

The Optimization Path of Research Support Services in University Libraries from the Perspective of Affordance Theory

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Abstract: University libraries, as an integral component of university research capabilities, are tasked with serving education by providing research support to faculty and students. This study adopts an affordance research perspective originating from ecological psychology to explore the optimization path of research support services in libraries in the new media era. Based on the characteristics of university library services, this research analyzes three aspects: production affordance, mobile affordance, and social affordance, and proposes practical recommendations to guide future research service practices of university libraries.

Keywords: Academic libraries; Affordance theory; Research support services; Social media; Media integration

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1. Introduction

With the rapid advancement of technology and the integration of different disciplines, researchers face unprecedented challenges and opportunities. The demand for high-quality information resources and professional support services is constantly increasing. University libraries, as crucial bearers and disseminators of information resources, are vital components of university research capabilities and have the important mission of imparting knowledge and assisting faculty and students. This is reflected not only in providing book collections but also in comprehensive support for research activities. In research related to libraries, integrating new media into services has been a focal point of academic attention. Existing studies mostly concentrate on the use of new media in library hardware construction and reading promotion services, with limited research on library research support services. Therefore, this research takes affordance theory as the theoretical foundation and analyzes research support services of university libraries in the new media era from the perspectives of production affordance, mobile affordance, and social affordance.

Affordance theory, derived from ecological psychology, has been commonly utilized in recent years to understand and analyze research related to information dissemination technologies. This paper aims to explore the optimization path of research support services in libraries in the new media era through this significant perspective,

in order to enhance the experience of faculty and students and the quality of university library services.

2. Literature review

The affordance theory was initially proposed as a new theory in ecological psychology by the ecologist Gibson and his wife Eleanor ^[1]. In Gibson's thinking ^[2], "an important fact about the affordances of the environment is that they are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental... It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer."

In 1988, Donald Norman introduced affordance theory into the field of industrial design in his book *The Psychology of Everyday Things*, exploring the dynamic interaction between humans and artifacts ^[3]. Subsequently, with the gradual update of media technology, research on affordances gradually transcended the fields of industrial design and human-computer interaction, and researchers began to use affordances to study how digital technologies play a role in media practices and human daily interactions. The connotation of technological affordance enriched, giving rise to studies such as social affordance ^[4], social media affordance ^[5], and communicative affordance ^[6]. In this context, Ian Hutchby proposed communicative affordance, emphasizing the action possibilities generated under specific technological forms. Taking the telephone as an example, he analyzed the relationship between the communication practices created by technology and the shaping of people's identities ^[7]. The concept of affordance theory is no longer limited to the specific functions of objects but focuses on more abstract matters. In 2015, American scholar Schrock established the concept of communicative affordance, believing that mobile media has portability, availability, locatability, and multimediality ^[8].

In 2017, scholar Zhongdang Pan explained the affordance theory in a mainland China academic journal interview. He divided affordances into three dimensions: production affordances, social affordances, and mobile affordances ^[9]. This concept quickly gained the attention of researchers. Jing and Shen built on previous research and interpreted 13 affordances within this framework, identifying and explaining social media affordances specifically ^[10]. Sun and Han, based on the fields of design and information science, used "architectural features" and "usage features" to analyze the interaction between technology objects and subjects, developing three new communication dimensions ^[11]. Currently, research on affordance mainly focuses on the perspective of the practical use of media. Yu and Zhao analyzed the growth space of media construction using the affordance research framework ^[12]. Zhang and Huang examined the interaction between platforms and users in their research, proposing that affordances involve collective cooperation between users and media, which is a negotiation and dynamic perception process, and should not be simplified as technical characteristics in research ^[13]. Liu and Tao explored the possibilities and paths for mainstream media to deepen digital transformation from four aspects: digital product affordance, mobile scene affordance, online interaction affordance, and communication matrix affordance, suggesting that news products should not only explore the potential of new media technology frameworks but also continuously update, improve, and optimize digital news products based on user experience and feedback, forming a good interaction between subjects and technology ^[14].

Some scholars have explored the affordance of media products from the perspective of users. Zhao and Zhu combined the technical attributes and social attributes of social media to construct four basic perceptual affordances: physical perceptual affordance, cognitive perceptual affordance, emotional perceptual affordance, and control perceptual affordance, emphasizing that designers should fully recognize the promoting role and importance of perceptual affordances in social media user experience design ^[15]. Subsequent research has expanded on these four dimensions. Chen *et al.* proposed service perceptual affordance beyond the

four dimensions, optimizing the construction of smart libraries from multiple perspectives^[16]. In summary, affordance theory provides a new analytical perspective for analyzing the development and application of new media technologies. It opens up a middle ground between technological determinism and social constructivism, bringing “people” back to the research forefront, emphasizing the subjectivity of technology while exploring how the characteristics of communication media become perceptible and observable attributes to users. University libraries target faculty and student groups, meeting their needs and nurturing people through library services are fundamental tasks and core objectives. Therefore, analyzing research support services of libraries from the perspective of affordance has considerable research value. Based on previous research, this paper analyzes research support services of libraries from three aspects: production affordance, mobile affordance, and social affordance, exploring how library research support services can be deeply embedded in university research support activities to provide references for relevant research.

