



Artificial Intelligence in Madrasah Libraries of Bangladesh: Status, Readiness, and Adoption Challenges

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Abstract

This study assesses the current state, readiness, and perceptions regarding artificial intelligence (AI) integration in madrasah libraries across Bangladesh, identifying key challenges and opportunities for modernization. A quantitative cross-sectional survey was employed with 300 respondents: students, teachers, librarians, and principals from both Alia and Qawmi madrasahs, analyzed using descriptive statistics, chi-square tests, Kruskal-Wallis H tests, and reliability analysis (Cronbach's $\alpha=.801$). Traditional print resources dominate library usage, yet 47% of respondents rely on smartphones for internet access, reflecting adaptive hybrid connectivity. Infrastructure limitations (38.7%) and lack of trained staff (31.7%) are the primary barriers to AI adoption, far outweighing ideological resistance (16%). Notably, 68% express willingness to adopt AI-based library services, with unanimous agreement ($M=4.00$, $SD=0.00$) that AI aligns with Islamic values. A significant association exists between digital resource availability and AI adoption readiness ($\chi^2=20.369$, $p=.002$). This systematic assessment of AI readiness in Bangladeshi madrasah libraries challenges prevailing assumptions regarding an inherent conflict between religious values and technology, demonstrating significant cultural receptivity despite existing infrastructural limitations. The findings hold direct policy relevance for Bangladesh's Vision 2041 digital transformation agenda. Policymakers and madrasah administrators are advised to prioritize investments in equitable infrastructure and staff training, rather than focusing on fostering cultural acceptance, as the evidence suggests that practical capacity, rather than religious or ideological resistance, constitutes the primary barrier to AI adoption in madrasah libraries.

Keywords: Artificial Intelligence; Madrasah Libraries; Technology adoption; Bangladesh; Islamic Education

Abstrak

Penelitian ini mengevaluasi kondisi terkini, kesiapan, dan persepsi terkait integrasi kecerdasan buatan (AI) di perpustakaan madrasah di seluruh Bangladesh, serta mengidentifikasi tantangan dan peluang utama dalam proses modernisasi. Survei potong lintang kuantitatif dilakukan terhadap 300 responden: siswa, guru, pustakawan, dan kepala sekolah dari madrasah Alia dan Qawmi, yang dianalisis menggunakan statistik deskriptif, uji chi-kuadrat, uji Kruskal-Wallis H, dan analisis reliabilitas (α Cronbach = 0,801). Sumber daya cetak tradisional masih mendominasi penggunaan perpustakaan, namun 47% responden mengandalkan ponsel pintar untuk mengakses internet, yang mencerminkan konektivitas hibrida yang adaptif. Keterbatasan infrastruktur (38,7%) dan kurangnya staf terlatih (31,7%) merupakan hambatan utama dalam adopsi AI, jauh melebihi resistensi ideologis (16%). Yang patut dicatat, 68% menyatakan kesediaan untuk mengadopsi layanan perpustakaan berbasis AI, dengan kesepakatan bulat ($M=4,00$, $SD=0,00$) bahwa AI selaras dengan nilai-nilai Islam. Terdapat hubungan yang signifikan antara ketersediaan sumber daya digital dan kesiapan adopsi AI ($\chi^2=20,369$,

$p=0,002$). Penilaian sistematis terhadap kesiapan AI di perpustakaan madrasah Bangladesh ini menantang asumsi yang berlaku mengenai adanya konflik inheren antara nilai-nilai agama dan teknologi, sekaligus menunjukkan keterbukaan budaya yang signifikan meskipun terdapat keterbatasan infrastruktur. Temuan ini memiliki relevansi kebijakan langsung bagi agenda transformasi digital Visi 2041 Bangladesh. Para pembuat kebijakan dan pengelola madrasah disarankan untuk memprioritaskan investasi pada infrastruktur yang merata dan pelatihan staf, daripada berfokus pada upaya mendorong penerimaan budaya, karena bukti menunjukkan bahwa kapasitas praktis – bukan resistensi agama atau ideologis – merupakan hambatan utama dalam adopsi AI di perpustakaan madrasah.

