The Journal of Academic Librarianship 51 (2025) 103083

Contents lists available at ScienceDirect

The Journal of Academic Librarianship

journal homepage: www.elsevier.com/locate/jacalib

Artificial Intelligence adoption, perceptions, and ethical literacy among Arab academic librarians: A survey

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ARTICLE INFO

Keywords:
Artificial intelligence in libraries
Academic libraries
Academic librarians
Artificial intelligence literacy
Artificial intelligence in higher education
Arab countries
Artificial intelligence ethics

ABSTRACT

The study explored how Arab academic libraries are adopting artificial intelligence (AI) and examined the awareness of AI ethical considerations from the perspectives of Arab academic librarians. It utilized a survey-based approach, employing a snowball sampling technique across 48 academic libraries in 17 Arab countries. The research instrument was a web-based questionnaire, which received responses from a total of 272 participants.

The findings revealed that 37.5 % of respondents indicated that their libraries use AI, with cataloging and generating metadata being the most common applications used by 43 % of libraries. The study highlighted several challenges to AI adoption in Arab academic libraries, including a lack of necessary infrastructure and staff training. Moreover, about 81 % of Arab academic librarians believed that intellectual property and copyright are the most important ethical considerations regarding AI. However, only 12% of participants reported having encountered ethical issues related to AI use in their library work. The results indicated that the primary actions taken by Arab academic libraries were offering face-to-face or online seminars and workshops on AI ethics, as well as providing ethical considerations and resources related to academic integrity through their websites. The study recommended that Arab academic libraries organize appropriate training programs to improve AI literacy among staff, develop the necessary infrastructure for AI adoption, and prepare relevant policy documents to guide the ethical use of AI technologies.

Introduction

Since Johan McCarthy coined the name and mission statement of Artificial intelligence (AI) in 1956, the world has witnessed one of the most revolutionary technological advances in human history. AI has become a national priority for every country around the globe. Determining what artificial intelligence (AI) is and is not may be challenging as many definitions exist. Kaplan and Haenlein (2019) stated that AI is "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation." According to the World Governments Summit (12 Feb., 2024, a recent survey revealed that governmental services, Education, and Health were the three domains in which Arab countries try to adopt AI technologies. In addition, An Arab Index for Artificial Intelligence in Universities (AIU) was just introduced in May 2024 to track and evaluate the advancement of AI technology in Arab Universities (Sawahel, 2024).

The academic community was among the first to adopt AI applications, but this development is often viewed as a double-edged sword. AI proves beneficial when it enables the integration of concepts from various scientific disciplines within research contexts. However, the debate surrounding the ethical concerns of AI has been ongoing since the 1960s (Stahl et al., 2022). Ethics refers to the moral principles that relate specifically to a particular group, field, or mode of conduct (Oxford English Living Dictionaries, 2024). Thus, we can assert that the history of AI ethics is as old as technology.

The rise of generative AI has created applications that enable immediate and personal interactions between humans and AI systems. Major technology companies like IBM, Google, and Meta have formed teams to address the ethical issues that arise from collecting vast amounts of data. Concurrently, governmental and intergovernmental entities have started formulating regulations and ethical policies based on academic research. Various universities have developed their principles, guidelines, or codes regarding the ethics of artificial intelligence,

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https://doi.org/10.1016/j.acalib.2025.103083
Received 14 January 2025; Received in revised form 15 May 2025; Accepted 29 May 2025
Available online 10 June 2025

mainly focusing on investigations related to this field (Coursera, 2025). In this context, ethical concerns can be categorized into two main types: those related to AI design and those arising from human-AI interactions (Giarmoleo et al., 2024). The latter has received significant attention, as will be discussed in the literature review.

