# A Model of the Impact of User Participation on Library Knowledge Service Performance: Post-print

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## Abstract

[Purpose/Significance] User participation serves as a crucial mechanism for libraries to integrate user wisdom and co-create service value. Establishing the importance and legitimacy of user involvement in library knowledge services helps enhance its role and effectiveness, providing theoretical support and practical guidance for excavating user value within library knowledge services.

[Method/Process] From the perspective of user participation, this study explores library knowledge service performance, proposes a theoretical model and research hypotheses concerning the influence of user participation on library knowledge service performance, designs a questionnaire survey to collect data, and utilizes SPSS and Amos for descriptive statistical analysis, exploratory analysis, and confirmatory analysis to empirically validate the impact model of user participation on library knowledge service performance.

[Results/Conclusion] User participation exerts a significant positive influence on library knowledge service performance, with user-perceived participation value and user-perceived interaction value serving as mediators. The impacts of different participation behaviors on library knowledge service performance differ, and the effects of user-perceived participation value and perceived interaction value on library knowledge service performance are also distinct.

## Full Text

## Preamble

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# Influence Model of User Participation on Library Knowledge Service Performance

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**Abstract:**
[Purpose/Significance] User participation is an important means for libraries to integrate user wisdom and co-create service value. Establishing the importance and rationality of user participation in library knowledge services helps strengthen its role and effectiveness, providing theoretical support and practical guidance for user value mining in library knowledge services. [Method/Process] From the perspective of user participation, this study explores library knowledge service performance, proposes a theoretical model and research hypotheses regarding the influence of user participation on library knowledge service performance, designs a questionnaire survey to obtain data, and employs SPSS and Amos for descriptive statistical analysis, exploratory analysis, and confirmatory analysis to empirically validate the influence model. [Result/Conclusion] User participation has a significant positive impact on library knowledge service performance, with user perceived participation value and user perceived interaction value playing mediating roles. Different participation behaviors have differential impacts on library knowledge service performance, and user perceived participation value and perceived interaction value also have distinct effects on library knowledge service performance.

**Keywords:** library; knowledge service; user participation; service performance
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## Introduction

The transformation and development of libraries has promoted the sublimation of library service levels. Knowledge services are regarded as an inevitable choice for the development of information services to a certain stage [**?**] and a new mission facing the future [**?**]. Oriented toward knowledge content, emphasizing user context, and integrating into user problem-solving are considered important characteristics of knowledge services [**?**]. Service forms such as intelligence services, subject consultation, knowledge base construction, and research data management are striving to approach the deep connotations of knowledge services. Librarian wisdom is currently the main reliance for knowledge services, with supporting research and decision-making being the primary development directions. However, users' perceived value of knowledge services is relatively low, and librarians' sense of service value is also not high. Existing library

knowledge services have failed to address the pain points of user needs [?], while integrating user wisdom and promoting user participation are highly anticipated [?].

Ma Tianshu [?] explored library knowledge service models based on different user groups (faculty and student users, enterprise users, and government users), providing a new perspective for libraries to leverage user resources to achieve development leaps, service transformation, and value co-creation. Chen Lu [?] believes that libraries can draw on the concepts of active innovation and collaborative communication from Living Library to attract users' deep participation in library knowledge services, promoting active communication and collision of new ideas and knowledge. Lü Yuanzhi [?] proposed that institutional arrangements for user participation are needed for performance evaluation of digital library knowledge services, elevating user participation to the height of institutional arrangements. Yan Xiaoyan et al. [?] believe that user participation in library knowledge services is gradually strengthening, with communication and interaction between librarians and users continuously increasing, showing a trend toward higher-level participation forms such as cooperation, collaboration, and co-creation. Shao Guochuan [?] believes that the quality of knowledge services largely depends on the degree of user participation, and user participation behaviors can have a positive impact on knowledge services. Libraries should adopt strategies to reduce the negative effects of user participation behaviors and motivate users to deeply participate in library knowledge services.