Kata kunci: Kecerdasan Buatan; Perpustakaan Madrasah; Adopsi Teknologi; Bangladesh; Pendidikan Islam

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Introduction

Madrasahs in Bangladesh are Islamic educational institutions that comprise two major streams: Alia, which are government-regulated and integrate religious and secular curricula, and Qawmi, which are traditional, independent, and follow Deobandi traditions (Al-Hasani, 2020, 2023). These institutions play an important role in meeting the educational, moral, and religious needs of millions of people (Chowdhury & Sarkar, 2018). While madrasah students represent a key opportunity for digital literacy development, their libraries face ongoing challenges such as limited funding, untrained staff, lack of space, and outdated collections (Momen, 2025). Most libraries still depend on manual record-keeping and print resources, which restricts access to electronic databases (Alam, 2026). Furthermore, because Alia and Qawmi madrasahs differ in governance, curriculum, and administrative structures, they exhibit varying levels of technological development and digital readiness. Consequently, understanding AI adoption across these distinct institutional contexts is essential for designing policies that accommodate the diversity of Bangladesh's madrasah education sector rather than assuming a uniform environment (Lee, 2024).

Artificial intelligence (AI) is transforming libraries worldwide by enabling automated cataloging, semantic search, and personalized recommendations, thereby shifting them from static print collections to digitally enabled ecosystems (Eromosele & Obande, 2026). Despite these advancements, the integration of AI in developing countries and religious educational contexts encounters substantial barriers, such as inadequate technological infrastructure, low digital literacy, and a shortage of AI-trained Library and Information Science (LIS) professionals (Düzbayır, 2025). The training deficit is particularly pronounced among madrasah library staff, whose limited exposure

to contemporary LIS pedagogy restricts their capacity to implement AI-based services (Corraya et al., 2025). Additional challenges in madrasahs include insufficient ICT resources, organizational resistance to departing from traditional practices, and concerns regarding job security (Begum & Elahi, 2025). However, some studies indicate that as internet access expands, developing countries are increasingly prepared for AI adoption, provided that staff training is aligned with local values (Warisno et al., 2025). Although the Government of Bangladesh has established national policies to promote equitable ICT access, a considerable gap persists in actual implementation (Rahaman et al., 2024).

The transformation of libraries through AI should also be viewed within the broader evolution of academic libraries in the twenty-first century (Zhang et al., 2024). Contemporary libraries are no longer limited to preserving printed collections but are expected to provide intelligent information services, digital learning support, and data-driven decision-making (Allen & Taylor, 2017). The rapid development of mobile technologies and generative AI has further accelerated this transformation by enabling users to access library services through smartphones and AI-assisted applications regardless of physical location (S & P, 2013). Nevertheless, developing countries frequently encounter structural barriers because technological innovation progresses more rapidly than institutional capacity and workforce development. Skill-biased technological change increases the demand for digitally competent professionals capable of managing emerging technologies, making staff capacity building as important as infrastructure investment (Conte & Vivarelli, 2011).

This study employs the Technology Acceptance Model (TAM) (Davis, 1989) and the Diffusion of Innovation (DOI) theory (Rogers et al., 2003) to analyze technology adoption. TAM suggests that perceived usefulness and ease of use are primary drivers of adoption, whereas DOI highlights the importance of relative advantage and compatibility with existing values. In religious-educational contexts, it remains uncertain whether AI adoption is primarily constrained by resource limitations, role-specific perceptions of usefulness, or hesitation rooted in cultural and religious values, as most existing studies examine these factors in isolation.

Beyond technological readiness, AI adoption in religious educational institutions also involves questions concerning cultural and ethical compatibility. While some scholars argue that emerging technologies may challenge established religious traditions (Rivers, 2006), recent studies indicate that AI can support educational quality and sustainable development when implemented responsibly and aligned with local values

(Pedró et al., 2019). Systematic reviews further reveal that AI research in education has focused predominantly on technological performance and learning outcomes, whereas the perspectives of educators, librarians, and institutional stakeholders remain insufficiently explored (Zawacki-Richter et al., 2019). In addition, limited ICT infrastructure and inadequate information retrieval systems continue to constrain digital transformation in many educational institutions, particularly in resource-constrained settings (Sumbal et al., 2025). These findings suggest that successful AI adoption depends not only on technological capability but also on institutional readiness, stakeholder acceptance, and contextual compatibility.