In the mid-1970s, Smith (1976) drafted the first scenarios for library tasks operated by intelligent machines. Her article introduced the term "artificial intelligence" (AI) and described automated information retrieval systems. Academic libraries have begun to address the ethical implications of AI. For example, the University of Toronto Library has created a Q&A page titled "Generative AI Tools and Copyright Considerations" (University of Toronto Libraries, December, 2024). The University of Alberta Library also published a document on its website entitled "Ethical Considerations for Using Generative AI (University of Alberta Library, March, 2025)." The University of Rhode Island established the first AI Laboratory within its library to provide students with technical skills and an understanding of AI-related ethical issues (University of Rhode Island, September, 2018).

Academic libraries benefit substantially from artificial intelligence (AI) in several areas, including enhancing search and retrieval, analyzing user behaviors and preferences to personalize learning, managing and analyzing data, and automating repetitive tasks. Cox (2022a, 2022b) explored the definition of AI for librarians, looking at several technologies that fall under the AI umbrella and their implications for library operations. They identified five distinct use cases for AI in libraries: back-end processes, library services, Data scientist community creation, Data and AI literacy, and user management. However, these advancements also raise concerns regarding privacy, bias, ethical considerations, technological dependence, and implementation challenges (Library Technology, News and Events, 2023). Recently, two common types of AI have emerged in academic libraries. Descriptive AI generates or extracts complex metadata from unstructured data to improve searchability. It recognizes various characteristics in text, images, audio, and video content, such as Elinar AI. In contrast, generative AI creates new content, including text, images, designs, music, and more, with examples being ChatGPT, New Bing, BARD, Hugging Chat, and DALL-E. The potential applications of these two types of AI in academic libraries have raised numerous ethical concerns, such as bias, misinformation, information overload, privacy, and copyright issues. An analysis of 31 artificial intelligence strategies worldwide by Papyshev and Yarime (2023) reveals several common themes, including the need to develop human capital, apply AI ethically, establish a robust research base, and regulate and enhance data infrastructure and policy.

Information professionals play crucial roles in addressing these priorities. They can educate the public to help build an AI-literate workforce, advocate for ethical considerations regarding AI, support researchers in developing the necessary research base, and contribute to designing and using adequate data infrastructure (Cox, 2024). As AI technology becomes increasingly integrated into library services, the issues related to AI ethics are becoming more complex. Proactively addressing these concerns through comprehensive training can help libraries maintain their roles as ethical information stewards. The rise of AI technologies for information professionals has introduced new challenges, placing them in a concerning and uncertain situation. If information professionals want to tackle these challenges, according to Cox (2022a, 2022b), eight ethical scenarios related to AI have been developed explicitly for information professionals. The scenarios were: support first responders, Nudges, the voice assistant, A special collection, Forum moderation, the recommender system, Stakeholders, and Project partners.

The ethical considerations surrounding artificial intelligence (AI) can significantly influence how academic librarians in Arab universities engage with AI applications. However, there has been a noticeable lack of empirical research within Arab academic libraries. This study addresses this gap by exploring AI ethical considerations among academic librarians in these institutions. The findings emphasize the importance of ethical considerations and highlights the potential benefits of creating communities of practice for AI training. These results can serve as valuable resources for governments, corporations, and non-profit organizations involved in AI technologies, assisting them in developing ethical principles for the responsible use and development of AI.

Literature review

Artificial intelligence (AI) has experienced significant growth in recent years. Like the Industrial Revolution, AI has the potential to be revolutionary, especially in transforming libraries. However, ethical issues related to AI in libraries have received limited attention in existing literature. Most studies have primarily focused on the applications of AI in library settings. This review will examine two main areas: the literature concerning AI in libraries and the ethical considerations surrounding AI in this context. This review aims to provide an overview of the current knowledge state, identify literature gaps, and highlight key findings.

