

Stakeholder Co-creation in Academic Library Knowledge-Service Model Development: A Multi-stage Qualitative Case Study in China

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Abstract: Academic libraries increasingly combine learning support, research assistance, and specialized information services, but the route from user demand to a workable service model is seldom documented. This article revisits the development of the knowledge-service model at the Library of North China University of Science and Technology (NCUST) to examine that route. The underlying doctoral study assembled evidence in five stages: an internal diagnosis, comparison with three provincial university libraries, a first round of stakeholder interviews, revision and a second interview round, and final version comparison. Seventeen purposively selected participants - six librarians, four faculty members, and seven students - took part. Rather than re-code the original interview transcripts, the present analysis follows documented changes across model versions and compares how stakeholder groups assessed value and feasibility. The first interview round did more than alter service labels: it led to the addition of an operating-process module and a supporting-elements module. Resource sharing was moved from the service list to the enabling layer, reading promotion was added to learning support, and capacity constraints changed how scientific novelty-search and research-topic tracking were positioned for implementation. These changes support a constrained co-creation account in which needs are expressed and negotiated, translated into professional terms, screened against organizational capacity, and then configured and revalidated. The findings show that stakeholder participation can shape model architecture, while staffing, qualifications, resources, platforms, and institutional priorities set practical limits. The study concerns model development rather than post-implementation effectiveness.

Keywords: Academic Library; Knowledge Services; Stakeholder Engagement; Co-creation; Co-design; Organizational Capacity; Qualitative Case Study.

1. Introduction

Academic-library service development now extends well beyond collection access. Libraries are expected to support learning, teaching, research activity, and, in some institutions, decision making around research and scholarly communication. This wider role makes stakeholder engagement a practical design problem rather than a supplementary consultation exercise. Harland et al. show that strategic engagement depends on how libraries distinguish among stakeholder groups, build relationships, and respond to institutional change [1]. Appleton's review reaches a related conclusion from the student perspective: participation can range from simply hearing student views to forms of partnership in which students have a more visible role in service development [2]. For knowledge-service design, the important question is therefore not only what users say they need, but how those views enter actual service decisions.

The relevant literature offers several pieces of this problem, although they are usually discussed separately. Student-partnership studies demonstrate that students can influence collections, communication, spaces, and inclusion when their involvement is linked to visible decisions [3]. Qualitative user-experience work shows why interviews, observation, and other contextual methods can reveal problems that routine service statistics miss [4]. Research-support studies, by contrast, draw attention to a different constraint: advanced services depend on specialist staff, time, data resources, and working relationships with academic and research units [5]. Cross-institutional evidence from Australia and Aotearoa

New Zealand also shows that research-support portfolios do not mature at the same pace even in broadly comparable university environments [6]. Taken together, these studies point to a design issue that is not resolved by compiling a list of desirable services: a library must connect service content with the processes and capacities that make provision possible.

What is less often shown is the sequence through which stakeholder input changes a service model. Published cases commonly describe a final intervention or a completed service portfolio, but the intermediate decisions are harder to see: which suggestion triggered a structural change, which proposal was reclassified, and which high-value request was delayed because the organization could not yet support it. Work on academic-library innovation suggests that these choices are shaped by organizational culture and by the tension between experimentation, collaboration, control, and routine operation [7]. Strategic-alignment research adds another layer because library proposals gain institutional traction when they can be related to university priorities [8]. A critical UX perspective also cautions against treating 'the user' as a single voice; frequent users, confident participants, senior academics, and professionals do not enter a design process with equal influence [9]. These issues make co-creation a negotiated and selective process, not a direct conversion of preferences into services.

The present article uses the doctoral study of NCUST Library as a case through which to examine that process [11]. The original project first reviewed the library's existing service arrangements and compared practice with Hebei University Library, Yanshan University Library, and Hebei

Normal University Library. An initial model was then taken into two rounds of interviews with librarians, faculty members, and students. Across those stages, the model moved from a benchmark-derived service portfolio to a three-part structure consisting of an operating process, supporting elements, and service items. Re-reading the study in this way shifts attention away from the final diagram itself and toward the decisions that produced it: why some ideas were added, why others were moved to a different part of the model, and why several services were assigned to pilot provision, external cooperation, or later development.