Although library research in Bangladesh has primarily concentrated on university and public sectors, the madrasah library system has received limited scholarly attention. Existing literature is largely outdated and does not address the implications of generative AI. There is a significant lack of empirical research regarding stakeholder perceptions of AI, specifically whether it is viewed as a threat to tradition or as a tool compatible with Islamic educational values. This study seeks to address this gap by applying TAM and DOI frameworks to religious-educational contexts. The principal conceptual contribution is the empirical investigation of whether religious and cultural values facilitate, rather than impede, AI adoption, a topic that remains underexplored in Library and Information Science (LIS) literature. By incorporating perspectives from both madrasah systems, this research aims to provide an evidence base to overcome adoption barriers and promote equitable digital access.

The primary objective of this research is to evaluate the current status, readiness, and perceptions related to AI integration in Bangladeshi madrasah libraries. The specific objectives are: (1) to determine the availability and usage of digital resources; (2) to assess stakeholder familiarity with and perceptions of AI; (3) to identify barriers to AI adoption; (4) to examine factors influencing AI adoption and skills development; and (5) to evaluate institutional preparedness for future AI advancements.

Method

This study utilized a quantitative cross-sectional survey design to capture a systematic snapshot of library conditions, AI awareness, stakeholder perceptions, adoption barriers, and institutional readiness across Bangladeshi madrasahs.

The target population included librarians, principals/vice-principals, teachers, and students from Alia and Qawmi madrasahs across Bangladesh. Because there was no unified national sampling frame for madrasah libraries, convenience sampling was

used. This is a standard approach in exploratory LIS research involving under-documented populations. In total, 300 completed and valid questionnaires were collected (N=300), providing adequate statistical power for descriptive and inferential analyses.

Data were collected using a self-administered structured questionnaire, which was developed based on a comprehensive review of research on AI adoption, digital libraries, and technology use in educational settings. Perception items were adapted from established technology-acceptance instruments, primarily Davis's (1989) Technology Acceptance Model (TAM) constructs of perceived usefulness and perceived ease of use, as well as Rogers et al.'s (2003) Diffusion of Innovations (DOI) attributes of relative advantage and compatibility, with modifications for the madrasah library context. Content validity of the instrument was assessed through pilot testing by a panel of three library and information science academics. Construct reliability was confirmed using Cronbach's alpha ($\alpha = .801$), demonstrating high internal consistency. The questionnaire included sections on demographic and institutional information, current library conditions (resources, internet access, usage), awareness and familiarity with AI, perceptions of AI integration, challenges and barriers, and willingness to use AI-based services. Most perception-related items were measured using a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree), while familiarity and usage-related questions employed categorical response options.

Data collection took place over four months (January-April 2026) using two modes: online links distributed via email and Messenger, and in-person survey administration. This ensured balanced representation across institutions with varying digital access. Data were processed using SPSS Version 25. Statistical evaluations included descriptive measures such as frequencies, percentages, means, and standard deviations, Cronbach's alpha reliability analysis, Chi-square tests of independence, Likelihood Ratio tests, and Kruskal-Wallis H tests ($p < 0.05$).

The study adhered to standard ethical protocols: voluntary participation, informed consent, complete anonymity, and strict data confidentiality. No personal identifiers were gathered.

Result and Discussion

Current Status of Madrasah Libraries in Bangladesh

This study identifies the current state of madrasah libraries in Bangladesh as a basis for assessing the institutions' readiness to adopt Artificial Intelligence (AI)-based

services. The analysis in this section covers internet access, frequency of library use, types of resources utilized, and the main challenges faced by madrasah libraries.

Table 1. Internet Access Methods and Library Use Patterns (N=300)

Variable	Category	Frequency	Percent
Internet access in the library	Library computer	53	17.7
	Wi-Fi	64	21.3
	Smartphone	141	47.0
	Feature Phone	33	11.0
	No internet	9	3.0
Library usage frequency	Daily	74	24.7
	Weekly	100	33.3
	Monthly	86	28.7
	Rarely	28	9.3
	Never	12	4.0

Table 1 summarizes patterns of internet access and library use among the 300 respondents. The findings reveal that nearly half of the respondents (47.0%, n=141) access the internet through a combination of library internet and personal smartphones, indicating a hybrid approach to digital connectivity. This data shows a trend toward hybridizing methods of connecting to digital devices and the internet; 21.3% (n=64) of respondents used Wi-Fi access and 17.7% (n=53) relied on the computer(s) in their madrasah. Nearly 11.0% (n=33) of respondents used Feature Phones with very limited internet connections; while 3.0% (n=9) reported no access to the World Wide Web or internet at all. The total average (mean) internet access score of 1.60 (SD=0.998) illustrates a broad range of, but also a large gap in, the extent of digital connectivity available in madrasah libraries.

