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A Comparative Analysis of IIT Libraries and Major Southeast Asian Technical Libraries: Evaluating Digital Resources, User Accessibility, and Technological Integration

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ABSTRACT

Functions of academic libraries have changed over the period with increasing use of ICT in the institutions of higher learning most especially in technical universities where updated information is of essence in academic and research endeavours. This paper is a comparative study of the libraries of IITs and other leading technical libraries in South East Asia by comparing them on the basis of collection of digital resources, ease of access for the users and technological infrastructure. The purpose of the study is to assess the density and quality of the digital collections, users' ability to access these materials and the level of technology in these libraries. The findings from the study are gathered from both quantitative research involving survey of users and qualitative research involving interviews of library staff. The sampled users include 500 users out of 5 IIT libraries of India that include IIT Bombay, IIT Delhi, IIT Madras, IIT Kanpur, and IIT Kharagpur and 50 staff members and 500 users out of 5 major technical libraries of South East Asia that include National University of Singapore, University of Malaya, Nanyang Technological University, Chulalongkorn University, and In order to measure performance in terms of digital resources' availability, user satisfaction and technology adoption the statistical analysis was conducted. Overall the findings suggest that on average the IIT libraries have larger and sophisticated digital libraries than the SE Asian libraries with more number of e-books, online journals and databases.

Keywords: IIT Libraries, Southeast Asian Libraries, Digital Resources, User Accessibility, Technological Integration, AI-Driven Search Engines, Comparative Analysis..

INTRODUCTION

1.1 Background

Today's academic libraries are in the process of transition, changing from mute physical storehouses of bound books to the dynamics digital information stores. Advancements in technology have changed the way information is created, stored and shared and therefore makes the use of such material in the university libraries irrereplaceable (Xu & Fong, 2018). This transition is more so, in the technical institutions and other faculty, where it is vital to obtain up to date information and new technological developments in their field as soon as possible for both teaching and research.

The IIT's is most renowned institutes of India and across the world for their work towards enhancing the status of engineering and technology courses. Their libraries have often been seen leading the adoption of digital

resources and the incorporation of new technologies to the end-users' satisfaction (Sharma, 2020). Likewise, the Southeast Asian technical libraries have not stayed behind and have also started this process of digital transformation though with different pace and intensity (Chowdhury, 2019). This analysis provide benefit in terms of comparing academic libraries' advantages and issues in one area to another area's libraries.

1.2 Research Objectives

1. Assess the variety, scope, and relevance of digital resources available in IIT libraries compared to those in major Southeast Asian technical libraries.
2. Examine how easily users can access digital resources in these libraries, considering factors like user interface design, availability of remote access, and the adequacy of user support services.
3. Analyse the level of technological integration in these libraries, including the use of AI-driven search engines, digital repositories, automated cataloging systems, and other advanced tools.
4. Based on the findings, highlight best practices that can be adopted by other libraries and identify areas where improvements are needed.

1.3 Research Questions

To guide this study, the following research questions are posed:

1. What types of digital resources are available in IIT libraries compared to those in Southeast Asian technical libraries?
2. How accessible are these digital resources to users in both sets of libraries?
3. What is the extent of technological integration in IIT libraries versus Southeast Asian technical libraries?
4. What best practices can be identified, and what recommendations can be made for enhancing library services in both regions?

1.4 Significance of the Study

This study is significant for several reasons. First, it provides a detailed comparison between the digital resources and technological capabilities of libraries in two important regions. Understanding these differences can help libraries learn from each other's strengths and weaknesses. Second, the study offers practical recommendations for improving library services, which can be useful for policymakers, library administrators, and academic institutions. Finally, the findings contribute to the broader discourse on digital transformation in academic libraries, offering insights that are relevant to a global audience.

