaboration, not limited to cooperation among libraries. Libraries may seek other departments, institutions, and partners outside universities. For example, the Scholarly Commons at the library at the University of Illinois in Urbana-Champaign has integrated library services and cooperated with other institutions on campus to provide data, digital humanistic, and research support services for users.[22] ILDS services should actively respond to the demand for multilateral sharing, promote the development of an information commons platform, seek related platforms, mine valuable information resources, and move toward knowledge services (beyond document services only).

How should ILDS services locate themselves in the information commons environment?
As in the case of DXY, ILDS services can play many roles such as the following:

· **Document provider**: ILDS services can continue to utilize the platform to provide resource sharing services and information consulting services for users.

· **Information sharer**: ILDS librarians can assist in constructing content for the information commons platform by mining information resources. For example, taking advantage of library resources, ILDS librarians can share document information such as hot research topics and papers as well as the latest professional books and other valuable information and to promote sharing and dissemination of related academic information.

· **Information connector**: ILDS is able to actively mine potentially high-quality information and disseminate it effectively. ILDS can find reliable information sources (not limited to documents) or information providers according to customers' requirements, which are conducive to information mining, connection, and conversion.

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[22] https://www.library.illinois.edu/sc/ [2019-6-20]

- **Information commons operator**: The operation of an information commons involves content construction, user maintenance, event planning, technical support, resource mining, and other tasks that require professional talent. ILDS librarians may consider joining an operation team to enhance comprehensive vocational abilities.

Concluding remarks

Open science and information, along with OA and the Internet, are expected to continue to blossom, and the global information commons will develop further through time. As a member of the information chain, ILDS services should learn from the providers who participate in information market competition, adhere to a "user-centered" philosophy, adapt to the present era with an open attitude, and redefine their own values. The service target audiences are not limited to users in academic circles. Services should emphasize efficiency and not be constrained to traditional document resources. Furthermore, ILDS services should aim to break through their traditional roles and consider comprehensive roles as information sharers, information connectors, and platform operators by offering personalized information services and information exchange opportunities to a larger number of users, thereby moving toward a knowledge service framework.

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