When it comes to how often people use the library, weekly visits are the most common (33.3%, n=100), followed by monthly trips (28.7%, n=86) and daily visits (24.7%, n=74). On the flip side, 9.3% (n=28) seldom go to the library, and 4.0% (n=12) never take advantage of the library's resources. The average frequency score of 1.35 (SD=1.073) suggests a moderate level of engagement with library services overall.

Table 2. Types of Resources Used in Madrasah Library (N=300)

Resource type	Frequency	Percent
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Textbooks	54	18.0
Reference books	43	14.3
Journals	108	36.0
Magazines	54	18.0
Newspapers	36	12.0
Digital resources	5	1.7
Religious manuscripts	5	1.7

Table 2 shows that students mostly rely on traditional print materials. Journals and magazines are used the most (36.0%, n=108), while textbooks and newspapers come next and are used at similar levels (18.0%, n=54 each). Reference books still play a noticeable role (14.3%, n=43), but digital resources make up only a small share of total use (12.0%, n=36). Surprisingly, religious manuscripts are consulted by very few respondents (1.7%, n=5), even though the study is set in an Islamic educational environment. Overall, the mean resource type score of 1.97 (SD=1.295) suggests a moderate spread in the kinds of materials being used, but it also makes clear that print resources continue to dominate over digital options.

Table 3. Challenges of Madrasah Libraries (N=300)

Challenge	Frequency	Percent
Lack of budget	41	13.7
Lack of trained staff	95	31.7
Limited digital infrastructure	116	38.7
Resistance to technology adoption	48	16.0

Table 3 indicates that the biggest challenge in the digital infrastructure being limited, as reported by 38.7% (n=116), is followed by a shortage of skilled personnel, which is acknowledged by 31.7% (n=95). The non-acceptance of technology is related to 16.0% (n=48) of libraries and cost limitations to 13.7% (n=41) of libraries. The average challenge score of 1.57 (SD=0.917) indicates moderate which is persistent systemic barriers to technological advancement.

Stakeholders' Awareness, Perceptions, and Readiness Regarding Artificial Intelligence

This section presents the results regarding respondents' level of understanding of Artificial Intelligence (AI), their willingness to use AI-based library services, their perceptions of AI implementation, the results of the instrument's reliability analysis, and the testing of the research hypotheses.

Table 4. Familiarity with AI in education (N=300)

Category	Frequency	Percent
Very familiar	67	22.3
Somewhat familiar	146	48.7
Heard about it, but not clear	61	20.3
Not familiar at all	26	8.7

Table 4 suggests that while 22.3% (n = 67) report being extremely familiar with AI in education, nearly half (48.7%, n = 146) indicate being somewhat familiar. However, 8.7% (n = 26) are completely unfamiliar with AI, and 20.3% (n = 61) have only heard about it without a complete understanding. The mean familiarity score of 1.15 (SD=0.867) indicates that the overall awareness is moderate. Overall, 71.0% of respondents show at least some awareness of AI, although about one-third of the sample still has substantial knowledge gaps.

Table 5. Willingness to use AI-based library services

Response	Frequency	Percent
Yes	204	68.0
No	62	20.7
Maybe	34	11.3

Table 5 indicates that a distinct majority (68.0%, n = 204) is ready to utilize AI-based library services, such as chatbot support, intelligent catalog search, and e-book recommendations. The number of people who are against it is still relatively small, at 20.7% (n=62), and 11.3% (n=34) remain uncertain. The mean acceptance score of 0.43 (SD = 0.688) indicates that there are mostly positive attitudes towards AI integration.

Table 6. Descriptive statistics for AI perception items

Statement (shortened)	Mean	Std. Dev.
AI will modernize madrasah libraries	1.77	1.17
AI can address current challenges	2.52	1.17
AI will enhance access to information and learning resources	2.96	1.22
AI will improve management and efficiency	3.07	1.22
AI is essential for sustaining relevance	3.09	1.25
AI can enhance access to information	3.33	0.47
AI tools can aid learning and research	4.00	0.00
AI poses a threat to conventional teaching	3.67	0.47
AI aligns with Islamic values	4.00	0.00
AI is too costly for madrasah libraries	3.67	0.47
AI will shape the future of madrasah libraries	4.00	0.00

Table 6 presents descriptive statistics for eleven AI perception items measured on a 0–4 scale. Respondents express strong agreement on several points: unanimous agreement that AI tools can support learning and research, that AI adoption is

compatible with Islamic values, and that AI will play an important role in the future development of madrasah libraries ($M=4.00$, $SD=0.00$ for each item), and high agreement that AI can improve access to information ($M=3.33$, $SD=0.472$). At the same time, respondents voice notable concerns that AI may threaten traditional teaching methods ($M=3.67$, $SD=0.472$) and that implementing AI systems could be too costly for their institutions ($M=3.67$, $SD=0.472$).

