Information Management Practices in Chinese Academic Libraries: A Qualitative Study of Digital Transformation and User Engagement

Chang Zhao; Linghao Zhang

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Chang Zhao
https://orcid.org/0009-0008-3234-5667
School of Design
Jiangnan University
Wuxi Jiangsu 214122, China
cczhaochang@outlook.com

Linghao Zhang ✉
https://orcid.org/0009-0000-0904-3187
School of Design
Jiangnan University
Wuxi Jiangsu 214122, China
zhanglhhao@outlook.com

Abstract

Digital library services gained immense significance during the pandemic as learning activities shifted to online platforms. However, the influence of these libraries persisted even after the pandemic ended. Very few studies have investigated the information management (IM) system of these libraries and their initiatives to boost user engagement. This study focuses on identifying the strategies used by digital libraries to engage with users and enhance their satisfaction. Adopting a qualitative research design, the data was collected through ten semi-structured interviews with IT staff members and system librarians from three digital academic libraries in China. The sample was identified with purposive sampling technique. The collected data was thematically analyzed to retrieve the underpinning themes. These themes explained the situation of contemporary digital libraries in China. The findings indicate that managing a large digital database can be challenging due to several security breach concerns. However, the IT staff of these libraries ensure regular system upgrades. Libraries also invite user feedback to strengthen their services. This study also presents some suggestions to provide better services to users. These suggestions include using a user-centric interface, providing personalized recommendations, partnering with academic institutes, and expanding the database.

Keywords

Digital Libraries, Information Management, User Engagement, Customer Satisfaction, China.

1. Introduction

Digital technologies are being leveraged in libraries to expand their services, democratize access and reach to the required information (**Sabharwal**, 2021). As a result, the adoption of virtual services, digital platforms and online databases has become pivotal for the academic libraries to bridge the gap between the modern and conventional information landscapes, improving the overall user engagement. Digital transformation has therefore become an essential aspect of modern library landscape. It has largely reshaped the way in which the information is stored, disseminated and accessed (**Lippincott *et al.***, 2021). Therefore, in the current digital era, the academic libraries are compelled to implement different changes in order to meet the continuously evolving user needs and to keep pace with the technology-driven society.

In China, there are more than 3,000 public libraries which are taking important steps to integrate digital transformation and fulfil the needs and requirements of digital users (**Statista**, 2022). This transformation encompasses a broad spectrum which ranges from archival materials' digitalization to advanced technologies implementation in different operations of library. In China, the academic libraries are also transitioning from books' physical repositories to technology-driven and dynamic hubs of managing knowledge and information. The transitioning to a digital-centric model is also crucial for the relevance and survival of the libraries within the society in which the information is consumed and utilized in digital formats (**Saibakumo**, 2021).

Digitalization also plays a vital role in the dissemination and preservation of information in libraries. It allows effective preservation and archiving of rare manuscripts, historical information and other valuable documents. These digital formats result in increased longevity of the associated facilities and resources which can be retrieved easily for future use, enhancing user satisfaction and engagement (**Omotayo; Haliru**, 2020). Digital transformation enables the academic libraries to disseminate the associated information globally. In this regard, the online platforms are also being used by the digital libraries to reach a broad and diverse audience, overcoming different geographical barriers (**Baye; Yusuf**, 2023). It also provides an accessibility to the required knowledge for the people who do not have physical access to the library. This shift is in association with fostering inclusivity, information democratization as well as accessibility in the present digital age (**Mercader; Gairín**, 2020). The digitalization of academic libraries is not only a technological upgrade; it is also a strategic response to continuously evolving information landscape (**Iroaganachi**, 2018). It also promotes empowerment among the libraries to facilitate the accessibility of information to the users with the help of emerging technologies.

The current study aimed to examine the implementation of digital services in academic libraries and how they enhance consumer engagement and satisfaction. The objectives of this study included: first, to explore information management practices in Chinese digital libraries; second, to study user engagement and satisfaction within digital libraries services, leading to the identification of important strategies which can enhance these services in Chinese academic libraries. It is hoped that this study can encourage different academic libraries to transform themselves into digital libraries by implementing important emerging technologies. This approach is also pivotal in improving the accessibility and reach of the information for the associated digital users.

