A Study on the Construction of Foreign-Language Digital Resources in University Libraries from the Perspective of Information Foraging Theory

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Abstract

Under the dual pressures of budget cuts and rising resource prices, the development of foreign-language digital resources in university libraries faces the severe challenge of how to "spend money where it matters most." This paper introduces information foraging theory as an analytical framework and, taking the Capital Normal University Library as a case study, defines journals in foreign-language databases as high-efficiency patches (high-frequency downloaded journals), restricted patches (high-frequency denied-access journals), and low-efficiency patches (dormant journals). Through quantitative analysis and user interviews, it deeply explores the logic of users' information behavior. The study finds that users' information foraging behavior shows significant quality-first and discipline-oriented characteristics, with both high-efficiency patches and restricted patches concentrated in high-quality journals in science and engineering disciplines; there are structural differences in the information foraging strategies of user groups from different disciplines; and there is a mismatch between the resource map constructed by the library and users' actual foraging map. Accordingly, from five dimensions—optimizing the structure of the information habitat, enhancing foraging capabilities, governing the foraging environment, enabling data-driven decision-making, and upgrading library-vendor negotiation strategies—this paper proposes optimization strategies for the development of foreign-language digital resources, with the aim of providing theoretical reference and practical guidance for precise resource procurement and efficient services in university libraries under the context of budget constraints.

Full Text

[**Professional Affairs · Management**]

A Study on the Construction of Foreign-Language Digital Resources in University Libraries from the Perspective of Information Foraging Theory

—Taking the Capital Normal University Library as an Example

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Abstract Under the dual pressure of shrinking budgets and rising resource

prices, the construction of foreign-language digital resources in university libraries faces the severe challenge of how to "spend money where it matters most." Taking information foraging theory as the analytical framework and the Capital Normal University Library as an example, this paper defines journals in foreign-language databases as high-efficiency patches (high-frequency downloaded journals), restricted patches (high-frequency access-denied journals), and low-efficiency patches (dormant journals). Through quantitative analysis and user interviews, it explores in depth the behavioral logic of users' information activities. The study finds that users' information foraging behavior shows distinct characteristics of quality priority and disciplinary orientation; both high-efficiency patches and restricted patches are concentrated in high-quality journals in science and engineering disciplines; structural differences exist in the information foraging strategies of user groups from different disciplines; and there is a mismatch between the resource map currently constructed by the library and users' actual foraging map. Accordingly, this paper proposes optimization strategies for the construction of foreign-language digital resources from five dimensions: optimizing the structure of the information habitat, improving foraging capability, governing the foraging environment, data-driven decision-making, and upgrading library–vendor game strategies. It aims to provide theoretical reference and practical guidance for the precise procurement of resources and efficient services in university libraries under budget constraints.

[**Keywords**] information foraging; university libraries; foreign-language databases; resource construction; information behavior

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Introduction

For a long time, university libraries in China have faced the triple real-world predicament of insufficient funding, insufficient librarians, and insufficient readers[1]. Especially after 2020, university library budgets have continued to shrink, and acquisition funds for literature resources have continued to decline. Meanwhile, resource prices—particularly the prices of foreign-language databases—have kept rising, causing the funding gap for literature resources to widen gradually; some universities have even experienced the phenomenon of zero book-purchasing funds[2]. The literature and information resources of university libraries are the foundation for carrying out all types of services, and stable funding is the lifeline that guarantees the construction of library literature resources[3]. Against the background of budget tightening, how to use limited funds to purchase more high-quality foreign-language digital resources and real-

ize the optimized construction of literature and information resources, thereby supporting the development of university disciplines to the greatest extent, has become a key task in library resource construction[4].

