Optimization Path and Strategies for Scenario-based Information Acceptance in Mobile Libraries: Postprint

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Abstract

[Purpose/Significance] With the aim of pursuing the ultimate experience of contextualized information acceptance in mobile libraries, and in response to the deficiencies in existing mobile library contextualized applications, this study systematically reviews the current research on barriers to contextualized information acceptance in mobile libraries. [Method/Process] Using the fishbone diagram method to analyze factors hindering mobile library information acceptance, and employing a scenario-based experimental approach to evaluate performance from three dimensions—information acceptance scenario performance, information acceptance context performance, and information acceptance context configuration performance—this study analyzes the scoring results, designs optimization pathways including creation, modification, reconstruction, transformation, and embedding for contextualized information acceptance in mobile libraries tailored to different scenario types, and constructs an optimization strategy for context adaptation of contextualized information acceptance in mobile libraries. [Results/Conclusion] The experimental data analysis results indicate that flexible and modular iterative refinement based on users' contextualized information acceptance expectations represents the future direction for optimizing contextualized information acceptance in mobile libraries.

Full Text

Preamble

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Optimization Path and Strategy for Scenario-Based Information Acceptance in Mobile Libraries

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Abstract

[**Purpose/Significance**] Aiming to pursue the ultimate experience of scenario-based information acceptance in mobile libraries, this paper addresses the current deficiencies in mobile library scenario applications and systematically reviews the research on obstacles hindering scenario-based information acceptance.

[**Method/Process**] Using the fishbone diagram method to analyze factors obstructing mobile library information acceptance, this study employs a scenario-creation experimental approach to evaluate performance across three dimensions: information acceptance scenario performance, information acceptance context performance, and information acceptance context configuration performance. By analyzing the scoring results, optimization paths—including new construction, modification, reconstruction, transformation, and embedding—are designed for different scenario types, and optimization strategies for context adaptation in mobile library scenario-based information acceptance are constructed.

[**Result/Conclusion**] Experimental data analysis reveals that flexible and modular iterative refinement based on users' scenario-based information acceptance expectations represents the future direction for optimizing mobile library scenario-based information acceptance.

Keywords: mobile library; scenario-based information acceptance; information acceptance optimization; information acceptance experience
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Introduction

In recent years, as information acceptance contexts in mobile libraries have continuously enriched and scenario elements have become more deeply embedded, mobile libraries have established the foundational conditions for delivering scenario-based services. Industry experts and scholars have conducted theoretical research and practical explorations in this area, yielding certain achievements. Research Librarian Zeng Jianxun, Director of the Information Resources Center at the Institute of Scientific and Technical Information of China, advocated in *Digital Library Forum* in November 2018 that libraries should "promote scenario-based services" [1]. Scholars in library and information science have also produced relevant research outputs on scenario services. For instance, Professor Bi Qiang's team from Jilin University School of Management has conducted in-depth studies on mobile library scenario-based services [2-7], covering topics such as information acceptance patterns, content adaptation, and scenario

recommendation. Guided by Meyrowitz's media situation theory, Li Mingli proposed strategies for constructing library scenarios in the new era, emphasizing value innovation through meeting user desires and responding to user needs, and provided specific scenario construction strategies from dimensions including media extension, space construction, role transformation, business reorganization, and technological improvement [10].

A review of the above literature reveals that existing theoretical research clearly indicates mobile libraries need to contextualize their services. Although mobile library information acceptance contexts have become increasingly rich and scenario-based elements have gradually deepened their integration, persistent issues remain, including technical limitations such as limited mobile terminal computing power, battery life, and small screen sizes, as well as problems like poor resource organization quality and insufficient visualization functionality. However, few existing studies have systematically analyzed the elements and relationships of mobile library scenario-based information acceptance, context adaptation for scenario-based information acceptance, seamless acceptance experiences, or scenario reconstruction. Wang Dongbo argued that library users are defined by scenarios and services should emerge from scenarios, proposing that libraries must implement scenario-based services to improve service levels. From this perspective, he analyzed the core elements of scenario services, established primary implementation pathways, fostered new thinking for scenario services, constructed high-level service scenarios, and completed scenario-based service delivery [8]. Bao Dongmei introduced scenario thinking into libraries, aiming to discover, adapt to, match, and integrate into users' research scenarios to achieve research service innovation through the reconstruction of virtual and physical spaces [9].