Artificial intelligence in libraries

One of the early studies by Hsieh and Hall (1989) investigated the definition and history of artificial intelligence (AI), as well as the AI-related literature in "Library Literature" and "Library and Information Science Abstracts" from 1976 to 1987. The findings showed that only twelve articles addressed AI applications in the technical services area, especially for the operation of cataloging. A survey conducted by Wheatley and Hervieux (2019) explored how libraries in the United States and Canada are responding to the increasing research and technological advancements related to AI. The study revealed that only five university libraries offer programming and services related to AI. Also, Hervieux and Wheatley (2021), assessed the perceptions of 163 academic librarians in Canada and the United States regarding AI and its potential impact on libraries. The study indicated that academic librarians need more training on AI and its potential applications in libraries. Using Rogers' Diffusion of Innovations model, Lund et al. (2020) surveyed 236 librarians worldwide. They explored how these librarians identified with different adopter categories and the relationship between this identification and their perceived knowledge and perceptions of AI technology within and outside the library environment. A survey conducted by Brown (2022) focused on the use of chatbots in academic libraries in the United States. This study revealed that most digital assistants, including chatbots, are typically assigned feminine names, appearances, voices, and personalities.

A study by Liu et al. (2022) examined the application of AI technology in information retrieval within university libraries. The study identified several main challenges, including inadequate understanding of natural language, unclear knowledge representation, and difficulties in knowledge acquisition. Huang (2022) studied the usage of AI applications in university libraries in Taiwan. The results indicated that the major obstacles to applying AI in these libraries included financial constraints, technical difficulties, and concerns related to privacy and ethics.

Another study by Cox (2022a, 2022b) reviewed the nature of artificial intelligence (AI) and its various applications in academic libraries, focusing specifically on how AI can aid knowledge discovery. The paper examined eleven alternative strategies that libraries could employ for AI applications and assessed the likelihood of their implementation. Rysavy and Michalak (2022) conducted a case study on the practical implementation of AI tools in libraries. Their research demonstrated how an academic library integrated tools like Scholarcy and Grammarly to support the writing and assessment processes within library users' research workflows. Ajani et al. (2022) examined librarians' perceptions and readiness to adopt AI in academic libraries in Nigeria. The study

revealed that while librarians are aware of the global use of AI in libraries, they are not fully prepared to integrate it into their daily operations.

A survey conducted by Winkler and Kiszl (2022) about academic library directors' opinions on AI applications in Hungary indicated that most library directors view AI as an opportunity rather than a threat. They believe AI could facilitate digitization, enhance information services, and improve library education. A review by Gasparini and Kautonen (2022) analyzed the use of AI technologies in research libraries. Their examination of findings from 126 papers revealed numerous roles envisioned for libraries, librarians, and their users. The study highlighted encouraging examples of libraries utilizing design methods to address this complex phenomenon. In a survey conducted by Emiri (2023) involving 704 librarians in university libraries across Southern Nigeria, it was reported that AI has not been widely adopted. The most common AI applications identified were security scanning devices at the entrances and exits of university libraries. Other technologies, such as chatbots, robots, RFID systems, humanoid robots, facial and touch recognition, robot classification tools, machine-readable catalogs, and innovative AI features, are still absent in Nigerian university libraries.

Cox and Tzoc (2023) explored the implications of ChatGPT. The authors discussed how ChatGPT may influence library operations and services. They emphasized the importance of librarians evaluating and utilizing ChatGPT and other AI tools while maintaining human interactions and being mindful of potential biases and challenges. Additionally, A. (2023) reviewed 65 articles on the application of AI in libraries and its impact on library operations. This review indicated that AI could enhance information retrieval, automate routine tasks, personalize user interactions, and provide innovative services.

In their study, Abid Fakhre Alam et al. (2024) examined the AI literacy of 82 librarians in Zambia and their perceptions of AI applications in libraries. The findings indicated that Zambian librarians have a solid understanding of AI fundamentals, but they encounter challenges such as a need for enhanced AI expertise, resistance to change, and budget constraints. Similarly, Leo S. Lo (2024) evaluated AI literacy among academic library employees in the United States, focusing on their grasp of AI concepts, practical skills with AI tools, and ethical considerations. This study revealed that while self-rated knowledge of AI was moderate, there were significant gaps in hands-on experience and confidence in discussing AI ethics. Respondents emphasized the necessity for comprehensive AI training and ethical guidelines.

