

Assessing Library Service Needs for the Development of a Mobile-Based Library Management System in a Higher Education Institution

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Abstract— The increasing adoption of digital technologies in higher education has heightened the demand for accessible and technology-enabled library services. However, many academic libraries continue to rely on manual and semi-automated processes that limit operational efficiency and user accessibility. This study assessed the current operational status of library services, identified operational challenges, and determined the functional requirements for the future development of a mobile-based library management system at Cebu Technological University–Barili Campus. A mixed-methods needs assessment research design was employed to assess existing library services and identify the functional requirements for a future mobile-based library management system. Data were collected from 346 respondents, including students, faculty members, and library personnel, using survey questionnaires, interviews, and focus group discussions. Descriptive statistics and thematic analysis were used to analyze the quantitative and qualitative data, respectively. The findings revealed that existing library services were generally functional (overall weighted mean = 4.15) but remained highly dependent on manual and semi-automated procedures. Respondents frequently encountered delays in locating library resources, processing circulation transactions, and accessing library information beyond regular operating hours. They also identified mobile catalog access, real-time book availability, automated notifications, secure user account management, and QR code-supported transactions as the most important functional requirements for a future mobile library management system (overall weighted mean = 4.36). The study concludes that academic libraries require user-centered and mobile-enabled services to address operational inefficiencies and meet the evolving information needs of higher education communities. The findings provide empirical evidence that can guide higher education institutions in planning, prioritizing, and implementing digital library transformation initiatives.

Keywords- Academic libraries; digital transformation; library needs assessment; mobile library services; higher education; mobile library management system

1. INTRODUCTION

The rapid advancement of information and communication technologies (ICT) has transformed service delivery across higher education institutions, including the management of academic libraries. Once regarded primarily as repositories of printed collections, academic libraries have evolved into technology-enabled learning environments that support teaching, research, and lifelong learning through digital resources and online services. As smartphones and other mobile devices have become indispensable tools for students and educators, academic libraries are increasingly expected to provide services that are accessible anytime and anywhere. Consequently, higher education institutions continue to adopt mobile technologies to improve library accessibility, operational efficiency, and user engagement [1, 13, 14, 15].

Mobile technologies have fundamentally changed how users search for, retrieve, and manage information resources. Mobile library services enable users to search Online Public Access Catalogs (OPACs), monitor borrowing records, reserve materials, receive notifications, and access digital resources through smartphones and tablets. These services enhance convenience, reduce dependence on physical library visits, and improve the overall user experience. Previous studies have consistently shown that mobile library applications improve information accessibility, increase user satisfaction, and promote more efficient library service delivery in higher education environments where mobile devices have become integral to academic life [1, 7, 14, 15]. Furthermore, a recent systematic review reported that mobile library services strengthen communication between libraries and users while improving access to information resources despite implementation challenges related to technological infrastructure and user readiness [14].

Despite these technological advances, many academic libraries continue to rely on manual or semi-automated procedures for circulation, attendance monitoring, and information retrieval. Users often need to visit the library to verify book availability, borrow or return materials, or obtain information regarding library services. Such

procedures may result in transaction delays, increase the administrative workload of library personnel, and restrict users' access to library resources outside regular operating hours. As higher education institutions continue to pursue digital transformation initiatives, identifying operational challenges and understanding stakeholder requirements have become increasingly important for planning sustainable and user-centered library technologies [1, 13, 15].

The successful implementation of digital library technologies depends not only on technological capability but also on users' acceptance and interaction with the system. The Technology Acceptance Model (TAM) explains that individuals are more likely to adopt information systems when they perceive them as useful and easy to use [2, 4]. Likewise, the Unified Theory of Acceptance and Use of Technology (UTAUT) identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of technology adoption [11, 16]. Complementing these theories, Wilson's Information Behavior Model explains that information-seeking behavior is influenced by users' information needs, environmental conditions, and available access mechanisms [17], while Nielsen's usability principles emphasize intuitive interfaces, efficient navigation, and user-centered design as essential characteristics of effective information systems [6, 10]. Collectively, these theoretical perspectives provide a sound foundation for understanding user expectations and guiding the development of mobile-based library technologies.

At Cebu Technological University-Barili Campus, library operations continue to rely on manual and semi-automated procedures for circulation, attendance monitoring, and user account management. Although these procedures adequately support routine library operations, they frequently require face-to-face transactions and limit users' ability to access library information remotely. With the increasing reliance on smartphones among students and faculty members, there is a growing need to determine whether existing library services adequately satisfy users' expectations for accessibility, efficiency, and convenience. Conducting a systematic assessment of current library operations and stakeholder requirements can therefore provide valuable evidence for future digital transformation initiatives within academic libraries.

