Journal of Applied Science, Engineering, Technology, and Education *ISSN: 2685-0591 (online)*
Vol. 7 No. 2 (2025)
https://doi.org/10.35877/454RI.asci3875

Artificial Intelligence Readiness in Malaysian Libraries: An Assessment Framework

Mohamad Noorman Masrek[a,*], Mohamad Rahimi Mohamad Rosman[b], Shamila Mohamed Shuhidan[a], Mohammad Fazli Baharuddin[a], Fitri Mutia[c], Tri Soesantari[c], Helmy Prasetyo Yuwinanto[c], & Ragil Tri Atmi[c]

[a]*Faculty of Information Science, Universiti Teknologi MARA Selangor Branch, Shah Alam, Malaysia*
[b]*Faculty of Information Science, Universiti Teknologi MARA Kelantan Branch, Machang, Malaysia*
[c]*Faculty of Social and Political Sciences, Universitas Airlangga, Surabaya, Indonesia*

Abstract

This study investigates the readiness of Malaysian libraries to embrace Artificial Intelligence (AI) technologies, focusing on six essential dimensions: infrastructure, technical skills, management support, policy and regulations, funding, and training. Employing a quantitative research design, data were collected via an online survey distributed to library heads, offering valuable insights into their level of preparedness for AI adoption. The questionnaire was developed based on preliminary interviews with librarians and further refined through expert input and pilot testing, demonstrating strong internal consistency. The findings indicate that while libraries generally show moderate readiness in terms of internet infrastructure and management support, notable challenges persist in areas such as financial planning and the formulation of AI-related policies and regulations. These gaps underscore critical areas that require attention to ensure successful integration of AI technologies. This study offers several key contributions. Theoretically, it enriches the current understanding of AI readiness in the library context by presenting a validated framework for future investigation. Empirically, it addresses a gap by providing evidence-based insights into the current state of AI readiness in Malaysian libraries. Practically, it delivers actionable recommendations, particularly in improving financial strategies and policy development, to support effective AI adoption.

Keywords: Artificial intelligence; Ai adoption; library readiness; Malaysian libraries; technology integration.

Received: 29 April 2025 Revised: 16 June 2025 Published: 31 August 2025

1. Introduction

As digital transformation accelerates across sectors, the readiness of libraries to harness Artificial Intelligence (AI) is becoming a defining factor in their continued relevance. No longer limited to traditional roles, the modern library is emerging as a data-rich environment where AI technologies are used to support advanced analytics, enhance user access, and facilitate research leveraging Big Data (Hussain, 2023). When routine functions are automated, librarians can shift their focus toward delivering specialized research assistance and tailored services (Pence, 2022). The application of AI further contributes to improved cataloging accuracy, smarter resource allocation, and more interactive user interfaces—reconfiguring library operations into agile, user-centered systems (Masrek et al., 2024).

Despite its potential, the successful implementation of AI in libraries presents significant challenges (Bassey & Owushi, 2023). While AI can enhance technical services and administrative functions, its effective integration depends on fulfilling a range of technical, organizational, and human resource requirements. Addressing these demands is essential for sustainable AI adoption. Libraries must also confront several critical research gaps, including the lack of comprehensive frameworks for assessing AI readiness and the need for strategies to manage staff resistance to technological change (Harisanty, Anna, Putri, Firdaus & Azizi, 2023). The readiness of Malaysian libraries to embrace AI, in particular, warrants focused investigation. Globally, academic libraries display varying degrees of awareness and engagement with AI. Many remain passive, with only a limited number actively developing or participating in AI-related initiatives or hubs (Wheatley & Hervieux, 2020). Moreover, AI readiness and adoption in libraries remain

* Corresponding author.
E-mail address: mnoorman@uitm.edu.my

underexplored in scholarly research, leaving both academics and practitioners with limited guidance for implementation (Jöhnk, Weißert & Wyrtki, 2021). In the context of Nigerian university libraries, for instance, although there is awareness of AI's potential to enhance user satisfaction, fears over job security among librarians have emerged as a significant barrier to adoption (Abayomi et al., 2021).

There are notable research gaps in the literature concerning the readiness of libraries to adopt Artificial Intelligence (AI), particularly within the Malaysian context. Theoretically, there is a lack of comprehensive and adaptable frameworks that assess AI readiness across various types of libraries. Empirically, data on the implementation and outcomes of AI initiatives in Malaysian libraries remain scarce, limiting our ability to evaluate progress and effectiveness. Practically, library professionals have limited access to structured guidance on navigating the transition toward AI-enhanced operations. In light of these gaps, this study seeks to answer the following research question: To what extent are Malaysian libraries ready to adopt and implement AI technologies in their operations and services? This investigation is significant, as it will offer critical insights into whether Malaysian libraries are adequately prepared to embrace AI as a transformative tool—ultimately contributing to the development of informed strategies, forward-looking policies, and sustainable capacity-building efforts in the sector.

2. Literature Review

Over the years, AI has seen significant progress, reshaping key industries such as healthcare, finance, and education (Masrek et al., 2024; Pattnaik, Ray & Raman, 2024; Kasula, 2024). Its strength lies in processing large datasets, identifying trends, and generating predictive insights—allowing organizations to boost operational efficiency, refine decision-making processes, and develop forward-looking services. AI is generally described as the technological capacity of machines to replicate aspects of human intelligence, especially through the manipulation of symbols and structured knowledge representations (Elmas & Babayev, 2021). These characteristics make AI a foundational tool for fostering innovation and driving advancement across a wide range of fields.

Similar to other industries, libraries must evaluate their readiness for AI implementation to fully capitalize on its transformative potential (Owolabi et al., 2022). Key areas such as infrastructure, financial capacity, workforce capabilities, training opportunities, leadership commitment, and adherence to relevant policies and regulations must be assessed. Doing so facilitates the smooth integration of AI tools and technologies. Proactively addressing these readiness factors can help libraries navigate common barriers, including limited funding, insufficient expertise, and outdated infrastructure. By employing structured AI readiness frameworks, libraries can approach AI adoption in a more strategic and organized manner. This preparation ensures they are equipped to utilize AI effectively while responding to the changing expectations of their user communities (Mayesti et al., 2024).