3. University libraries research support services based on the perspective of affordance theory

3.1. Production affordance: Harnessing library collections to enhance operational capabilities

The information and services offered by university libraries are intricately linked to the needs of faculty and students. To better support their research endeavors, university libraries should first focus on maximizing the research and educational potential of libraries in the digital media age from the perspective of content production.

In previous research definitions, production affordance includes elements such as editability, reviewability, replicability, scalability, and associability. With the emergence of social media platforms and advancements in technology, the barriers to production have diminished, enabling library services to easily achieve these elements. For instance, the introduction of new media platforms for consultation by university libraries has laid the foundation for functions such as editing, replicating, scaling, and reviewing, while associability is reflected in the creation of official media matrices by universities. Thus, to delve deeper into the analysis of library research support services, this study proposes a shift from production affordance to content affordance, focusing on how these services can offer action possibilities to the primary actors, i.e., university faculty and students, through various pathways.

For university libraries, the exploration and enrichment of library collections serve as the cornerstone of their work. Librarians, in response to the requests of faculty and students, curate and categorize existing knowledge content within the library collections. They present paper documents and multimedia resources in various formats such as text, audio video, lectures, and courses. This significantly reduces the preparatory time for readers’ research activities, thereby maximizing the efficiency of their research endeavors. Throughout this process, readers not only consume content but also actively participate in the editing and production of knowledge content through evaluations and course feedback.

The “Trends in Academic Library Development” report by the Association of College and Research Libraries Planning and Evaluation Committee in 2016 identifies “establishing digital academic centers” as one of the nine major trends. Presently, the establishment of digital academic centers in university libraries primarily encompasses open-access services, knowledge base platform construction, and spatial resource provisions. For example, The Hong Kong University of Science and Technology’s Open Access Publishing Agreements support HKUST authors in publishing their work openly through various agreements with publishers. Additionally, some university libraries provide relevant journal catalogs and lists of open resources on knowledge-base platforms, showcasing all funding information for scholars within the university. This includes ongoing and

completed fund projects and sponsorship programs, thereby aiding faculty and students in understanding and applying for various types of funding, further enhancing the research support services offered by university libraries. Peking University's knowledge base encompasses 51 departments and 90,671 scholars, with a total of 194,290 foreign academic papers spanning from 2000 to the present. Document types include academic journal articles, conference papers, online preprints, and various other academic papers. Institutional knowledge bases promptly catalog the academic achievements of universities and provide various filtering and navigation functions, thereby serving as references for retrieval, citation, and research assessments.

As spaces for academic research, libraries not only facilitate information consumption but also provide physical spaces for production. Nowadays, many university libraries have established seminar rooms equipped with high privacy levels and essential amenities such as projectors and computers. These spaces are ideal for conducting digital academic research, conferences, lectures, workshops, and teaching sessions.

3.2. Mobile affordance: Lowering access barriers to deepen research services

In the era of new media, audiences no longer confine media usage to specific times and spaces but exhibit a continuous state of media engagement ^[17]. The four elements of mobile affordance—portability, availability, locatability, and multimodality—have become ubiquitous in social media platforms, with digital survival becoming the norm. To actively disseminate research support services and attract greater participation, university libraries must first lower access barriers and fulfill the visiting needs of all faculty and students to the fullest extent possible, thereby minimizing access barriers or restrictions.

Currently, the establishment of SNS (social networking service) platforms for information dissemination has become a standard practice for university libraries. In mainland China, the primary channels include Weibo, WeChat, and short video platforms ^[18]. Libraries appoint dedicated personnel to manage these accounts, regularly updating them with new notices regarding library services, including database launches and professional lecture events. Once faculty and students subscribe to these accounts, they gain access to the latest information on research support activities and can easily reproduce content for further dissemination, forming new points of dissemination. To provide more comprehensive services, libraries should focus on information dissemination and classify sections based on the diverse service needs of faculty and students. By integrating and reprocessing messages, libraries can enhance convenience and user-friendliness. For example, in recent years, university student research competitions have gained increasing attention. To cater to interested student groups, libraries consolidate research services and disseminate them in the form of keyword-based notifications, thereby improving service accessibility and user-friendliness.

Furthermore, research support services can deepen their technical aspects. By setting up navigation links on school and library portal websites, universities can enhance the accessibility of library resources. Optimizing service interfaces, streamlining operational processes, enhancing interface design, and providing real-time user support can improve user experience, satisfaction, and loyalty, consequently fostering trust and dependence on library research services.