2. Literature Review

2.1. Digital Services in Academic Libraries

Digitalization has enabled the implementation of different advanced technologies in library settings and enhanced the learning and academic environment with modern learning technology (**Keshavarz; Norouzi**, 2022). When the COVID-19 pandemic disrupted the library systems and services worldwide (**Pambayun**, 2021), a need was felt to incorporate innovative solutions to combat this disruption. Libraries globally focused on implementing digital services to promote digital literacies which can act as information gateways. Past research has identified factors that have contributed to the implementation of digital services in academic libraries such as responsiveness and information quality, which also act as predictors of utilization of e-services in the library (**Baharuddin; Rosman**, 2020). However, different barriers can also be observed in implementation of digital services in academic libraries. For instance, the lack of important technology and technical staff prevent the effective promotion of digital libraries, limiting the scope for the information landscape.

Barsha and Munshi (2023) assert that artificial intelligence (AI) is commonly used in library services and it is considered to have the potential to revolutionize the information age. AI in academic libraries can allow the users to explore knowledge, leading to making of smart decisions. AI in libraries improves overall user satisfaction, leading to significant outcomes. Past research has also shown that different social networking services (SNS) are also used as essential communication tools by different libraries (**Fong *et al.***, 2020; **Mizani *et al.***, 2024; **Muthuswamy**, 2024). It has been observed that SNS have been effective in improving user interaction which also help in providing important information. According to **Amarasekara and Marasinghe** (2020), different parameters also contribute to user satisfaction which include library staff, library resources, library facilities, library website, information access and library services. Therefore, the implementation of digital services in libraries provide easy accessibility of the information for the users (**Khan *et al.***, 2022). It also reduces the borrowing as well as returning of books due to availability of online information. Thus, digital services in libraries play an important role in increasing user engagement and satisfaction.

2.2. Information Management in Digital Libraries

Information management depends upon the information literacy that instils empowerment among the academics, leading to higher self-efficacy among them (**Taufiq *et al.***, 2020; **Wiroonrath *et al.***, 2023; **Tran *et al.***, 2023). In this regard, Information management can also be translated into the development of pro-active information culture which strengthens the position of academics. Therefore, digital transformation is also considered to be crucial in academic libraries which can also lead to digital transformation in universities. Past research has shown that the expansion and modernization of information services is vital to improve the performance of academic libraries in current digital era (**Baryshev *et al.***, 2020; **Bharti; Verma**, 2021). Technological evolutions have allowed the libraries to implement technology-driven as well as user-friendly services to fill the gap observed in the conventional academic libraries. Different technologies such as "library guide app, Internet of Things and Integrated Library Management System," are being used for improving the learning environment in digital libraries (**Bi *et al.***, 2022; **Saibakumo**, 2021; **Sudarmanto *et al.***, 2022; **Wilson-Mah; MacRae**, 2022). Although, the promotion of technologies in academic libraries is considered to be effective in improving information management, still less focus has been given on this aspect in past research.

Different AI tools are also being used in digital libraries for information management. For instance, ChatGPT, a public AI

tool is being used as a pre-trained transformer model (**Lund; Wang**, 2023). It has the capability to carry out different language-based tasks and it is used as a sophisticated chatbot. This technology is found to have a potential impact on the libraries and the academia. However, while implementing this technology, important ethical considerations are needed to be taken into consideration, ensuring the prevention of bias. Therefore, with the continuous development in libraries, they also aim to renew the mission, helping the learners within the online space by providing them important information (**Zoé**, 2023; **Strehovec**, 2023).

Studies have highlighted the impact of different electronic sources on social networking platforms such as LinkedIn, KUDOS, Google Scholar and others (**Udo-Anyanwu *et al.***, 2023; **Manullang; Ramadhan**, 2023; **Xi *et al.***, 2023), which are also being used for academic work. These databases can also be used for promoting an individual's academic profile, focusing on their research publications, grants and interests. Moreover, such online sources are also being used in digital libraries for management of information, leading to significant outcomes. Studies have also emphasized the integration of digital technologies for effective information management within the context of academic libraries in order to ensure the availability of required information for the users (**Martzoukou**, 2021). According to **Mathar *et al.*** (2021), an academic library is considered to play an essential role in supporting research, learning activities and teaching. All these services must be adapted to present as well as future situations of the associated library users.