AI readiness has also emerged as a key consideration across various sectors beyond libraries. Studies have highlighted that the social sector in Asia, including non-profit and public services, must strengthen its technological capabilities to fully benefit from AI advancements (Hewage, 2024). At the governmental level, ASEAN countries have begun establishing national AI policies and frameworks, yet disparities remain in terms of policy coherence and implementation readiness (Labanieh et al., 2024). Lee, Shankararaman, and Lieh (2024) further emphasize the need for public sector organizations to adopt structured AI readiness frameworks to enhance citizen services and governance efficiency. Similarly, Yen, Hong, and Yen (2024) propose a readiness framework specifically designed for Malaysian SMEs, highlighting common challenges such as technological infrastructure gaps and limited organizational capability. These insights collectively reinforce the need for libraries to benchmark their AI readiness efforts not only within the library community but also against broader sectoral and regional initiatives to ensure alignment with national digital transformation goals.

2.1. Infrastructure

Although the advantages of integrating AI are widely recognized, many libraries continue to face challenges related to limited funding, lack of expertise, and underdeveloped infrastructure (Ajani, Tella, Salawu & Abdullahi, 2022). Assessing AI readiness from an infrastructure perspective involves examining both technological and physical components of the organization (Jöhnk, Weißert & Wyrtki, 2021; Nortje & Grobbelaar, 2020). This includes evaluating systems such as hardware, software, networking tools, and data architecture. The objective is to determine whether the existing technological environment is capable of supporting AI adoption in a secure, scalable, and efficient manner (Horani et al., 2023). As highlighted by Vuong et al., infrastructure evaluation also affects broader aspects such as budget stability, political will, and cultural acceptance. Within the library context, this readiness is reflected in access to digital assets, the ability to manage and analyze extensive data collections, and the infrastructure required to

implement sophisticated AI-enabled services (Subaveerapandiyan, Sunanthini & Amees, 2023; Barsha & Munshi, 2024).

2.2. Top Management Support

As the saying goes, *"a fish rots from the head down"*—emphasizing that leadership sets the tone for the entire organization. AI readiness, when viewed through the lens of top management support, refers to the extent of commitment and engagement shown by senior leadership in driving AI adoption across the organization. This involves their readiness to invest necessary resources, foster an environment that values innovation, and provide strategic guidance for AI-related efforts (Horani et al., 2023; Clarke, 2019). Active leadership ensures that AI initiatives are well-aligned with organizational objectives and are supported by a clear implementation plan. When top executives are visibly involved, AI efforts are more likely to secure essential funding, receive organizational focus, and follow a coherent strategic path (Najdawi, 2020; Shang, Low & Lim, 2023). In addition, robust leadership support plays a key role in minimizing the risks linked to AI adoption, thereby protecting the organization's integrity and reinforcing stakeholder confidence.

2.3. Human Resource

Human resources have long been recognized as a critical factor in the successful adoption and implementation of any IT initiative. In the context of AI, assessing readiness from a human capital perspective involves determining how capable and prepared the workforce is to support AI integration. This requires understanding how emerging technologies reshape job roles and recognizing the growing need for continuous upskilling to stay relevant in a rapidly evolving environment. Key considerations include evaluating employees' skill sets, their willingness to engage with new technologies, and the availability of training programs that foster AI-related competencies (Chowdhury et al., 2023). Within libraries, this translates into ensuring that librarians and support staff possess the necessary technical know-how and are ready to apply AI tools to enhance service delivery and operational performance. Nevertheless, human resource leaders often face challenges in addressing employee anxieties about AI, building trust, and managing expectations (Arslan, 2021). Additionally, the personal beliefs and attitudes of staff play a crucial role in shaping their adoption behavior (Charlwood & Guenole, 2023). By addressing these people-centered concerns, libraries and other institutions can better navigate the shift toward AI-enabled processes (Suseno, Chang, Hudík & Fang, 2021).

2.4. Policy and Regulations

Understanding and adapting to institutional and regulatory shifts is vital to keeping human interests at the core of AI advancement (UNESCO, 2023). From a policy and regulatory standpoint, AI readiness entails reviewing the organizational structures, legal frameworks, and ethical principles that guide the deployment and use of AI technologies. This includes establishing clear protocols on data protection, transparency, accountability, and responsible AI practices (Huriye, 2023). In the absence of strong regulatory measures, the potential harms of AI—such as privacy violations, algorithmic bias, and unethical use—can overshadow its intended benefits (Cachat-Rosset & Klarsfeld, 2023). For libraries, this readiness translates into formulating well-defined policies on how AI should be incorporated into daily operations, ensuring its use reflects institutional values and serves the public good (Weijia, 2022). Moreover, libraries are encouraged to harmonize their internal policies with global standards and established best practices, thereby promoting both ethical conduct and operational effectiveness in their application of AI tools (Ali, Naeem, Bhatti, & Richardson, 2024).

2.5. Funding

Given that most libraries operate as non-profit entities, securing financial support often presents a significant hurdle. Financial sustainability plays a critical role in evaluating AI readiness, as it directly influences an institution's capacity to shift toward AI-driven operations (Abadi, He, & Pecht, 2020). In this context, funding readiness refers to the availability of financial resources dedicated to developing, deploying, and maintaining AI solutions within the organization. This includes expenditures on infrastructure, employee training, research activities, and the procurement of AI-related tools and systems (Vuong et al., 2019; Vorm & Dasgupta, 2020). While AI offers transformative potential for enhancing library services, limited access to funding remains a major constraint (Jha, 2023). Therefore, ensuring sufficient financial allocation is essential for enabling infrastructure improvements, capacity-building initiatives, and creating an environment conducive to successful AI adoption. By strategically investing in AI, libraries can enhance their service delivery, remain technologically relevant, and meet the evolving expectations of their users in an increasingly digital world (Abadi, He, & Pecht, 2020).