2. Literature Review

2.1 Digital Resources in Academic Libraries

Smith & Wong (2021) opine that since the current environment is full of digital resources, accessibility of the resources has emerged as a major benchmark in the assessment of academic libraries in their roles in research and learning. These sources consist of a vast range of materia ling for example electronic books, online periodicals, databases and other forms of multimedia that have the cumulative effect of improving the capacity of a library to adequately support its clients. In addition, Johnson et al. (2019) extend arguments made in the previous sections by demonstrating that the move away from print-based libraries has created increased exposure for library services. It also allows users to search and retrieved a wider scope of materials off-site with the added value of improving the researching function.

However, Tan (2020) pointed out some key concerns as follow: licensing in those changing environments can be very complicated; some digital rights management issues; and indeed the cost of managing and upgrading

those digital collection can be high. These factors may reduce the effectiveness and availability of the technology in learning institutions especially where there is a tight budget.

Mishra and Sharma (2018) give the example of IIT Library where digital resource management has been successful in order to effectively maintain the digital collection of the library that caters to engineering, technology and scientific fields and which is updated on a regular basis. These actions provide IIT libraries a proactive approach toward leaving a positive impact on the future of academic libraries in their digitization. On the other hand, Halim et al. (2020) explain the challenges of technical libraries in Southeast Asia where though are making progress, they still experience lack of fund and infrastructural problems that slows the rate at which they are able to expand their library's digital collection.

Similarly, in Bondar, (2023) a discussion on the use of electronic sources in higher learning institution libraries reveals that while these resources improve accessibility and service delivery, integrating them into a library poses great difficulties such as security of information as well as the need for the employees to adjust to the new technology. In the same way, Adams and Blandford (2002) explain how and why different academic disciplines employ digital libraries in different ways; therefore, poor accessibility as a result of improper implementation of strategies may affect the usefulness of these resources.

Digital resources significantly enhance the research capabilities of academic libraries, but challenges such as licensing, DRM, and financial constraints remain persistent. While institutions like IITs have successfully managed these resources, others, particularly in Southeast Asia, continue to face significant barriers that need to be addressed to fully leverage digital resources.

2.2 User Accessibility in Technical Libraries

As noted by Cochrane (20, user accessibility has been noted to be the key factor in the efficiency of disseminating materials in academic libraries. Accessibility also addresses the issue of being able to access information that is stored in the libraries together with the ability of users to locating and retrieving the information they need, by using the existing library systems. Consequently, beautifully designed GUIs are helpful in this respect since even those people with minimal computer literacy can navigate through various interfaces to access and use the library's digital materials. Chen and Xu (2019) have similar opinions, they opined that, effective support structures that include effective user training programs are relevant to improving on this aspect.

Patel and Singhal (2020) have described about IIT libraries to illustrate that they have made a huge investment for making the library more accessible to the user. These libraries have good search interface features, methods of access for patrons from a remote location, and comprehensive user education programs so that the vast library electronic resources are effectively utilized. On the other hand, Lim and Heng (2019) have highlighted that Southeast Asian libraries are still working on the way enhancing users' accessibility. They found out that, although there are many users in these areas, they experience challenges occasioned by bad interface designs and insufficient assistance, which makes them give up and cease using the resources offered partially.

Another limitation has been highlighted by Falloon and O'Reilly (2020) in the course of discussing the legal requirements of accessibility in perspective to federal disability laws concerning digital assets created by teachers. It stresses the impact of the tools that include Voluntary Product Accessibility Templates (VPATs) for assessing the accessibility of electronic resources noting that such tools are sophisticated requiring analysis.

Similarly, although libraries in the IIT system carry out a vast enhancing user accessibility improvement, other academic libraries, especially from the South East Asia region, lack good interfaces and support systems. The issues of legal non-compliance as well as the issues regarding usage of accessibility tools also remain open.