The analysis is organized around four questions. RQ1 asks how librarians, faculty members, and students differed in what they valued and in what they regarded as implementation risk. RQ2 examines how repeated stakeholder input changed the structure of the model rather than merely confirming an existing design. RQ3 focuses on the role of staffing, professional qualifications, resources, technology, and inter-unit relationships in deciding what could realistically be provided. RQ4 considers the limits of participation, especially differences in professional authority, representation, and the meaning of consensus. Together, the four questions are used to develop a constrained co-creation explanation linking stakeholder demand to organizational capacity and service configuration.

2. Literature Review and Conceptual Framework

2.1. Stakeholder Engagement from Consultation to Co-Design

In academic libraries, stakeholder engagement differs in both form and influence. Satisfaction surveys and suggestion channels usually leave problem definition in the hands of the library. Interviews and focus groups can open a wider conversation, but they still remain consultative if participants are only asked to react to options already fixed by staff. More collaborative arrangements involve users in identifying the problem, comparing alternatives, interpreting evidence, or reviewing implementation. Harland et al. describe strategic engagement as a combination of differentiated stakeholder strategies, organizational culture, and formal as well as informal engagement mechanisms [1]. Appleton similarly shows that student engagement spans several levels, including student voice, learning, partnership, and the methods used to sustain participation [2]. The distinction matters here because the presence of interviews alone is not enough to claim co-design.

For this reason, the present study uses model change as the practical test of participation. An interview is treated as evidence of co-design only when a participant's input can be connected to a later change in service priority, model structure, classification, or implementation route. Halliday et al. provide a useful comparison: in their work, student partnerships mattered because student recommendations affected decisions on collections, communication, and inclusion, rather than because students had simply been consulted [3]. Appleton's discussion of qualitative performance assessment likewise places students within processes of observation and interpretation, not only as respondents [4]. The NCUST case is examined with the same distinction in mind.

2.2. Knowledge-service Portfolios and Organizational Capacity

Knowledge services cover a broad range of academic-library work, from information literacy and subject liaison to advanced consultation, research intelligence, citation-related support, and intellectual-property information. Their breadth, however, can obscure the organizational conditions behind them. Haddow and Mamtora's study of Australian academic libraries brings services, staffing and resources, and relationships into the same analytical frame; skill shortages, workload, and cooperation with research offices all affected what libraries could sustain [5]. Howlett et al. report a similarly uneven pattern across Australian and Aotearoa New Zealand universities, where some forms of research support were well established and others remained emergent [6]. These studies are useful for the NCUST case because they direct attention to the capacity required behind each proposed service.

A service list therefore answers only one part of the design problem. A workable model must also indicate how demand is identified, how delivery is organized and improved, and what people, resources, and technologies support the work. Cox's discussion of future academic-library space is instructive in this respect: the form and use of library space are shaped by interacting pedagogical, technological, social, governance, and sustainability factors rather than by a single use indicator [10]. Knowledge services can be read in a comparable way. The service item, the workflow through which it is delivered, and the infrastructure that enables it are analytically distinct, but in practice they depend on one another.

2.3. Strategic Alignment, Innovation, Power, and Representation

Organizational capacity also has a cultural and strategic dimension. Otake et al. use competing-values and innovation perspectives to show that academic-library change involves tensions among collaboration, hierarchy, responsiveness, and experimentation [7]. Harland et al. approach the issue from strategic alignment: library leaders interpret university priorities and frame library contributions in terms that are meaningful to the institution [8]. In practical terms, two libraries may face a similar user request yet make different decisions because they differ in specialist expertise, authority, resources, or sponsorship. Capacity is therefore treated here as part of the decision process, not as a background variable that appears only after a model has been designed.

Participation brings a further problem: not every voice carries the same weight. Critical library-UX scholarship warns that user-centered practice can reproduce exclusion when 'users' are treated as a homogeneous group detached from institutional and social context [9]. Librarians possess professional language and knowledge of internal constraints; faculty members may have status and disciplinary authority; frequent student users may be more confident in describing their needs than occasional users or non-users. In an insider study, the researcher's institutional position can add another layer of influence. These asymmetries do not invalidate participation, but they do affect how agreement should be interpreted and whose absence must be acknowledged.

2.4. Analytical Framework

The analytical framework brings these strands together

around the sequence of actual model decisions. Stakeholders first contribute needs, value judgments, and concerns about service use. Those inputs are compared across groups and translated into operational questions such as staffing, platform requirements, professional qualifications, and strategic fit. The organization then decides whether a proposal should be incorporated as a routine service, moved to an enabling layer,

tested on a limited basis, supported through an external partner, or postponed. The process is iterative because later discussion can reopen earlier decisions. Power, representation, and researcher positionality are considered across the sequence rather than treated as issues that arise only after consensus has been reported.