Practices and explorations have emerged in areas such as user participation in knowledge annotation [?], user-generated book reviews [?], user-assisted knowledge consultation [?], and user participation in institutional repository self-archiving [?]. Research results on user participation behaviors in specialized knowledge services have also begun to appear [?]. User-centered knowledge service innovation has attracted increasing attention. However, existing research on user participation remains at the primary exploration stage, and systematic analysis of the role and effects of user participation is still lacking. This study attempts to explore knowledge service performance from the perspective of user participation, aiming to provide theoretical support for user value mining in library knowledge services.

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## 2. Analysis of User Participation Behavior in Library Knowledge Services

### 2.1 Survey of Library Knowledge Service Projects

Library knowledge service is a user-centered, knowledge content-based service model. Zhang Xiaolin [?] believes that knowledge service content includes supporting knowledge environments for user knowledge application and innovation, as well as collaborative knowledge application and innovation. Zhang Xinyu [?]

considers that web-based reference consultation services, intelligence services, knowledge management services, library characteristic databases, and joint virtual reference consultations are practical contents of knowledge services. Chen Xinhua [**?**] found that personalized services, reference consultation services, embedded services, subject services, and fixed-topic services are currently the main contents of library knowledge services, which exhibit characteristics of intellectualization, ubiquity, networking, digitization, specialization, diversification, and openness.

In 2018, we surveyed knowledge services claimed on the websites of world-class university construction university libraries. Considering the inconsistent categorization of library knowledge service projects and ambiguous project contents, we designed a questionnaire based on library knowledge service projects identified through literature and web surveys. The questionnaire was distributed in university library staff QQ groups, and 82 responses were collected. After analysis, we selected projects with high librarian recognition as knowledge service projects, including knowledge consultation (including learning consultation and research consultation), sci-tech novelty search, citation search, knowledge bases (including institutional repositories and subject knowledge bases), subject services (including subject navigation, subject blogs, and research data management), fixed-topic services, intelligence services (mainly patent intelligence analysis), and teaching and training (including information literacy and research literacy).

### 2.2 Types of User Participation Behavior in Library Knowledge Services

Currently, there is no unified understanding of the concept of user participation. Scholars represented by P. Silpakit et al. [**?**] and A. Rodie et al. [**?**] believe that user participation is individual user behavior, such as investment and contribution across physical, psychological, and emotional dimensions. Scholars represented by J. Wind et al. [**?**] believe that user participation is a process or stage-based activity; for example, D. Kellogg et al. [**?**] divided user participation into pre-preparation, relationship establishment, information exchange behavior, and intervention behavior. Scholars represented by A. Lloyd et al. [**?**] believe that user participation is a result or state. Overall, user participation is a combination of behavior, process, and result, reflecting the manifestation, stage, and state of user participation respectively.

Different library knowledge service projects have different workflows, leading to variations in user participation behaviors. Starting from the processes of library knowledge service projects to identify user participation points can better clarify user participation behaviors in library knowledge services. Based on website surveys and existing literature, we identified the following user participation behaviors in library knowledge service projects, detailed in Table 1 .

According to the processes of library knowledge service projects, we found that

users can participate in library knowledge services from different dimensions and to varying degrees. Combining existing user participation dimension classifications with the characteristics of library knowledge services, we categorized user participation types in library knowledge services into usage participation, evaluative participation, and constructive participation. Usage participation refers to a series of behaviors users undertake to use resources or services, belonging to the category of low-level user participation, manifested as accessing, browsing, searching, acquiring, liking, collecting, following, sharing, attending, and proposing needs. Evaluative participation is the behavior of users evaluating services after using them, belonging to the category of medium-level user participation, manifested as service evaluation (usability, preference, satisfaction), interactive comments, and feedback information. Constructive participation refers to user behaviors involving efforts to integrate into the service process, belonging to the category of high-level user participation, manifested as providing information, contributing knowledge, replying, answering, leaving messages, writing special topics, posting topics, proposing opinions or suggestions, discussing and communicating, jointly solving problems, and posting.