2.3. User Engagement in Digital Libraries

Academic libraries offer different services on social media platforms in order to increase user engagement. Many millennials prefer to utilize different photo-snapping apps, encouraging the libraries to begin the utilization of Instagram unavoidably in order to form a connection with the users (**Chan *et al.***, 2020). Libraries in different universities have adopted this approach in order to attract more users, leading to significant learning outcomes for the users. **Strover *et al.*** (2020) argue that public libraries are the main sites for cultural capital acquisition. It is also used for addressing inequality. Therefore, digitalization of libraries has become the center of attention for academic scholars, providing evidence regarding the association between cultural capital, social satisfaction and digitalization. Past research has identified four groups of users in this regard including family, tech access, active and traditional users (**Wickramarachchi**, 2021). These users also obtain important benefits from digital libraries in various ways, leading to decreased social inequalities. Therefore, emphasis has been given on the integration of digitalization in academic libraries to enhance user engagement and satisfaction.

Digital libraries have the abilities to store different resources of electronic information which is later accessed by the end-users through the internet. Recently, different universities worldwide are taking important measures to integrate technologies within their operations for promoting improvement in digitalization of information resources which are beneficial academically (**Leguina *et al.***, 2021). Although, development of digital libraries is considered to be a committed investment, still less research has been conducted in this regard, providing an opportunity for the current research to bridge this gap. Moreover, digital libraries are found to be effective in improving the tasks performance of the students, resulting in improved user satisfaction.

2.4. Strategies to Increase Digital Services in Libraries

In education sector, the success of the student mainly depends on the accessibility of digital services and resources. At present, students mainly depend on the library to have access to important information. However, many students from developing and other under-developed nations around the world, lack a digital device or a computer with an internet access (**Lau *et al.***, 2020). These identified barriers prevent the students from experiencing digital inclusion as well as equity within remote learning realm. Therefore, it has been observed that the lack of resources negatively impacts digital equity and inclusion, emphasizing the integration of important strategies to promote digital services in libraries. **Martzoukou** (2021) discover that relevant stakeholders need to focus on the formulation of strategic plan, ensuring efficient training for the library users. In this regard, focus is also needed to be given to enhance internet connectivity reliability and utilization awareness regarding digital services to gather required academic information. For this purpose, efficient promotion and marketing strategies can be applied to increase library users' mobilization. Therefore, the use and access of digital services is considered to be crucial within the context of academic libraries, leading to improved academic services.

It has also been a trend that different online media channels such as teleconferencing platforms, e-mails and social media are largely being used to promote the services of academic libraries (**Igwebuike; Onoh**, 2022). However, emphasis has also been given on using other SNS for the promotion of digital services of academic libraries. In the past, the main issues faced in the promotion of digital libraries include insufficient funds and accessibility to information resources. This condition is characterized by infrastructure trauma and other technological inaccessibility (**Addai-Wireko *et al.***, 2020). In order to overcome these issues, the librarians are needed to develop and improve their technology skills, leading to a user-centered paradigm shift. Different management challenges integrate the pressure to attain the required performance indicators to ensure value for money. According to **Smith** (2020), important innovative strategies and creativity are also needed to be implemented in order to promote digital services in academic libraries. This approach is also pivotal for digital libraries to attain competitive advantage which has become crucial in today's highly competitive library sector. Past research has thus

focused on the implementation of effective marketing strategies for the promotion of digital services in academic libraries (**Nishath; Somaratna**, 2021), leading to significant academic information accessibility for the end-users in remote settings.

3. Methodology

This study adopted a qualitative research design as it is aimed at investigating the phenomenon of information management (IM) in academic libraries in China. A quantitative design, on the other hand, would not provide a holistic picture of IM practices in Chinese libraries. A qualitative research, based on an interpretive philosophy, would help look at the experiences and perceptions of the IT staff and system librarians regarding these practices (**Nassaji**, 2020). The qualitative investigation in this study allowed the researcher to address 'HOW' and 'WHY' questions (**Tenny *et al.***, 2022) related to IM in academic libraries. Moreover, this research design allows the researcher to gain extensive responses from respondents.