Over the past five years, limited research has been conducted on the readiness and implementation of AI in Arab libraries. A study by Fayez (2020) analyzed 18 comprehensive AI platforms to determine which ones best meet the needs of libraries and their services. The findings showed that the Google AI Platform received the highest rating.

Additionally, Serdouk (2020) investigated 25 academic libraries in Maghreb countries to assess their use of AI and their views on adopting this technology in the future. The results indicated that these libraries do not recognize AI as a valuable strategic tool for enhancing knowledge management. Unfortunately, there seem to be no promising prospects for its adoption.

A conference paper by Al-Jabri et al. (2023) discussed how academic libraries can benefit from AI, focusing on the libraries of Sultan Qaboos University in Oman, the University of Leeds Beckett Library in the United Kingdom, and the University of Kuala Lumpur Library in Malaysia. The authors examined the impact of AI on the services provided by these libraries. Additionally, a study by Al Naanah and Taha (2023) aimed to determine the attitudes of 15 directors of Jordanian university libraries regarding the use of AI applications. The results indicated that many directors had a positive outlook on implementing AI technologies. Furthermore, a recent study by Shaaban (2024) assessed Egyptian library experts' attitudes towards employing AI applications in library services. This study found strong positive trends in favor of utilizing AI in libraries. However, it also identified technological challenges as the most significant barrier to implementing AI applications in these settings.

Ethical considerations of AI in libraries

In her study, Kennedy (2019) emphasized the importance of considering the ethical implications of artificial intelligence (AI) in library contexts. She advocates for including various stakeholders in the development process and highlights the need for transparency and accountability in designing and implementing AI technologies.

A study by Huang et al. (2021) examined AI's ethical and educational perspectives within the Library and Information Science (LIS) field. The research focused on the impact of AI on higher education and its implications for LIS professionals. The findings uncovered significant ethical concerns, including surveillance, bias, and social inequality. Similarly, Bubinger and Dinneen (2021) explored practical approaches to promote ethical AI in libraries. Their study noted the increasing presence of AI in libraries—used for tasks like collection analysis and item recommendations—and highlighted ethical issues such as bias, fairness, and transparency.

Nayyer and Rodriquez (2022) emphasized the importance of caution when implementing AI applications in academic libraries and discussed potential avenues for ethical use. They also defined implicit bias, explaining how it can infiltrate machine learning applications and why this issue is insidious and challenging. Cox (2022a, 2022b) conducted a study examining AI's ethical implications for information professionals. The research presented eight scenarios showcasing AI's ethical challenges in this field. The findings indicated that AI can potentially enhance information services, but it raises significant ethical concerns, including bias, privacy, and transparency.

Stahl et al. (2023) conducted a Delphi study to investigate ethical and human rights issues associated with AI. The findings recognized key ethical and human rights issues, yet there was little consensus on addressing them. In a related exploration, Mishra (2023) examined the ethical implications of AI and machine learning (ML) in libraries and information centers. The study underscored critical ethical challenges such as bias, privacy, and job displacement due to automation.

Michalak (2023) explored the importance of including academic librarians in developing ethical AI policies. He highlighted several benefits of involving librarians, such as their expertise in privacy and information ethics, practical experience with AI tools, and their capacity for collaboration. A recent literature review by Hodonu-Wusu (2024) examined AI's ethical and equitable use in libraries, emphasizing how it can empower users and what librarians should consider when implementing AI systems.