Foreign-language databases account for an increasingly high proportion of literature-resource acquisition funds. According to statistics from the Steering Committee for Academic Libraries of the Ministry of Education, in 2023 the purchase expenditure on electronic resources by university libraries nationwide was approximately 11.8 billion yuan, accounting for 65.8% of the average literature-resource acquisition expenditure per library and reaching a historical high[5]. Current research on the construction of foreign-language databases can be roughly divided into three areas: statistical analysis of database use, research on database 保障, and database evaluation. In terms of statistical analysis of database use, university libraries mainly conduct statistical analyses of database usage costs from the perspective of performance assessment[6–7]. In research on database 保障, methods such as citation analysis[8] and visualization analysis[9] are mainly used to understand the resource 保障 situation for key university disciplines. In database evaluation research, digital resources are mainly evaluated by constructing evaluation indicator systems[10–11]. In recent years, relevant scholars have used methods such as combined weighting-TOPSIS[12] and the Kano model[13] to improve and optimize evaluation indicator systems, providing important references for database evaluation work. At present, many university libraries conduct performance analyses using database usage volume and usage costs, and on this basis optimize resource procurement strategies and reduce acquisition expenditures. However, most such analyses use downloads or average download cost per article as evaluation indicators[14], lacking an in-depth analysis of the effectiveness of resource utilization from the micro-level perspective of user behavior. As a result, they find it difficult to perceive users' real and dynamic demand preferences, leading to a mismatch between resource-construction decisions and users' actual needs. In addition, changes in database usage are an important foundation for analyzing databases and user behavior, but at present there is a lack of multidimensional and three-dimensional analysis of user usage data, making it difficult to fully grasp users' actual use of databases

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situation, which is not conducive to analyzing the use performance of foreign-language databases or allocating funds for literature resources.

To gain an in-depth understanding of the behavioral logic behind users' use of foreign-language digital resources, this paper introduces information foraging

theory as its analytical framework. Proposed by Peter Pirolli and Stuart Card in the 1990s[15], this theory analogizes users' search behavior in an information environment to animals' foraging processes in nature. Its core idea is that, in the process of information seeking, people—like animals foraging in the wild—instinctively adjust their strategies and behaviors so as to obtain high-value information at the lowest possible cost. After more than 20 years of development, information foraging theory has evolved into a complete model system that includes the information patch model, the information menu model, and information cue theory[16]. In the field of library and information science, information foraging theory has been widely applied to research on user information behavior, information-system design, and the evaluation and optimization of information-seeking strategies[17–18]. At the same time, this theory provides a useful theoretical basis for understanding users' behavior in using foreign-language digital resources. Accordingly, taking the library of Capital Normal University (hereinafter referred to as the "Capital Normal University Library") as an example, this paper explores the following questions in depth: against the background of budget tightening, do users' information-foraging behaviors exhibit specific preferences and path characteristics? What mismatches exist between users' resource-selection strategies and the library's existing resource supply? On this basis, the paper analyzes the mechanisms behind these phenomena and proposes targeted optimization strategies for the construction of foreign-language databases and user resource services, thereby providing data support and reference for the development of literature resources and user services in university libraries.

1 Research Design

1.1 Definition of Related Concepts

1.1.1 Definition of the Core Concepts of Information Foraging Theory

In this study, information foraging theory has five core concepts.

(1) **Information habitat**: The foreign-language digital resource system constructed by university libraries through purchasing, self-built resources, and other means; it is the environment in which users carry out information-foraging activities.

(2) **Information patch (Information Patch)**: A collection of resources within an information habitat that differ in value and cost. This concept originates from the resource patches encountered by animals during foraging in behavioral ecology. In information foraging theory, it is extended to refer to resource-cluster areas encountered by users in an information environment that have different information benefits and acquisition costs; it is a neutral academic concept. This study focuses on three types of patches: efficient patches, restricted patches, and low-efficiency patches.

(3) **Information scent**: The cues users employ to judge the value of an information patch, such as journal reputation, impact factor, JCR quartile,

author, and database quality.

(4) **Foraging path**: A series of actions taken by users to obtain information, such as database selection and the formulation of search strategies.

(5) **Information acquisition cost**: The time, effort, cognition, and other costs paid by users in searching for and obtaining information.

1.1.2 Definition of Statistical Indicators Many studies focus on the phenomena of highest usage, lowest usage, and zero usage in databases[19-21]. Considering that high downloads or zero downloads within a short period may be accidental, this paper sets the statistical-analysis period at three years. On the basis of relevant studies[14] and drawing on the concept of ESI highly cited papers, the three types of journals emphasized in this analysis are defined as follows: high-frequency downloaded journals (efficient patches) refer to journals whose downloads entered the top 1% for three consecutive years; high-frequency denied-access journals (restricted patches) refer to journals whose denied-access counts entered the top 1% for three consecutive years; and dormant journals (low-efficiency patches) refer to journals with no downloads for three consecutive years. In this paper, "denied access" specifically refers to database denial records generated when users can search normally but cannot obtain the full text because the library has not subscribed to the relevant resources. The denied-access data in this study come from the relevant indicators in COUNTER-standard reports provided by database vendors.