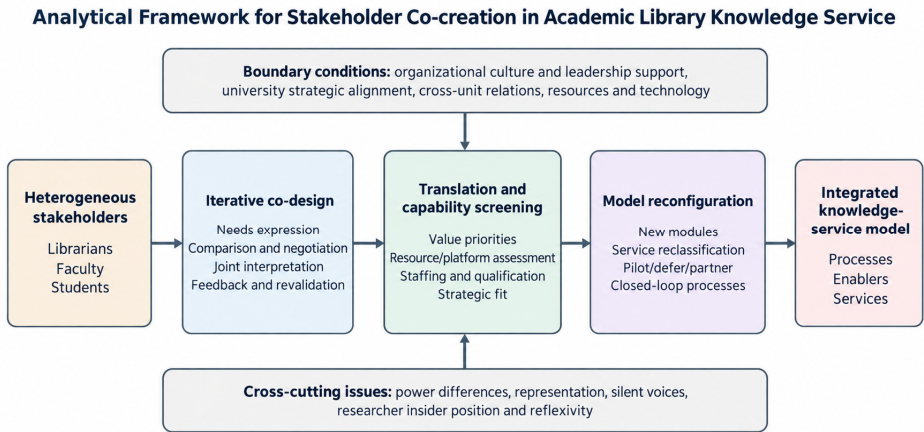


Fig 1. Analytical framework for stakeholder co-creation in academic library knowledge services

3. Methodology

3.1. Research Setting and Design

This article draws on evidence collected for the doctoral development of a knowledge-service model at NCUST Library [11]. NCUST is a provincial comprehensive university in Hebei Province. Before the model-development work began, the library was already providing information consultation, information-literacy education, subject services, intellectual-property information, citation verification, reading-related activities, and interlibrary resource sharing. The internal review, however, pointed to several practical problems: responsibilities overlapped across units, the depth of provision varied by service, personalized and intelligent functions were still limited, and publicity and feedback were

not consistently built into service routines. These conditions formed the organizational starting point for the model.

The original study proceeded through several linked stages, which makes it possible to reconstruct how the model changed. Internal documents and public service information were first used to describe the current situation. A comparison with three provincial university libraries then informed the initial service portfolio. Two rounds of stakeholder interviews followed, with model revision between the rounds. For the present article, the case is examined through three types of evidence: differences among stakeholder groups, differences among model versions, and specific modification events that can be traced from a reported concern to a later design decision. This is a secondary process analysis of the reported study, not a new round of qualitative coding.

Table 1. Data sources and analytical role in the present study

Stage	Data/Activity	Original Purpose	Analytical Role in This Article
1	NCUST job-responsibility documents, website information, and supplementary managerial input	Diagnose the current service situation	Establish organizational context and identify fragmentation, overlap, and capability gaps
2	Comparison with Hebei University, Yanshan University, and Hebei Normal University libraries	Benchmark knowledge-service practices and construct an initial model	Explain how benchmarking informed an initial portfolio that required local adaptation
3	Round 1 interviews with 17 stakeholders	Evaluate applicability of the initial model	Identify stakeholder priorities, disagreements, structural gaps, and feasibility concerns
4	Revised model and Round 2 interviews	Validate and refine the revised model	Trace bounded consensus and decisions on service classification and proposed implementation
5	Initial, revised, and final model versions	Summarize the model	Reconstruct modification events and infer co-creation mechanisms

3.2. Comparative Case Inputs

The benchmarking stage covered Hebei University Library, Yanshan University Library, and Hebei Normal University Library. In the original study, evidence came from public service information, telephone consultation, and site visits. Across the three libraries, recurring service domains included advanced reference and consultation, document and resource

sharing, scientific novelty-search related work, citation verification, intellectual-property information, subject services, information literacy, and research-topic tracking. The comparison was used to enlarge the set of possible services, not to rank institutions. It also revealed why a benchmark-derived portfolio could only be provisional: the three libraries differed in service arrangements and organizational conditions, so any model for NCUST still

required local adaptation.

3.3. Participants and Purposive Sampling

Seventeen participants were selected purposively because they occupied different positions in the design, delivery, or use of knowledge services. The six librarians included management, senior professional, and frontline perspectives. Four faculty members came from engineering, medicine, the

humanities, and science, allowing the study to capture disciplinary variation in teaching and research needs. The seven students comprised five undergraduates, one master's student, and one doctoral student. The sample was designed for information-rich comparison rather than statistical representation. It also leaned toward participants who already used or understood library services, a feature that later becomes relevant when representation is discussed.