However, perceptions for the imperative role of AI in modernization are more variable in nature ($M=1.77$, $SD=1.169$). Again, perceptions for AI meeting today's challenges in an effective manner ($M=2.52$, $SD=1.172$) reflect some level of agreement in terms of varying nature.

Three perception items showed zero variance: "AI tools can aid learning and research," "AI aligns with Islamic values," and "AI will shape the future of madrasah libraries." Each of these items had a mean of 4.00 and a standard deviation of 0.00, indicating a ceiling effect. This result reflects unanimous agreement among all respondents, suggesting that these beliefs are widely accepted normative foundations rather than contentious opinions.

To examine whether professional roles influence AI perceptions, Kruskal-Wallis H tests were conducted comparing students, teachers, librarians, and principals/vice principals.

Out of the eleven variables, only two really stood out with statistically significant differences based on professional roles. Notable differences in how people perceive AI's role in modernization ($p=.012$) and its capability to tackle current challenges ($p=.001$). The fact that there were no significant differences in the other nine areas suggests a strong agreement among different positions regarding the core values, abilities, and concerns surrounding AI.

The unanimity ($p = 1.000$) that AI can support learning and research, is compatible with Islamic values, and will shape the future of madrasah libraries indicates that these core beliefs about AI are shared across all professional groups in the study.

Reliability Analysis

To assess the internal consistency of the AI perception scale, Cronbach's alpha reliability analysis was conducted on eleven items measuring various dimensions of AI attitudes and beliefs.

Table 7. Reliability Statistics

Cronbach's Alpha	N of Items
0.801	11

Case Processing Summary: Valid cases: 296 (98.7%); Excluded cases: 4 (1.3%); Total: 300 (100.0%).

The Cronbach alpha coefficient of 0.801 indicates very high internal consistency reliability. An alpha coefficient above 0.80 is considered to be satisfactory for attitude scales. This indicates that the eleven items designed to measure AI perceptions are reliable indicators of the collective construct. This helps to establish the reliability of the survey to measure attitudes toward AI among the stakeholders of the madrasah library.

Hypothesis Testing

H1: Association between Digital Resources and AI Service Willingness

There is a significant association between the availability of digital resources in madrasah libraries and the willingness of users to adopt AI-based library services.

Chi-square analysis revealed a statistically significant association between digital resource availability and willingness to adopt AI-based library services ($\chi^2=20.369$, $df=6$, $p=.002$). The likelihood ratio test confirmed this relationship ($\chi^2=18.792$, $df=6$, $p=.005$). Therefore, the null hypothesis was rejected.

H2: Familiarity with AI across Professional Roles

Table 8. Association between Respondent Position and AI Familiarity (N = 300)
Chi-square Test of Independence: $\chi^2 (9) = 16.783$, $p = .052$

Position	Very Familiar n (%)	Somewhat Familiar n (%)	Heard but Unclear n (%)	Not Familiar n (%)	Total
Librarian	16 (34.0%)	19 (40.4%)	7 (14.9%)	5 (10.6%)	47
Principal/Vice Principal	15 (25.9%)	33 (56.9%)	8 (13.8%)	2 (3.4%)	58
Teacher	13 (23.2%)	31 (55.4%)	8 (14.3%)	4 (7.1%)	56
Student	23 (16.5%)	63 (45.3%)	38 (27.3%)	15 (10.8%)	139
Total	67 (22.3%)	146 (48.7%)	61 (20.3%)	26 (8.7%)	300

Likelihood Ratio: 17.058, $p = .048$

As shown in Table 7, students demonstrated the highest proportion with unclear or no AI familiarity (38.1% combined), compared to librarians (25.5%), principals/vice principals (17.2%), and teachers (21.4%). Chi-square analysis was used to examine whether familiarity with AI differs significantly across professional roles. The Chi-Square value of 16.783 ($df = 9$, $p = .052$) approached but did not reach statistical

significance at the conventional 0.05 level. The Likelihood Ratio test yielded similar results ($\chi^2=17.058$, $df=9$, $p=.048$).