3.1. Data Collection

To investigate the impact of IM practices in digital academic libraries on user engagement and satisfaction, 10 interviews with IT staff and system librarians were conducted. Based on the existing literature, these semi-structured interviews consisted of 10 broad questions (see Appendix). The online interview guide was sent to chief librarians from three academic libraries in China. After obtaining the respondents' consent, interviews were scheduled to be conducted via Google Meet. The duration of each interview spanned from 20 to 30 minutes. The study focuses on ten participants selected through purposive sampling to align the data collection with research objectives (**Campbell *et al.***, 2020). Thematic analysis of the interview transcripts was done to analyze the significant patterns in the collected data due to its flexible approach (**Nowell *et al.***, 2017; **Terry *et al.***, 2017; **Clarke; Braun**, 2017). **Braun and Clarke** (2006) have devised a six-step method for conducting thematic analysis as shown in Figure 1. The findings from this analysis have been presented in the subsequent sections.

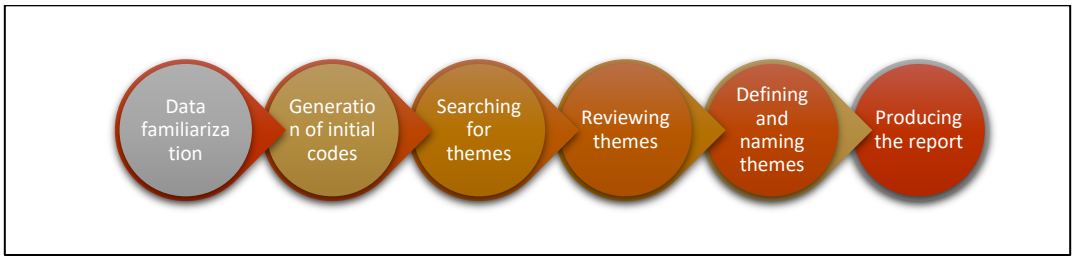

Figure 1: Thematic Analysis Source: (Braun; Clarke, 2006).

4. Data Analysis and Discussion

A thematic content analysis of the interview transcripts resulted in the development of themes. The process involved listening to the interview recording multiple times for familiarization and developing initial codes by identifying similar patterns in the data. Similar patterns were gathered under specified categories to develop themes. Figure 2 depicts the whole process of theme development for this research. This includes themes and codes developed from the raw data.

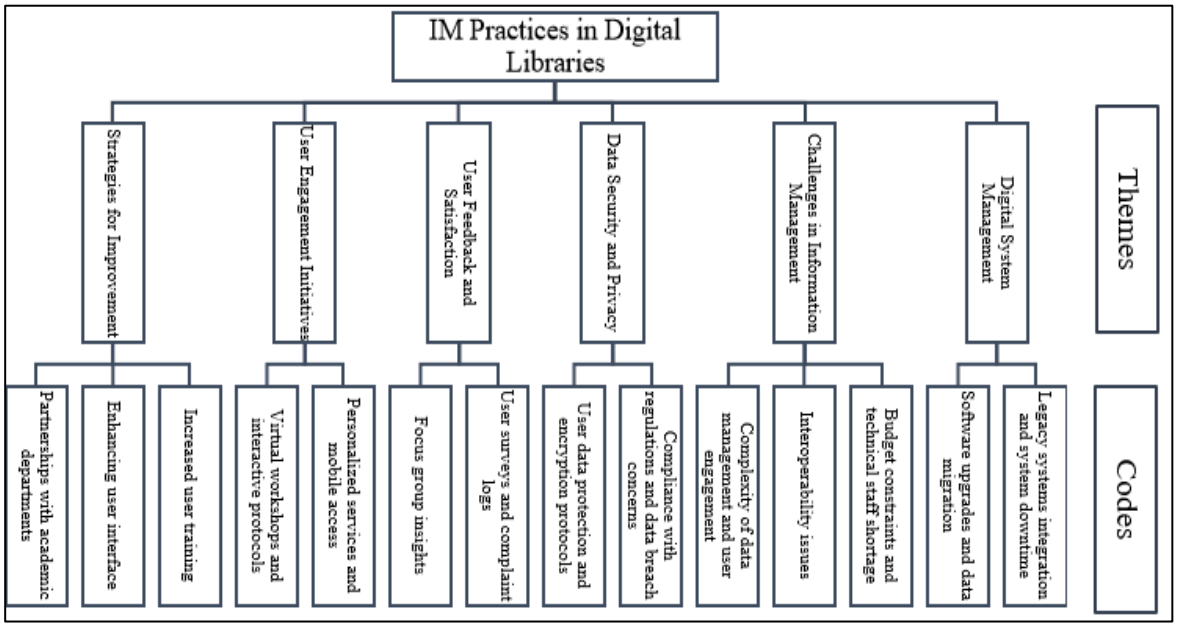

Figure 2: Categorization and Theme Development based on Thematic Analysis.
Source: Author-generated