Several Integrated Library Management Systems (ILS), particularly Koha, have been widely adopted to automate cataloging, circulation, acquisitions, patron management, and Online Public Access Catalog (OPAC) services [3, 8, 9]. Through responsive web interfaces and third-party mobile applications, these systems enable users to search library collections, monitor borrowing records, and access library services remotely. Studies have shown that Koha provides a cost-effective and flexible platform that supports library automation across diverse institutional settings [3, 8]. Nevertheless, implementing Koha frequently requires technical customization, system administration, and institutional configuration to align with local workflows, policies, and user requirements. Moreover, existing studies on Koha have largely focused on software adoption, implementation, operational effectiveness, and implementation barriers rather than systematically identifying stakeholder requirements before developing institution-specific mobile library solutions [3, 8].

Despite the increasing adoption of mobile technologies and integrated library systems in academic libraries, existing research has predominantly emphasized system implementation, usability evaluation, or technology acceptance after deployment [5, 11, 14, 15, 18]. Comparatively few studies have integrated assessments of existing library operations, operational challenges, and stakeholder-defined functional requirements prior to developing a mobile-based library management system. This research gap is particularly evident in higher education institutions where operational workflows, service priorities, and user expectations vary considerably. Systems developed without a comprehensive understanding of institutional requirements may experience lower usability, reduced user acceptance, and limited long-term sustainability.

To address this gap, the present study adopts a user-centered needs assessment approach by examining the current operational status of library services, identifying operational challenges encountered by library users, and determining the functional requirements for a future mobile-based library management system at Cebu Technological University-Barili Campus. Rather than evaluating an existing mobile library application, this study establishes an empirical foundation for future system development based on the perspectives of students, faculty members, and library personnel. The findings contribute practical evidence that can guide higher education institutions in designing institution-specific, mobile-enabled library management systems that support digital transformation, improve library service delivery, and increase the likelihood of successful technology adoption.

Therefore, this study assessed the current operational status of library services, identified the operational challenges encountered by library users, and determined the functional requirements considered essential for the future development of a mobile-based library management system at Cebu Technological University-Barili Campus. Specifically, the study sought to describe existing library operations, examine users' experiences and operational challenges, and identify the mobile-based features considered most important by library

stakeholders. The findings provide empirical evidence to support institutional planning, guide technology adoption, and inform future library modernization initiatives in higher education institutions.

2. MATERIALS AND METHODS

2.1 Research Design

This study employed a mixed-methods needs assessment research design to examine the existing library services at Cebu Technological University–Barili Campus and identify the requirements for a future mobile-based library management system. The quantitative component assessed the current operational status of library services, operational challenges, and the perceived importance of proposed system features using structured questionnaires. The qualitative component, through interviews and focus group discussions, provided a deeper understanding of users' experiences, expectations, and service requirements. The integration of quantitative and qualitative findings enabled a comprehensive assessment of institutional needs that will serve as the empirical basis for the subsequent design and development of the proposed mobile-based library management system within a broader Design and Development Research (DDR) framework.

2.2 Research Locale and Participants

The study was conducted at the Cebu Technological University–Barili Campus Library in Cebu, Philippines. The library serves undergraduate and graduate students, faculty members, and administrative personnel by providing access to printed and electronic academic resources.

Participants consisted of 346 respondents, including students, faculty members, and library personnel, who regularly utilized the university library. The sample size was determined using Slovin's formula with a 5% margin of error. Library personnel were selected through purposive sampling because of their direct involvement in library operations, while students and faculty members were recruited using convenience sampling based on their availability and experience in using the library's services. Convenience sampling was considered appropriate because only students and faculty members with prior experience using the university library could provide meaningful evaluations of existing library services and future system requirements. Their participation provided valuable perspectives regarding the operational status of the library, challenges encountered during routine transactions, and the functionalities expected from future mobile-based library services.

2.3 Data Collection

Data collection focused on assessing the current operational status of library services, identifying operational challenges, and determining the functional requirements for a mobile-based library management system. Quantitative data were collected using a structured questionnaire administered to students, faculty members, and library personnel. The questionnaire included indicators related to accessibility, operational efficiency, user experience, common problems encountered during library transactions, and desired system features.