2.6. Training

As the saying goes, *"Knowledge is power,"* and in the case of AI integration, that power begins with effective training. Equipping library personnel with the right skills and understanding is an essential component of preparing for AI adoption. From a training standpoint, AI readiness involves developing the capabilities, awareness, and confidence among staff to navigate and utilize AI tools within their institutions (Leddy & McCreanor, 2023). In the library context, this entails offering structured learning opportunities that address core AI principles, practical tool usage, and strategic applications in areas like library services and administration (Ali, 2020; Cox, 2023). Such efforts are pivotal in cultivating a workforce that can effectively apply AI to improve workflows, user engagement, and service innovation (Wang et al., 2022). One illustrative example is Sweden's learning circle for librarians, which significantly enhanced participants' understanding of AI. As a result, librarians reported increased confidence and a more favorable perspective on how AI could improve access to and management of library collections (Andersdotter, 2023).

2.7. Theoretical Framework

Theoretical frameworks play a critical role in building up one's research study trajectory, deciding the foundational dynamics of research inquiry and creating boundaries and shape for the research inquiry (Costa, 2020). A framework for AI readiness in healthcare includes technical expertise, financial sustainability, socio-political commitment, and a healthy psycho-cultural context (Vuong et al., 2019). A theoretical framework for AI readiness in the context of business enterprises includes dimensions such as employee and culture, technology management, organizational governance, strategy, infrastructure, knowledge and information, and security (Nortje & Grobbelaar, 2020; Yen, Hong & Yen). According to Bawack, Fosso Wamba, and Carillo (2021), a theoretical framework for AI readiness involves perception, comprehension, action, and learning, connecting information system research to contemporary AI practices. A theoretical framework for AI readiness addresses technical, sustainable development, responsible innovation management, and legislation (Haidar, 2023).

While these frameworks provide valuable insights, they are predominantly designed for healthcare, business, or general information systems, and are not specifically tailored to the unique characteristics and operational realities of library environments. Furthermore, most of these frameworks emphasize organizational or technological factors without adequately addressing sector-specific considerations such as library policies, service delivery models, user engagement practices, and the ethical implications of AI adoption in public knowledge institutions. Drawing upon these theoretical frameworks and combined with the review presented above, the researcher developed a theoretical framework as shown in Figure 1 for assessing AI readiness in the context of libraries. The framework consists of six dimensions, namely, infrastructure, top management, policy and regulations, funding, human resource, and training.

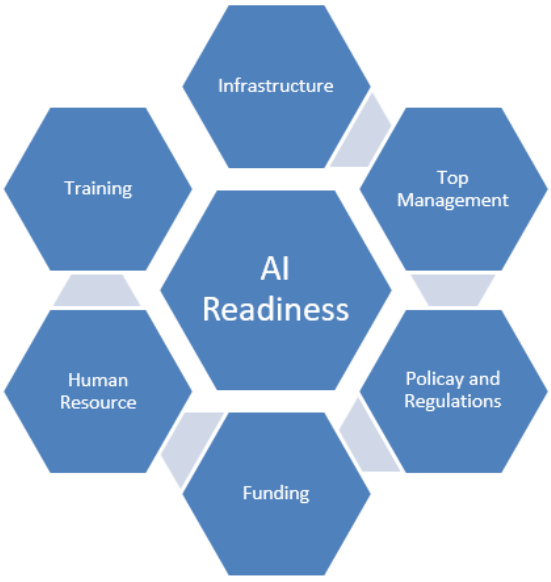

Fig. 1. Theoretical Framework.

3. Research Methodology

The research approach adopted for this study is quantitative, aiming to provide a comprehensive and systematic analysis of the readiness of Malaysian libraries to embrace Artificial Intelligence (AI). This approach was chosen to facilitate the collection of numerical data that can be statistically analyzed to identify patterns, trends, and relationships. The primary research method employed is a survey, which was facilitated through an online questionnaire. This method was deemed most appropriate due to its efficiency in reaching a large number of respondents across diverse geographical locations. Given the exploratory nature of this study, the questions in the survey were primarily self-developed. These questions were developed based on the findings from a preliminary study that involved in-depth interviews with librarians. This preliminary phase was crucial in ensuring that the survey questions were highly relevant and specific to the unique context of Malaysian libraries, addressing pertinent issues and potential barriers to AI adoption.

To enhance the reliability and validity of the questionnaire, it underwent a rigorous pre-testing phase (Aithal & Aithal, 2020). The questionnaire was pre-tested with seven academicians who specialize in library science teaching and research. Their expertise and insights were instrumental in refining the survey instrument, ensuring that it effectively captured the key dimensions of AI readiness. The feedback received from these academicians was thoroughly analyzed, and necessary modifications were made to improve the clarity, relevance, and comprehensiveness of the questions. Following these improvements, a pilot test was conducted with 30 librarians from various institutions. This pilot test yielded a good Cronbach's alpha ranging from 0.72 to 0.85, indicating acceptable to excellent internal consistency and reliability of the survey instrument. The final questionnaire employed perceptual measures using a Likert scale, where respondents rated their agreement with various statements from 1 (strongly disagree) to 5 (strongly agree), allowing for nuanced and detailed responses.

The unit of analysis for this study is the organization, specifically the library. Therefore, the targeted respondents were library heads who are in positions to provide informed insights about their institution's readiness to adopt AI technologies. A total of 350 librarians were invited via email to participate in the survey, ensuring a broad and diverse sample. After a period of two months, 71 valid responses were obtained, representing a range of library types and sizes. The data collected from these responses were analyzed using SPSS version 24, a powerful statistical software package. This analysis aimed to uncover deep insights into the current state of AI readiness in Malaysian libraries, including existing capabilities, challenges, and the potential benefits that AI adoption could bring to this sector.

4. Findings

The demographic profiles of the respondents are presented in Table 1. The findings indicate that the majority of the respondents were male, comprising 52.1% of the total, while females made up 47.9%. The majority of respondents were in the 40-49 year age group, accounting for 43.7% of the total. This is followed by the 30-39 year age group, which comprises 40.8% of respondents. The 20-29 year age group represents 8.5%, while the 50-59 year age group is the smallest, making up 7.0% of the respondents. The positions of the respondents indicate that the majority fall into the "Others" category, comprising 52.1% of the total. This suggests a diverse range of roles not specified in the main categories. Head of Unit positions account for 35.2%, indicating a significant representation of individuals in leadership roles within specific departments or units. Senior Librarians make up 26.8% of the respondents, reflecting a substantial portion of experienced professionals in senior roles. Chief Librarians represent the smallest group, at 1.4%, indicating a limited number of top-level administrators among the respondents.