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## 3. Conceptual Model and Research Hypotheses

### 3.1 Conceptual Model

User participation is the core of user innovation and user orientation [**?**] and is regarded as a supplement and extension of internal library innovation [**?**]. Both user innovation and user orientation as library service trends emphasize incorporating users into the product or service value chain [**?**], participating in library services as stakeholders to co-create service value [**?**], and emphasizing deep communication, interaction, and cooperation between libraries and users. With the continuous improvement of library service quality, library service performance evaluation is also being optimized, with the evaluation perspective gradually shifting from libraries to users [**?**], and library service performance evaluation based on user participation is receiving increasing attention [**?**]. The application of LibQual to library service performance evaluation has sparked research emphasizing user value and user participation [**?**], with academia and industry gradually considering service performance as the orientation for user value.

Evaluating library knowledge service performance from the perspective of user participation further clarifies the library's user-centered service philosophy, providing a new positioning for user roles and functions. Grasping user perceived value is an important way to improve service performance [**?**]. User perceived value directly leads to two behavioral tendencies: recommending to others and repeated use [**?**], is a predictor of user retention, user pleasure, and user loyalty [**?**], and is a decisive factor in user satisfaction [**?**]. In summary, this study explores the influence of user participation types on library knowledge service

performance, using usage participation, evaluative participation, and constructive participation as independent variables, user perceived participation value (perceived value) and user perceived interaction value (perceived interaction) as mediating variables, and library knowledge service performance as the dependent variable. The hypothetical model is proposed as shown in Figure 1 [FIGURE:1].

### 3.2 Research Hypotheses

User participation in library knowledge services occurs under the guidance of libraries, centered around the "user-centered" service philosophy, and based on user needs, evaluation, interaction, feedback, and cooperation to develop, improve, and provide services, aiming to enhance library service quality and user satisfaction. The higher the level of user participation, the higher the enthusiasm for user participation in value co-creation [**?**]. Users can propose different service opinions, suggestions, or ideas from their own needs [**?**], and user participation, especially lead user participation, is very important, as users can play different roles in services [**?**], such as users, evaluators, and constructors. The quality of knowledge services largely depends on the degree of user participation, and users' interactive behaviors, publishing behaviors, content generation behaviors, and evaluation behaviors all have positive impacts on knowledge services [**?**]. Accordingly, we propose the following research hypothesis:

**RH1:** User participation has a significant positive impact on library knowledge service performance.

Usage participation, evaluative participation, and constructive participation represent progressive levels of user participation, and different participation types will have different user perceived participation values and perceived interaction values. Yin Meng et al. [**?**] empirically found that various dimensions of user participation have a positive impact on user perceived value. The process of user participation in library knowledge services is both a process of user experience and service use, and a process of users proposing opinions, making evaluations, and co-creating value. Throughout this process, communication and interaction between users and libraries are always present. Accordingly, we propose the following research hypotheses:

**RH2:** Usage participation has a significant positive impact on perceived interaction value.
**RH3:** Evaluative participation has a significant positive impact on perceived interaction value.
**RH4:** Constructive participation has a significant positive impact on perceived interaction value.

A. Rodie et al. [**?**] believe that user participation in value creation brings pleasure and freshness. M. Holbrook [**?**] points out that user participation also brings social respect and social identity. User participation in services not only reflects functional demands but also entertainment demands, as users achieve

functional goals and entertainment experiences through service participation. In this process, good user participation experiences will have a positive impact on user perceived participation value [?]. R. Kivetz et al. [?] found through research that user participation can enhance users' sense of achievement. Pleasure, freshness, and sense of achievement all belong to user perceived participation value. Accordingly, we propose the following research hypotheses:

**RH5:** Usage participation has a significant positive impact on perceived participation value.
**RH6:** Evaluative participation has a significant positive impact on perceived participation value.
**RH7:** Constructive participation has a significant positive impact on perceived participation value.