Based on the above analysis of obstacles to mobile library scenario-based information acceptance, this study identifies the following hindrances:

1. **Abandonment and uninstallation phenomena persist.** Current mobile libraries still suffer from various problems. In the face of people's addiction to new media, self-media, and micro-media, we must reflect on whether existing mobile library scenario designs have truly adopted a user-centric approach or effectively integrated available contextual dimensions and situational elements. This deficiency prevents users from identifying pain points for information acceptance across different scenarios, leaving them to vacillate between usability and non-usability, usefulness and uselessness, and ease-of-use and difficulty-of-use. The result is low utilization rates and disproportionate input-output ratios, leaving both users and developers feeling dissatisfied [11].
2. **Scenario functions and utilities are not fully realized.** Although mobile libraries have incorporated many scenario elements such as big data, sensors, mobile devices, social media, and positioning systems, they have failed to integrate these elements' functions with scenario-based service capabilities. This manifests as severe homogenization across different

scenarios, preventing scenario functions from becoming prominent [12].

3. **Insufficient scenario construction and functional development.** While libraries at all levels have achieved notable results in reading promotion months, new student orientation, and graduation season activities, the failure to leverage mobile libraries for seamless online-offline integration has prevented these activities from fully realizing their value [13].

4. **Unclear scenario-based service touchpoints.** To deliver scenario-based services, mobile libraries must identify user information demand touchpoints across different scenarios, excavate user information acceptance from these touchpoints, and provide pain points that trigger ultimate scenario-based information acceptance experiences [14]. However, existing mobile libraries lack clear touchpoints, resulting in 不痛不痒 (non-painful) pain points.

In response to these obstacles and with the goal of achieving ultimate scenario-based information acceptance experiences, this paper employs the fishbone diagram method to detail hindering factors, proposes optimization paths and strategies for mobile library scenario-based information acceptance, and presents an effective approach to realizing this ultimate experience goal.

1 Performance Analysis of Scenario-Based Information Acceptance in Mobile Libraries

Mobile library information acceptance has evolved from the traffic era to the data era, and then to the scenario era. Scenario-based information acceptance in mobile libraries is increasingly characterized by the declining dominance of traffic-based acceptance and the rising utility of scenario-based information entry points. For mobile libraries, without scenarios, there is no information acceptance [16]. In practice, mobile library scenario-based information acceptance faces two challenges: first, the gradual deepening of scenario element embedding continuously multiplies information acceptance entry points, resulting in information overload; second, although acceptable information continues to increase, users struggle to identify valuable information, leading to information acceptance disorientation. Therefore, scenario-based information acceptance must implement effective filtering of unnecessary information and achieve scenario performance across three dimensions of context usability, usefulness, and ease-of-use [17].

1.1 Scenario Performance of Mobile Library Information Acceptance

Scenario performance is evaluated through the five scenario elements—big data, mobile devices, social media, sensors, and positioning systems—and their support for user information acceptance. In practice, this manifests as the integrated utility of two modes: superimposed scenarios (e.g., combining text, video, and audio resources on the same theme) and matrix scenarios (e.g., combining

personal courses, 尔雅 courses, training courses, and open courses) [18].

1.2 Context Performance of Mobile Library Information Acceptance

Context performance reflects the contextual configuration capability of scenario-based information acceptance. Based on resource, technology, and service contexts, supplemented by mobile, social, and terminal contexts, configuration should align with user expectations across scenarios and scenario transitions [19]. Measuring this performance presents a research challenge. This study employs the think-aloud method, capturing user experience through screen recording and mining emotional experience tags from the resulting text [20]. Since user expectations vary across scenario types, experience mining must be scenario-specific for greater relevance.

Context performance manifests as comprehensive, three-dimensional, and multi-level information acceptance value across scenarios such as dormitories, dining halls, classrooms, and campuses. As users become increasingly immersed in scenario-based information acceptance, developing stronger dependencies, they require in-scene discussions on specific themes, achieving information acceptance "makerization" where users become creators and disseminators of information. Mobile libraries must thoroughly excavate user expectations across scenarios and aggregate different contextual dimensions to achieve context performance [21].

1.3 Context Configuration Performance of Mobile Library Information Acceptance

Mobile library information acceptance revolves around scenario-based "context + configuration." Libraries must accurately position the functional attributes of information acceptance context configurations across scenarios and achieve scenario-based coupling between user expectations and context configuration, thereby forming context configuration performance. In essence, this performance reflects the degree to which information acceptance context functional attributes (Inside) are effectively associated and integrated with configuration attributes (Plus) to meet user expectations [22].