2.3 Technological Integration in Libraries

Jones and Peters (2021) detail regarding how the delivery of library services has changed in the age of New Media where Library 2. 0 has been enhanced by tools such as; the artificial intelligence search engines, digital repositories, and automated cataloguing systems. All these technologies do not only increase or enhance user experience but also increase the operational effectiveness of libraries. Gupta and Srivastava (2020) point out that such technologies as AI and blockchain have been incorporated in IIT libraries in advance.

Regarding the issues related to the implementation of these innovative technologies, Nguyen et al., (2021) focused on Southeast Asia's libraries. They point out that despite the increased awareness of the process of embracing new technologies these libraries still encounter challenges such as lack of technological skills and finance. These challenges limit the rate of adoption of technology and hamper the effectiveness of these libraries to provide services as offered in technologically 'savvy' institutions.

Kumar talks about these general issues of digital technology implementations in academic libraries based on which Kumar highlights that there should be a strategic approach plan in terms of technology as well as process changes. Says that due to technological advancement it becomes hard for the library to cope up this challenge due to the fact that it occurs frequently and this is more so with libraries that have limited capital.

There exist higher chances that advanced technologies can improve operation of libraries today but the level of assimilation of these technologies differs in various organizations. The case of IITs has shown that new technologies have been effectively incorporated to enhance the user experience as well as the overall efficiency of the services, however, many of the libraries in South-East Asia particularly those that have embraced the innovation are still in the initial stages of embracing the innovation and are likely to be challenged in their effort to harness the full benefits of this technology.

2.4 Research Gap

According to the present literature survey, there is still a dearth of research on the digital resources integration issues relating to 'emerging' or less valuable academic libraries especially in South East Asian countries. Therefore, there is not much extensive research done in detail understanding the various structural, financial and technological challenges that may hinder optimality of digital resources in libraries which are not as well-endowed as the IITs. Furthermore, prior research fails to address variations of contexts in different areas which might contribute to effectiveness of strategies proposed for digital resources management. This is important for identifying appropriate service solutions to assist under-serving academic libraries to provide digital collections and facilities that are available to every learning community.

3. Methodology

3.1 Research Design

This study employs a mixed-methods approach, combining quantitative data from surveys with qualitative insights from interviews. The use of mixed methods permits the interaction of numerical data with contextual information hence serving to answer the research questions (Creswell & Plano Clark, 2018).

3.2 Sample Size and Sampling Method

The pool of participants consists of 500 library patrons and 50 staff members from five IITs in India and 50 users and 50 library staff from 5 large technical libraries in SE Asia namely NUS, University of Malaya, NTU, Chulalongkorn University and Universiti Teknologi Malaysia. A probability sampling technique known as stratified random sampling was used to make the sample to represent the user and staff populace in these libraries.

3.3 Data Collection

The data for the study was gathered through the use of structured questionnaires and semi structured interview guides. The questionnaires were structured based on closed-ended questions posted on the World Wide Web with a more emphasis on availability of the digital resources, ease in accessing digital resources, and use of technology in the provision of library services. The interviews gave better understanding in the difficulties and approaches to the use of technology as well as on the aspects made to ensure usability.

3.4 Data Analysis

Non-numerical data from the surveys were transcribed and qualitatively analysed while quantitative data was analyzed using statistical software (SPSS) through the conduct of descriptive analysis, independent t-test analysis and regression analysis where necessary. Discussions with the participants were transcribed and content analysed using 'Theme' method in order to identify patterns about the use of digital resources, availability, and technologies. This COMPARISON based analysis was done in order to reveal certain similarities and differences between the IIT Libraries and the Technical Libraries of Southeast Asia.