1.2 Research Approach

This paper takes information foraging theory as the core analytical framework (see Figure 1). First, the library' s foreign-language digital resources are viewed as a complex information habitat, and journals with different characteristics are defined as information patches with different benefit and cost characteristics. Second, through quantitative analysis of the characteristics of three types of information patches—high-frequency downloaded journals, high-frequency denied-access journals, and dormant journals—a macro-level user foraging map is drawn to clarify the actual scope of resources users use and avoid. Third, combined with interview data from core user groups, the study deeply explores the deeper logic behind their foraging decisions, including their perception of information scent, the motivations behind foraging-path selection, and their responses to foraging obstacles. Finally, by integrating the results of quantitative and qualitative analyses, the study sorts out the structural defects in the current library information habitat and proposes targeted strategies for optimizing the construction of foreign-language digital resources and improving the efficiency of users' information foraging.

Figure 1 Research-framework workflow

1.3 Database Selection and Interviewee Selection

With respect to the analytical objects among foreign-language journal databases, this paper selects five multidisciplinary databases—ScienceDirect, Springer Link, Wiley, Taylor & Francis, and Sage—as observation samples. The reasons are as follows: first, all five databases are multidisciplinary databases, covering disci

···broad disciplinary coverage and high resource quality, and publish more than half of the world' s journal articles

; second, users of these five databases are highly active—for example, annual downloads from the ScienceDirect database at the CNU Library all exceed 200,000; third, owing to funding constraints in 2024, three databases—Springer Link, Wiley, and Taylor & Francis—were changed from full-database subscriptions to discipline-package subscriptions, which facilitates comparative research. Based on the COUNTER reports provided by the database vendors, the Electronic Resource Analysis System (ERS) was used for data processing. In the end, 56 high-efficiency patches, 32 restricted patches, and 131 low-efficiency patches were identified.

To gain a deeper understanding of the logic behind users' information-foraging behavior, this study selected senior graduate students and young faculty members who rely heavily on foreign-language databases for teaching and research as interviewees. Invitations were sent via WeCom, email, and other channels to faculty and students who had previously consulted the library about database-use issues. Ultimately, interviews were conducted with 6 master' s students, 3 doctoral students, and 2 young faculty members. The interviews took place in on-campus cafés or offices; each lasted about 30 minutes. With the interviewees' consent, the interviews were recorded, and the relevant materials were organized afterward. Approximately 15,000 Chinese characters of interview transcripts were obtained, on the basis of which an in-depth analysis was conducted. It should be noted that the interviews were not limited to the five journal databases mentioned above; rather, according to the interviewees' actual usage, the study examined their overall needs for and use of foreign-language databases, so as to comprehensively capture their logic of information foraging.

2 Analysis of Characteristics of Users' Information-Foraging Behavior Based on Usage Data

2.1 High-Efficiency Patches

As the most active high-efficiency patches in the information habitat, high-frequency-downloaded journals directly reveal users' concentrated choices for maximizing information gain. The method for identifying such patches is generalizable: university libraries may, based on multi-year continuous download data for journals in their own collections, set appropriate thresholds to define their institution' s high-efficiency patches, and then analyze them from dimensions such

as database distribution, disciplinary affiliation, and information-scent strength, thereby drawing a user-foraging map suited to the institution' s actual conditions. In 2024, the CNU Library had 56 high-frequency-downloaded journals. The three journals with the highest downloads were *Science of the Total Environment*, *Remote Sensing of Environment*, and *Angewandte Chemie International Edition*. Each of these three journals had more than 7,000 downloads per year for three consecutive years, becoming the densest core areas within the information habitat.