The findings on library size show that nearly half of the libraries, 47.9%, are small, with fewer than 10 staff members. Medium-sized libraries, with 10-50 staff members, make up a smaller proportion at 8.5%. Large libraries, those with more than 50 staff members, constitute 40.8% of the total. With regard to working experience in the current library reveal that a significant portion of respondents, 43.7%, have been working in their current library for less than 1 year. Those with over 20 years of experience in their current library make up 35.2%, indicating a substantial number of long-term employees. Respondents with 11-20 years of experience in their current library constitute 26.8%, showing a considerable presence of mid-career professionals. Only 7.0% have been in their current library for 1-5 years, and the smallest group, with 6-10 years of experience, is 1.4%. In terms of education level, the majority hold a Diploma, accounting for 52.1%. Bachelor’s Degree holders make up 47.9% of the respondents, indicating a significant portion

† Corresponding author.
E-mail address: xxxx@xxxxxx.edu

with undergraduate education. Master's Degree holders constitute 8.5%, while those with a Doctorate/Ph.D. represent 40.8%.

Table 1. Demographic Profiles

		Frequency	Percent
Gender	Male	37	52.1
	Female	34	47.9
Age	20 - 29 year	6	8.5
	30 - 39 year	29	40.8
	40 - 49 year	31	43.7
	50 - 59 year	5	7.0
Position	Chief Librarian	1	1.4
	Senior Librarian	19	26.8
	Head of Unit	25	35.2
	Others	26	52.1
Library Size	Small (fewer than 10 staff members)	15	47.9
	Medium (10-50 staff members)	8	8.5
	Large (more than 50 staff members)	48	40.8
Working	Less than 1 year	8	43.7
Experience	1-5 years	4	7.0
	6-10 years	13	1.4
	11-20 years	34	26.8
	More than 20 years	12	35.2
Education	Diploma	14	52.1
	Bachelor's Degree	26	47.9
	Master's Degree	29	8.5
	Doctorate/Ph.D	2	40.8

The findings for infrastructure readiness (Table 2) indicate that the highest score was for internet connection speed and reliability to support AI software usage without interruptions, which received a mean score of 3.6620. This was followed by the regular maintenance and updates of hardware and software to meet evolving AI technology requirements, with a mean score of 3.4648, indicating a moderate level of upkeep to support AI integration. The availability of computers with sufficient processing power and memory to run AI applications effectively had a mean score of 3.3239, showing that there is some capacity but room for improvement. The lowest score was for the provision of sufficient storage space for AI datasets and related files, which had a mean score of 3.2676, highlighting a significant area that needs enhancement. The overall mean score for all these aspects combined was 3.4296, reflecting a general moderate readiness of the libraries to support AI technologies.

Table 2. Infrastructure

	Mean	Std. Deviation	Variance
The library provides computers with sufficient processing power and memory to run AI applications effectively	3.3239	1.06603	1.136
The library's internet connection speed and reliability are adequate to support the download and use of AI software without interruptions	3.6620	0.98479	0.970
The library provides sufficient storage space, either on local servers or in the cloud, to store AI datasets and related files	3.2676	0.99940	0.999
The library's hardware and software are regularly maintained and updated to meet the requirements of evolving AI technologies	3.4648	0.92321	0.852
Overall Mean	3.4296		

In terms of human resource readiness, the overall mean score combined was 3.2394, reflecting a moderate level of readiness among the library staff to effectively engage with AI technologies (Table 3). The highest score was for staff members' willingness to adapt to new technologies, including AI tools, and actively seeking opportunities to integrate them into their daily tasks, which received a mean score of 3.7042. The next highest score was for the technical skills necessary to understand and effectively operate AI tools and applications, with a mean score of 3.1268, indicating a moderate level of technical competence among the staff. The proficiency of library staff in troubleshooting common

issues related to AI tools received a mean score of 3.0704, showing that there is some ability but also a need for further skill development. The lowest score was for staff members possessing a deep understanding of the ethical implications associated with AI technologies, which had a mean score of 3.0563, highlighting a critical area for improvement in staff training.

Table 3. Human Resource

	Mean	Std. Deviation	Variance
Library staff members possess the necessary technical skills to understand and effectively operate AI tools and applications	3.1268	1.06810	1.141
Staff members are willing to adapt to new technologies, including AI tools, and actively seek opportunities to integrate them into their daily tasks	3.7042	0.91643	0.840
Library staff members demonstrate proficiency in troubleshooting common issues related to AI tools	3.0704	1.03267	1.066
Staff members possess a deep understanding of the ethical implications associated with AI technologies	3.0563	0.98398	0.968
Overall Mean	3.2394		

The findings for management's role in promoting and supporting AI technologies in the library revealed that (Table 4): Both the active promotion of a culture of technological innovation and seeking input from staff regarding AI tool selection and implementation received a mean score of 3.3803. This indicates a moderate level of encouragement and inclusion of staff in AI-related decisions by the management. The establishment of clear communication channels to keep staff informed about the library's AI initiatives had a slightly lower mean score of 3.3239, suggesting that while there is some effort in communication, there is room for improvement in ensuring staff are well-informed. The highest score was for fostering a supportive environment where staff members are given the freedom to explore AI tools, which had a mean score of 3.5857. Overall, the mean score for all these aspects combined was 3.4176, reflecting a generally positive but moderate level of managerial support and initiative in promoting AI technologies within the library.

Table 4. Top Management

	Mean	Std. Deviation	Variance
Management actively promotes a culture of technological innovation within the library, encouraging staff to experiment with new AI tools	3.3803	1.07393	1.153
Management actively seeks and values input from staff regarding AI tool selection and implementation	3.3803	0.94667	0.896
Library leaders establish clear communication channels to keep staff informed about the library's AI initiatives	3.3239	1.07935	1.165
The library fosters a supportive environment where staff members are given freedom to explore AI tools	3.5857	1.04247	1.087
Overall mean	3.4176		

The findings for management's role in promoting and supporting AI technologies in the library revealed that (Table 4): Both the active promotion of a culture of technological innovation and seeking input from staff regarding AI tool selection and implementation received a mean score of 3.3803. This indicates a moderate level of encouragement and inclusion of staff in AI-related decisions by the management. The establishment of clear communication channels to keep staff informed about the library's AI initiatives had a slightly lower mean score of 3.3239, suggesting that while there is some effort in communication, there is room for improvement in ensuring staff are well-informed. The highest score was for fostering a supportive environment where staff members are given the freedom to explore AI tools, which had a mean score of 3.5857. Overall, the mean score for all these aspects combined was 3.4176, reflecting a generally positive but moderate level of managerial support and initiative in promoting AI technologies within the library.