Based on the review above, we can conclude the following points: (1) Most studies have centered on librarians' adoption and implementation of AI in libraries. (2) In the past six years, numerous studies addressing the ethical considerations of AI in libraries have emerged due to the topic's novelty. (3) Notably, 2022 saw many studies on this subject, reflecting remarkable advancements and several stunning developments in AI (Butterfield, 2023). (4) The literature indicated diversity of opinions regarding academic librarians' perceptions of AI. (5) Researchers have only recently begun to explore the role of librarians in the ethical implementation of AI. (6) Furthermore, the research on AI in Arab libraries remains limited, primarily focusing on the application of AI in library and information services, with a notable lack of scholarly work addressing AI ethics. To address these gaps, this study is conducted to identify the most pressing issues faced by Arab academic librarians and to understand how they manage the numerous ethical questions surrounding AI. The findings from this study will enhance the understanding of AI ethical literacy within the library profession.

Research objectives

The following research objectives guided the study:

1. To assess the extent to which academic librarians in Arab countries have utilized AI technologies.

2. To explore the awareness and perceptions of librarians in Arab academic libraries regarding AI.
3. To identify the challenges faced by Arab librarians in adopting AI technologies within their academic libraries.
4. To evaluate the current levels of AI ethical literacy among librarians in Arab academic libraries.

Methodology

This study utilized a survey-based approach to examine the adoption of artificial intelligence (AI) in Arab academic libraries and to explore the ethical considerations surrounding AI among academic librarians. Due to challenges in reaching the target population, researchers could not construct a traditional sampling frame. Instead, a purposive sampling technique was employed. The questionnaire (see Appendix A) was administered in Arabic and pilot-tested with a small group of academic library professionals to ensure the questions' clarity, relevance, and appropriateness. It consisted of three main sections: demographic information, use of AI, and ethical considerations regarding AI. The online questionnaire was created using Microsoft Forms.

Once finalized, the questionnaire was distributed via instant messaging (specifically the WhatsApp application), accompanied by an introductory cover letter sent directly to the directors of 48 prominent academic libraries across 17 Arab countries. These libraries were selected as representing notable examples of academic libraries in size and popularity within their respective countries. The directors were requested to share the survey message with their staff to ensure a broad and representative sample for the study.

To maximize the response rate, researchers sent reminder messages at regular intervals. From March 2024 to July 2024, 272 academic librarians responded to the survey. Their responses were analyzed using descriptive statistics, and the results were calculated using SPSS (version 22) to summarize the demographic data. Inferential statistics, including independent *t*-tests and chi-square tests, were employed to address the study's aims, with a significance level set at $p \leq 0.05$.

Ethical approval for the study was obtained from the Institutional Review Board at *Imam* Abdulrahman Bin Faisal University (No. IBR-2024-17-452). The consent form was included on the first page of the questionnaire, outlining what participants would be asked and allowing them to agree or disagree to participate in the study. Respondents were required to click "Yes" to begin the survey. If they clicked "No," they were immediately directed to the exit page. It is important to note that seven academic librarians were excluded from the study due to their unwillingness to participate. The table below provides an overview of the survey respondents by country.

Table 1 shows that the highest percentage of participants (36.8 %) came from the Arab Republic of Egypt, followed by 21 % from the Kingdom of Saudi Arabia. The participation rates from other countries ranged between 1.1 % and 8.5 % for Kuwait and Algeria. The lowest participation rates were recorded for Palestine and Yemen at 0.4 %.

Table 1
Survey respondents by country.