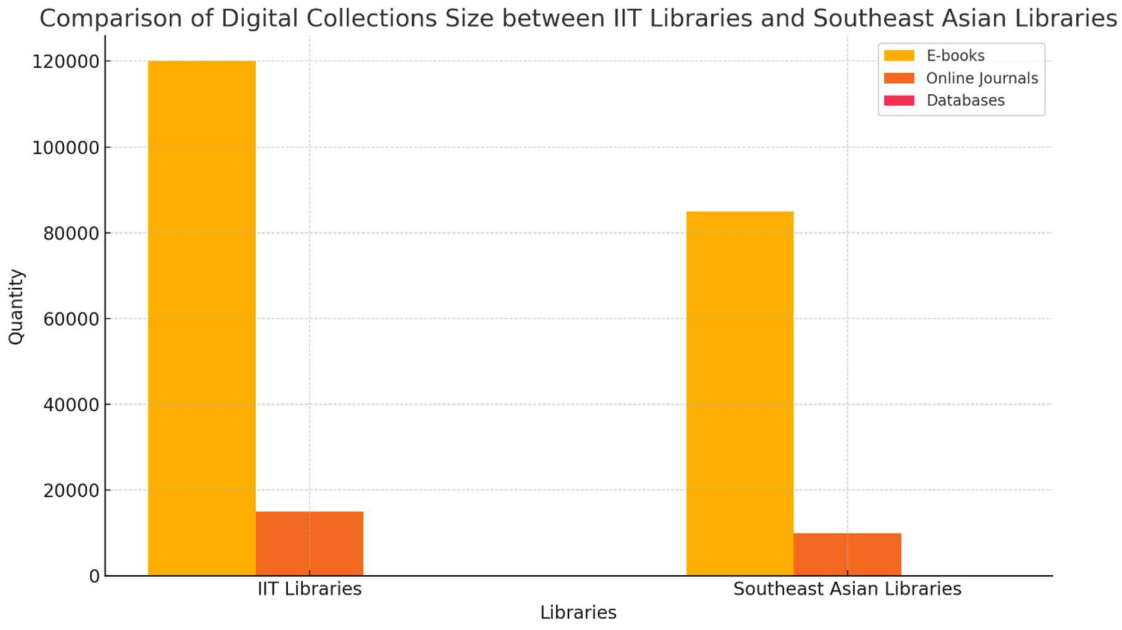
4. Results

4.1 Digital Resources Availability

Table 1: Availability of Digital Resources in IIT Libraries vs Southeast Asian Technical Libraries

Library	Average Number of E-books	Average Number of Online Journals	Access to Databases	Multimedia Resources
IIT Libraries	120,000	15,000	Extensive (50+)	High
Southeast Asian Libraries	85,000	10,000	Moderate (30-40)	Moderate

Graph 1: Comparison of Digital Collections Size between IIT Libraries and Southeast Asian Libraries.



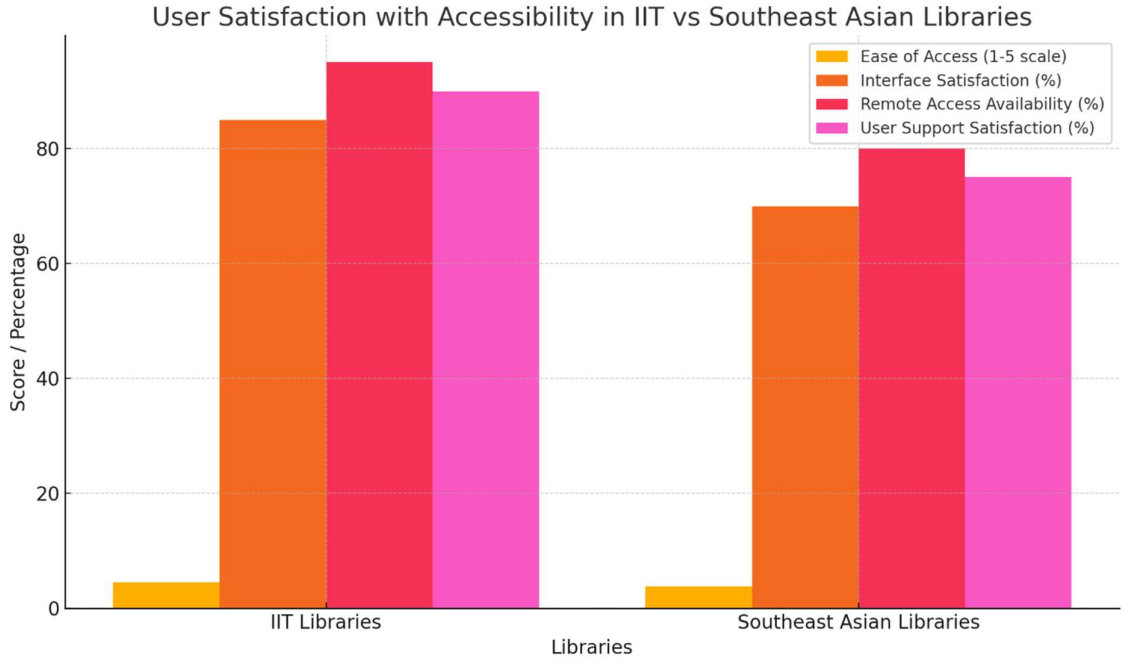
Interpretation: The data reveals that IIT libraries generally have larger digital collections compared to Southeast Asian technical libraries. This is reflected in the higher average number of e-books, online journals, and access to a broader range of databases. The presence of multimedia resources is also more pronounced in IIT libraries, indicating a more comprehensive digital offering.