According to user perceived value theory and performance management theory, libraries simultaneously pursue the maximization of user benefits and the minimization of user costs, that is, the maximization of user perceived value. User participation does not directly affect user satisfaction; perceived participation and service results all affect user satisfaction to varying degrees [?]. User participation plays an important role in improving library service quality and user satisfaction [?], and service performance is closely related to service quality and user satisfaction. Ge Mina et al. [?] studied the internal influence mechanism of library Weibo user participation on service innovation performance, and the results showed that user participation has a significant impact on library service innovation performance through knowledge acquisition. Numerous studies have proven that user participation has a direct positive impact on service performance [?], with some literature exploring indirect effects, such as from the perspective of self-determination theory [?], relationship embedding [?], and knowledge creation [?], but related research is relatively scarce. Based on this, we propose the following hypotheses:

**RH8:** Perceived interaction value has a significant positive impact on library knowledge service performance.
**RH9:** Perceived participation value has a significant positive impact on library knowledge service performance.

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## 4. Scale Design and Data Collection

### 4.1 Scale Design

**4.1.1 Initial Design of Measurement Scale (1) Independent Variable - User Participation (UP).** For measuring user participation behavior, we drew on existing user participation behavior observation items, combined with user participation behaviors in library knowledge service projects, and divided specific dimensions and designed observation items as shown in Table 2 .

**(2) Mediating Variables - Perceived Interaction Value (IV) and Per-**

**ceived Participation Value (PM).** The measurement of perceived value is mainly based on users' evaluation and judgment of participation value perception and interaction value perception in library knowledge services, as shown in Table 3 .

**(3) Dependent Variable - Library Knowledge Service Performance (KSP).** For measuring library knowledge service performance, we referenced performance evaluation concepts and related research on library knowledge service performance evaluation [**?**], and evaluated library knowledge service performance from four aspects: the width, accuracy, depth, and user satisfaction of the impact of user participation on library knowledge services, as shown in Table 4 .

**4.1.2 Establishment of Measurement Scale** To optimize the initially designed scale, we conducted an online pilot survey with university students in the Nanjing area as respondents. We pre-processed 134 collected data sets and ultimately screened out 102 valid data sets. Using SPSS 20.0 to analyze the above data, we employed relevant indicators to test the reliability of the measurement scale, with results shown in Table 5 . In item analysis, EP5 had three indicators that did not meet standards, so it was deleted. PM1 and CP2 had one indicator each that did not meet standards and were revised.

Referring to the initial scale item analysis summary and combining user feedback from the pilot survey stage, we further revised the initial scale and transformed the expression methods to make the measurement items more accessible. We ultimately determined the formal scale observation items, including 3 items for "usage participation," 4 items for "evaluative participation," 5 items for "constructive participation," 5 items for "user perceived participation value," 3 items for "user perceived interaction value," and 4 items for "library knowledge service performance."

### 4.2 Data Collection

From July 13 to 20, 2018, we conducted field visits to libraries of four world-class university construction universities: Wuhan University, Huazhong University of Science and Technology, Nanjing University, and Southeast University. Simultaneously, we conducted targeted online questionnaire distribution through WeChat groups including the Ministry of Industry and Information Technology Talent Doctoral Group, Nanjing Agricultural University Master's and Doctoral Group, National Information Science Forum Group, Nanjing University Department Groups, and Southeast University Department Groups, targeting master's and doctoral students and faculty and staff for online surveys. A total of 512 questionnaires were collected through both methods. After eliminating incomplete and duplicate questionnaires, we initially obtained 488 valid questionnaires.

We then processed the data according to the following steps: (1) Data pro-

cessing based on demographic information. The “discipline,” “institution,” and “identity” items had an “other” option. We standardized the data based on text information users filled in the “other” option and deleted questionnaire No. 247 where “technical school” was filled in the “discipline” item, and questionnaire No. 116 where “housewife” was filled in the “identity” item. (2) Data processing based on scale items. The questionnaire used a 5-point Likert scale, with 1-5 representing “strongly disagree” to “strongly agree.” We deleted questionnaires with identical responses for ten consecutive items. After processing, we obtained 426 valid questionnaires.