First, judging from the database distribution of high-frequency-downloaded journals (see Table 1), high-efficiency patches are distributed across mainstream databases such as ScienceDirect and Wiley. In terms of the proportion within each database, ScienceDirect has the largest absolute number (48 titles), while Wiley has the highest share (3.89%). Second, in terms of disciplinary distribution, ERS provides different disciplinary classification systems, including JCR, ESI, and the Ministry of Education' s disciplinary categories, and supports mutual mapping among these systems. This article adopts the Ministry of Education' s disciplinary categories as the unified classification standard. Statistics show that high-frequency-downloaded journals are mainly distributed in science (31 titles) and engineering (10 titles), while the number in social sciences such as philosophy (1 title), economics (1 title), and history (1 title) is relatively small. Mapping disciplinary distribution to database distribution (see Figure 2) shows that ScienceDirect contains high-frequency-downloaded journals from all disciplinary categories; Wiley's high-frequency-downloaded journals are concentrated in science and law; and Springer Link' s high-frequency-downloaded journal belongs to education. This may be because ScienceDirect was subscribed to as a full database, whereas the latter two were subscribed to only as partial discipline packages, resulting in certain differences in disciplinary distribution. To some extent, this distribution pattern indicates that the library' s resource-subscription scope directly limits the distribution range of high-efficiency patches. Finally, in terms of information-scent strength, high-frequency-downloaded journals generally emit strong quality signals. The data show that all 56 journals are indexed in the Web of Science Core Collection; in the JCR quartiles, 55 journals (98.21%) are Q1 journals, and 16 journals have impact factors greater than 10. Inclusion in authoritative indexes and high impact factors constitute key information scents by which users judge the value of information patches, enabling users to quickly identify high-yield targets among massive resources. Viewed through information-foraging theory, the distribution characteristics of high-frequency-downloaded journals profoundly reveal users' core foraging strategies. As rational foragers, users strictly follow the principle of maximizing returns; through information scents such as impact factor, journal reputation, and index inclusion, they precisely locate and continuously use the core patches with the highest academic value within the information habitat. At the same time, users' foraging scope is not random, but closely centered on the disciplinary territory to which they belong. This both reduces the cognitive cost and uncertainty brought by interdisciplinary searching and ensures a high degree of relevance

between information gains and research output.

Table 1 High-Frequency-Downloaded Journals

Database	Number of high-frequency-downloaded journals / titles	Number of subscribed journals / titles	Proportion / %
ScienceDirect	48	2,336	2.05
Wiley (discipline package)	7	180	3.89
Springer Link (discipline package)	1	579	0.17
Taylor & Francis (discipline package)	0	581	0.00
Sage	0	837	0.00

Figure 2 Database Distribution in the Disciplinary Mapping of High-Frequency-Downloaded Journals

2.2 Restricted Patches

Journals with frequent access denials constitute a special type of restricted patch within the information habitat. Such information patches usually emit a strong information scent, but users' routes for obtaining the literature are constrained by subscription permissions, thereby creating barriers to foraging. Access-denial data directly reflect users' unmet literature needs. In 2024, Capital Normal University Library had 32 journals with frequent access denials. The journals with the highest numbers of denied accesses were *Advanced Materials*, *Advanced Functional Materials*, and *Small*. For three consecutive years, each of these three journals recorded more than 1,000 denied accesses annually, making them typical examples of resources that users strongly need but cannot obtain directly.

First, judging from the database distribution of journals with frequent access denials (see Table 2), restricted patches were concentrated in Springer Link (16 titles) and Wiley (14 titles). In terms of proportion, Wiley had the highest share of journals with frequent access denials (7.78%), followed by Springer Link (2.76%) and ScienceDirect (0.09%). By comparison, although the number of journals with frequent access denials in Springer Link was close to that in Wiley, Wiley's proportion was higher, indicating that this database contains high-quality resources for which there is user demand but which are not covered by the existing

subscription scope. Second, in terms of disciplinary distribution, journals with frequent access denials were mainly distributed in science (17 titles), education (9 titles), and engineering (6 titles). On the one hand, these disciplines are all key disciplines under development at Capital Normal University, with high demand and correspondingly high numbers of denied accesses; on the other hand, this also shows that demand for e-journals in these disciplines has not been fully guaranteed. Mapping the disciplinary distribution to the database distribution (see Figure 3) shows that Wiley' s denied-access journals are distributed across science, education, and engineering, while Springer Link' s denied-access journals are concentrated in science and education. Finally, from the perspective of information-scent intensity, these restricted patches possess academic quality equivalent to that of efficient patches: all 32 journals are indexed in the Web of Science Core Collection; 26 titles (81.25%) are Q1 journals; and 6 journals have impact factors greater than 10. From the perspective of information foraging theory, the phenomenon of journals with frequent access denials represents an overflow of user demand within a predetermined habitat structure. The library' s subject-package acquisition strategy artificially delineates the boundaries of the information habitat, whereas users' research needs often exceed these preset boundaries. Frequent access-denial data are, in essence, a quantitative representation of users' unmet rigid needs. The current resource-supply model has a clear supply gap within the information habitat; users' foraging efficiency is therefore severely constrained, and they may be forced to turn to other informal channels to accomplish their foraging goals.