Funding has always been a major obstacle for organizations, including libraries, when it comes to adopting new technologies. The findings indicate the following mean scores for the financial readiness of libraries to support AI technologies (Table 6): The library has a dedicated budget specifically allocated for the acquisition and implementation of AI technologies, with a mean score of 2.6377. Financial planning that includes provisions for ongoing maintenance, updates, and necessary upgrades of AI systems received a mean score of 2.9000. While slightly higher, this score still indicates that financial planning for sustained AI operations is inadequate. The regular financial assessments conducted

by the library to evaluate the cost-effectiveness of AI implementations had a mean score of 2.7429, showing that there is some effort in financial evaluation but it remains a low priority. The lowest score was for the contingency funds set aside to address unforeseen challenges or emergencies related to AI technologies, with a mean score of 2.6143. This highlights a significant gap in financial preparedness for unexpected issues. Overall, the mean score for all these aspects combined was 2.7237, reflecting a generally low level of financial readiness for AI technologies in libraries.

Table 5. Policy and Regulation

	Mean	Std. Deviation	Variance
The library has established clear and comprehensive policies governing the use of AI technologies	2.8857	1.11046	1.233
There are guidelines in place that define the scope of AI applications within library services	2.9000	1.15658	1.338
Regulations are in place to safeguard patron data collected or processed by AI systems	3.0000	1.19176	1.420
There are protocols in place to address public concerns and complaints related to AI technologies	2.8429	1.15012	1.323
Overall Mean	2.9072		

Table 6. Funding

	Mean	Std. Deviation	Variance
The library has a dedicated budget specifically allocated for the acquisition and implementation of AI technologies	2.6377	1.08426	1.176
Financial planning includes provisions for ongoing maintenance, updates, and necessary upgrades of AI systems	2.9000	1.13124	1.280
The library conducts regular financial assessments to evaluate the cost-effectiveness of AI implementations	2.7429	1.07253	1.150
There are contingency funds set aside to address unforeseen challenges or emergencies related to AI technologies	2.6143	1.09403	1.197
Overall Mean	2.7237		

Promoting a culture of continuous learning and skill enhancement is essential for libraries aiming to adopt AI technologies effectively. The findings indicate the following mean scores for the library's efforts in this area (Table 7): The overall mean score for the library's efforts in promoting continuous learning and skill enhancement in AI technologies is 3.1398, reflecting a moderate level of commitment. The highest score was for promoting a culture of continuous learning, with a mean score of 3.4286, suggesting that the library is moderately successful in encouraging staff to upgrade their skills and stay updated with AI technology. Library staff members' access to training and resources that enhance their knowledge of AI technology received a mean score of 3.0571, indicating that while some training opportunities exist, there is room for improvement. The assessment of staff AI proficiency and the provision of targeted training for improvement had a mean score of 3.0000, showing a basic level of effort in evaluating and addressing staff training needs. The effectiveness of AI training programs, aimed at equipping staff with the necessary knowledge and skills for their roles, was assessed with a mean score of 3.0735.

Table 7. Training

	Mean	Std. Deviation	Variance
The library promotes a culture of continuous learning, encouraging staff members to upgrade their skills and stay updated with AI technology	3.4286	1.04356	1.089
Library staff members have received training or have access to resources that enhance their knowledge of AI technology	3.0571	1.15327	1.330
The library assesses staff AI proficiency and offers targeted training for improvement	3.0000	1.06322	1.130
The library assesses AI training program effectiveness to equip staff with the necessary knowledge and skills for their roles	3.0735	1.12391	1.263
Overall Mean	3.1398		

5. Discussion

In terms of infrastructure, satisfaction levels are moderate across Malaysian library AI support aspects. Internet speed and reliability are generally adequate, but opinions on processing power, memory, and storage space vary. These discrepancies might be due to different AI activities and user demands. However, confidence in maintenance and updates is consistent, suggesting Malaysian libraries can adapt to tech developments (Hanelt et al., 2021; Aslam, 2022). To optimize AI use, further needs assessments tailored to AI users are beneficial. Collaboration with IT departments and academic institutions can provide additional resources and expertise, enhancing the library's infrastructure for AI research and education in Malaysia. These findings align with Weinert et al. (2022).

The situation of human resources supporting AI in Malaysian libraries is more complex. There is a general view of moderate technical skills among library staff for operating AI tools, indicating a need for more training. Staff willingness to learn and integrate AI into workflows is uniformly positive. There is a moderate level of troubleshooting proficiency for AI-related issues, but some libraries need intensive training. Similarly, librarians have a moderate understanding of AI's ethical implications. Creating targeted training programs and fostering a culture of knowledge sharing among staff will enhance Malaysian library performance in using AI technologies (Bhardwaj et al., 2020; Votto et al., 2021).

Top management support for AI initiatives in Malaysian libraries shows variability. While there is overall support for AI projects, the effectiveness of communication channels and a supportive atmosphere for staff exploration differ. This moderate support level suggests varying commitment from top management. Malaysian libraries can strengthen this by fostering a consistent culture of innovation, ensuring communication channels are updated regularly, and creating an environment where staff feel empowered to explore AI tools without fear of mistakes. Involving staff in decision-making and maintaining open communication can further bolster top management support (Harsanto, 2021; Weijia, 2022; Bonal, 2023).

Policies and regulations regarding AI in Malaysian libraries show moderate establishment but room for improvement. Existing policies are in place, but inconsistencies in implementation indicate varying priorities among libraries. Enhancing and clarifying policies can ensure no gaps, particularly in AI application scope and data security. Clear protocols for addressing public concerns about AI can enhance transparency and credibility, creating a supportive environment. Improving these policies is crucial for responsible AI use, boosting user trust and adhering to guidelines while promoting innovation and accessibility (Permadi, Purnomo, & Pratiwi, 2022; Lo, 2024).

