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Academic Library with Generative AI: From Passive Information Providers to Proactive Knowledge Facilitators

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Abstract

This study investigates how generative artificial intelligence (AI) is reshaping academic libraries from passive information providers into proactive knowledge facilitators. Drawing on the qualitative case study of a South Korean university library that implemented an AI-powered chatbot, the study examines its impact on service personalization, user engagement, and research efficiency. The thematic analysis of interviews with users and staff reveals how AI integration transforms the user experience and redefines professional roles. Findings contribute to scholarly discussions on library innovation, demonstrating how generative AI enables adaptive, anticipatory knowledge services in academic environments shaped by digital transformation.

Keywords: generative artificial intelligence; passive information; proactive knowledge; digital transformation; artificial intelligence



Academic Editors: Marta de la Mano, Beatriz Albelda and Andrew Kirby

Received: 15 June 2025

Revised: 7 August 2025

Accepted: 11 August 2025

Published: 15 August 2025

Citation: Kim, J. (2025). Academic Library with Generative AI: From Passive Information Providers to Proactive Knowledge Facilitators. *Publications*, 13(3), 37. <https://doi.org/10.3390/publications13030037>

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1. Introduction

For centuries, academic libraries have served as foundational institutions dedicated to the collection, preservation, and dissemination of knowledge, playing a central role in supporting human learning and scholarly inquiry. Historically, these institutions operated under a reactive service paradigm in which users initiated information-seeking tasks and libraries responded by retrieving relevant resources. While this model was effective in the relatively static, print-dominated environment of the past, it has become increasingly inadequate in the digital era—an era characterized by exponential growth in the volume, speed, and complexity of information. As a result, academic libraries are under mounting pressure to transcend their traditional function as passive repositories and instead adopt proactive, user-centered strategies capable of addressing the evolving demands of diverse scholarly communities (Williams, 2023).

Within this shifting landscape, generative artificial intelligence (AI) presents new opportunities for reimagining library services. Unlike conventional search tools, generative AI—powered by large-scale language models and advanced natural language processing (NLP)—enables dynamic, context-sensitive interactions between users and information systems (Boateng, 2025). For instance, when queried about emerging research in climate change, these systems can rapidly scan extensive academic corpora and return not only relevant publications but also synthesized insights and tailored summaries. This capacity supports users in navigating information overload, increases the accessibility of academic content, and accelerates the research process.

Beyond transforming user interactions, generative AI holds significant potential for reshaping internal library operations. Many functions previously reliant on manual efforts—

such as cataloging, metadata creation, and routine reference services—can now be automated, enabling librarians to reallocate their expertise to higher-order tasks (J. S. Kim et al., 2024). These include the analysis of user behavior, the development of targeted instructional programs, the design of digital literacy curricula, and the implementation of data-informed collection development strategies. Furthermore, generative AI can assist with outreach initiatives by identifying emerging user interests and recommending tailored content, thereby reinforcing the library's evolving role as both an academic partner and a social anchor within the institution.

A particularly promising application of generative AI lies in the delivery of personalized services. By analyzing users' search patterns, topic preferences, and behavioral histories, AI systems can offer individually tailored resource recommendations and even introduce users to emerging scholarly domains aligned with their academic trajectories. This capability reframes libraries not as passive support units but as active collaborators in students' and researchers' learning journeys. These developments mirror the growing body of literature that positions service innovation and personalization as strategic imperatives in contemporary librarianship (Baryshev et al., 2018; Chaudhuri & Terrones, 2025; Kulkanjanapiban et al., 2025; and Wójcik, 2019). However, the integration of generative AI into library systems also raises foundational questions about the mission and identity of academic libraries. As Harisanty et al. (2024) suggest, moving from passive information provision to proactive knowledge facilitation—where the library actively guides users through complex information ecosystems, contextualizes resources to individual academic needs, and co-creates meaningful learning experiences—necessitates deep shifts in organizational culture, professional competencies, and governance structures. Libraries may increasingly be expected to deliver not just access to static resources but curated, real-time, and user-specific knowledge solutions. Such a transformation requires not only advanced technological capacity but also institutional redefinition (Okunlaya et al., 2022).

Against this backdrop, the present study explores the integration of generative AI in an academic library context, with a specific focus on its role in enabling proactive information services. This research investigates how AI implementation affects service personalization, user experience, and research efficiency. Through interviews with both library users and implementation stakeholders, the study provides empirical insights into the strategic, operational, and experiential dynamics of AI-enabled innovation. Ultimately, this work contributes to the ongoing discourse on the future of academic libraries in the age of intelligent systems, with the aim of informing sustainable and user-responsive service design within higher education ecosystems. Accordingly, the study aims to examine how generative AI transforms the role of academic libraries from passive service providers to proactive knowledge facilitators. To guide this inquiry, we pose the following research questions:

RQ1: *In what ways does generative AI enable personalized and proactive information services within academic libraries?*

RQ2: *How do users and staff perceive the strategic and operational impacts of implementing generative AI tools in library settings?*

2. Theoretical Background

Libraries have long served as essential institutions for collecting, preserving, and disseminating knowledge, acting as pillars that support human learning and research. However, with rapid technological advancements—particularly in AI—the role of libraries has evolved from passive information providers to dynamic knowledge curators. Understanding this transformation requires an exploration of the theoretical foundations of

library services and the shifting paradigms of information delivery (Dei & Danquah, 2024; Howlett et al., 2024).