Country	University Libraries	No. of libraries	No. of respondents	%
Egypt	Al-Azhar University, Cairo University, Helwan University, Minia University, Menofia University, Beni-Suef University, Benha University, Badr University in Cairo, Alexandria University, German University in Cairo, Luxor University, Tanta University, Sohag University, American University in Cairo, New Giza University, British University in Egypt	16	100	36.8
Saudi Arabia	*Imam* Abdulrahman Bin Faisal University, Jazan University, Taibah University, Umm Al-Qura University, King Abdulaziz University, King Khalid University, King Faisal University King Saud University, Northern Border University, Taif University, Nourah bint Abdulrahman University	11	57	21
Algeria	Université de Constantine, Université Mohamed Khider Biskra, University of Science and Technology Houari Boumediene, Université de Zian Achour Djelfa	4	23	8.46
Iraq	Mustansiriyah University, University of Diyala	2	15	5.5
Sudan	University of Khartoum	1	12	4.4
Tunisia	Université de Tunis	1	10	3.68
UAE	United Arab Emirates University, Umm Al Quwain University	2	10	3.68
Jordan	The University of Jordan	1	8	2.9
Oman	Sultan Qaboos University, University of Technology and Applied Sciences	2	8	2.9
Syria	Damascus University	1	7	2.57
Libya	Al-Jafra University	1	5	1.8
Bahrain	University of Bahrain	1	4	1.47
Lebanon	American University in Lebanon	1	4	1.47
Morocco	Université Ibn Tofail	1	4	1.47
Kuwait	Kuwait University	1	3	1.1
Yemen	The University of Science and Technology	1	1	0.4
Palestine	An-Najah National University	1	1	0.37
Total		48	272	100

Results

Demographic data of the respondents

This section presents the demographic characteristics of the survey respondents and their implications. Among the 272 completed questionnaires, Table 2 indicates that a significant majority (57.4 %) of participants were female, totaling 156, while 116 (42.6 %) were male. Most respondents were older librarians, with the majority being over 50. The age groups of 36–45, 31–35, and 46–50 had a lower percentage of participants, while the group aged 20–25 had the lowest participation rate at 2.2 %. Regarding educational qualifications, the data reveals that most participants held a bachelor's degree (45.6 %). In comparison, 22.4 % of respondents had a master's or doctorate, and the smallest percentage, 8.5 %, comprised diploma holders. In terms of job titles, the majority of participants identified as information specialists (46.3 %). This was followed by library managers (27.6 %), heads of departments or units (18.8 %), and vice presidents (7.3 %). Looking at professional experience, Table 2 shows that 45.2 % of respondents had more than 15 years of experience. Additionally, 23.9 % reported having 11 to 15 years of experience, while only 3.7 % had more than one year of experience.

Fig. 1 illustrates participants' knowledge of how AI and its applications are utilized in library operations and services. One-third of the respondents (33.5 %) reported having good knowledge, while only 2.9 % claimed their knowledge of AI was poor.

The findings regarding respondents' knowledge of AI by age indicate that the age group of 20 to 30 years had the highest average knowledge level. The 41 to 50 age group followed this. Conversely, knowledge of AI decreased among those aged over 50 years. As shown in Table 4, knowledge of AI was positively correlated with years of experience. Those with 1 to 5 years of experience had the highest levels of knowledge, followed by those with less than one year of experience. In

Table 2
Survey respondents' characteristics.

Gender	F	%	Job title	F	%
Female	156	57.4	Information Specialist	126	46.3
Male	116	42.6	Library Manager	75	27.6
			Head of department or unit	51	18.8
Age			Vice president	20	7.3
Over 50	62	22.8			
36–40	56	20.6			
41–45	55	20.2			
46–50	40	14.7	Years of experience		
31–35	38	14	More than 15 years	123	45.2
26–30	15	5.5	11–15 years	65	23.9
20–25	6	2.2	6–10 years	39	14.3
			1–5 years	35	12.9
Qualifications			Less than a year	10	3.7
Bachelors	124	45.6	Total	272	100
Master	61	22.4			
Ph.D.	61	22.4			
Diploma	23	8.5			
Secondary School	3	1.1			

contrast, individuals with 11 to 15 years of experience or more had the lowest knowledge levels (See Table 3).

The results of this study revealed that a small percentage of participants ($N = 46$, 16.9 %) reported that their libraries currently provide AI technologies to the academic community. In contrast, a larger group ($N = 117$, 43 %) indicated "No, but we are working to provide it in the future," while another segment ($N = 109$, 40.1 %) responded with "No."