Funding for AI technologies in Malaysian libraries shows both strengths and gaps. There is some financial provision, but significant variability in spending and contingency funding. Some libraries have dedicated budgets and regular financial assessments, while others lack resources, creating challenges in sustaining AI initiatives. Enhancing financial planning and approving significant budgets, including contingency funds, is critical for long-term AI success. This approach allows for effective maintenance, updates, and upgrades, improving service delivery and user experience in the digital era (Lund et al., 2020; Chen et al., 2021).

The culture of continuous learning in Malaysian libraries is above average, with many libraries encouraging staff to upskill and stay updated with AI advancements. However, there's inconsistency in the success of these training initiatives. Specific training programs score moderately well, indicating some success but also highlighting the need for consistency in availability and effectiveness. These elements, backed by targeted training initiatives, resource availability, and regular assessments, can develop a competent workforce capable of operating AI technologies effectively (Harisanty et al., 2023; Lo, 2024).

6. Conclusion

This study provides a comprehensive assessment of the readiness of Malaysian libraries to embrace Artificial Intelligence (AI) technologies, focusing on six key dimensions: infrastructure, technical skills, management support, policy and regulations, financial readiness, and continuous learning culture. The framework developed for this study ensures a holistic examination of each dimension, revealing the multifaceted nature of AI readiness in the library sector. By exploring these dimensions, the study offers a detailed understanding of the strengths and weaknesses present in Malaysian libraries, providing a valuable benchmark for other institutions aiming to assess their AI readiness.

6.1. Contribution

Theoretically, this study significantly adds to the knowledge on AI readiness in the library sector. It develops a framework to assess library readiness for AI adoption across six key dimensions: infrastructure, technical skills, management support, policy and regulations, financial readiness, and continuous learning culture. Empirically, this study provides data-driven insights into the current state of AI readiness among Malaysian libraries, addressing a significant research gap. The findings serve as a benchmark for other studies and offer a reference point for comparing AI readiness in libraries across different regions. Practically, the study offers actionable recommendations for library administrators and policymakers to enhance AI readiness. It identifies key areas for improvement and provides practical guidelines for overcoming barriers to AI adoption. These recommendations are tailored to the context of Malaysian libraries, making them relevant and applicable. In a broader context, the proposed framework and findings can guide library stakeholders globally in formulating strategic policies, developing capacity-building programs, and investing in digital infrastructure to support AI adoption. Additionally, the insights gained from this study can inform national and regional policy discussions on digital transformation in public knowledge institutions, positioning libraries as active players in the wider AI and digital economy agenda.

Moving forward, enhancing AI readiness in libraries is not just an institutional priority but also a national opportunity to strengthen Malaysia's broader educational and research agendas. Libraries that are fully prepared to adopt AI can play a transformative role in improving information accessibility, supporting digital literacy initiatives, and enabling data-driven research services for students, educators, and researchers. This aligns with Malaysia's aspiration to become a digitally-driven nation. To move from moderate readiness to full AI adoption, libraries are encouraged to implement continuous capacity-building programs, establish cross-sector collaborations with technology providers, and secure long-term investment in AI infrastructure and workforce development. These strategic actions will not only advance library services but also contribute to the country's national digital transformation agenda.

6.2. Limitation and Suggestion for Future Research

Despite its contributions, this study has several limitations. The reliance on self-reported data from library heads may introduce bias, and the sample size, although substantial, represents a fraction of the entire library population in Malaysia. Additionally, the study focuses solely on Malaysian libraries, limiting the generalizability of the findings to other contexts. Future research should consider a broader and more diverse sample, including libraries from different regions and types, to enhance the generalizability of the findings. Longitudinal studies could also provide deeper insights into how AI readiness evolves over time. Further research should explore the specific challenges and barriers in greater detail, particularly in financial planning and policy development, to provide more targeted solutions. Additionally, qualitative studies involving in-depth interviews with a wider range of library staff could complement the quantitative findings and offer richer, more nuanced insights into the practical aspects of AI adoption in libraries.

Acknowledgements: We extend our heartfelt thanks to Faculty of Information Science at Universiti Teknologi MARA. Our appreciation also goes to the Research Management Centre at Universiti Teknologi MARA for facilitating our research.

Funding Statement: This project is funded by the Ministry of Education, Culture, Research, and Technology, Universitas Airlangga, Indonesia, under registration: Penelitian Internasional Research Network (IRN) Tahun 2023, No. SK. 1662/UN3.LPPM/PT.01.02/2023.

References

Abadi, H. H. N., He, Z., & Pecht, M. (2020). Artificial intelligence-related research funding by the US National Science Foundation and the National Natural Science Foundation of China. *IEEE Access, 8*, 183448–183459. https://doi.org/10.1109/ACCESS.2020.3029231

Abayomi, O., Adenekan, F., Abayomi, A., Ajayi, T., & Aderonke, A. (2021). Awareness and perception of the artificial intelligence in the management of university libraries in Nigeria. *Journal of Interlibrary Loan, Document Delivery & Electronic Reserve, 29*, 13–28. https://doi.org/10.1080/1072303X.2021.1918602

Aithal, A., & Aithal, P. S. (2020). Development and validation of survey questionnaire & experimental data–a systematical review-based statistical approach. *International Journal of Management, Technology, and Social Sciences (IJMTS), 5*(2), 233–251. https://doi.org/10.47992/ijmts.2581.6012.0116

Ajani, Y., Tella, A., Salawu, K., & Abdullahi, F. (2022). Perspectives of librarians on awareness and readiness of academic libraries to integrate artificial intelligence for library operations and services in Nigeria. *Internet Reference Services Quarterly, 26*, 213–230. https://doi.org/10.1080/10875301.2022.2086196

Ali, M. Y., Naeem, S. B., Bhatti, R., & Richardson, J. (2024). Artificial intelligence application in university libraries of Pakistan: SWOT analysis and implications. *Global Knowledge, Memory and Communication, 73*(1/2), 219–234. https://doi.org/10.1108/GKMC-12-2021-0203

Andersdotter, K. (2023). Artificial intelligence literacy in libraries. *Journal of Information Literacy*. https://doi.org/10.11645/17.2.14