Table 2. Journals with frequent access denials

Database	No. of journals with frequent access denials / titles	No. of subscribed journals / titles	Proportion / %
Springer Link (subject package)	16	579	2.76
Wiley (subject package)	14	180	7.78
ScienceDirect	2	2,336	0.09
Taylor & Francis (subject package)	0	581	0.00
Sage	0	837	0.00

Figure 3. Distribution of database mapping by discipline for journals with frequent access denials

2.3 Inefficient Patches

In sharp contrast to efficient patches and restricted patches are inefficient patches, namely dormant journals. Identifying inefficient patches is a key step in optimizing resource allocation and releasing redundant expenditures. The criteria for identifying them are simple and clear, and university libraries can quickly locate such resources on the basis of their own data. These patches have not triggered any download behavior for three consecutive years, indicating that their information scent is weak, or that users have judged their potential information benefits to be insufficient to cover the cost of acquisition; as a result, they cannot attract users' foraging attention.

In 2024, Capital Normal University Library had 131 dormant journals. First, judging from the database distribution (see Table 3), dormant journals were concentrated in Sage (67 titles) and ScienceDirect (38 titles). In terms of the proportion within each database, Sage had the highest share of dormant journals (8.00%), followed by Springer Link (2.42%), while Wiley had the smallest share, at only 0.56%. Second, in terms of disciplinary distribution, dormant journals were mainly distributed in medicine (50 titles), law (15 titles), engineering (14 titles), and interdisciplinary fields (10 titles). Capital Normal University has not yet established a medical major; therefore, the number of dormant journals in the medical field is relatively large, and the optimization and adjustment of this portion of resources should be emphasized in subsequent resource development. Further mapping the disciplinary distribution to the database distribution (see Figure 4) shows that Sage' s dormant journals are distributed across almost all disciplinary categories; ScienceDirect' s dormant journals are concentrated in medicine; and the dormant journals of Springer Link and Taylor & Francis are scattered across law, engineering, interdisciplinary fields, and other categories. Finally, from the perspective of information-scent intensity, these inefficient patches generally lack the key quality signals that attract users: among the 131 dormant journals, only 31 titles (23.66%) are indexed in the Web of Science Core Collection; the numbers of Q1–Q4 journals are 17, 16, 22, and 19, respectively; and the average impact factor is only 0.79, showing a clear gap compared with efficient patches (average impact factor 8.89) and restricted patches (average impact factor 7.99). From the perspective of information foraging theory, users' information-foraging behavior has a strong sense of disciplinary territory. For fields that have no intersection with their own research, users actively ignore their existence. In an environment of information overload, users efficiently screen resources by setting quality thresholds; resources not indexed by major indexes,

journals with unclear academic reputations have information scent that is too weak, and are excluded from the foraging range. Inefficient patches indicate substantial resource redundancy in the information habitat: they occupy valuable funds yet fail to generate any knowledge flow. They are a concentrated manifestation of resource development deviating from users' real needs, and provide clear data for libraries to identify and eliminate inefficient investments

and optimize the structure of the information habitat.

Table 3 Dormant journals

Database	Dormant journals (titles)	Purchased journals (titles)	Proportion / %
Sage	67	837	8.00
ScienceDirect	38	2,336	1.63
Springer Link (subject package)	14	579	2.42
Taylor & Francis (subject package)	11	581	1.89
Wiley (subject package)	1	180	0.56

Figure 4 Distribution of database-discipline mappings for dormant journals

3 Analysis of the Decision-Making Mechanism of Users' Information Foraging Based on Interview Content

3.1 Information patch selection strategies

Users' strong tendency toward high-efficiency patches and restricted patches stems from a highly rational patch-selection strategy, the core of which is to maximize information 收益; moreover, the key information scent on which users rely is not an abstract concept, but a set of concrete indicators closely linked to the evaluation system of the academic community. Many interviewees directly equated high quality with journals recommended by supervisors, recognized within the field, or included in lists designated by the university. For example, doctoral student D stated explicitly: "Our research group stipulates that the literature reported at group meetings must come from top journals in the field, so my search scope is fixed from the very beginning." This indicates that users' foraging range is first delineated by the consensus of the academic community; they tend to operate within patches that have already been proven to be of high quality. Against the background of information overload, selecting high-impact journals is an efficient environmental filtering strategy. Young teacher B clearly pointed out: "My time is limited, so I must give priority to ensuring that what I read is the most cutting-edge and most reliable work; these top journals are the best filters." By following the strongest information scent, users greatly reduce the costs of information screening and cognition, ensuring that each foraging attempt can yield relatively high expected returns.