A Discussion of the State of Madrasah Libraries and Readiness for Artificial Intelligence

Research findings indicate that madrasah libraries in Bangladesh are still in a transitional phase toward digital transformation. Although the majority of respondents have internet access, this access is dominated by the use of personal smartphones (47.0%), while the use of library computers and institutional Wi-Fi networks remains relatively limited. This pattern suggests that access to digital technology is supported more by individually owned devices than by infrastructure provided by the institution. This situation indicates that madrasah libraries do not yet fully possess the technological capacity necessary to support the implementation of Artificial Intelligence (AI)-based services.

This finding aligns with Hossain (2022) research, which explains that the development of mobile technology in Bangladesh is proceeding more rapidly than the development of institutional digital infrastructure. Consequently, the public relies more on personal devices to access information than on facilities provided by educational institutions. In the context of madrasah libraries, this situation indicates that digital transformation has not progressed evenly, meaning that the implementation of AI still faces obstacles related to basic infrastructure.

The research results also indicate that library usage rates remain relatively high. A total of 58% of respondents visit the library daily or weekly. This utilization rate indicates that libraries remain the hub of academic activities for madrasah students even though the digitization process has not yet developed optimally. Thus, the low utilization of technology is not caused by a decline in the library's function but rather by the limitations of available digital facilities.

These findings support the view of Garoufalis and Garoufallou (2022), who state that libraries continue to play a strategic role as centers of learning, even as the educational environment undergoes digital transformation. The presence of AI is not intended to replace the functions of libraries but to enhance the effectiveness of information services so that libraries can meet users' needs more quickly, accurately, and personally.

This study also found that print collections still dominate the use of information sources in madrasah libraries. Journals are the most widely used information source

(36.0%), followed by textbooks and magazines, while the use of digital resources reached only 1.7%. This situation indicates that the digitization of library collections is still proceeding very slowly.

These results differ from various studies on academic libraries in developed countries, which show that digital resources have become the primary medium for learning and research activities. This discrepancy highlights that the rate of information technology adoption is still heavily influenced by infrastructure readiness, technological investment, and institutional policies. Thus, the transformation toward an AI-based library cannot be achieved instantly but must begin with strengthening digital services as the foundation for implementing more advanced technologies.

Furthermore, this study shows that limitations in digital infrastructure (38.7%) and a shortage of library staff with digital competencies (31.7%) are the main barriers to AI implementation. In contrast, resistance to the technology was reported by only 16.0% of respondents. These findings indicate that barriers to AI implementation are not primarily caused by user resistance but are more closely related to institutional resource constraints.

These results reinforce the Technology Readiness Theory, which states that the success of technology adoption is determined not only by user acceptance but also by an organization's readiness to provide infrastructure, human resources, and institutional support. Therefore, enhancing the digital capacity of madrasah libraries must be prioritized before AI services are widely implemented.

Another interesting aspect is the high level of respondents' awareness of Artificial Intelligence. A total of 71.0% of respondents stated that they were familiar with AI, although only 22.3% felt they fully understood the technology. This situation indicates a gap between awareness and competence. In other words, AI is widely known within the madrasah community, but understanding of how it works, its benefits, and its implementation remains limited.

This phenomenon suggests that the dissemination of information about AI is outpacing the development of digital competencies. Therefore, programs to enhance AI literacy among librarians, teachers, and students are an urgent necessity to ensure that the application of this technology is based not only on conceptual knowledge but also on practical skills in utilizing AI to support library services.

The level of acceptance of AI in this study was also relatively high. A total of 68.0% of respondents stated they were willing to use AI-based library services. This

percentage indicates that the majority of stakeholders have a positive attitude toward technological innovation. This high level of acceptance serves as an important social capital for the successful implementation of AI in the future, as technological changes tend to be more easily adopted when they receive support from users.

The most interesting finding in this study is the unanimous agreement that AI can support learning and research processes, align with Islamic values, and play a role in shaping the future of madrasah libraries. These results indicate that stakeholders do not view AI as a threat to Islamic education, but rather as a technology that can be utilized to improve the quality of information and learning services.