4.1. Digital System Management

Respondents provided valuable insights into the digital system management in digital libraries. They emphasized the alignment of legacy systems with modern technology. However, this alignment required smooth communication between the two systems. This leads to several compatibility issues. System librarians ensure that old data is safely integrated into modern databases. However, this system also faces downtime issues, which lead to disruptions in IM practices. Therefore, the IT staff is responsible for ensuring consistent updates of the system.

Respondents emphasized their role in maintaining regular updates and maintenance of the system to avoid any disruption. Figure 3 reports a variety of expressions of respondents relevant to this theme. These expressions show different perspectives of respondents regarding the IM in digital libraries.

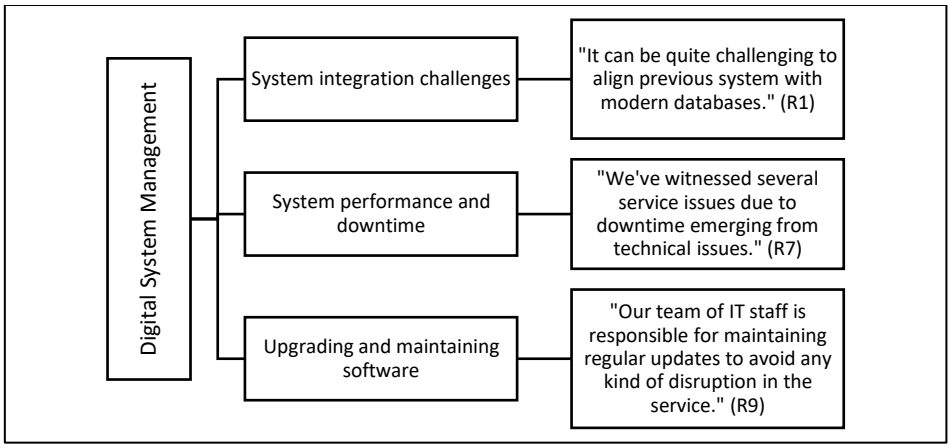

Figure 3: Digital System Management (Source: Author-generated).

4.2. Challenges in Information Management

Respondents agreed that Information Management (IM) is a complex process, especially while working with old databases. Respondent 4 highlighted that the presence of several fake copies of manuscripts also makes it challenging to manage the database. Moreover, respondents also mentioned the issue of budget constraints, which do not allow them to integrate high-end software in their IM. In addition, Respondent 2 pointed out the lack of technical staff in their library services. This makes the available staff overburdened. Moreover, while working with various systems, the IT staff also faces issues in ensuring the compatibility of their digital library with other online platforms. Another issue highlighted by the respondents was the need to keep their users engaged with the system (see Figure 4).