Table 2. Participant structure and purposive sampling logic.

Stakeholder Group	n	Composition	Sampling Rationale
Librarians	6	2 library leaders; 2 senior librarians; 2 frontline librarians	Capture strategic decision-making, professional design, and service-delivery perspectives
Faculty	4	One participant each from engineering, medicine, humanities, and science	Represent disciplinary variation in teaching and research needs
Students	7	5 undergraduates; 1 master's student; 1 doctoral student	Represent different levels of library use, learning, and research intensity
Total	17	Three stakeholder categories	Support cross-group comparison rather than statistical representation

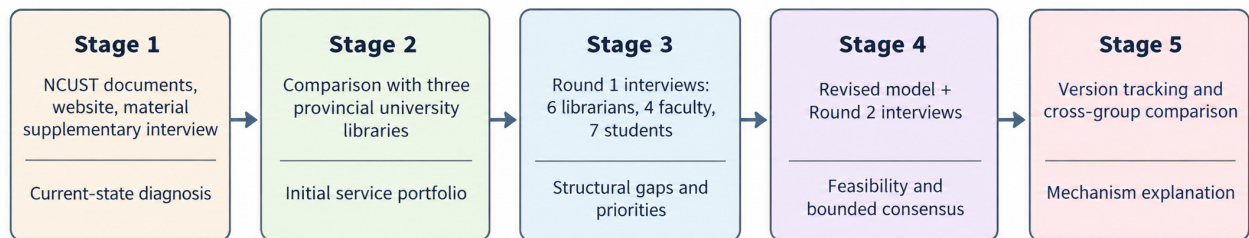
3.4. Iterative Model-development Procedure

The initial model was prepared after the internal diagnosis and the three-library comparison. During the first interview round, participants commented on whether proposed services were needed, how useful they might be, and what difficulties could arise in delivery. Their comments were then used to revise both service content and model structure. In the second round, participants saw the revised version and discussed the remaining points of uncertainty, including technical support, resource allocation, staff capacity, and the scope of particular services. The final version was produced after the main

architecture had become acceptable across groups, although agreement was not uniform on every implementation detail.

For the present analysis, the key question is whether participation left a visible trace in a later version of the model. A comment is therefore treated as analytically consequential when it can be associated with an addition, removal, relocation, reclassification, pilot arrangement, external-collaboration route, or decision to delay implementation. This criterion is deliberately stricter than simply reporting that interviewees 'supported' the model, because it focuses on how stakeholder input entered the design.

Multi-stage Research Design and Model Development



Analytical logic: compare versions → trace modification events → identify demand–negotiation–capacity–configuration chains

Fig 2. Multi-stage research design and model-development process

3.5. Data Analysis

Three comparisons were used in the re-analysis. First, reported findings were read across librarians, faculty members, undergraduates, and postgraduate students to identify differences in value judgments and feasibility concerns. Second, the initial, revised, and final models were compared as a version history. Third, the major changes were linked back to the concerns or practical conditions reported in the study. The literature informed the categories used to interpret these changes - stakeholder value, negotiation, professional translation, organizational capacity, strategic alignment, power, representation, and consensus - but no claim is made that the original interview transcripts were re-coded for this article. The mechanism proposed later in the paper is therefore an explanation reconstructed from the

reported findings and model sequence.

3.6. Trustworthiness, Reflexivity, and Ethics

The evidence base in the doctoral study was not limited to interviews. Internal documents, public service information, cross-institutional comparison, and two interview rounds were used together [11]. The interview instruments were reviewed by library experts, and the study received ethics approval from St. Paul University Manila before data collection. Participants gave informed consent, and the research procedures addressed privacy, anonymization, data minimization, secure storage, and withdrawal. In the present article, model-version comparison adds an audit trail by showing which design decisions changed and which were not equivalent to immediate implementation. The researcher's position as an NCUST librarian provided detailed knowledge

of the setting, but it could also shape questioning, interpretation, or participants' willingness to disagree. For that reason, apparent agreement is interpreted cautiously rather than treated as evidence of complete consensus.

4. Results

4.1. The Starting Point: A Broad but Fragmented Service Portfolio

The starting problem was fragmentation rather than an absence of knowledge-oriented activity. NCUST Library's internal responsibilities already covered information consultation, user education, subject services, demand investigation, reading support, online interaction, literature-retrieval education, and cultural activities. Public service information also showed intellectual-property information, citation verification, and interlibrary resource sharing. These activities formed a broad portfolio, but they did not yet function as a clearly integrated system. Related responsibilities appeared in more than one organizational unit, the boundary between consultation and subject services was not always explicit, and the available documents did not set out a stable cross-departmental coordination mechanism.