2.1. Evolution of Library Services and Shifts in Information Delivery Paradigms

Libraries have traditionally served as central institutions for collecting, preserving, and disseminating knowledge to support learning and research. Historically, they operated through a passive information delivery model wherein users initiated queries and libraries responded by retrieving requested materials. This approach, effective in a more static and resource-constrained, print-based era, has become insufficient in the digital age, where the volume, diversity, and immediacy of information have increased dramatically.

The proliferation of digital content and rapid advancements in technology have reshaped user expectations. Today's users seek instant access not only to diverse information sources but also to high-quality, contextually relevant content that can be integrated into their academic or professional work. Consequently, libraries are shifting from reactive service models to active information delivery paradigms that anticipate user needs and provide tailored information before it is explicitly requested (Duncan, 2025). This transformation necessitates the reimagining of libraries as dynamic institutions engaged in ongoing knowledge curation rather than static repositories (Oladokun et al., 2023).

At the core of this shift is the concept of information curation. Traditionally limited to cataloging and classification, curation now involves filtering irrelevant content, highlighting important resources, and offering interpretive insights that transform data into meaningful knowledge. This ensures that information is not only available but specifically aligned with users' academic, professional, or personal goals (Jha, 2023). Equally important is the growing emphasis on personalized service delivery. Modern libraries increasingly provide custom services such as reading lists, tailored content recommendations based on past user behavior (Williams, 2023), and notifications about new resources relevant to specific interests, thereby enhancing user engagement and efficiency (Okunlaya et al., 2022; Aboelmaged et al., 2024).

The expansion of these services is made possible by developments in data analytics, machine learning, and AI (Pival, 2023). These tools allow libraries to analyze usage patterns, predict future needs, and design more responsive services. For instance, machine learning algorithms can track user interactions with digital resources and proactively suggest materials, while NLP technologies enhance search functionalities by understanding and responding to natural language queries in more human-like ways (Haffenden et al., 2023).

These changes also have implications for library professionals. Whereas librarians were once mainly the custodians of information—focused on managing collections and assisting users—they are now expected to act as knowledge curators and engagement specialists. This expanded role requires a deep understanding of user behavior, technological fluency, and the ability to contextualize information for varied audiences (Allen, 1995; Panda & Chakravarty, 2022). Moreover, library spaces themselves are being reconfigured to reflect this shift. Many institutions now offer collaborative learning environments, such as maker spaces and media labs, while also expanding digital literacy programs, research consultations, and instructional workshops (Kalota et al., 2025).

In summary, the evolution from passive to active information delivery reflects the broader transformation of libraries in the digital era. Libraries are no longer confined to preserving information; they are increasingly expected to facilitate knowledge creation through curated, personalized, and anticipatory services. As such, they remain essential to the academic enterprise, adapting their spaces, roles, and systems to meet the evolving demands of the information landscape.

2.2. Generative AI and Information Curation

In the digital age, managing the influx of vast and complex data has elevated information curation into a critical operational task for libraries. Generative AI offers new possibilities to automate this process, enhancing efficiency in filtering, organizing, and delivering relevant information. With the rise in generative AI, libraries are poised to revolutionize the way information is curated, transitioning from manual processes to AI-driven, automated, and personalized approaches that more effectively engage with user needs. The primary goal of information curation is to sift through extensive datasets, identify meaningful content, and organize it in a user-centric manner to deliver relevant and timely information (Zhou & Lu, 2025). While traditional curation relies on human expertise to filter, categorize, and interpret data, the advent of generative AI has introduced new possibilities for automating and personalizing this process.

Generative AI, driven by advancements in NLP and machine learning, enables the analysis of large datasets and the proactive delivery of contextually relevant information tailored to user needs. This technology outpaces traditional information delivery methods by learning from user search patterns, preferences, and behaviors, enabling libraries to offer highly accurate and personalized recommendations. Consequently, libraries are re-defining their traditional role, shifting from passive information disseminators to proactive knowledge facilitators (J. S. Kim et al., 2024). One of the most significant advantages of generative AI in information curation is its capacity to process and analyze vast volumes of data at speeds far exceeding human capabilities. While traditional human curators are constrained by time and cognitive capacity, generative AI can scan millions of documents, articles, and datasets in real time, extracting relevant information and organizing it in an accessible manner. This capability not only enhances the efficiency of information curation but also ensures that users have access to the most up-to-date and pertinent information available. By managing large-scale data processes, generative AI enables libraries to evolve from static information repositories to active knowledge facilitators, providing users with insights that support immediate, meaningful engagement.

Generative AI's ability to understand and process natural language enables it to engage with users in a more intuitive, human-like manner. Rather than relying only on traditional keyword searches, users can pose complex queries in natural language, allowing the AI to interpret the context and provide nuanced, comprehensive responses. Moreover, generative AI can engage in sophisticated dialogs, clarifying user intent and refining its responses based on ongoing interactions. This level of engagement transforms the user experience, making it not only more interactive but also more personalized and responsive to users' evolving needs (Kautonen & Gasparini, 2024).

Additionally, generative AI excels in delivering personalized information curation tailored to individual user preferences (Zhou & Zhang, 2025). By analyzing users' search histories, interests, and behavioral patterns, AI systems can proactively recommend relevant materials. For instance, if a user frequently searches for information on climate change, the AI can automatically suggest the latest research articles, news updates, and relevant books on the topic. This predictive capability ensures that users receive not only relevant information but also anticipatory resources, addressing their needs even before they explicitly request them (Aboelmaged et al., 2024).

The integration of generative AI into library services represents a significant shift from traditional information delivery methods to a more proactive, user-centered approach. This evolution highlights the need for libraries to adapt to the changing information landscape and leverage emerging technologies to meet users' sophisticated demands. By doing so, libraries can strengthen their role as dynamic knowledge curators, supporting human learning and research in an increasingly complex digital landscape (Okunlaya et al., 2022).