### 4.3 Basic Statistical Analysis

**(1) Demographic variables.** Demographic variables mainly included four aspects: gender, identity, institution, and discipline of survey respondents, detailed in Table 6 . In terms of gender, males accounted for 41.1% and females for 58.9%. In terms of discipline, 27.9% were in management and 24.4% in engineering, representing relatively large proportions, followed by agriculture (11.7%), science (9.6%), and literature (9.4%), covering all disciplines except military science. In terms of identity, lower-level undergraduate students (freshmen and sophomores) accounted for a certain proportion, upper-level undergraduate students (juniors, seniors, and fifth-year students) were also represented, master’s students were the largest group (46.5%), followed by doctoral students (19.0%), with undergraduate students and faculty and staff also representing certain proportions. Overall, the respondents were primarily researchers. In terms of institution, respondents mainly came from world-class university construction universities (53.5%) and world-class discipline construction universities (30.0%), with the remainder from ordinary undergraduate institutions (11.0%), research institutes (3.8%), and specialized colleges (1.6%).

**(2) Usage and importance assessment of library knowledge services.** Clarifying respondents’ usage and importance assessment of library knowledge services is a prerequisite for studying the impact of user participation on library knowledge service performance. Respondents who had used library knowledge services and considered them important make the selection of survey respondents targeted and representative.

From the usage perspective (see Table 7 ), 1-5 represent “never used” to “frequently used,” with an overall mean of 3.01, indicating that respondents overall used library knowledge services but with varying frequency. Knowledge bases, citation search, subject services, and knowledge consultation all had means $ $3, indicating higher usage rates for these knowledge service projects. Intelligence services, sci-tech novelty search, fixed-topic services, and teaching and training all had means <3, indicating lower usage rates for these knowledge services.

From the importance assessment perspective (see Table 7 ), 1-5 represent “very unimportant” to “very important,” with an overall mean of 4.03, indicating that respondents considered knowledge services relatively important. Knowl-

edge bases had the highest mean, with 0.7%, 3.3%, 16.0%, 30.5%, and 49.5% selecting 1-5 respectively, indicating that respondents considered knowledge bases the most important service project. This was followed by citation search and knowledge consultation, both with means >4, indicating these knowledge service projects were also considered important. The lowest mean for other knowledge service importance assessments was 3.88, indicating respondents considered these knowledge service projects relatively important.

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## 5. Empirical Analysis

### 5.1 Exploratory Analysis

**5.1.1 Reliability and Validity Testing** Reliability analysis aims to measure the internal consistency of questionnaire scale items to determine the stability and reliability of the questionnaire scale. First, we analyzed Cronbach's Alpha coefficient, with $\alpha$\$ \$0.8 considered ideal and $\alpha$\$ \$0.9 considered very ideal [**?**]. Second, we analyzed the alpha coefficient if item deleted and CITC values (corrected item-total correlation). Items with alpha if item deleted higher than the overall $\alpha$ or CITC values <0.3 should be considered for deletion. The overall internal consistency $\alpha$ coefficient of our scale was 0.947, indicating very high overall scale reliability. The alpha if item deleted did not show significant improvement, indicating all items should be retained. All CITC values were >0.4, indicating good correlation between analysis items.

Scale content validity was considered during questionnaire design. Here we mainly used factor analysis to test construct validity, with indicators being KMO test and Bartlett's sphericity test. Generally, KMO>0.8 indicates suitability for factor analysis [**?**]. The sample KMO value was 0.939, indicating variables have common factors. The Bartlett's sphericity test chi-square value was 6665.607, degrees of freedom=276, p=0.000<0.05, reaching significance. Therefore, the scale has high validity and reliability, and its reliability and stability are guaranteed, making measurement with this scale effective. In summary, the sample sources and distribution are diverse, with good reliability and validity, meeting required standards, and scale data can be used for further analysis.

**5.1.2 Quantitative Screening of Measurement Items** Referencing relevant research results from our research group [**?**], quantitative screening mainly used factor loading, communality, item-total correlation, corrected item-total correlation, squared multiple correlation, and Cronbach's Alpha if item deleted values as six indicators. Factor loading is an indicator for judging the close relationship between measurement items and related dimensions; higher factor loading indicates closer relationship between the item and related dimension. Communality, or common factor variance, is the variance amount explained by each variable, used to judge attribute variation among variables. Extracted communality is the squared multiple correlation of variables predicting factors;

small values indicate the variable is unsuitable as a factor and can be deleted in analysis.