Arslan, A., Cooper, C., Khan, Z., Golgeci, I., & Ali, I. (2021). Artificial intelligence and human workers interaction at team level: A conceptual assessment of the challenges and potential HRM strategies. *International Journal of Manpower*. https://doi.org/10.1108/ijm-01-2021-0052

Aslam, M. (2022). Adapting to change in academic libraries. *Global Knowledge, Memory and Communication, 71*(8/9), 672–685. https://doi.org/10.1108/gkmc-04-2020-0053

Barsha, S., & Munshi, S. A. (2024). Implementing artificial intelligence in library services: A review of current prospects and challenges of developing countries. *Library Hi Tech News, 41*(1), 7–10. https://doi.org/10.1108/LHTN-07-2023-0126

Bassey, M. M., & Owushi, E. (2023). Adoption of artificial intelligence in library and information science in the 21st century: Assessing the perceived impacts and challenges by librarians in Akwa Ibom and Rivers States. *International Journal of Current Innovations in Education, 6*(1), 75–85. https://doi.org/10.1109/5.771073

Bawack, R. E., Fosso Wamba, S., & Carillo, K. D. A. (2021). A framework for understanding artificial intelligence research: Insights from practice. *Journal of Enterprise Information Management, 34*(2), 645–678. https://doi.org/10.1108/JEIM-07-2020-0284

Bhardwaj, G., Singh, S. V., & Kumar, V. (2020). An empirical study of artificial intelligence and its impact on human resource functions. In *2020 International Conference on Computation, Automation and Knowledge Management (ICCAKM)* (pp. 47–51). https://doi.org/10.1109/ICCAKM46823.2020.9051544

Bonal, R. B. (2023). Contactless information centres: 5G-enabled library services. *Library Hi Tech News, 40*(5), 10–12. https://doi.org/10.1108/LHTN-11-2022-0122

Cachat-Rosset, G., & Klarsfeld, A. (2023). Diversity, equity, and inclusion in artificial intelligence: An evaluation of guidelines. *Applied Artificial Intelligence, 37*(1), Article 2176618. https://doi.org/10.1080/08839514.2023.2176618

Charlwood, A., & Guenole, N. (2023). Can HR adapt to the paradoxes of artificial intelligence? *Human Resource Management Journal*. https://doi.org/10.1111/1748-8583.12418

Chen, T., Guo, W., Gao, X., & Liang, Z. (2021). AI-based self-service technology in public service delivery: User experience and influencing factors. *Government Information Quarterly, 38*(4), 101520. https://doi.org/10.1016/j.giq.2020.101520

Chowdhury, S., et al. (2023). Unlocking the value of artificial intelligence in human resource management through AI capability framework. *Human Resource Management Review, 33*(1), Article 100899. https://doi.org/10.1016/j.hrmr.2022.100899

Clarke, R. (2019). Principles and business processes for responsible AI. *Computer Law & Security Review, 35*, 410–422. https://doi.org/10.1016/J.CLSR.2019.04.007

Costa, K. (2020). Integrating the C.O.S.T.A. research framework in teaching of thematic analysis for postgraduate students. https://doi.org/10.2139/ssrn.3654214

Cox, A. (2023). How artificial intelligence might change academic library work: Applying the competencies literature and the theory of the professions. *Journal of the Association for Information Science and Technology, 74*(3), 367–380. https://doi.org/10.1002/asi.24635

Elmas, Ç., & Babayev, J. (2021). Artificial intelligence techniques used in project management. *Advances in Artificial Intelligence Research*, *1*(1), 1–5. https://dergipark.org.tr/en/download/article-file/1366942

Haidar, A. (2023). An integrative theoretical framework for responsible artificial intelligence. *International Journal of Digital Strategy, Governance, and Business Transformation.* https://doi.org/10.4018/ijdsgbt.334844

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies, 58*(5), 1159–1197. https://doi.org/10.1111/joms.12639

Harisanty, D., Anna, N., Putri, T., Firdaus, A., & Azizi, N. (2023). Is adopting artificial intelligence in libraries urgency or a buzzword? A systematic literature review. *Journal of Information Science*. https://doi.org/10.1177/01655515221141034

Harsanto, B. (2021). Innovation management in the library: A bibliometric analysis. *Library Philosophy and Practice (e-journal), 5908.* https://digitalcommons.unl.edu/libphilprac/5908

Hewage, K. V. (2024). Technological readiness of Asia's social sector for the adoption and use of artificial intelligence. In *The Routledge Handbook of Artificial Intelligence and Philanthropy* (pp. 205-220). Routledge.

Horani, O. M., Al-Adwan, A. S., Yaseen, H., Hmoud, H., Al-Rahmi, W. M., & Alkhalifah, A. (2023). The critical determinants impacting artificial intelligence adoption at the organizational level. *Information Development.* https://doi.org/10.1177/02666669231166889

Huriye, A. Z. (2023). The ethics of artificial intelligence: Examining the ethical considerations surrounding the development and use of AI. *American Journal of Technology, 2*(1), 37–44. https://doi.org/10.58425/ajt.v2i1.142

Hussain, A. (2023). Use of artificial intelligence in the library services: Prospects and challenges. *Library Hi Tech News, 40*(2), 15–17. https://doi.org/10.1108/LHTN-11-2022-0125

Jha, S. (2023). Application of artificial intelligence in libraries and information centers services: Prospects and challenges. *Library Hi Tech News.* https://doi.org/10.1108/lhtn-06-2023-0102

Jöhnk, J., Weißert, M., & Wyrtki, K. (2021). Ready or not, AI comes—An interview study of organizational AI readiness factors. *Business & Information Systems Engineering, 63*, 5–20. https://doi.org/10.1007/S12599-020-00676-7

Kasula, B. Y. (2024). Ethical implications and future prospects of artificial intelligence in healthcare: A research synthesis. *International Meridian Journal, 6*(6), 1–7. https://doi.org/10.1080/jet.2019.12345678

Labanieh, M. F., Yusoff, Z. M., Ayub, Z. A., Wahab, H. A., & Shariffuddin, M. D. K. (2024). The Artificial Intelligence (AI) Readiness In Asean Countries: The Government Policies And Frameworks. *ASEAN Legal Insights, 1*, 68-76. https://doi.org/10.32890/aseanli2024.1.5