The managerial evidence added a second layer to the diagnosis. Some newer services could only be offered experimentally because resources were limited. Consistent personalized support was difficult to maintain, digital and intelligent tools were still developing, and staff capability with new technologies needed further strengthening. These observations changed the design problem. Adding more service names would not resolve the underlying issue; the

model also had to show how services were organized and what capacity was required to sustain them.

4.2. Stakeholders Valued Knowledge Services Differently

Stakeholders did not evaluate the model from the same vantage point. Librarians tended to ask whether a service could be delivered with clear responsibilities, adequate staff skills, suitable resources, and acceptable quality. Faculty members focused more on disciplinary relevance, the depth and speed of research support, citation-related assistance, intellectual-property information, and research-topic intelligence. Undergraduate students emphasized access, basic information-literacy support, reading and learning experience, and awareness of available services. The postgraduate participants gave more attention to advanced retrieval, research support, and digital tools. The differences were therefore tied to role and use context rather than to simple support or opposition.

The contrast was especially visible when value and feasibility pointed in different directions. Faculty members could regard a specialized research service as highly valuable while librarians remained concerned about qualifications, workload, or platform support. Conversely, a service could look straightforward to provide from the library's perspective yet have little practical effect if students did not know it existed or found the access route difficult. Model revision consequently required two judgments at the same time: whether users saw value in the service and whether the library could provide it to an acceptable standard.

Table 3. Cross-stakeholder priorities, risk perceptions, and model influence

Stakeholder	Primary Value Priorities	Primary Risk/Constraint Concerns	Reported Contribution to Model Development
Librarians	Professional quality, workflow, sustainability, role clarity	Workload, skills, qualifications, resources, overlapping responsibilities	Addition of operating processes and supporting elements; capability assessment of services
Faculty	Disciplinary fit, research depth, decision and output support	Insufficient depth, delayed response, weak specialist expertise	Strengthening of subject services, citation verification, intellectual-property information, and research-topic tracking
Undergraduates	Convenience, foundational information literacy, reading and learning experience	Low awareness, complex access, insufficient promotion	Greater emphasis on information literacy, reading promotion, and user education
Postgraduates	Advanced retrieval, research intelligence, digital research support	Insufficient specialist support and interdisciplinary capacity	Greater emphasis on advanced consultation, research support, and technology-enabled services

4.3. First-round Participation Changed the Architecture of The Model

The first interview round produced the largest structural change in the model. Before the interviews, the model was still close to a list of service items distilled from the benchmarking stage. Participants' comments exposed what that list could not explain. It did not show how needs would be identified, how a service would move into delivery, how users would be informed or educated, or how feedback would lead to later adjustment. It also blurred the distinction between services that users receive directly and the resources or capabilities that support several services at once.

The revised version addressed those gaps by adding two modules. The operating-process module set out demand analysis, service implementation, publicity and user education, feedback, evaluation, and improvement. The

supporting-elements module brought together resources, platforms, personnel allocation, and professional support. With those additions, the model no longer treated knowledge service as a catalogue of offerings. It began to specify how services would operate and what had to be in place behind them. In this sense, stakeholder input altered the coordination logic of the model, not only its terminology.

Other revisions were more targeted but still informative. Resource sharing, initially listed as a stand-alone service, was moved to supporting elements because it functions as a resource base for multiple knowledge services. Reading promotion moved in the opposite direction: it was added to learning support because student needs intersected with existing NCUST practice in bibliotherapy and reading promotion. Both decisions show that the comparison with other libraries was treated as a starting point. The final classification depended on how the service functioned in the

local setting.

4.4. Capability Screening Informed Differentiated Implementation Choices

Two proposed areas make the role of capacity particularly clear. Scientific novelty-search related support and research-topic tracking were valued for research, but both demanded specialist skills, appropriate qualifications, and resources. Where NCUST Library did not yet have the conditions for independent provision, the model did not simply delete the need. Instead, the implementation route was changed. Novelty-search support was associated with external

collaboration, while research-topic tracking was positioned for limited or pilot provision rather than immediate full-scale expansion.