Moreover, generative AI can assist libraries in managing their collections more effectively. Through predictive analytics, AI systems can identify trends in user behavior and anticipate future information needs, guiding libraries in their acquisition and resource allocation strategies. For example, if AI detects a growing interest in a particular scientific field, it can recommend new publications and resources, ensuring that the library's collection remains relevant and up to date. Such proactive collection management ensures libraries remain closely aligned with user needs and emerging academic trends (Harisanty et al., 2024; Mughari et al., 2024).

In addition to improving information curation and collection management, generative AI plays a crucial role in enhancing user engagement and outreach. AI-driven chatbots and virtual assistants provide 24/7 support, answering queries, guiding users through the library's resources, and offering personalized recommendations. These AI tools bridge the gap between users and the vast array of information available, making it easier for users to find what they need and engage more deeply with the library's offerings (Bilgram & Laarmann, 2023). For instance, advanced AI-powered chatbots can handle a wide range of tasks, from answering frequently asked questions to assisting with complex research inquiries, thereby improving the overall user experience and ensuring that users receive timely and relevant information (Jha, 2023). However, it is important to note that simple, rule-based chatbots often fail to address more sophisticated user needs, which has limited their widespread adoption in academic library settings.

The integration of generative AI in libraries has significant implications for the skills and roles of library professionals. As AI automates routine tasks such as data processing and basic information retrieval, library staff can shift their focus to more complex, value-added activities. These include developing innovative programs, providing in-depth research support, and fostering a collaborative and inclusive learning environment. By embracing generative AI, library professionals can enhance their expertise and contribute more significantly to the library's mission of supporting education, research, and community engagement (Gupta & Gupta, 2023). However, the successful implementation of generative AI in libraries requires overcoming several challenges, including securing adequate funding, developing technical skills, and cultivating positive attitudes among library staff. Training and professional development programs are essential for equipping library professionals with the skills needed to effectively integrate AI technologies. Additionally, fostering a culture of innovation and openness to change will facilitate the seamless adoption of AI in library services (Subaveerapandiyan & Gozali, 2024).

In conclusion, the integration of generative AI into information curation marks a transformative shift in how libraries manage and deliver information. By leveraging AI, libraries can transition from passive information repositories to proactive knowledge facilitators, offering personalized and anticipatory services that meet the evolving needs of their users. This shift not only streamlines library services but also repositions libraries as dynamic centers of knowledge, essential to the evolving digital academic landscape. The future of libraries depends on their ability to adapt to technological advancements and harness AI to create more engaging, responsive, and user-centric services.

3. Research Design

This study employs a qualitative research design rooted in thematic analysis to comprehensively investigate the integration of generative AI into academic library services. The core research aim is to elucidate how the adoption of generative AI technology, especially through the implementation of advanced chatbots, drives the evolution of library services from traditional, passive information provision toward proactive, user-centered, and knowledge-driven models. This transformation is conceptually situated within the

broader discourse of digital transformation and service innovation in academic libraries, confirming the increasing relevance of AI-related frameworks for redefining the mission and operations of such institutions.

To achieve this goal, the research utilizes a single embedded case study methodology. The focal case is the pioneering implementation of the generative AI-powered chatbot *tlooto Copilot* (1.5 ver.) at a major university library in South Korea—a site purposefully selected for its early adoption, technological novelty, and strong potential for theoretical contribution. This case embodies the rare yet critical phenomenon of institutional-scale AI adoption in the library sector, offering an opportunity to map out practical pathways for digital innovation (J. S. Kim & Kim, 2023), as highlighted in recent conceptual and applied research on the integration of artificial intelligence within the global library landscape.

On 1 September 2024, the Case University Library launched *tlooto Copilot*, developed in partnership with an AI technology company (<https://tlooto.com>, accessed on 10 August 2025). The chatbot system was seamlessly embedded into the library's digital infrastructure, enabling users to search across an extensive academic corpus comprising over 300 million peer-reviewed articles, scholarly monographs, and theses. Users are empowered to interact with the system via natural language queries, receiving contextually relevant, academically robust responses in real time. Regarding copyright considerations, the system accesses licensed academic databases for Case University users, while the commercial service offers similar AI-driven search capabilities based on publicly available and partner-provided datasets. The university's collaboration focused on creating a customized deployment, ensuring compliance with institutional licensing agreements while leveraging the commercial platform's infrastructure. The selection of this case enables the exploration of the overarching research question: in what ways does generative AI facilitate the reconfiguration of library services from information gatekeeping to anticipatory knowledge facilitation?

Data collection was conducted through semi-structured, in-depth interviews with two main stakeholder groups: (1) Library users—including undergraduate and graduate students, faculty members, and administrative staff—representing a range of academic and practical information needs; and (2) AI implementation personnel, spanning technical developers and library management. Participants were purposefully selected to capture diverse perspectives across disciplines, academic years, and engagement levels with library services. For users, the sample included undergraduate students from different academic years and majors, graduate students involved in active research projects, and faculty members from various departments. For staff and developers, the selection criteria included roles in AI system development, service management, and direct user support. Recruitment occurred via targeted email invitations disseminated through the library's user base and project communication channels. In total, fourteen interviews were conducted between October and November 2024—comprising eight with users and six with library staff and developers. Each interview lasted approximately 45–60 min and was audio recorded and transcribed verbatim in accordance with participant consent and research ethics standards.