To complement the survey results, semi-structured interviews and focus group discussions were conducted with selected participants. These activities provided deeper insights into users' experiences with existing library services and enabled respondents to express their expectations regarding future digital library technologies. The qualitative findings were used to support and enrich the interpretation of the quantitative results.

2.4 Research Instrument

A researcher-developed questionnaire served as the primary instrument for data collection. The instrument was designed to assess three major areas: (1) the current operational status of library services, (2) operational challenges encountered by users, and (3) the functional requirements considered essential for a mobile-based library management system. Items were developed following an extensive review of literature and theoretical constructs derived from TAM, UTAUT, Wilson's Information Behavior Model, and Nielsen's usability principles.

Before administration, the questionnaire underwent expert validation to evaluate its content relevance, clarity, and appropriateness. Suggestions from the validators were incorporated to improve the instrument before it was distributed to the respondents.

2.5 Data Analysis

Quantitative data were analyzed using descriptive statistical techniques. Frequency counts and percentages were used to summarize respondents' demographic characteristics, while weighted mean scores were computed to determine the current operational status of library services, the operational challenges encountered by users, and the perceived importance of the proposed system features.

Qualitative data obtained from interviews and focus group discussions were analyzed using thematic analysis. Responses were coded, grouped into categories, and synthesized into recurring themes that complemented the

quantitative findings and provided additional context for interpreting users' experiences and expectations regarding future library services.

2.6 Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents before data collection. Participants were informed of the purpose of the study, their right to withdraw at any stage without penalty, and the confidentiality of the information they provided. Personal information collected during the study was treated with strict confidentiality and used solely for research purposes in accordance with institutional research ethics and the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173).

3. RESULTS AND DISCUSSION

3.1 Current Operational Status of Library Services

The current operational status of library services at Cebu Technological University–Barili Campus was assessed to establish a baseline understanding of existing library operations. The assessment focused on accessibility, operational efficiency, and user experience to determine how effectively the library supports the information needs of its users.

As presented in Table 1, respondents rated the overall operational status of the library with a weighted mean of 4.15, interpreted as Agree. Among the evaluated dimensions, accessibility obtained the highest weighted mean (4.18), followed by efficiency (4.17) and user experience (4.10). These findings indicate that while the library generally provides satisfactory services, its operations remain largely dependent on manual and semi-automated procedures that require users to visit the library for routine transactions.

TABLE 1: CURRENT OPERATIONAL STATUS OF LIBRARY SERVICES

Indicator	Weighted Mean	Interpretation
Accessibility	4.18	Agree
Efficiency	4.17	Agree
User Experience	4.10	Agree
Overall	4.15	Agree

These findings indicate that existing library services remain operationally functional; however, they no longer fully satisfy users' expectations for immediate, technology-enabled access to library resources. This reflects the increasing demand for digital library services in higher education and reinforces the importance of user-centered digital transformation initiatives. These results are consistent with Acheampong and Agyemang [1], who emphasized that mobile technologies improve library accessibility by extending services beyond the physical library environment. Similarly, Rivo and Žumer [13] reported that mobile library services enhance user convenience by enabling remote access to library information and resources. The present findings indicate that although the current library system remains functional, opportunities exist to modernize service delivery through mobile-enabled technologies that better accommodate the changing information-seeking behavior of library users.

3.2 Operational Challenges Encountered by Library Users

To better understand the limitations of the existing library system, respondents identified the operational challenges they commonly experienced during routine library transactions. The findings revealed that several activities continue to rely on manual procedures, affecting both service efficiency and user convenience.

As shown in Table 2, the most frequently encountered challenge was the time required to locate available library materials (weighted mean = 3.86), followed by the lengthy borrowing and returning process (3.78) and the absence of real-time information regarding book availability (3.76). Respondents also reported inconvenience in accessing library services beyond regular operating hours (3.73) and occasional recording errors during manual transactions (3.65). The overall weighted mean of 3.75 indicates that these operational concerns are often experienced by library users.

TABLE 2: OPERATIONAL CHALLENGES ENCOUNTERED BY LIBRARY USERS

Problem	Weighted Mean	Interpretation
Locating available books takes a long time	3.86	Often
Borrowing and returning are time-consuming	3.78	Often
No real-time information on book availability	3.76	Often
Services are inconvenient outside office hours	3.73	Often

Recording errors occur during transactions	3.65	Often
Overall	3.75	Often

These findings suggest that users increasingly expect library services to be available through mobile platforms rather than traditional face-to-face transactions. Similar observations were reported by Singh and Madhusudhan [15], who noted that mobile technologies enable libraries to improve service delivery by providing immediate access to catalogs, circulation records, and notifications. These findings further support Wilson's Information Behavior Model [17], which suggests that users prefer information systems that provide timely, convenient, and accessible information through appropriate technological channels. Addressing these operational challenges is therefore essential in planning future digital transformation initiatives within academic libraries.