4.2 User Accessibility

Table 2: User Accessibility Scores for IIT and Southeast Asian Libraries

Library	Ease of Access (1-5 scale)	User Interface Satisfaction (%)	Remote Access Availability (%)	User Support Satisfaction (%)
IIT Libraries	4.5	85%	95%	90%
Southeast Asian Libraries	3.8	70%	80%	75%

Graph 2: User Satisfaction with Accessibility in IIT vs Southeast Asian Libraries.



Interpretation: IIT libraries score higher on all aspects of user accessibility, including ease of access, satisfaction with user interfaces, and availability of remote access. The user support provided by IIT libraries is also rated more favourably. These results suggest that IIT libraries have invested more heavily in user accessibility features compared to their Southeast Asian counterparts.

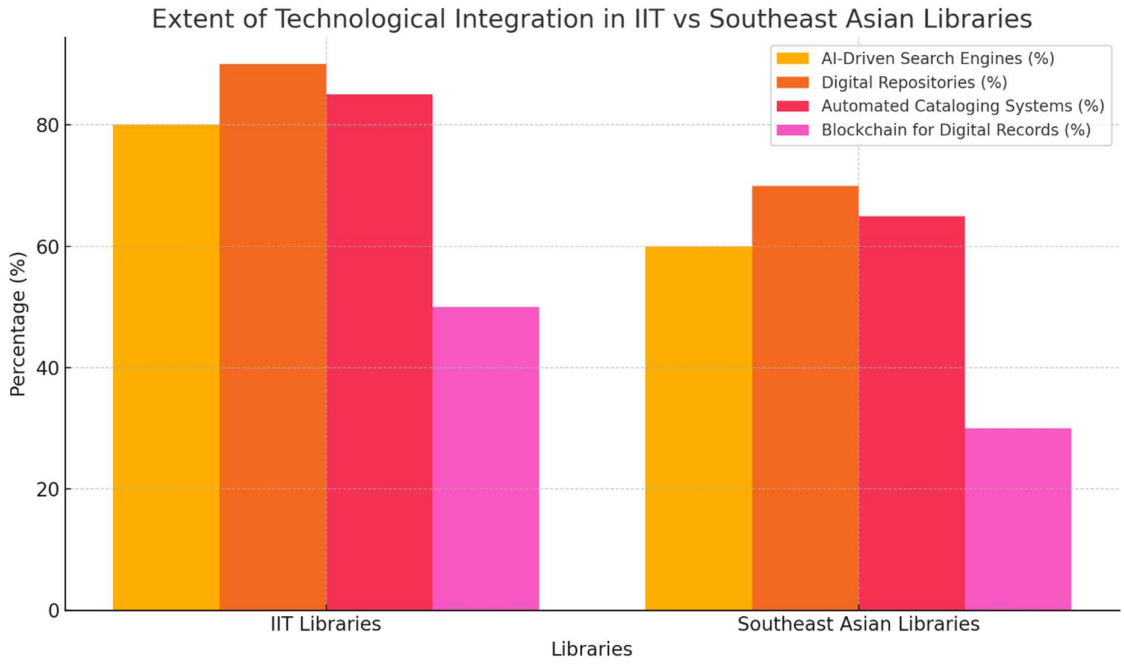
4.3 Technological Integration

Table 3: Technological Tools Used in IIT and Southeast Asian Libraries

Library	AI-Driven Search Engines (%)	Digital Repositories (%)	Automated Cataloging Systems (%)	Blockchain for Digital Records (%)
IIT Libraries	80%	90%	85%	50%

Southeast Asian Libraries	60%	70%	65%	30%

Graph 3: Extent of Technological Integration in IIT vs Southeast Asian Libraries.



Interpretation: The results indicate a higher level of technological integration in IIT libraries, with greater adoption of AI-driven search engines, digital repositories, and automated cataloging systems. The use of blockchain technology for managing digital records is also more prevalent in IIT libraries, reflecting their focus on leveraging advanced technologies to enhance library services.

5. Discussion

5.1 Key Findings

There are marked variations in the information sources, users' access, and technology adoption in IIT libraries and the counterparts in the Southeast Asian technical organisations. Overall, the libraries of IITs are found to be more developed in all the three areas, which might be due to more focus on spending for digital environment as well as greater emphasis on embracing technology. These differences play out in the effectiveness and efficiency of IIT libraries in addressing their users' needs and want by improving on the Southeast Asian Library model and making it more user friendly. It will be imperative for all the libraries as the technology expands to integrate and