Leddy, M., & McCreanor, N. (2023). The potential utilisation of artificial intelligence (AI) in enterprises. In *European Conference on Innovation and Entrepreneurship.* https://doi.org/10.34190/ecie.18.1.1720

Lee, A., Shankararaman, V., & Lieh, O. E. (2024). Enhancing citizen service management through AI-enabled systems-a proposed AI readiness framework for the public sector. In *Research Handbook on Public Management and Artificial Intelligence* (pp. 79-96). Edward Elgar Publishing. https://doi.org/10.4337/9781802207347.00014

Lo, L. S. (2024). Evaluating AI literacy in academic libraries: A survey study with a focus on US employees. https://digitalrepository.unm.edu/ulls_fsp/203/

Lund, B. D., Omame, I., Tijani, S., & Agbaji, D. (2020). Perceptions toward artificial intelligence among academic library employees and alignment with the diffusion of innovations' adopter categories. *College & Research Libraries, 81*(5), 865. https://doi.org/10.5860/crl.81.5.865

Masrek, M. N., Susantari, T., Mutia, F., Yuwinanto, H. P., & Atmi, R. T. (2024). Enabling education everywhere: How artificial intelligence empowers ubiquitous and lifelong learning. *Environment-Behaviour Proceedings Journal, 9*(SI18), 57–63. https://doi.org/10.21834/e-bpj.v9iSI18.5462

Mayesti, N., Huang, C. H., Azmir, A. F., & Adzani, D. M. (2024). Librarians' views of the readiness of university libraries in Indonesia to adopt virtual and augmented reality. *Digital Library Perspectives.* https://doi.org/10.1108/DLP-05-2023-0041

Najdawi, A. (2020). Assessing AI readiness across organizations: The case of UAE. In *2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT)* (pp. 1–5). https://doi.org/10.1109/ICCCNT49239.2020.9225386

Nortje, M., & Grobbelaar, S. (2020). A framework for the implementation of artificial intelligence in business enterprises: A readiness model. In *2020 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)* (pp. 1–10). https://doi.org/10.1109/ICE/ITMC49519.2020.9198436

Owolabi, K. A., Okorie, N. C., Yemi-Peters, O. E., Oyetola, S. O., Bello, T. O., & Oladokun, B. D. (2022). Readiness of academic librarians towards the use of robotic technologies in Nigerian university libraries. *Library Management, 43*(3/4), 296–305. https://doi.org/10.1108/LM-11-2021-0104

Pattnaik, D., Ray, S., & Raman, R. (2024). Applications of artificial intelligence and machine learning in the financial services industry: A bibliometric review. *Heliyon*. https://doi.org/10.1016/j.heliyon.2023.e23492

Pence, H. (2022). Future of artificial intelligence in libraries. *The Reference Librarian, 63*, 133–143. https://doi.org/10.1080/02763877.2022.2140741

Permadi, I., Purnomo, G. W., & Pratiwi, K. Y. (2022). The new policy on library in Indonesia facing the industrial era 4.0: Opportunities and challenges. *Wacana: Jurnal Sosial dan Humaniora, 25*(3). https://doi.org/10.21776/ub.wacana.2022.025.03.05

Shang, G., Low, S., & Lim, X. (2023). Prospects, drivers of and barriers to artificial intelligence adoption in project management. *Built Environment Project and Asset Management.* https://doi.org/10.1108/bepam-12-2022-0195

Subaveerapandiyan, A., Sunanthini, C., & Amees, M. (2023). A study on the knowledge and perception of artificial intelligence. *IFLA Journal, 49*(3), 503–513. https://doi.org/10.1177/03400352231180230

Suseno, Y., Chang, C., Hudík, M., & Fang, E. (2021). Beliefs, anxiety and change readiness for artificial intelligence adoption among human resource managers: The moderating role of high-performance work systems. *The International Journal of Human Resource Management, 33*, 1209–1236. https://doi.org/10.1080/09585192.2021.1931408

UNESCO. (2023). *Readiness assessment methodology: A tool of the Recommendation on the Ethics of Artificial Intelligence.* https://doi.org/10.54678/yhaa4429

Vorm, E., & Dasgupta, P. (2020). Computer-centered humans: Why human-AI interaction research will be critical to successful AI integration in the DoD. *IEEE Intelligent Systems, 35*, 112–116. https://doi.org/10.1109/MIS.2020.3013133

Votto, A. M., Valecha, R., Najafirad, P., & Rao, H. R. (2021). Artificial intelligence in tactical human resource management: A systematic literature review. *International Journal of Information Management Data Insights, 1*(2), 100047. https://doi.org/10.1016/j.jjimei.2021.100047

Yen, W. T. M., Hong, T. L., & Yen, Y. Y. (2024). A Proposed Framework for Assessing the Readiness of AI in Small and Medium Enterprises (SMEs) in Malaysia. *Journal of Ecohumanism, 3*(5), 254-260. https://doi.org/10.62754/joe.v3i5.3893

Vuong, Q., et al. (2019). Artificial intelligence vs. natural stupidity: Evaluating AI readiness for the Vietnamese medical information system. *Journal of Clinical Medicine, 8*(2), Article 168. https://doi.org/10.3390/jcm8020168

Wang, H., Jia, S., Li, Z., Duan, Y., Tao, G., & Zhao, Z. (2022). A comprehensive review of artificial intelligence in prevention and treatment of COVID-19 pandemic. *Frontiers in Genetics, 13*, 845305. https://doi.org/10.3389/fgene.2022.845305

Weijia, G. U. O. (2022). Influencing factors of artificial intelligence readiness in libraries. *Journal of Library and Information Sciences in Agriculture, 34*(5), 47. https://doi.org/10.13998/j.cnki.issn1002-1248.22-0016

Weinert, L., Müller, J., Svensson, L., & Heinze, O. (2022). Perspective of information technology decision makers on factors influencing adoption and implementation of artificial intelligence technologies in 40 German hospitals: Descriptive analysis. *JMIR Medical Informatics, 10*(6), e34678. https://doi.org/10.2196/34678

Wheatley, A., & Hervieux, S. (2020). Artificial intelligence in academic libraries: An environmental scan. *Information Services & Use, 39*, 347–356. https://doi.org/10.3233/isu-190065