Mobile libraries must leverage big data technology to deeply mine and position diverse needs within fragmented scenarios, enabling effective connections for information acceptance and realizing context configuration value. Scenarios serve as authentic entry points built around user experiences, representing the fusion of mobile libraries' internal contextual capabilities with user expectations. Scenario construction helps users identify pain points, segment information needs, and meet diverse expectations. For example: short videos + evening rest + social information = personalized information acceptance + seamless experience. This reflects users' personalized and fragmented needs, representing effective online-offline integration [23].

The performance of mobile library scenario-based information acceptance can

be expressed as:
Mobile Library Scenario-Based Information Acceptance Performance = (Scenario Performance × Scenario Weight) + (Context Performance × Context Weight) + (Context Configuration Performance × Context Configuration Weight). While these weights could be obtained through Delphi methods, this study considers all three elements equally important and indispensable, thus assigning each a weight of 1/3.

2 Performance Evaluation of Scenario-Based Information Acceptance in Mobile Libraries

Based on the above performance formula, this study evaluates different scenario types across three dimensions—user information demand expectations, search habits, and acceptance preferences—using a scenario-creation experimental method to score scenario performance, context performance, and context configuration performance, thereby identifying current obstacles.

2.1 Experimental Evaluation of Scenario-Based Information Acceptance Performance

Mobile library scenarios must satisfy users' diversified and personalized information acceptance needs, as all information acceptance inevitably occurs within mobile contexts. Libraries should integrate online and offline demands, imbue scenarios with emotional resonance, and enable scenario-based information acceptance that facilitates content sharing through trusted social relationships [24].

To effectively evaluate performance across different scenarios, this study adopts a scenario-creation experimental method, categorizing university mobile library scenarios into: life, learning, entertainment, social, leisure, consultation, activity, task, examination, research, payment, and announcement scenarios. Using Chaoxing Xuexitong as the test platform in selected universities in Liaoning and Jilin provinces, the experiment obtained user experience scores (10-point scale) for information demand expectations, acceptance habits, and acceptance preferences across these scenarios, with averaged results shown in Table 1 .

2.2 Analysis of Obstacles to Scenario-Based Information Acceptance

The scoring results in Table 1 reveal suboptimal performance in current mobile library scenario-based information acceptance. Analysis indicates this stems from insufficient embedding of scenario elements such as sensors, big data, positioning systems, mobile terminals, and social media, preventing effective realization of the three-dimensional "scenario-demand-context," "scenario-search-context," and "scenario-acceptance-context" integration.

The performance scores in Table 1 are calculated from integer-rounded evaluations of three dimensions across scenarios, with detailed element scores provided

in Table 2 . Based on Table 2, obstacle factors for different scenarios are identified and aggregated using a fishbone diagram (Figure 1 [Figure 1: see original paper]), which categorizes specific deficiencies across scenarios to guide optimization directions [25], as detailed in Table 3 .

3 Optimization Paths for Scenario-Based Information Acceptance in Mobile Libraries

Big data serves as a targeting mechanism for user information acceptance expectations [26]. Mobile libraries should employ big data analytics to discover new scenarios, ensure correct scenario design, and thereby stimulate, guide, and regulate user information acceptance behaviors. Since obstacles arise from misalignment between "scenario-behavior-context," this study constructs optimization paths from three dimensions: demand, search, and acceptance (Figure 2 [Figure 2: see original paper]).

The process involves: (1) mining user historical acceptance preferences using big data; (2) analyzing scenario elements, attributes, and contextualization across mobile library scenarios; and (3) identifying touchpoints and pain points for ultimate experiences between users and contexts. When user experience reaches optimality, optimization succeeds; otherwise, user behavior must be guided and adjusted, or scenarios must be newly constructed, edited, modified, transformed, recombined, reformed, embedded, and optimized.

3.1 New Construction: New Student Orientation

New student orientation represents an extended service in domestic university libraries, traditionally divided into "Understanding the Library" and "Entering the Library" modules delivered via classroom slideshows and on-site tours. Mobile libraries can leverage their advantages to incorporate orientation as a functional component [28]. Using gamified treasure-hunt narratives with animations, 360° panoramic virtual navigation, promotional videos, and micro-videos, libraries can create customized orientation scenarios that meet student expectations. These scenarios provide vivid operational demonstrations and 真人讲解 (live narration), intuitively introducing library overviews, regulations, resource distribution, borrowing rules, self-services, digital resources, and reader activities. The gamified approach enhances learning interest and immersive experience.