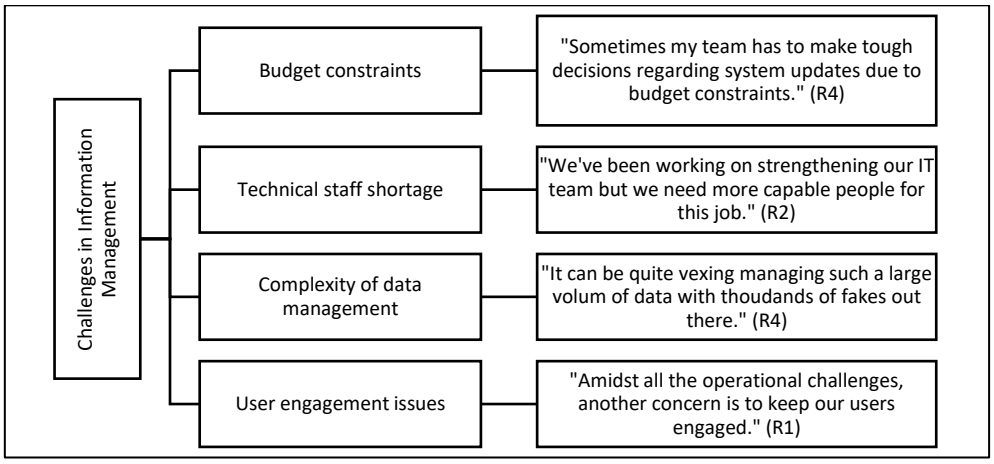

Figure 4: Digital System Management.
Source: Author-generated

4.3. Data Security and Privacy

Digital libraries involve several data security and privacy concerns. Respondents were therefore aware of the several steps taken by their libraries to protect users' data. Every respondent highlighted the significance of an encryption protocol, which allowed users to protect their personal library space. Respondent 8 highlighted the impact of this protocol on avoiding security breaches. Respondent 10 emphasized the value of robust regulatory standards to protect the databases from any unauthorized access (see Figure 5). This also includes protecting intellectual property rights.

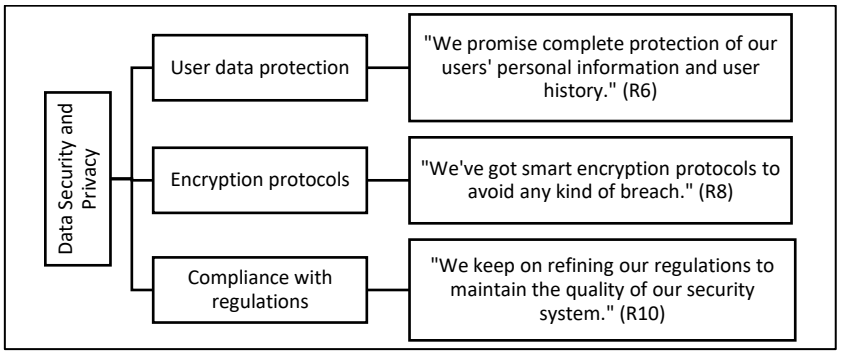

Figure 5: Data Security and Privacy.
Source: Author-generated

4.4. User Feedback and Satisfaction

All the respondents were of the opinion that their services relied on getting timely feedback from users. This helps them strengthen their services. Respondent 9 mentioned monthly online surveys for which users receive a direct link via email. This helps the library identify any potential area of concern regarding user satisfaction. Respondent 3 highlighted the use of feedback forms, which would allow users to give their suggestions. Respondent 7 emphasized the use of complaint logs, which were solely focused on user complaints (see Figure 6). Another way of gathering user feedback is organizing focus group meetings in online communities.

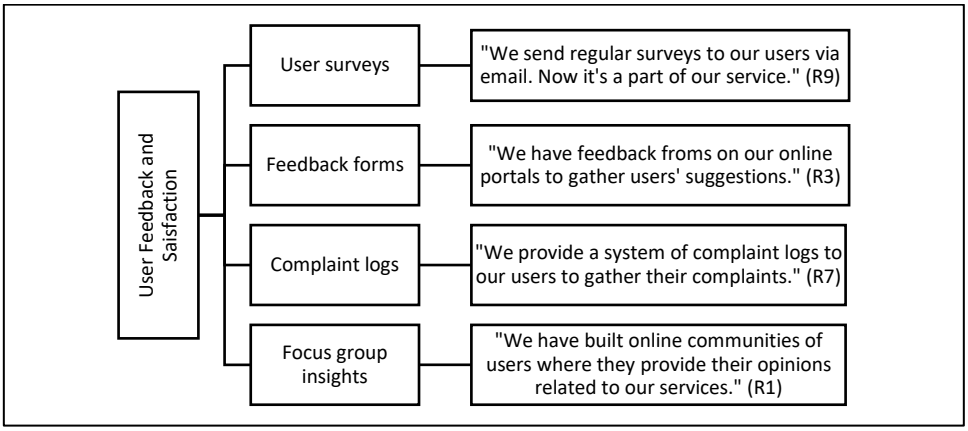

Figure 6: User feedback and satisfaction
Source: Author-generated

4.5. User Engagement Initiatives

Respondents regarded user engagement initiatives as central to their user-related policies. Respondent 6 mentioned the conduct of online workshops where several users are invited to enhance their engagement. In these workshops, users are not only encouraged to share their suggestions but also trained in the use of digital libraries. Respondent 8 mentioned that their online portal provides interactive tutorials to guide users on how to avail their services. Respondent 10 emphasized that their services and recommendations are tailored according to user preferences (see Figure 7). After signing up, users are asked to identify their preferred books. Respondent 1 highlighted the efficacy of their library's mobile application, which provides a seamless user experience.