The interview participants reflected a diverse cross-section of the university community, including undergraduate students navigating early-stage research tasks, graduate students engaged in advanced academic projects, faculty members seeking comprehensive literature reviews, and library staff overseeing service delivery and system integration. Implementation personnel provided insights into the technical and operational dimensions of the project, including system customization, data management, and end-user training. The interviews were designed to explore four primary domains: (1) users' interaction experiences with *tlooto Copilot*, (2) perceived improvements in research efficiency and service satisfaction, (3) challenges encountered during implementation from both user and staff perspectives, and (4) the evolving role of librarians in an AI-augmented service

environment. This structured approach ensured that each interview session systematically captured both individual user journeys and institutional insights. The interview protocol probed participants' interaction experiences, perceived utility, changes in research productivity, satisfaction with library services, as well as project rationale, implementation challenges, and institutional objectives from the administrative and developer perspectives. This design situates the investigation in line with sectoral best practices for capturing multifaceted user and staff feedback relating to technological change. Although only selected quotes are presented, all interview data contributed to identifying patterns aligned with our research questions. Voices not directly quoted informed underlying conceptual insights.

Thematic analysis proceeded through four iterative and rigorous stages (see Figure 1). First, interview transcripts were created and systematically reviewed. Second, open coding was employed to identify descriptive codes and salient patterns, leveraging both recurring terminology and emergent conceptual insights. Third, these codes were clustered into broader themes by axial coding, resulting in the identification of four dominant thematic anchors: "enhanced user experience," "improved research efficiency," "service personalization," and "shifts in the role of librarians." These themes are directly aligned with current international research on the impacts of generative AI, encompassing service quality, personalization, operational effectiveness, and professional role transformation in academic libraries. These themes were not predetermined but emerged directly from participant narratives, reflecting their lived experiences and perspectives on AI integration. Fourth, cross-thematic synthesis was performed by linking each theme to the study's central research questions.

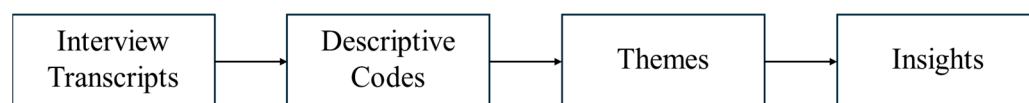


Figure 1. The case study process.

The analytic process generated a nuanced understanding of both perceived and demonstrated shifts resulting from AI integration. For instance, both users and staff reported substantial improvements in research efficiency, citing faster and more accurate access to academic content. The AI chatbot's capacity for real-time, tailored recommendations based on individual queries and inferred intent deepened user engagement and fostered higher satisfaction levels. At the same time, the deployment of generative AI catalyzed an evolution in the roles of library professionals, moving beyond traditional custodianship toward dynamic knowledge curation, digital literacy support, and ethical guidance for academic work in a digitally enhanced environment. These findings will be further discussed in the Conclusion section, where their broader implications for policy, workforce development, and institutional strategy are explored.

4. Findings

The Case University Library has established itself as a pioneering institution in supporting academic research and learning. In June 2024, the library, in collaboration with the AI company 'tlooto (tlooto.com)', agreed to implement a generative AI chatbot service, tlooto Copilot, which was officially launched in September (See Figure 2). This strategic collaboration aimed not only to enhance information accessibility but also to transform how users interact with academic resources. The system, designed to process over 300 million academic papers and professional books, enables users to ask natural language questions and receive contextually relevant answers from a vast database of the scholarly literature. By integrating this advanced AI technology, the library sought to move beyond the limita-

tions of traditional research methods, making academic content more accessible not only to specialized researchers but also to undergraduate students and general users.

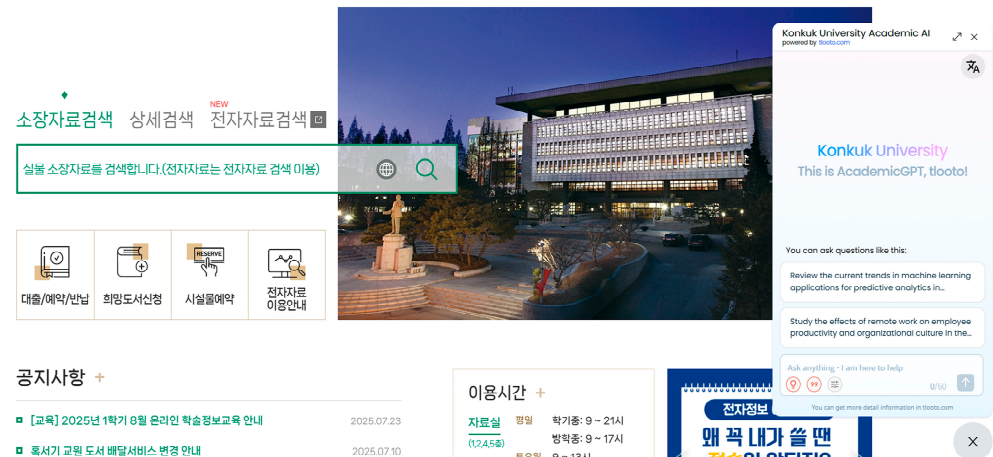


Figure 2. Case University Library with tlooto Copilot.

The introduction of the tlooto Copilot marked a significant turning point for the university library, signifying a transformation from traditional, reactive information services to a dynamic, proactive service model. Users could now engage directly with the library system in conversational interactions, receiving personalized responses to complex academic queries. This innovation fundamentally shifted the perception of the academic literature as the domain of expert researchers, making it more accessible to a wider audience. The ability of the tlooto Copilot to respond in real time, provide tailored research recommendations, pre-emptively deliver relevant materials, and actively engage in user dialog represented a major departure from previous static FAQ-based systems. This transformation aligns with the broader theoretical argument that integrating generative AI in libraries significantly enhances their ability to provide personalized, user-centric knowledge facilitation, thus redefining the traditionally passive role of libraries.