3.3. Social affordance: Enhancing interaction to foster social collaboration

The framework of social affordance encompasses elements such as greeting ability, emotional ability, coordinating ability, and connecting ability. Leveraging social media platforms, library research support services can construct online digital communities, meeting the psychological needs of faculty and students for intentionality and emotional expression. Through these platforms, users can transcend real-life kinship, geographical, and professional ties, thereby fostering a sense of community and initiating new social circles for

discussion. By coordinating multiple components within these online networks, libraries facilitate networked collaborative operations, aiming to communicate with faculty and students, address queries, gather feedback, and enhance services.

Moreover, social affordance not only addresses the emotional needs of faculty and students at a micro level but should also integrate resources to support research services at a macro level. Universities can collaborate with other high-level institutions to organize academic exchange activities, creating communication platforms for researchers to stimulate academic discourse and cooperation. By jointly conducting diverse research support activities involving research project sponsors, professional researchers, and publishing institutions, universities can explore pathways to resolve conflicting interests, foster innovation, accelerate the birth of new research outcomes, and promote the conversion of research results, ultimately nurturing a robust academic ecosystem. Actively engaging in the construction of external knowledge base alliance platforms beyond institutional resources and participating in international cooperation can further strengthen collaborations.

4. Development directions of library services from the affordance perspective

4.1. Advancing media integration

With the information explosion era, media integration has emerged as a prevailing trend in digital technology evolution. Given that the users of university libraries are predominantly faculty and students with specialized needs, university libraries must provide research support from a hardware perspective. By fully integrating various digital technologies, including artificial intelligence, big data analysis, and virtual reality, libraries can revamp the form and content of research support services. For example, libraries can incorporate smart search engines and data mining tools to facilitate quick access to research resources. These tools utilize advanced algorithms and technologies to efficiently retrieve and analyze vast literature and data, offering users precise search results and personalized recommendations. Introducing digital academic research tools such as data analysis, visualization, geographic information systems, and digital mapping to provide statistical summaries or analysis results of works from different dimensions or levels can cater to diverse field and level requirements. Equipped with cutting-edge technology, libraries can provide virtual space facilities to help faculty and students overcome geographical barriers. By integrating virtual reality technology into offline learning spaces, users can conduct research experiments and academic exchanges in virtual environments, collaborate remotely with others, and expand the boundaries and possibilities of research activities. By establishing multi-channel interactive platforms, libraries can deepen interdisciplinary and professional collaborative cooperation, actively supporting the interactive cooperative learning needs of learning groups in a complex environment.

4.2. Innovating the training mechanism for university librarians

Libraries not only need to meet the demands of the digital age in internal resource construction but also ensure that library staff and employees keep pace in providing research services. They should possess solid professional knowledge and skills, be familiar with the latest information technology and service concepts, and effectively carry out research support services. Therefore, libraries should strengthen staff training and learning, innovate training mechanisms, and cultivate versatile librarians capable of providing comprehensive services. Librarians should first adopt the role of educators, providing information literacy courses, one-on-one teaching, and research consultation or specialized resource demonstration services for students. Secondly, librarians should act as disseminators of research knowledge. As central institutions for knowledge and information dissemination, academic libraries aggregate vast amounts of data sets on research portal websites. However, many users have a relatively limited understanding of library collection resources, necessitating librarians to

promote library collection resources through multiple channels, providing detailed promotions to new students who are unaware, and introducing new collection resources to existing staff. Lastly, librarians should serve as research consultants for faculty and students. Given the complex and vast amount of data stored in libraries, librarians need to develop data processing capabilities and provide professional knowledge on the correct use of hardware and software devices for faculty and students, thus offering guidance during the research exploration stage.

4.3. Expanding institutional cooperation and resource sharing

Research activities are not solitary endeavors. Collaborations and exchanges with external entities often yield unexpected results. Therefore, university libraries need to strengthen cooperation and resource sharing with other institutions. Specifically, libraries can establish cooperative relationships with publishing institutions, research institutions, enterprises, etc., to achieve resource sharing. External research information resources, data resources, and other research information resources can complement the library's collection resources, further improving the coverage and quality level of library research services, and enhancing the efficiency and quality of research support services.

5. Conclusion

The use of new media has transformed the pathways through which libraries provide research services. This study adopts affordance as a research perspective, constructing a research framework for library research services, and analyzing the specific research services provided by university libraries from the perspectives of production affordance, mobile affordance, and social affordance. It reveals that there is still room for improvement in current library research services. Indeed, the needs of faculty and students are dynamic rather than static, trending towards continuous development. Libraries should constantly integrate information technology developments, always maintaining “serving nurturing people” as their work goal. By introducing new technologies, innovating the training mechanism for university library staff, expanding cooperation with external institutions, and sharing resources, libraries can meet the growing information needs of their audience, further achieving sustainable library development.

Disclosure statement

The author declares no conflict of interest.

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