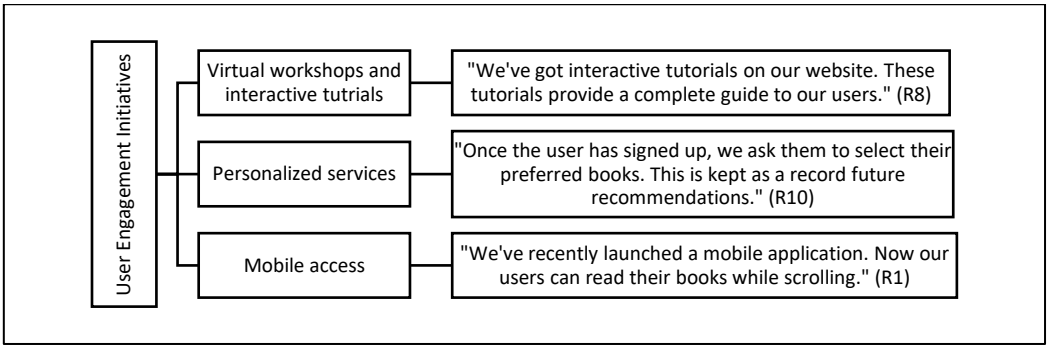

Figure 7: User Engagement Initiatives.
Source: Author-generated

4.6. Strategies for Improvement

A majority of respondents focused on training users to make effective use of their digital services. This can be made possible by providing more interactive tutorials. They also emphasized the need to enhance the user interface so that the latter do not find it vexing to navigate the library's services. Respondent 1 highlighted the need to expand the data collection so that more users can be attracted. Respondent 9 was of the view that digital libraries should partner with educational departments to strengthen their services in academics (see Figure 8).

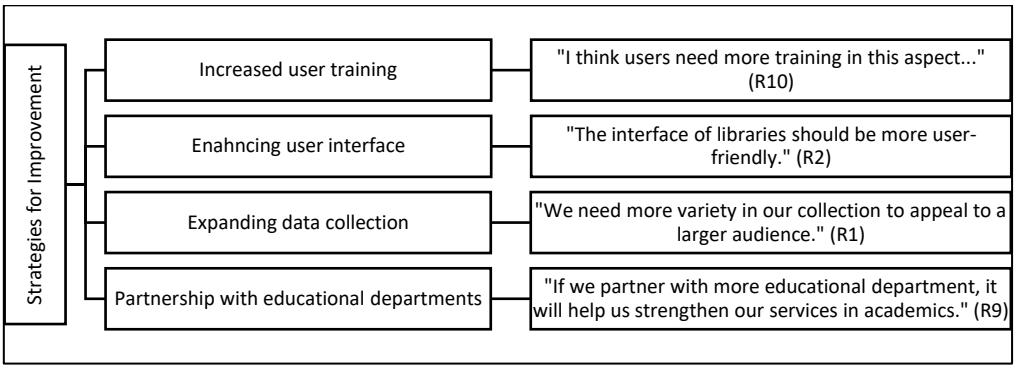

Figure 8: Strategies for Improvement.
Source: Author-generated

4.7. Discussion

Findings show that the IM system in digital academic libraries involves complex processes of aligning various systems together. This exposes the IT staff and system librarians to various challenges related to user engagement and system compatibility. Moreover, digital libraries need more trained staff to keep their IM system up-to-date and satisfy their users. Though respondents have emphasized the efficacy of user surveys and feedback in gathering users' suggestions, more focus is needed to keep users engaged. Respondents have delineated several strategies, which can strengthen user satisfaction. Providing personalized services and a convenient digital interface would help libraries build their audience. Moreover, there should be more focus on expanding the existing database, which should align with developments in academic research.