“The partnership with [Case University Library] was a significant milestone for us, as it demonstrated how generative AI can enhance both user engagement and research outcomes”—Marketing Director, tlooto.com

4.1. Implementation and Strategic Goals

The implementation of the tlooto Copilot was not just a technological upgrade but a strategic decision aimed at reshaping how library users engage with information. By leveraging NLP, the tlooto Copilot enabled users to ask complex, nuanced questions and receive accurate, research-based responses in real time. This system’s capacity to process extensive academic databases allowed for the seamless integration of cutting-edge AI into the research workflow, providing immediate and intuitive access to a wealth of academic knowledge. Additionally, the service was designed to cater to users across various levels of expertise, from undergraduate students to seasoned researchers, further demonstrating the library’s commitment to democratizing access to scholarly resources.

One of the most transformative aspects of the tlooto Copilot was its ability to facilitate deeper interactions between users and the library. The system not only provided more personalized research recommendations but also enabled users to engage in an ongoing dialog with the AI. This conversational approach marked a significant shift from passive information retrieval to an interactive, knowledge-driven service model. The AI’s ability to anticipate user needs and deliver context-aware information underscores the hypothesis that libraries utilizing generative AI will demonstrate higher levels of user engagement

and knowledge creation compared to traditional libraries relying only on static information retrieval methods.

“Using tlooto Copilot has saved me so much time when searching for research papers—I can get relevant results instantly, without having to sift through hundreds of articles”—Professor, Case University

4.2. Data Collection and Stakeholder Insights

To gain a comprehensive understanding of the impact of the tlooto Copilot, in-depth interviews were conducted with both AI implementation project managers and library users who actively engaged with the AI-based services. These interviews provided critical insights into the adoption process and tangible changes observed in service delivery. One project manager emphasized that the collaboration with tlooto was a strategic effort to evolve the library’s role beyond merely storing and retrieving information to actively providing tailored data and insights to users. The system’s ability to scan over 300 million academic sources and deliver relevant, contextually nuanced information in real time was seen as a key factor in achieving this vision.

“I love how intuitive the AI is. It understands exactly what I’m looking for, which makes my research process much smoother”—Researcher, Case University

Interviews with library users further validated the transformative potential of the tlooto Copilot. One researcher highlighted that, before the AI’s implementation, considerable time was spent manually searching for relevant materials. However, AI now performs much of the initial search work, delivering relevant articles and resources quickly and effectively, which has dramatically increased research productivity. Another user noted that the AI’s personalized recommendations were particularly valuable, allowing them to explore research areas they might not have otherwise considered, thereby deepening their engagement with the material. These insights reinforce the notion that generative AI enhances the personalization of library services and improves research efficiency, further supporting the theoretical hypothesis that AI can transform libraries into proactive knowledge facilitators.

“The personalised recommendations are one of my favourite features. The AI suggests resources I hadn’t even thought of, which has really enriched my research”—PhD Student A, Case University

4.3. Impact on User Engagement and Knowledge Creation

The implementation of the tlooto Copilot has fundamentally transformed the user experience within the library. By enabling real-time, personalized knowledge delivery, the AI system significantly enhanced the efficiency of information retrieval, reducing the cognitive load on researchers. Its capacity to deliver context-aware suggestions greatly improved user satisfaction, as users reported being able to locate relevant information more quickly and effortlessly. The AI’s proactive approach to delivering resources preemptively addressed user needs before they were explicitly articulated, aligning with modern expectations of immediacy and tailored service in academic environments.

Additionally, the AI’s ability to engage users in interactive dialog facilitated higher levels of knowledge creation. Rather than simply retrieving static information, the tlooto Copilot provided nuanced responses that integrated diverse academic sources, helping to shape the direction of users’ research. This interactive model reflects a broader trend in which libraries transition from static repositories of information to dynamic hubs of knowledge, where data is actively curated and tailored to individual needs. The increased engagement between users and the library system is a key outcome of this transformation,

demonstrating that generative AI not only enhances user engagement but also fosters deeper, more meaningful knowledge creation.

“I’ve found the generative AI incredibly easy to use. I can ask complex questions in everyday language, and it delivers accurate, detailed responses right away”—Master Student, Case University

4.4. Key Outcomes and Broader Implications

A case study of a university library’s adoption of the tlooto Copilot reveals several key outcomes. First, the integration of generative AI streamlined information retrieval processes, yielding notable time savings for researchers and improving overall service efficiency. Beyond enhancing daily operations, the AI system’s capacity to proactively assist users fostered a deeper engagement with the library’s digital ecosystem, reshaping how academic support is perceived and delivered. This shift elevated the library’s strategic role, positioning it as an active collaborator in research activities rather than a passive resource center. Furthermore, the successful deployment of the tlooto Copilot reinforced the institution’s leadership within the academic community, illustrating how thoughtful AI integration can serve as a catalyst for innovation and institutional relevance in a rapidly evolving research landscape.