These findings make an important contribution to the literature on digital transformation in Islamic educational institutions. Contrary to the common assumption that religious institutions tend to reject technological innovation, this study shows that the main obstacles lie in the limitations of infrastructure and institutional capacity, rather than in cultural factors or religious values. Thus, the acceptance of AI in the madrasah context is influenced more by technical readiness than by ideological resistance.

Factors Influencing the Adoption of Artificial Intelligence and Theoretical Implications

The results of the hypothesis testing indicate that the availability of digital resources is significantly associated with respondents' willingness to use Artificial Intelligence-based library services ($\chi^2 = 20.369$; $p = 0.002$). This finding indicates that the readiness of digital infrastructure is a key prerequisite for implementing AI in madrasah libraries. The better the access to digital devices, internet networks, and electronic collections, the higher the tendency for users to accept AI-based services.

This finding supports the Technology Acceptance Model (TAM) developed by Davis (1989). According to TAM, perceived ease of use and perceived usefulness are the primary factors influencing an individual's intention to adopt new technology. In this study, although the majority of respondents expressed positive perceptions regarding the benefits of AI, the implementation of this technology remains influenced by the availability of infrastructure. In other words, user acceptance of AI is not automatically followed by an institution's ability to implement it if technological support remains limited.

The results also indicate that the level of familiarity with AI does not differ significantly based on respondents' job titles according to the Pearson Chi-Square test ($p = 0.052$), although the Likelihood Ratio test yielded a result approaching significance ($p = 0.048$). These findings indicate that the dissemination of information about AI has

reached various stakeholder groups, including students, teachers, librarians, and school principals. Thus, awareness of AI is no longer an issue confined to specific professional groups but has evolved into a broader phenomenon within the Islamic educational environment.

Nevertheless, the results of the Kruskal–Wallis test show that there are differences in perceptions based on professional roles regarding two aspects: AI's ability to modernize libraries and its ability to address current library challenges. These differences indicate that work experience and professional responsibilities influence how respondents assess the practical benefits of AI. Librarians and institutional administrators tend to have more realistic perspectives on AI implementation because they directly face various operational constraints, such as budget limitations, human resources, and digital infrastructure.

Conversely, no significant differences were found in most other perception indicators, particularly regarding AI's alignment with Islamic values, the benefits of AI for learning and research, and the role of AI in the future of madrasah libraries. These findings suggest a shared perspective among all respondent groups regarding the importance of AI in the development of library services. This shared perception constitutes an important form of social capital, as it indicates that the implementation of AI does not face barriers stemming from cultural or religious values.

The results of this study also support the Diffusion of Innovations Theory (Rogers, 2003). This theory explains that the adoption of innovations is influenced by the characteristics of the innovation, organizational readiness, and social environmental conditions. In the context of madrasah libraries, AI is perceived to have a relative advantage because it can improve the quality of information services and support the learning process. Furthermore, AI is also viewed as having high compatibility with Islamic educational values, as evidenced by the respondents' consensus that the use of AI does not conflict with Islamic principles.

However, this study indicates that two other characteristics of innovation—namely, trialability and observability—remain relatively low. The low utilization of digital resources and limited technology implementation mean that most respondents have not yet had direct experience using AI-based services. Consequently, the benefits of AI are understood more conceptually than through empirical experience. This explains why respondents express a high level of optimism toward AI but, at the same time, still question the institution's readiness to implement it.

Based on the overall research findings, it can be concluded that the main challenge in implementing AI in madrasah libraries does not stem from low user acceptance, but rather from the institution's limited capacity. Inadequate digital infrastructure, a shortage of library staff with digital competencies, and low utilization of electronic resources are factors that slow down the digital transformation process. Therefore, AI implementation strategies should begin by strengthening the digital foundation, enhancing librarians' competencies, developing electronic collections, and providing more equitable internet access before AI services are widely implemented.

Conclusion

This study investigated AI integration in Bangladeshi madrasah libraries, revealing an early but promising stage of readiness. The principal scientific contribution is demonstrating that practical rather than ideological barriers dominate AI adoption in religious-education libraries. Value-compatibility and perceived usefulness sustain technology acceptance independently of infrastructural readiness. This refines technology-adoption theory by identifying cumulative technological capacity, not cultural resistance, as the primary constraint on diffusion. The significant association between digital infrastructure and adoption readiness underscores the need for equitable infrastructure development. Moving toward AI-supported madrasah libraries is urgent and possible; ensuring these learners are not excluded from AI's benefits requires targeted investments in infrastructure and training, modernizing facilities while upholding Islamic educational values.

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