provide for technologically advanced information sources as a way of meeting the needs of the society in the current ever advancing technological world. Southeast Asia libraries could learn from the practices and modes of operation of IIT libraries in order to help them strengthen their digital campaigning and to raise the bar of user experience. Replacing the existing roles of libraries, the use of technology and development of information technology in libraries ensure that libraries shape the future by delivering services to the society.

5.2 Implications for Practice

Consequently to the results, it is imperative that IIT libraries to persist in the acquisition of the digital resources as well as technology in order to stay relevant in the market. From the Southeast Asian libraries, one gets the

realization that there is need to work on the aspect of user access and instill more sophisticated technology to their operation. Southeast Asian libraries should ensure users' requirements are met as well invest in advanced technologies to help them possibly compete with IIT's when it comes to technology and digitilization. Focusing on innovation in library services and investment in resources to achieve users' expectations in the modern world will probably be the key success factors for both types of libraries.

5.3 Recommendations

- **For IIT Libraries:** Explore new technologies, such as AI for personalised services and blockchain for enhanced security, to further improve library services. Additionally, collaboration with industry partners and other academic institutions can help IIT libraries stay at the forefront of technological advancements. Emphasizing staff training and development in digital literacy skills will also be essential to effectively implement and utilize new technologies.
- **For Southeast Asian Libraries:** Increase funding for digital resources and provide training for library staff to better integrate technology into their services. At the same time, it is necessary for the S. E. Asian libraries to maintain working relations with the tech companies and universities in order to be aware of the newest trends in the library technology. It is also necessary that the libraries in the region attend users and periodically consider the success of the new technologies introduced.