This pattern is important because it shows that the decision space was wider than 'accept' or 'reject'. A proposal could enter routine provision, move to another part of the model, begin as a pilot, rely on an external partner, or wait for later capability development. In other words, feasibility altered the form and timing of response without erasing the underlying user demand. That distinction helps explain why services with similar perceived value did not appear in the final model at the same level of maturity.

Table 4. Critical model-modification events and their mechanism significance

Initial Issue	Stakeholder/Evidence	Negotiation or Interpretation	Capability/Strategic Judgment	Model-design Decision	Mechanism Significance
Parallel service items only	Primarily librarians plus cross-group feedback	Model lacked demand, process, quality, and enabling logic	Existing services required institutionalized operation	Add operating-process and supporting-elements modules	Stakeholder input informed model architecture as well as service content
Resource sharing as stand-alone service	Librarian interpretation and model comparison	Function served multiple services	Better treated as an enabling resource condition	Move to supporting elements	Distinguishes value provision from implementation conditions
No explicit reading-promotion item	Student needs and existing local practice	Reading support linked learning experience with library strengths	Existing staff/practice base increased feasibility	Add reading promotion to learning support	Local context and user experience reshape benchmark model
Independent scientific novelty-search service	Research value recognized across groups	Value high but implementation requirements substantial	Qualifications and capacity for independent provision were limited	Retain in the model through proposed external collaboration	Capability screening changes implementation form
Comprehensive research-topic tracking	Faculty and librarians valued service	Potential value strongest for priority research needs	Specialist and interdisciplinary capability insufficient for full scale	Plan limited or pilot provision	High-demand service is assigned to phased development

4.5. Second-round Validation Produced Bounded Rather Than Absolute Consensus

The second interview round was used mainly to work through the parts of the revised model that still depended on conditions not yet settled. Discussion concentrated on technical support, staffing, resource allocation, service boundaries, and the practical meaning of some categories. Compared with the first round, fewer structural changes followed. The smaller distance between the revised and final versions indicates that the three-part architecture had largely stabilized, even though implementation questions remained open.

The resulting agreement was therefore conditional. Participants generally accepted the integrated architecture, but some services were accepted only on the understanding that capability would be strengthened or implementation would proceed in stages. This is a more limited claim than saying that all participants shared the same preferences. In the NCUST case, consensus concerned the overall direction and structure of the model; it did not imply equal readiness, equal priority, or immediate implementation across every service area.

4.6. The Final Model as the Outcome of Constrained Co-Creation

The final model brought together three components that had been separated during the revision process. The operating process formed a cycle from demand analysis through service implementation, publicity and user education, feedback, evaluation, and improvement. Supporting elements covered resources and platforms together with personnel allocation and development. The service portfolio was organized around learning, teaching, and research support and contained eight major areas: advanced information consultation, information-

literacy services, reading promotion, subject services, citation verification and research-impact support, intellectual-property information services, scientific novelty-search/prior-art and research-landscape support, and research-topic tracking/current-awareness support.

What matters analytically is how that structure emerged. Benchmarking supplied the initial vocabulary of service possibilities. The first interview round exposed missing process and capability dimensions. Professional interpretation converted stakeholder concerns into changes in structure and classification. Capacity judgments then differentiated the implementation route for more demanding services. The second round tested the revised configuration and narrowed the remaining disagreements. The final model is therefore best read as a negotiated organizational arrangement, not as a claim that one technically optimal design has been identified.

Table 5. Structure of the final integrated knowledge-service model

Model Component	Core Content	Function in the System
Operating process	Demand analysis; service implementation; publicity and user education; feedback; evaluation and improvement	Specifies a continuous cycle linking user demand with delivery and improvement
Supporting elements	Resources and platforms; personnel allocation, development, and professional support	Specifies the resources and capacity required for feasible service provision
Service portfolio	Learning support; teaching support; research support; eight major knowledge-intensive service areas	Specifies the services and value intended for users

5. Discussion

5.1. Co-design as Structural Reconfiguration Rather Than Consultation

The clearest evidence of co-design in this case lies in what

changed between versions. Participation research distinguishes between giving users a voice and allowing that voice to affect decisions [2,3]. At NCUST, the important outcome of the first interview round was not simply a favorable response to the initial proposal. The model itself changed from a service-item portfolio into a system with an operating process and enabling conditions. That change provides stronger evidence of stakeholder influence than a statement of satisfaction or agreement would have done.

This version history adds a process dimension to earlier work on strategic engagement. Harland et al. emphasize the interaction among stakeholder strategy, organizational culture, and engagement mechanisms [1]. The NCUST case shows one way to observe that interaction empirically: trace a stakeholder concern to a subsequent change in workflow, classification, resource requirements, or service scope. Recording these modification paths makes it easier to distinguish meaningful design influence from consultation that leaves the original model intact.