“Even as an undergraduate, I feel like I have access to the same high-level research tools as advanced researchers, thanks to the way the AI simplifies complex academic searches”—Undergraduate Student, Case University

Furthermore, the collaboration between the Case University and tlooto offers practical insights into the processes and considerations involved in implementing generative AI solutions within library environments. Rather than viewing AI solely as a tool for service enhancement, this partnership exemplifies how strategic collaborations can drive institutional innovation, enabling libraries to evolve alongside technological advancements. The Case University experience underscores the importance of co-developing solutions that align with user expectations and academic objectives, ensuring that AI integration is both meaningful and sustainable. Figure 3 illustrates the website traffic growth of the Case University Library following the launch of tlooto Copilot in early September 2024. This increase highlights how the AI system, developed in collaboration with tlooto, enhanced user engagement by simplifying access to research resources and responding to the immediate needs of the academic community.

“I love how intuitive the AI is. I can ask broad questions or very specific ones, and it understands exactly what I’m looking for, which makes my research process much smoother”—PhD Student B, Case University

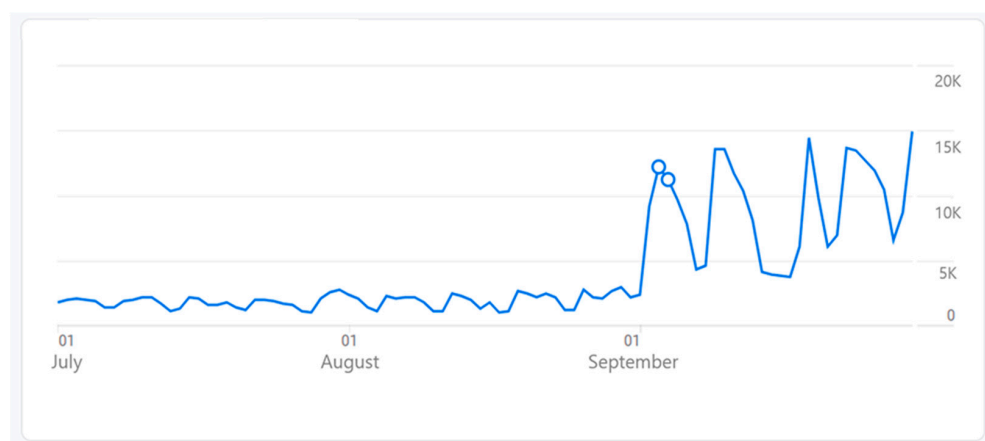


Figure 3. Website traffic growth following the installation of the generative AI.

5. Discussion

This study offers an in-depth examination of how generative artificial intelligence (AI) redefines the role and functions of academic libraries, with a particular focus on the implementation of the flooto Copilot system. Drawing on qualitative interviews with 14 participants—including undergraduate and graduate students, faculty members, and library staff—the analysis captures firsthand perspectives on how AI integration reshapes user experiences and service delivery. The findings illustrate a fundamental institutional shift—from functioning as passive information providers to operating as proactive, adaptive knowledge facilitators. Traditionally, academic libraries have responded to user-initiated queries through static access points. The deployment of generative AI, however, marks a paradigmatic change: one in which libraries anticipate user needs and deliver real-time, personalized, and contextually enriched information.

This transformation is not simply technological but conceptual. Through dynamic dialog, continuous engagement, and tailored content delivery, generative AI enables libraries to move beyond traditional reference models toward a cognitive partnership in research and learning. In replacing static FAQs and keyword-based search interfaces with conversational, user-responsive systems, AI-driven services such as the flooto Copilot elevate user satisfaction and position the library as an embedded agent in academic inquiry rather than a peripheral infrastructure.

Interview participants consistently highlighted improvements in their research process, particularly in terms of reduced time spent searching for information and the AI's ability to surface relevant yet previously overlooked resources. Undergraduate students, in particular, noted how the system simplified their access to credible academic materials, mitigating the initial barriers often encountered when navigating complex digital databases. Faculty members emphasized the efficiency gains in conducting literature reviews, while library staff reflected on their evolving roles in facilitating AI-augmented services. These effects were particularly pronounced among undergraduate students and novice researchers—user groups that often encounter difficulties navigating complex academic systems. By reducing cognitive barriers and delivering guided support, generative AI facilitates a broader participation in library services and enriches user interaction with knowledge resources.

Theoretically, the study contributes to ongoing discussions of library transformation by reframing the library as a dynamic knowledge ecosystem. This reconceptualization shifts the library's identity from that of an archival or custodial entity to an active participant in algorithmically mediated knowledge production. The case of the flooto Copilot demonstrates how AI can reconfigure the ontological status of the library—from a passive intermediary to a co-creative agent within scholarly ecosystems. This finding aligns with broader epistemological movements in higher education, in which institutions are redefined not only by what they provide but by how they enable the creation and circulation of knowledge.

On a practical level, the flooto Copilot case illustrates how generative AI can significantly enhance user experience design. The system's ability to provide intuitive interfaces, deliver anticipatory recommendations, and support complex natural language queries represents a major advancement in academic service delivery. These user-centric features align with established constructs in technology acceptance theories, particularly perceived ease of use, playfulness, and interactivity, which are known to drive user acceptance and active learning intentions. Interview participants frequently described the system as "intuitive" and "engaging," which corresponds to these constructs and highlights how positive user experiences facilitate adoption. Such factors have been identified as critical enablers of digital tool acceptance in educational contexts, reinforcing the importance of designing AI systems

that are not only functional but also enjoyable and interactive for users. Similar findings have been reported in recent research on technology acceptance in education (Wang et al., 2024). These features not only improve the efficiency of information retrieval but also support the strategic repositioning of library professionals from information gatekeepers to facilitators of digital literacy, instructional designers, and curators of AI-augmented services.