The significance of digital libraries has multiplied after the pandemic (**Mehta; Wang**, 2020). In addition, the present study's findings highlight the need for user training in using digital library services. Previously, **Deja *et al.*** (2021) have regarded academic libraries as a transformative force in strengthening the digital literacy of learners. Moreover, the responses of the participants in this study highlight the significance of making timely decisions for digital libraries. This aligns with the findings of **Hamad *et al.*** (2021). The existing literature has highlighted the growing concerns regarding data security in the digitalized world (**Acquisti *et al.***, 2020). According to the findings of the present study, these issues exist in the context of digital libraries as well. These findings thus make a valuable contribution to existing studies. The novelty of these findings lies in their focus on digital libraries in China. The findings offer guidelines on how to enhance user engagement in digital library services. By focusing on the user interface, digital libraries can provide a convenient experience to their users. This would help them build a solid base of readers. Moreover, these libraries can also support remote learning of users. Another important insight from the interviews is the potential of mobile applications to provide a seamless reading experience to users (**Tarwneh**, 2023).

5. Conclusion

Digital libraries became popular during the pandemic and allowed academic institutions to ensure sustained learning of students (**Temiz; Salelkar**, 2020; **Tsekea; Chigwada**, 2021). These libraries also offered community engagement (**Tammaro**, 2020). Therefore, this study sought to investigate IM practices in digital libraries in China. Findings indicate that digital academic libraries have to navigate several operational challenges due to data security risks. However, the IT teams of these libraries were responsible for maintaining regular system updates. The study also indicates that gaining regular user feedback is instrumental in achieving high levels of user engagement and satisfaction. Strategies such as the availability of feedback forms, interactive guides, user-friendly interfaces, and personalized services can help satisfy users. Moreover, partnering with academic institutions can help digital libraries add variety to their academic databases. These findings strengthen the theoretical and practical values of this study.

5.1. Implications

Studies on digital libraries are ample and growing over time (**Kosciejew**, 2021; **Smith**, 2020). However, very few studies have focused on digital libraries in China and their role in engaging users in academic learning (**Guo *et al.***, 2021). Therefore, the theoretical contributions of this study include highlighting the challenges faced by these Chinese libraries. The study

also contributes to the extended policy-oriented literature by delineating strategies for improvement in library services. Moreover, this study added to the literature the element of security risks in digital platforms (**Saura *et al.***, 2021).

In addition, practically, this study focused on a user-friendly interface that can help digital libraries amplify their services. Moreover, this study implies the need for building the digital literacy of learners. Academic institutes can play a crucial role in this aspect by making it mandatory for students to sign up for digital libraries and offering them training in using these facilities. This can be made possible by integrating more technological tools into the curriculum (**Rafi *et al.***, 2019). Another important implication of this study is the focus on robust security protocols to protect user data. This can be made possible by designing a strict encryption protocol (**Das *et al.***, 2021; **Seth *et al.***, 2022; **Yang *et al.***, 2020).

5.2. Limitations

This study faced several limitations as well. First, it spanned a limited geographical focus as it gathered data only from Chinese libraries. Its findings, therefore, may not reflect the situation of digital libraries in other regions. In addition, as the study focused on qualitative insights, the research design did not deal with numerical data and lacked quantifiable results (**England**, 2021). Being qualitative in design, this present study provided rich insights into the experiences of digital library staff. Hence, it lacked statistical evidence to back these findings. last, but not the least, the study collected the data through semi-structured interviews, which were quite time-consuming (**Khan; MacEachen**, 2022).

5.3. Future Research Directions

Several areas for future research in the field of digital libraries have been highlighted by the findings of this study. For instance, factors influencing the adoption of digital libraries represent a promising research area (**Shahzad; Khan**, 2023). Future studies research can be conducted in the context of China's academic libraries. Moreover, research can also focus on policies related to IM in digital libraries (**Farid *et al.***, 2023). Moreover, future research can investigate the impact of AI tools on Chinese academic libraries and make additions to existing studies (**Aithal; Aithal**, 2023).

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Appendix

Semi-structured interviews consisted of the following questions:

1. Can you introduce yourself and provide a little background on your experience in this line of work?
2. What is it like working in a digital library? Are there any particular challenges?
3. Do you face any data security concerns? If yes, how do deal with them?
4. Can you share any strategies from your experience, which have helped you manage a large volume of data efficiently?
5. How do you ensure the alignment of modern technology with an already-existing system?
6. Do you gather feedback from your users? If yes, what is your primary tool for gathering feedback?
7. Do you face any complaints from users related to your digital services?
8. Has your library taken any initiative to enhance user engagement and satisfaction?
9. How do you ensure that the needs and preferences of every user are considered with your services?
10. In your opinion, what are the key strategies that could further improve user satisfaction and engagement with digital library services?