3.3 Functional Requirements for a Mobile-Based Library Management System

Following the identification of operational challenges, respondents evaluated the functionalities that they considered important for a future mobile-based library management system. The assessment aimed to determine which features should be prioritized to improve library service delivery and user accessibility.

As presented in Table 3, all proposed system features received Very Important ratings, with an overall weighted mean of 4.36. The highest-rated requirement was a user-friendly mobile interface (weighted mean = 4.43), followed by mobile access to the library catalog (4.38) and real-time book availability (4.38). Respondents also emphasized the importance of automated due-date notifications (4.37), secure user account management (4.35), automated borrowing and returning transactions (4.34), online reservation and renewal (4.32), and digital attendance monitoring (4.31).

TABLE 3: FUNCTIONAL REQUIREMENTS OF THE PROPOSED SYSTEM

Problem	Weighted Mean	Interpretation
User-friendly mobile interface	4.43	Very Important
Mobile access to library catalog	4.38	Very Important
Real-time book availability	4.38	Very Important
Automated due-date notifications	4.37	Very Important
Secure user account management	4.35	Very Important
Automated borrowing and returning	4.34	Very Important
Online reservation and renewal	4.32	Very Important
Digital attendance monitoring	4.31	Very Important
Overall	4.36	Very Important

The prioritization of these features indicates that future system development should focus on enhancing accessibility, automation, and user convenience. Respondents prioritized features that provide immediate access to library information, reduce manual transactions, and enhance communication between the library and its users. These findings are consistent with the Technology Acceptance Model, which explains that users are more likely to adopt technologies they perceive as useful and easy to use [4]. Likewise, Parhamnia [11] reported that perceived usefulness, facilitating conditions, and usability significantly influence users' intentions to adopt mobile library services. The identified functional requirements therefore provide an empirical basis for planning future mobile-based library initiatives and may serve as practical guidance for higher education institutions seeking to modernize their library services.

Collectively, the findings demonstrate that while the existing library services remain functional, users continue to experience operational challenges that affect accessibility and efficiency. The strong preference for mobile-enabled services highlights the growing demand for technology-supported library operations in higher education. These findings underscore the importance of conducting comprehensive needs assessments before implementing digital library initiatives, ensuring that future systems are aligned with institutional requirements and user expectations.

4. CONCLUSIONS

This study assessed the current operational status of library services, identified the operational challenges encountered by library users, and determined the functional requirements for a future mobile-based library management system at Cebu Technological University–Barili Campus. The findings revealed that although the existing library services adequately support routine operations, they remain largely dependent on manual and semi-automated procedures that limit accessibility, delay transactions, and reduce service efficiency. These operational constraints underscore the importance of adopting user-centered mobile technologies to improve accessibility, efficiency, and service delivery within academic libraries.

The study further identified several operational challenges, including delays in locating library materials, time-consuming circulation processes, the lack of real-time information on book availability, and limited access to library services beyond regular operating hours. In response, respondents consistently rated mobile-based functionalities—such as mobile catalog access, real-time availability of library resources, automated notifications, secure account management, and digital transaction support—as highly important. These findings demonstrate a strong demand for library services that are more accessible, efficient, and responsive to the evolving needs of students, faculty members, and library personnel.

The results provide empirical evidence that can support strategic planning for library modernization and digital transformation in higher education institutions. By identifying user priorities before implementing technological solutions, institutions can make informed decisions regarding future library information systems and allocate resources toward features that directly address operational needs. Conducting a comprehensive needs assessment also helps ensure that future technology initiatives are aligned with user expectations and institutional objectives, thereby increasing the likelihood of successful adoption and long-term sustainability.

This study was conducted in a single higher education institution; therefore, the findings may not fully represent the needs and operational contexts of other academic libraries. Future research may expand the investigation to multiple institutions, compare the digital readiness of different library environments, or examine additional factors that influence the adoption of mobile library services. Such studies would contribute to a broader understanding of technology readiness and support evidence-based digital transformation initiatives across higher education institutions.

Overall, this study highlights the importance of systematically assessing library operations and user requirements before implementing digital innovations. The findings provide a practical foundation for institutions seeking to modernize library services through user-centered, mobile-enabled technologies while supporting more accessible, efficient, and sustainable academic library operations.

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