Item-total correlation, corrected item-total correlation, and squared multiple correlation are all indicators used to judge the homogeneity between observation items and the overall scale; larger coefficients indicate higher homogeneity between the item and the scale. Cronbach's Alpha if item deleted is a reliability indicator that should be lower than the overall scale reliability, otherwise deletion can be considered. As shown in Table 8 , factor loading, communality, item-total correlation, corrected item-total correlation, squared multiple correlation, and Cronbach's Alpha if item deleted all met judgment standards, so we could proceed to the next step of analysis.

**5.1.3 Descriptive Statistical Analysis of Measurement Items** Descriptive statistical analysis of measurement items can help understand respondents' basic views on user participation, perceived value, and library knowledge service performance. This survey used a 5-point Likert scale, with minimum and maximum values of 1 and 5 respectively, and a range of 4. The mean represents respondents' overall degree of recognition of measurement items, standard deviation represents differences in respondents' recognition of measurement items, and skewness and kurtosis represent the dispersion degree of respondents' recognition of measurement items.

Descriptive statistical analysis was conducted on 24 observation items from 426 valid questionnaires. In terms of means, all 24 observation items had means $ $3.69, indicating respondents generally agreed with the scale statements. The standard error of means for all observation items was <0.05, skewness coefficients were all <1 (with standard error of skewness=0.118), and kurtosis coefficients were all <2 (with standard error of kurtosis=0.236), indicating normal data distribution. The data obtained from this survey is suitable for further analysis.

### 5.2 Confirmatory Analysis

**5.2.1 Model Modification (1) Initial model.** Using Amos 21.0 to test the hypothetical model and research hypotheses, some fit indices of the initial model did not meet standards, such as the p-value. Next, we used outliers and modification indices provided by Amos to revise the model.

**(2) Using outliers to revise the model.** Amos calculates the distance of each observation from the group centroid and sorts them by magnitude, which can reflect observations that may be outliers. The p2 value better reflects non-normal distribution cases than the p1 value; when the p2 value is very small (e.g., <0.05), it indicates the case may be an outlier [**?**]. Referencing the distance from the group centroid and corresponding p2 values, we identified outliers and deleted one at a time, gradually checking fit coefficients after deletion. We attempted to continuously revise the model. Using outliers to revise the

model essentially reduces the Chi-Square value to increase the p-value. Based on outlier distance from largest to smallest, we deleted one data point at a time. If Chi-Square decreased, it was considered an outlier and deleted, such as questionnaires No. 227 and No. 389; otherwise, data was recalled.

**(3) Using modification indices to revise the model.** Amos provides model modification indices, with M.I. indicating covariation relationships between variables and Par Change indicating changes in relationships between corresponding variables when the model changes. Based on M.I. values, we added one covariation relationship at a time, observing whether Chi-Square decreased, which would indicate the added covariation relationship was effective for model revision; otherwise, it was ineffective and the covariation relationship was deleted. Details are shown in Table 9 .

**5.2.2 Revised Model** Model testing mainly uses two types of key indicators: absolute fit indices and incremental fit indices [**?**]. P, RMR, GFI, and RMSEA are absolute fit indices, while AGFI, NFI, CFI, and IFI are incremental fit indices. In the initial model, the absolute fit index P-value was <0.05, CMIN/DF was >2, and the incremental fit index AGFI was <0.9. After model revision, all indices met testing standards (see Table 11 ). The results indicate that the structural model has good fit and strong explanatory power, with high consistency between correlations among latent variables and hypotheses. After repeated revisions, we finally formed the revised structural model and path coefficients, shown in Figure 2

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To test research hypotheses, we listed influence path coefficients between latent variables, as shown in Table 12 . Estimate represents the unstandardized regression coefficient, used to compare relative influence. S.E. (Standard Error) is the standardized error, C.R. (Critical Ratio) is the critical ratio value, and p (Probability) is significance. When C.R.>1.95, then p<0.05; when C.R.>2.58, then p<0.001. As shown in Table 10 , usage participation, evaluative participation, and constructive participation all have significant impacts on perceived participation value and perceived interaction value, and perceived participation value and perceived interaction value have significant impacts on knowledge service performance.