3.2 Dependence on foraging paths

Although users have clear patch-selection strategies, their foraging paths display significant singularity and path dependence. All interviewed students stated that they had not received systematic training in database searching. The experience of master' s student A is highly typical: "I just try it myself. If a keyword doesn' t work, I change to another word, or change databases. I' ve never learned advanced searching or search formulas." This shows that users spontaneously form the habit of simple keyword searching with the lowest cost; when this path can produce reasonably acceptable search results, they lack the motivation to explore more efficient paths. This path dependence is reinforced by the complex interfaces and delayed feedback of some databases. Interviewed student F complained: "Some databases have many filtering conditions, but they respond slowly; sometimes there is no response after clicking, so it is faster to search directly with simple keywords." This increases the cost of exploring new paths and causes users to adhere to the single mode that is most familiar and has the lowest trial-and-error cost.

3.3 Development of alternative foraging paths

When the formal foraging paths provided by the library cannot satisfy high-return needs, users take the initiative to develop alternative foraging paths. Interviewed student G described a typical process: "First search the literature title in Baidu Scholar; if it links directly to a database purchased by our library, then download it through the library portal." This circuitous search exposes the weak information-scent characteristics of the library' s resource navigation system, forcing users to rely on more user-friendly third-party platforms to locate resources. More notably, several students frankly stated that they use gray channels such as Z-Library and Sci-Hub to obtain resources not purchased by the library. When the required high-return patch cannot be accessed through formal paths, official alternatives such as document delivery impose relatively high time costs, whereas gray channels can achieve almost immediate document acquisition and thus have extremely high path efficiency. As interviewed student I stated: "I use Taobao intermediary searching to solve literature needs." This shows that when the formal habitat has insufficient resource coverage or the cost of access is too high, users will flow toward informal channels that can efficiently meet their needs, even though the latter involve copyright risks.

3.4 Strategic differentiation among foraging groups

Different user groups have developed differentiated information-acquisition strategies under a unified foraging logic. The strategies of graduate students are influenced by disciplinary characteristics and research stages: graduate students in the humanities and social sciences are more inclined toward deep-browsing foraging, regularly mining first-hand materials in specific databases in depth and conducting accumulative research; by contrast, graduate students in science and engineering more often adopt goal-driven foraging, conducting

precise searches on platforms such as WoS based on specific experimental or project needs in order to solve clearly defined scientific research problems. Because teachers have heavy teaching and research tasks, they generally pursue efficiency-oriented foraging behavior: drawing on rich experience, they can quickly locate core patches, are highly sensitive to the usability and stability of databases, and, once a commonly used foraging path malfunctions, will rapidly reduce the frequency with which they use that path. For example, several teachers and students pointed out: "Because the ScienceDirect database has vague classifications and the search results are relatively···

relevance and therefore have to reduce use."In sum, users'resource-use behavior is by no means random; rather, under conditions of tightening academic budgets, it is an adaptive strategy adopted by users as rational foragers seeking to maximize information returns.

4 Discussion and Implications

Organizing literature resources to the greatest extent possible in service of teaching and research has always been the mission and value orientation of university libraries, and it is also the original intention and proper role of literature-resource development in university libraries[^23]. Using information foraging theory as the analytical framework, and combining quantitative analysis of high-yield patches, constrained patches, and low-yield patches with in-depth user interviews, this study jointly reveals a core issue: in a resource-scarce environment caused by budget constraints, there is a mismatch between the structure of the university library' s information habitat and users' logic of efficient foraging. The library' s optimization strategy should be upgraded from simple addition or deletion of resources to a systematic reshaping of the entire habitat, so as to effectively support users' research-oriented information foraging activities.

4.1 Optimizing the Structure of the Information Habitat: Building a Dynamic Procurement Mechanism Based on Identifying Demand Spillover

The study finds that constrained patches and high-yield patches highly overlap in terms of disciplinary distribution and resource-quality characteristics. Users' needs in their core research fields exceed the resource boundaries of the current information habitat, forming a typical demand spillover; traditional renewal or cancellation decisions can no longer cope with this challenge. Libraries should innovate their resource-supply models and establish a dynamic procurement mechanism based on identifying demand spillover. Specifically, first, they should systematically integrate multi-source information such as high-frequency turnaway data, key-discipline development plans, and ESI potential directions, build a cross-database list of core-demand journals, and accurately mark the foraging areas in the current habitat where the scent is strong but access cannot be reached. Second, for journals on the list, they should break through the constraints of disciplinary packages and actively explore flexible supply methods

such as demand-driven acquisition and single-title subscriptions. For example, materials-science journals in Wiley with extremely high demand and turnaway volumes could be supplemented through single-title purchasing. Finally, low-yield patches should be systematically adjusted, and the released funds should be reallocated to identified high-demand areas, thereby completing the dynamic optimization of resources within the habitat.