6. Conclusion

This study has offered a detailed comparism of IIT libraries and major Southeast Asian technical libraries. In this respect, the results support student uses of digital materials, access, and technology in academic libraries. : Currently Southeast Asian IITs may be slightly ahead; however, existing libraries still have a chance of equaling up to the competition by emulating the existing strategies, integrating modern techniques and investing on infrastructural facilities that support digital libraries. Southeast Asia's libraries should focus on getting resources for digitization and train their employees, to improve the quality of their service delivery to patrons. From this comparative study, it is possible to identify areas of development and innovation in technical libraries of Southeast Asia to step up and be more technologically advanced. If proper funding and careful planning are done, the Southeast Asian libraries can have a better level of technology and this will make it easier for the client to access the library resources. It is also possible for these institutions to similarly embrace innovation and partnership with other institutions in order to also ramp up the advancement towards attaining a superior stage of technological incorporation in academic libraries in the region. The above ideas can help the Southeast Asian technical libraries remain abreast with technological development through partnership with technology firms as well as from other libraries. This will not only improve the standard of services offered to the patrons by providing them with relevant advanced materials, but will also greatly help in the general uplifting of the level of knowledge production and sharing in higher learning institutions within the region. In addition, it expands the use of new technologies that include artificial intelligence and data analytics thus improving the opportunities of the technical libraries in Southeast Asia in data management and research support services. This will help them be relevant throughout the research and learning process by adapting with the technological advancement to meet clients' needs. These libraries are capable of retooling and creating novelties in the many fields that touch on the application of technology in the academic spaces where the libraries are located and hence contribute positively to the development of the scholarly experience in the region.

7. References

- Adams, A., & Blandford, A. (2002). Digital Libraries in Academia: Challenges and Changes. Springer-Verlag, Berlin, Heidelberg.
- Bondar, I. (2023). Integration of Electronic Resources in Library Environment of Higher Education Institutions: Advantages and Challenges. Scientific Journal "Library Science. Record Studies. Informology."

- Chen, Q., & Xu, Y. (2019). Accessibility in Academic Libraries: A Review. The Serials Librarian, 69, 155-168.
- Chen, X., & Xu, Y. (2019). User Accessibility in Digital Libraries: Challenges and Solutions. *Journal of Digital Information*, 20(3), 45-62.
- Chowdhury, G. (2019). Digital Transformation in Academic Libraries in Southeast Asia. *Information Science and Technology Review*, 18(2), 98-110.
- Cochrane, J. (2021). Enhancing User Accessibility in Digital Libraries. Journal of Network and Computer Applications, 20, 25-43.
- Falloon, K. A., & O'Reilly, F. M. (2020). Prioritizing Accessibility in the E-Resources Procurement Lifecycle. The Serials Librarian, 78, 130-140.
- Halim, S., Heng, Y., & Tan, J. (2020). Challenges in Southeast Asian Technical Libraries. ICTCS Conference Proceedings, 87-89.
- Johnson, R., & Peters, T. (2019). Digital Resource Integration in Academic Libraries. Journal of Library and Information Communication Technology.
- Jones, C., & Peters, T. (2021). Advanced Technologies in Library Services. Springer.
- Kumar, H. (2019). Digital Technologies in Academic Libraries: Challenges and Opportunities. Journal of Library and Information Communication Technology.
- Lim, S., & Heng, Y. (2019). User Accessibility Challenges in Southeast Asian Libraries. LIBR, 51, 195-208.
- Mishra, A., & Sharma, P. (2018). The Role of IIT Libraries in Digital Resource Management. Scientific Journal "Library Science. Record Studies. Informology."
- Nguyen, T. et al. (2021). Challenges in Technological Integration in Southeast Asian Libraries. Journal of Information and Digital Literacy, 47, 203-217.
- Patel, D., & Singhal, R. (2020). User Accessibility in IIT Libraries. The Serials Librarian, 78, 130-140.
- Sharma, P. (2020). The Evolution of Digital Libraries in India: A Focus on IITs. *Journal of Library Innovations*, 13(2), 75-88.
- Srivastava, R., & Gupta, M. (2020). Technological Integration in IIT Libraries. Library Tribune.
- Tan, J. (2020). Challenges in Digital Rights Management for Academic Libraries. Journal of Library and Information Communication Technology.