To synthesize these insights, the study proposes a four-dimensional framework (see Figure 4) that articulates the architecture and governance necessary for the AI-enabled transformation in academic libraries. The framework consists of: (1) generative AI capabilities for knowledge facilitation; (2) digital enablers of proactive library services; (3) service innovation pathways; and (4) responsible AI and sustainable governance. This model underscores the interplay between technology, service design, user needs, and institutional accountability. In particular, the “Responsible AI and Sustainable Governance” dimension must address not only algorithmic transparency and data ethics, but also the ethical anxiety experienced by users and staff when interacting with AI systems. Such anxiety—stemming from concerns over fairness, privacy, and loss of human judgment—can moderate the success of AI adoption and hinder user trust. Similar findings have been reported in recent research on AI digital employees, where ethical anxiety negatively influenced innovation outcomes (Wang & Zhang, 2025). Addressing this requires clear communication strategies, participatory governance mechanisms, and ongoing ethical training to ensure that AI systems are perceived as supportive tools rather than opaque decision makers. Notably, the inclusion of governance and feedback mechanisms highlights that successful AI integration requires more than infrastructure—it demands foresight, ethical evaluation, and iterative refinement based on user-centered feedback. This framework was developed inductively through the thematic analysis of qualitative interview data. Using a grounded approach, I conducted open coding of user and staff narratives, followed by axial coding to group emergent themes into broader conceptual categories. These categories were then synthesized into the four dimensions presented in Figure 4. While individual components may align with the existing literature on digital transformation and library innovation, the framework as a whole represents a novel configuration derived from empirical insights within an AI-integrated library context. As such, it constitutes the central theoretical contribution of this study.

Strategically, the findings emphasize the critical role of institutional support in facilitating AI adoption in academic libraries. Beyond acquiring technology, universities must develop comprehensive strategies that include governance frameworks, ethical review protocols, librarian training, and performance assessment systems. The case of the tlooto Copilot demonstrates that, when aligned with institutional vision and user needs, generative AI can enable academic libraries to reclaim their centrality within the scholarly ecosystem—not as static service points but as intelligent, anticipatory, and human-centered knowledge platforms (J. Kim & Ahn, 2025). While the case demonstrates considerable promise, it is important to acknowledge that the successful implementation of generative AI in libraries is contingent on several contextual factors. Employee resistance to new technologies, especially among staff unfamiliar with AI systems, may hinder effective adoption. In addition, budgetary constraints and the lack of institutional readiness may delay or dilute intended benefits. Furthermore, without robust training, governance mechanisms, and performance monitoring, the introduction of AI may lead to unintended failures or underutilization. These factors underscore the importance of adopting a realistic, well-resourced, and institutionally grounded approach to AI integration in academic libraries.