4.2 Enhancing Foraging Capability: Implementing Precise Information-Literacy Education Based on "User Profiles"

The study finds that users' foraging paths are singular, and that different disciplinary and identity groups show significant differentiation in foraging strategies. University libraries can implement precise services based on user behavior profiles and formulate categorized service strategies. For student groups, libraries can set up disciplinary resource navigation pages, recommend commonly used foreign-language databases and high-quality journals according to different majors and research directions, and regularly hold database-use training by discipline. For example, for humanities students engaged in deep-browsing foraging, emphasis should be placed on training in the use of primary-source databases; for science and engineering students engaged in goal-driven foraging, training in cutting-edge data retrieval should be strengthened. For faculty groups, libraries can establish one-to-one dedicated resource services for key research teams or core backbone teachers, and regularly push the latest literature information according to their research fields; open rapid database feedback channels to promptly handle faults and problems during use and ensure smooth database access; and customize personalized resource alert services, notifying teachers in advance when database subscription renewal dates are approaching or when key resource changes occur, so as to ensure that their research and teaching are not affected.

4.3 Governance of the Foraging Environment: Regulating Users' Resource-Acquisition Behavior and Strengthening Awareness of Copyright-Risk Prevention and Control

The interviews show that users turn to gray channels because formal access routes are not smooth or acquisition costs are too high. This not only entails risks in copyright and resource quality, but also reflects deficiencies in the coverage and usability of the library' s formal channels. Some studies[^24] have pointed out that gray channels such as Sci-Hub include a large number of retracted articles, but do not mark the word "retracted" on the literature page, which can easily mislead users' research and may even create the risk of research misconduct caused by citing retracted papers. Therefore, university libraries need to enhance users' copyright awareness and guide users to obtain compliant literature through regular channels. On the one hand, libraries should optimize their own resource navigation systems by building a unified resource retrieval platform that integrates the library' s foreign-language databases, open-access

resources, and so forth, facilitating one-stop searching by users. On the other hand, they should intensify copyright publicity by using channels such as library websites and WeChat public accounts to regularly push popular-science articles on copyright knowledge and analyses of infringement cases, thereby improving users' awareness of and respect for legitimate copyright channels. In addition, libraries may consider purchasing specialized document-delivery services to provide users with convenient and legal supplementary channels for obtaining literature.

4.4 Data-Driven Decision-Making: Improving the Driving Mechanism Based on Information-Patch Utilization Data

The study shows that user-usage data are of important value for the evaluation and development of foreign-language databases. Analyzing high-frequency downloaded journals, high-frequency turnaway journals, and dormant journals can provide an in-depth understanding of users' true usage preferences and offer precise evidence for database optimization. Therefore, university libraries should establish a normalized data monitoring and analysis mechanism. With the help of professional platforms such as ERS, they should regularly collect data such as downloads, turnaways, and searches for each foreign-language database, and conduct comprehensive evaluations in combination with disciplinary trends and user feedback. Based on the analysis results, database subscription strategies should be adjusted dynamically: appropriately increase investment in databases containing high-frequency downloaded journals; for high-frequency turnaway journals, actively communicate and negotiate with database vendors to seek expanded resource-access permissions or adjustments to subscribed disciplinary packages; remove databases with an excessively high proportion of dormant journals, or remove dormant journals within databases, and use limited funds to purchase more valuable resources. At the same time, user-usage data should be fed back to database vendors, prompting them to optimize database content and services, realize benign interaction between the upstream and downstream of literature resources, and continuously improve the resource quality and service level of foreign-language databases.

4.5 Upgrading Library–Vendor Game Strategies: Transforming Users' Foraging Data into Evidence for Negotiation

The existence of constrained patches and low-yield patches is, in essence, a database

This is a manifestation of a mismatch between products and user needs. Against the backdrop of sustained budget tightening, libraries should not confine themselves to internal performance evaluation of resources; rather, they should more strategically transform user-behavior data into evidence for negotiations with database vendors. Specifically, libraries can construct comprehensive and three-dimensional performance profiles of databases on the basis of multidimensional indicators such as journal downloads, turnaways, cost per article, disciplinary

relevance, and scholars' citation data. In renewal negotiations, they can use evidence from resource use at their own institution to demonstrate the shortcomings of current product packages, negotiate with database vendors for customized content packages better aligned with the university's disciplinary layout, or seek larger price discounts for content that has not been fully used. By converting users' real behavioral data into powerful negotiating evidence, libraries can move from being passive purchasers to active designers in library–vendor relationships.