5.2. A Constrained Co-Creation Mechanism

The case also clarifies why co-creation in an academic library is necessarily constrained. Stakeholder input entered the model through several stages rather than moving directly from request to service. Needs were compared across groups, interpreted in professional terms, and then considered against qualifications, workload, resources, platforms, and strategic fit. This sequence is not a rejection of user-centeredness. It reflects the library's responsibility to provide services at an acceptable professional standard and within conditions that can be sustained.

The resulting choice set was correspondingly varied. Routine adoption was one possibility, but not the only one. Resource sharing was reclassified as an enabling condition; novelty-search support was linked to external cooperation; research-topic tracking was positioned for limited or pilot provision; other proposals could remain pending while capability developed. Research-support studies have already shown that staff expertise, resources, and institutional relationships shape the services a library can sustain [5,6]. The NCUST case makes that constraint visible inside the co-creation process itself.

5.3. Integrating Services, Processes, and Enabling Conditions

The three-component architecture offers a second insight. A portfolio tells users what a library offers, but it says little about how those offers are initiated, communicated, reviewed, or sustained. Separating the model into service items, an operating process, and supporting elements made those dependencies explicit. Service items describe the value proposition; the operating process links demand to delivery and improvement; supporting elements identify the resources and professional capacity required for implementation. The three parts are analytically distinct, but the case shows that none is sufficient on its own.

This structure also provides a point of contact among several bodies of library research that are often treated independently. User-engagement studies explain whose needs enter the conversation; research-support studies show the dependence of advanced services on expertise and relationships; innovation research draws attention to organizational conditions; and strategic-alignment work explains why some activities acquire stronger institutional

support. Cox's systems-oriented account of academic-library space similarly stresses interaction among people, technology, institutional priorities, and use practices [10]. Read in that way, platforms and staff development are not secondary implementation details. They are part of the service model because they determine what the library can credibly promise.

5.4. Strategic Alignment and Institutionalization

Strategic alignment becomes visible in the way the final portfolio was organized around learning, teaching, and research support. Harland et al. argue that libraries strengthen their institutional position when they express their contribution in terms that connect with university priorities [8]. In the NCUST model, this organization did more than tidy the service list. It linked specialized library work to the university's core missions, making it easier to explain why services such as subject support, citation-related assistance, or research intelligence matter beyond the library itself.

Alignment also affects where capability is likely to be built. A service that is closely tied to priority research activity may be better placed to justify staff development, data resources, technical support, or cross-unit cooperation. By contrast, strong user interest alone may not be enough to institutionalize a service if the organization lacks both capacity and strategic sponsorship. Sustainable service development therefore requires the library to consider user value and institutional fit together, while keeping the evidence for each visible.

5.5. Co-creation Does not Automatically Resolve Power and Representation

The participatory process also had representational limits. The purposive sample was information rich, but it was not intended to mirror the entire user population. Faculty participants already had contact with the library, students were frequent users, and librarians were more familiar with professional terminology and internal constraints than other participants. These features helped the study obtain informed judgments, yet they also increased the likelihood that experienced users and professional voices would shape the discussion more strongly than occasional users, non-users, or less confident participants.

Critical UX research is useful here because it asks not only whether users were invited to participate, but who was able to define the problem and whose experience counted in the final decision [9]. Professional authority is especially double-edged in this case. Librarian expertise was necessary to identify qualification requirements and implementation risks, but the same expertise could narrow the range of options regarded as realistic. Future iterations of the model would benefit from separate stakeholder workshops, anonymous feedback, deliberate recruitment of low-frequency users and non-users, and a more direct role for participants in interpreting findings.

5.6. The Emergent Mechanism

Figure 3 summarizes the process inferred from the sequence of model changes. Stakeholder needs entered the process as claims about value, use, and risk. Comparison across groups exposed points of agreement and tension. Librarian and organizational interpretation then translated those claims into questions of staffing, resources, platforms, qualifications, and strategic fit. Configuration decisions

followed, and the revised arrangement was returned for another round of validation. The loop remains open because implementation and evaluation can generate new evidence

that requires an earlier decision to be revisited. The model is therefore both an outcome of participation and a provisional structure for future adjustment.