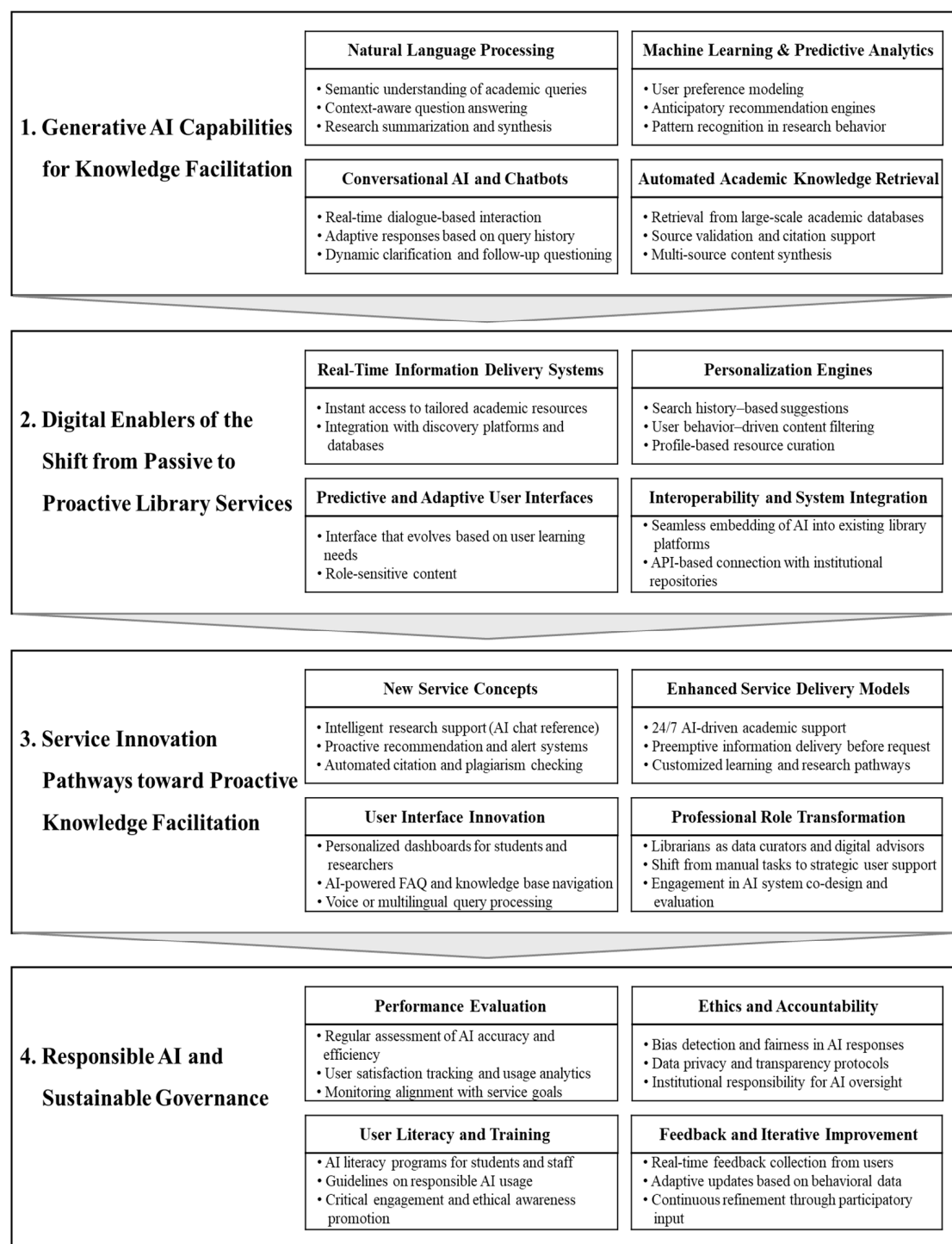


Figure 4. Framework for transforming academic libraries from passive information providers to proactive knowledge facilitators through generative AI.

6. Conclusions

This study provides a timely and empirically grounded contribution to ongoing discussions about the transformative potential of generative AI in academic libraries. Focusing on the implementation of a generative AI-powered chatbot in a Case University Library, the study examines how such technologies, when strategically integrated, can influence service delivery models and the dynamics of user engagement. The findings indicate that generative AI significantly enhances the relevance, speed, and personalization of information services, thereby improving research efficiency and fostering deeper user

engagement. Participants described AI-powered services as more intuitive, responsive, and tailored to their academic needs, suggesting that the integration of generative AI reshapes user experiences and service expectations. However, these outcomes primarily reflect user interactions with the AI system rather than a comprehensive transformation of the library's institutional functions. This transformation reflects a broader movement toward anticipatory, conversational, and context-aware support in higher education environments, where libraries are expected to play a more dynamic role in knowledge ecosystems.

Importantly, this shift is not limited to technological adoption but carries significant institutional, organizational, and professional implications. While generative AI systems automate routine tasks such as cataloging, classification, metadata creation, and basic reference services, they also introduce new demands on library professionals. Librarians are increasingly tasked with overseeing AI system governance, ensuring ethical data use, curating content relevance, and providing critical guidance on the limitations and responsible use of AI-generated information. Rather than displacing librarians, AI shifts their focus toward managing the complexities of human–AI interaction, fostering information literacy that now encompasses algorithmic transparency and data ethics. This reallocation of professional roles calls for new skillsets, ethical awareness, and a reimagined sense of purpose among librarians. Theoretically, the study contributes to the evolving conceptualization of academic libraries as intelligent infrastructures that actively participate in digital transformation. The four-dimensional framework presented in Figure 4 illustrates how generative AI applications—particularly those enabled by natural language processing and real-time interaction—reshape service delivery models, generate new institutional value, and reposition libraries as strategic knowledge facilitators.

Despite these contributions, the study has several limitations that should be acknowledged. First, the findings are based on a single-institution case study, which—although rich in depth—may limit the generalizability of the results across different library types or national contexts. Second, the research captures an early phase of implementation, focusing primarily on short-term user perceptions and organizational adaptation, while the long-term sustainability and evolution of AI-enabled services remain unexplored. Given that data collection occurred within two months of the AI system's launch, the findings provide only an initial snapshot of its impact. To understand how user behaviors, satisfaction levels, and the roles of library professionals evolve over time—especially as the novelty effect wears off and the technology becomes more deeply integrated into academic workflows—future longitudinal research will be essential. Additionally, the study examines the deployment of a commercially available AI tool, which limits the scope of institutional customization and raises questions about the extent to which libraries can exert control over AI-driven service design. The library's role in this context is largely managerial—integrating and monitoring third-party technology—rather than curating proprietary AI models or algorithms. These limitations suggest fruitful directions for future research. Additionally, as this study is based on a large South Korean university with substantial resources, the findings may not fully generalize to smaller institutions or those in different cultural and infrastructural contexts. Future comparative research is needed to examine how institutional size, resource availability, and cultural factors influence AI adoption outcomes. Longitudinal studies could examine how generative AI shapes library service design and user expectations over time, while comparative studies across public, school, and research libraries may uncover institutional and cultural variables that mediate AI adoption. Further exploration is also needed into the ethical implications of algorithmic personalization and user profiling, particularly in relation to data privacy, transparency, and trust in human–AI collaboration.

In conclusion, the integration of generative AI technologies such as tlooto Copilot represents a pivotal development in the evolution of academic library services. However, its impact is contingent on how libraries strategically manage the intersection between automated functionalities and human expertise. Librarians are not merely displaced by AI-driven processes; rather, their roles are redefined to encompass the oversight of AI system performance, critical evaluation of AI-curated content, and mediation of ethical concerns arising from algorithmic decision-making. Nevertheless, the integration of such technologies must be approached with caution, as overreliance on AI systems without adequate oversight may introduce new risks related to trust, equity, and institutional accountability. As academic libraries continue to navigate the tensions between technological efficiency and human-centered values, generative AI may serve as a critical enabler in reaffirming the relevance, legitimacy, and strategic potential of libraries within 21st-century higher education. Embracing this opportunity requires more than technical implementation—it demands a cultural transformation that redefines the mission, competencies, and partnerships that shape the academic library of the future.

Funding: This work was supported by Institute of Information & communications Technology Planning & Evaluation (IITP) under the metaverse support program to nurture the best talents (IITP-2024-RS-2023-00256615) grant funded by the Korea government (MSIT).

Data Availability Statement: No new data were created or analyzed in this study.

Conflicts of Interest: The author declares no conflicts of interest.

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