5 Conclusion

This study applies information foraging theory to research on foreign-language digital resources in university libraries, revealing users' rational decision-making logic under conditions of budget contraction. Treating databases as information habitats, this paper classifies journals into three types of information patches —efficient, constrained, and inefficient—on the basis of their download, turnaway, and dormant performance. In essence, these three types of information patches represent systematic foraging strategies by which users, within a limited cognitive budget, pursue maximization of information benefits while avoiding high acquisition costs. The findings can provide practical reference for library literature-resource development and user services. This paper proposes a framework for analyzing resource use. University libraries may flexibly set identification thresholds in light of their own disciplinary structure and budgetary conditions, and conduct analysis from dimensions such as database distribution, disciplinary mapping, and strength of information scent. By using usage data to reconstruct users' information-foraging maps, libraries can identify the matches and mismatches between resource supply and user demand.

This paper still has the following limitations. First, the number of interviewees is relatively small, which may affect the comprehensiveness of the analysis of information-foraging behavior. Second, only journal databases are analyzed; other types of databases and even open-access resources are not included in the scope of analysis. Third, this paper takes the Capital Normal University Library as its case. The university' s disciplinary layout and the overall scale of its faculty and students directly affect journal downloads and turnaways. Therefore, the specific disciplinary composition of patch distribution and the proportions of databases in the findings have institution-specific characteristics; caution is needed when extending the conclusions to universities with substantially different disciplinary structures or markedly different faculty and student populations. Future research may expand the scale of interviewees and the types of databases covered, explore users' usage preferences in greater depth under the trend of disciplinary convergence, analyze the evolutionary characteristics of users' resource needs, and conduct research on user services and resource development from multiple perspectives, thereby offering new ideas for literature-resource acquisition under conditions of financial constraint.

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Research on the Construction of Foreign Language Digital Resources in University Libraries from the Perspective of Information Foraging Theory: A Case Study of Capital Normal University Library

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Abstract Under the dual pressure of reduced funding and rising resource prices, the construction of foreign language digital resources in university libraries is facing the severe challenge of how to "spend money where it counts most." This paper introduces information foraging theory as an analytical framework. Taking the library of Capital Normal University as an example, the journals in foreign language databases are defined as efficient patches (frequently downloaded journals), restricted patches (frequently access-denied journals), and inefficient patches (dormant journals). Through quantitative analysis and user interviews, the logic of user information behavior is deeply explored. The research findings are as follows: users' information foraging behavior exhibits significant quality-first and discipline-oriented characteristics, with both efficient and restricted patches concentrated in high-quality journals in science and engineering. There are structural differences in the information foraging strategies of user groups from different disciplines. There is a mismatch between the current resource map constructed by libraries and users' actual foraging map. Based on these findings, this paper proposes optimization strategies for the construction of foreign language digital resources from five dimensions: optimization of information habitat structure, improvement of users' foraging ability, governance of foraging environment, data-driven decision-making, and upgrading of library-vendor negotiation strategies, aiming to provide theoretical reference and practical guidance for precise resource procurement and efficient services in university libraries under budget constraints.

Keywords Information foraging; University library; Foreign language database; Resource construction; Information behavior

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Digital Intelligence Governance of Public Digital Culture: Theoretical Basis, Multidimensional Challenges, and Coping Strategies

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Abstract Digital intelligence governance of public digital culture is an innovative governance model that prioritizes data as a key production factor, serving as a strategic deployment to modernize national governance capabilities in the era of digital intelligence. This article systematically traces the evolutionary stages of the concept of digital intelligence governance of public digital culture, reveals the transformational logic of digital intelligence governance, and distills four core logics. However, as the instrumental value of technology, characterized by mechanical logic and efficiency supremacy, expands, digital intelligence governance of public digital culture faces multidimensional challenges, including decision-making constraints, human-machine disconnect, collaborative barriers, and the digital divide. To effectively mitigate the tension between the ideal of technological empowerment and the realities of governance, the article proposes a comprehensive framework for digital intelligence governance of public digital culture from four dimensions: production factors, technological tools, organizational collaboration, and ethical values, providing valuable insights for advancing the digital intelligence transformation of public digital culture governance and promoting the high-quality development of public cultural services.

Keywords Public digital culture; Digital intelligence governance; Concept evolution; Intrinsic mechanisms

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