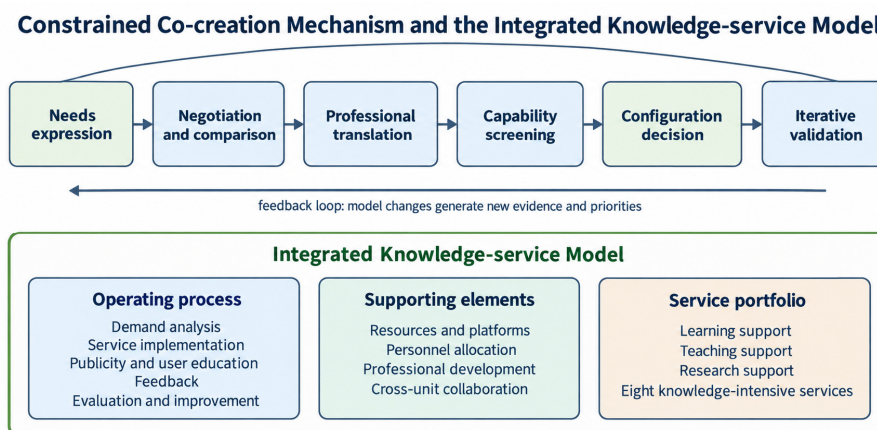


Fig 3. Constrained co-creation mechanism and its relationship to the integrated knowledge-service model

5.7. Practical Implications

For practice, the case suggests that stakeholder involvement should continue after a model has been drawn. A library can institutionalize recurring advisory or feedback arrangements and, importantly, show users what happened to their suggestions. Proposed services can then be considered against two separate forms of evidence: evidence of demand and evidence of capacity. Keeping the two judgments distinct makes room for several transparent outcomes - full implementation, pilot provision, external partnership, or deferred implementation while capability is developed - rather than forcing every proposal into a yes-or-no decision.

The study also places staff development and cross-unit relationships inside service design rather than outside it. Advanced research support draws on subject knowledge, information analysis, data and technology skills, and the ability to work with research offices, academic schools, and external specialists. Resource planning should therefore cover training, team composition, cooperation mechanisms, and incentives for collaborative work in addition to databases and technical platforms. Linking these investments to university goals in learning, teaching, research, and social engagement can strengthen the institutional case for the services, provided that user-demand evidence remains visible.

6. Limitations and Future Research

The scope of inference is narrow in two important respects. First, the case concerns one provincial comprehensive university in China. The proposed mechanism may be useful as an analytical lens elsewhere, but its transferability cannot be assumed; comparison across institution types, regions, and governance arrangements is needed. Second, the purposive sample favored people with substantial library experience. Low-frequency users, non-users, university administrators, and external partners were not represented to the same degree, so the study is better at explaining informed stakeholder negotiation than at claiming population-wide preference.

Two further limitations concern evidence and outcome. The article examines how a model was developed, not whether the model later improved learning, research productivity, service use, or satisfaction. Those questions require longitudinal implementation data. In addition, the

doctoral study used consensus analysis, whereas the present article reconstructs a process mechanism from reported findings and model changes. A fresh analysis of the original transcripts, with explicit coding, negative-case analysis, and participant quotations, would provide a stronger evidential link between individual accounts and design decisions. Finally, the researcher's insider role offered contextual depth but may also have introduced confirmation or authority effects; multi-researcher coding and participant co-analysis would strengthen future work.

7. Conclusion

The NCUST case shows that developing a knowledge-service model was not simply a matter of selecting a set of desirable services. Librarians, faculty members, and students approached the model with different priorities and different understandings of risk. Their participation mattered because it left visible traces in the design: a benchmark-derived portfolio was reorganized into an integrated structure with an operating process, supporting elements, and service items. The largest change occurred after the first interview round, when gaps in workflow, communication, feedback, resources, and staffing became part of the model itself.

The case also shows why co-creation has practical limits. User demand was compared and negotiated, translated into professional and organizational terms, and then considered against staffing, qualifications, resources, platforms, and institutional priorities. As a result, similar levels of perceived value could lead to different design decisions - routine provision, reclassification, pilot delivery, external cooperation, or postponement. The final arrangement therefore represented conditional agreement about direction and structure rather than an unrestricted promise to implement every request.

For academic libraries, the useful lesson is procedural: make service-configuration decisions visible, participatory, and explainable. For research, the case suggests that final service lists reveal only part of the story. Following model versions and modification events can show how stakeholder influence interacts with professional authority and organizational capacity over time. That process perspective is necessary if knowledge services are to remain responsive to users without losing feasibility or institutional sustainability.

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