Current implementations, such as the University of Electronic Science and Technology's "Little Guide Takes You Through Bajiao Studio," library promotional videos, virtual tour systems, and borrowing rules, remain PC-centric without mobile-specific scenario development, resulting in mediocre mobile acceptance experiences.

3.2 Modification: Mobile Ecological Teaching

The integration of traditional and mobile teaching represents the future direction, exemplified by Tsinghua University's "Rain Classroom" smart teaching solution. Mobile libraries should incorporate similar functionalities, modifying existing mobile classroom teaching into six subsystems [29]:

1. **Mobile Classroom Interaction System**: Sign-in, voting, discussion walls, random selection, resource sharing, class reports, big data analytics, electronic lesson plans, teaching evaluation, question racing, and multi-screen interaction.

2. **Mobile Credit System**: Learning monitoring (anti-dragging), gamified learning (video homework Q&A), online support (real-time customer service), online interaction (group discussions), online note-taking, and online examinations (forming learning assessments).

3. **Mobile Reading System**: Books, journals, massive topical collections, lectures, newspapers, and online reading.

4. **Mobile Open Courses**: Thousands of high-quality courses from prestigious universities for teacher preparation and student learning.

5. **Mobile Educational Administration System**: Administrative notifications, schedule queries, grade inquiries, course selection queries, and credit queries.

6. **Mobile Social System**: Group-based discussion forums for users with shared interests or intersections, enabling real-time interaction and information sharing.

3.3 Reconstruction: Mobile Visual Search

As library contexts continue to enrich, research on Mobile Visual Search (MVS) has grown domestically. Professor Zhu Qinghua's team at Nanjing University defines MVS at two levels [30]:

1. **Narrow sense**: Using mobile terminals to capture visual resources of physical objects in real scenes as search items, parsed and processed by mobile applications or platforms for interactive information retrieval.

2. **Broad sense**: A data-driven, task-oriented innovative information service model in mobile internet environments, emphasizing effective construction and organization of visual information resources to develop specific applications for different user groups and contexts, meeting personalized, precise, and agile user needs.

MVS can be implemented through approaches such as:

- University of Miami Computer Science Assistant Professor B. Brinkman's app using QR-code-like tags on book spines for rapid shelf-checking via automatic and batch recognition.
- Shanghai Jiao Tong University's Nobel Prize exhibition, where scanning activity photos with mobile apps displays historical background text, audio, video, and animations, enriching acceptance modalities.
- Shanghai Jiao Tong University's graduation yearbook activity, providing users with information about their first and last borrowed books, borrowing history, personalized behavior characteristics, and career orientation predictions.

3.4 Transformation: Digital Micro-Campus

Digital micro-campus typically includes [31]:
1. **Enterprise Messaging**: Creating digital campus conversation groups similar to WeChat/QQ groups for learning, research, reading, and business interactions.
2. **Personal Data Center**: Network fee queries, shuttle services, campus card, personal profiles, meeting assistants, off-campus internships, class schedules, ID information, borrowing records, and overdue fees.
3. **Personal Message Center**: Personal notification publishing/receiving, campus surveys, and subscriptions.
4. **Repair Suggestions**: Reporting network, dining, campus card, utilities, and hospital issues.
5. **Counselor Assistant**: Grade queries, funding queries, class circles, help documentation, enrollment queries, parent contact information, and one-click group creation.
6. **Campus Communication**: Creating circles for message publishing, searching, and trending topics like campus hotspots and second-hand trading.
7. **Campus Information**: Academic lectures, document notices, and academic reports.
8. **Life Services**: Shuttle information, lost and found, campus 互助 (mutual assistance), second-hand trading, and academic calendars. Additional features include address books, micro-office, micro-campus assistants, micro-libraries, personal cloud storage, news notifications, and mobile payments.

3.5 Embedding: Social and Consultation Services

The QQ platform "Lirentang" primarily discusses library operations, research, and academic studies, occasionally providing document delivery. Since its establishment, weekly digests have been compiled, organized, and processed. Members engage in high-quality exchanges given the diverse identities of participants (library directors, party secretaries, department heads, journal editors, foreign practitioners), facilitating knowledge dissemination in the field. These virtual interactions promote real-world interactions, enhancing multidimensional exchanges and user acceptance pleasure.