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## 6. Research Conclusions and Implications

### 6.1 Research Conclusions

Based on the revised model and hypothesis testing results, we mapped the influence model of user participation on library knowledge service performance, shown in Figure 3


Figure 1: Figure 2

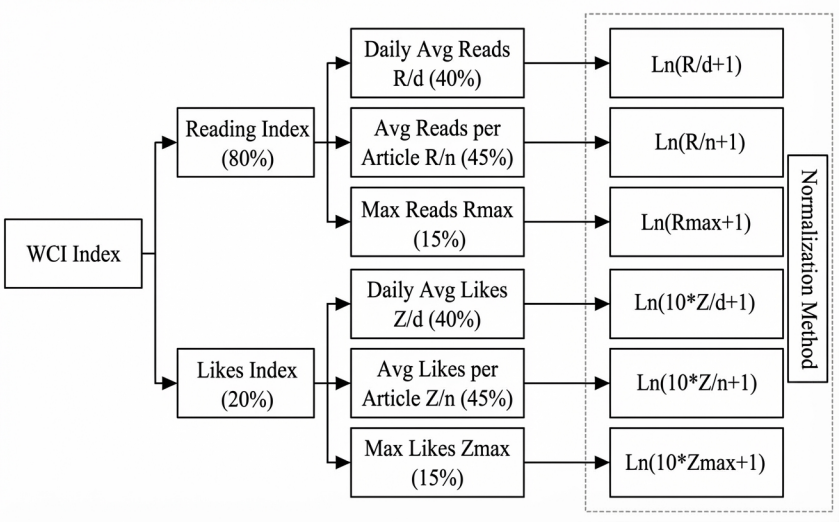


Figure 2: Figure 3

. According to the revised model and path coefficients, user participation has a positive impact on library knowledge service performance, with perceived participation value and perceived interaction value playing mediating roles. Usage participation and constructive participation have greater impacts on perceived interaction value, evaluative participation has a greater impact on perceived participation value, and perceived interaction value has a more obvious impact on knowledge service performance. Usage participation, evaluative participation, and constructive participation influence each other, jointly acting on user perceived participation value and perceived interaction value; perceived participation value and perceived interaction value jointly influence library knowledge service performance.

Research on the influence of user participation on library knowledge service performance not only enriches user participation theory in library knowledge services, clarifying the importance and rationality of user participation in library knowledge services, but also provides guidance and reference for user participation practice in library knowledge services.

### 6.2 Research Implications

Usage participation, evaluative participation, and constructive participation all affect library knowledge service performance through perceived participation value and perceived interaction value, but the impacts of different participation types on library knowledge service performance are differentiated, and the impacts of user perceived participation value and perceived interaction value on library knowledge service performance are also distinct. Therefore, when libraries attract, encourage, and guide users to participate in knowledge services, they need to start from the influencing factors of different user participation types, match user participation types according to library knowledge service project needs, embed user participation behaviors corresponding to participation roles into knowledge service projects based on role positioning and functions, integrate them into the library knowledge service process according to their roles and functions, and promote the smooth development of knowledge services and improvement of service performance. During the user participation process, corresponding perceived participation value will be generated. While promoting user participation, libraries also need to consider the impact of perceived interaction value on library knowledge service performance, and promote more active user participation in library knowledge services through smooth communication and interaction during the participation process.