The WeChat platform "Sunshine Reading" regularly invites library directors and

experts for academic lectures and specialized sessions for graduate students, achieving positive outcomes. These platforms enable industry-wide interpersonal interaction, driving application and research development.

Worldlib AI Online Consultation, a web and WeChat-based platform using latest network technologies to integrate multiple search engines for foreign literature access, can be embedded into mobile libraries as a document query service scenario [32].

4 Optimization Strategies for Scenario-Based Information Acceptance in Mobile Libraries

The above optimization paths integrate service innovation and information space reconstruction with mobile library scenario applications. Given the obstacles and insufficient context configuration, flexible and modular iterative refinement based on user scenario expectations represents the future optimization direction.

4.1 Scenario Optimization Strategies

Mobile library information acceptance has evolved through three eras:
1. **Traffic Era**: Functions focused on short-term demand satisfaction, attracting high traffic and forming product-centered competitive advantages (e.g., Chaoxing Mobile Library).
2. **Data Era**: Traffic advantages diminished as the industry mined value-added potential. Libraries excavated user behavior history to provide personalized recommendations, increasing stickiness and developing traffic monetization.
3. **Scenario Era**: Cloud computing, big data, and mobile internet ushered in the scenario era where information acceptance is satisfied through both online and offline channels. As needs are progressively met, acceptance fatigue emerges.

Scenario optimization requires:
1. **Keen scenario perception**: Integrating user location, time, preferences, and gender data to segment needs and build user-centered application scenarios beyond product limitations [33].
2. **Intelligent breakthroughs**: Employing big data and AI algorithms to analyze user location and behavior patterns, accurately identifying workplaces, exercise habits, music interests, and gaming preferences for targeted scenario recommendations.
3. **Potential demand mining**: Mobile operators must analyze latent needs for proactive scenario design, as future competition centers on scenario capture. Meeting diverse, personalized needs attracts users and creates value.

4.2 Context Optimization Strategies

Mobile library information acceptance has transitioned from mechanical to emotional to intelligent acceptance. Context design, construction, reorganiza-

tion, and optimization should:
- Leverage big data to mine user expectations across scenarios regarding information needs, search habits, and acceptance preferences [34].
- Achieve modular adaptation of the three-dimensional "scenario-behavior-context" integration, representing the key optimization point.

4.3 Context Configuration Optimization Strategies

Mobile library scenarios transcend actual information acceptance needs. With sensor-embedded mobile terminals exhibiting organ-like characteristics, scenarios such as pre-wake beds, post-wake bathrooms, and dining halls have become acceptance contexts. Unlike previous products, scenario orientation represents an experience-based new species embodying unique lifestyles and emotional values [35].

Mobile library gamification concepts are transforming lifestyles and learning methods. Fragmented scenario-based rapid linking has become key to scenario experience optimization. Through fast community connections, mobile libraries reshape customs and emotional identity, revolutionizing information acceptance experiences.

4.4 Scenario Marketing Optimization Strategies

Since users have different expectations, search habits, and preferences across scenarios, perceiving these variations is fundamental to precision marketing. Optimization approaches include:

1. **User characteristic segmentation**: Analyzing multi-dimensional data including geographic (residence, district, scale), demographic (age, gender ratio, income, occupation, education), psychographic (personality, lifestyle), and behavioral (purchase motivation, brand loyalty, frequency) data [36].

2. **User value differentiation**: Applying the RFM model to identify user value based on recency, frequency, and monetary value of information acceptance behaviors, distinguishing high-value to low-value and potential to non-value users.

3. **Scenario recommendation**: For segmented user groups, recommending scenarios based on interest relevance, historical behavior similarity, and matching between interests and behaviors.

Conclusion

The misalignment of "scenario-behavior-context" severely hinders ultimate user experiences. This study analyzed obstacle factors, identified deficiencies, and proposed optimization paths and strategies. Building on existing scenarios and

core business needs, the research optimizes mobile library information acceptance paths through new construction, modification, reconstruction, transformation, and embedding, offering concrete optimization strategies.

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Author Contributions

Wang Fu: Determined the paper framework, wrote the manuscript, and revised the paper.
Bi Qiang: Proposed the research topic, revised the manuscript, and finalized the paper.

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