The influence paths and coefficients of user participation on library knowledge service performance are differentiated, and libraries can adopt differentiated strategies to promote user participation to improve knowledge service performance. Considering the mutual influence among various dimensions of user participation, library incentive strategies need to be well-connected, emphasizing the continuity of incentive mechanisms. Given that different dimensions of user participation have different impacts on user perceived participation value and

perceived interaction value, efforts should focus on improving perceived participation value primarily through evaluative participation, supplemented by usage participation and constructive participation, while improving perceived interaction value primarily through constructive participation, supplemented by usage participation and evaluative participation. Meanwhile, perceived interaction value has a larger path coefficient in influencing library knowledge service performance, indicating that libraries can focus on motivating user participation from the perspective of perceived interaction value to enhance library knowledge service performance.

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**Author Contributions:**
Li Yongming: Responsible for data acquisition, analysis, and paper writing.
Zheng Dejun: Responsible for framework design and paper revision.

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## Figures

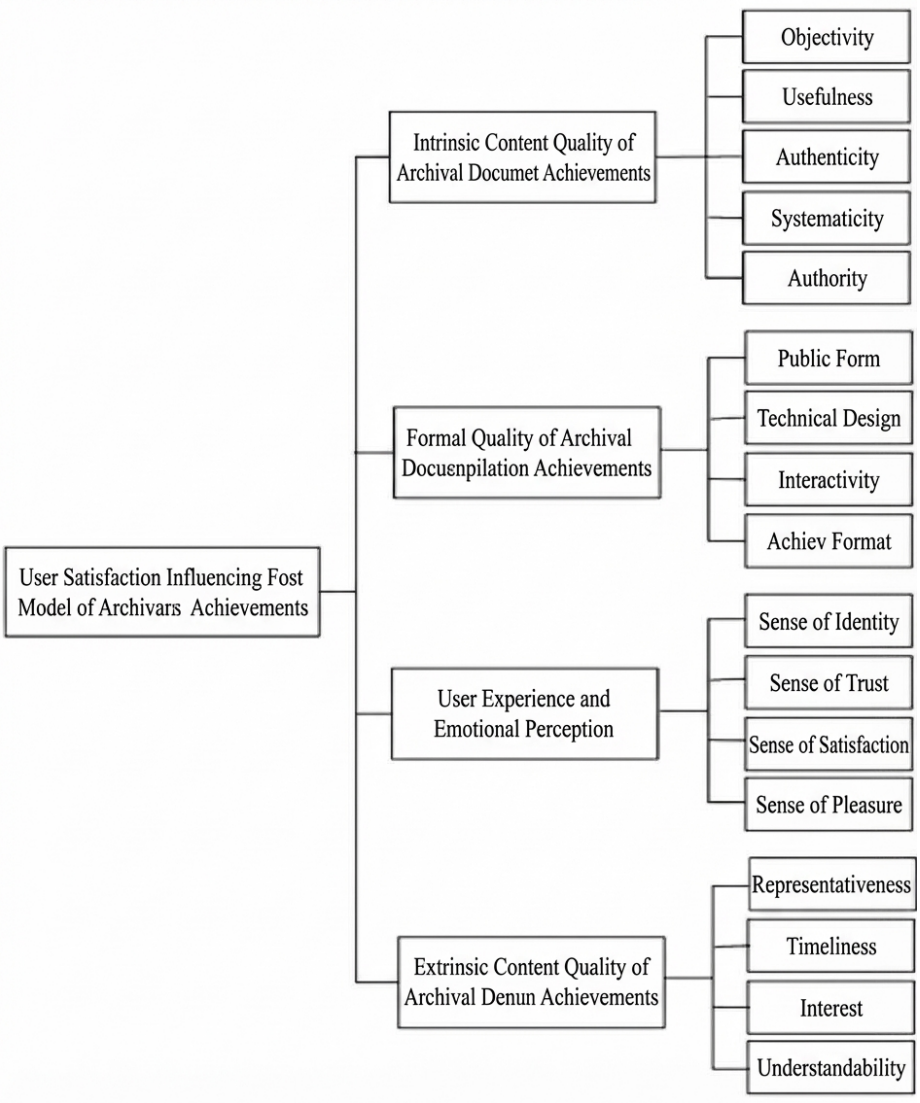


Figure 3: Figure 4