When librarians were asked about their use of AI applications in their work, approximately two-thirds of participants ($N = 170$, 62.5 %) stated that they do not use AI applications in their library work, whereas 37.5 % (N = 102) affirmed, "Yes, we use it." Furthermore, as shown in Table 4, academic librarians who answered "No" were prompted to identify the reasons for not using AI applications in their library work.

Table 4 outlines the most cited reasons for not utilizing AI applications in library work. The primary reason, cited by 64.7 % of respondents, is the lack of necessary infrastructure for implementing AI. This is followed by a lack of training in using AI, which was indicated by 41.2 % of respondents. Interestingly, only 3.5 % stated that they do not trust AI technologies.

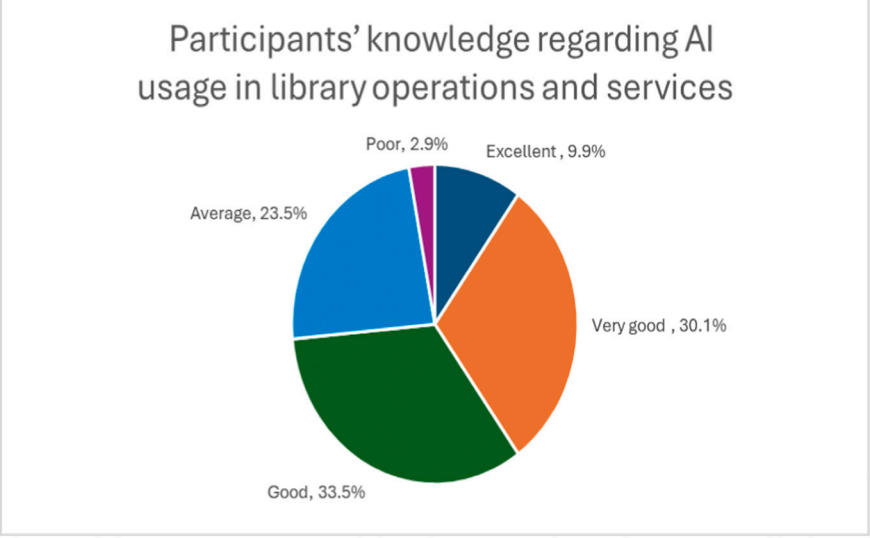

Fig. 1. Paticipants' knowledge regarding AI usage in library operations and services.

Table 3
Participants' knowledge of AI and Age, Gender, Years of experience.

Variables	knowledge of artificial intelligence											
Age	Excellent	%	Very good	%	Good	%	Average	%	Poor	%	Mean	SD
20–25	2	33.3	2	33.3	2	33.3	0	0	0	0	4.00	0.89
26–30	1	6.7	6	40	7	46.7	1	6.7	0	0	3.47	0.74
31–35	0	0	16	42.1	8	21.1	12	31.6	2	5.3	3.00	0.98
36–40	5	8.9	17	30.4	19	33.9	13	23.2	2	3.6	3.18	1.01
41–45	8	14.5	19	34.5	17	30.9	10	18.2	1	1.8	3.42	1.01
46–50	7	17.5	10	25	15	37.5	7	17.5	1	2.5	3.38	1.05
Over 50	4	6.5	12	19.4	23	37.1	21	33.9	2	3.2	2.92	0.96
Gender												
Male	11	9.5	36	31	43	37.1	23	19.8	3	2.6	3.25	0.97
Female	16	10.3	46	29.5	48	30.8	41	26.3	5	3.2	3.17	1.04
Years of experience												
Less than a year	1	10	3	30	4	40	2	20	0	0	3.30	0.95
1–5 years	5	14.3	12	34.3	11	31.4	5	14.3	2	5.7	3.37	1.09
6–10 years	3	7.7	16	41	10	25.6	9	23.1	1	2.6	3.28	1
11–15 years	4	6.2	19	29.2	25	38.5	15	23.1	2	3.1	3.12	0.94
More than 15 years	14	11.4	32	26	41	33.3	33	26.8	3	2.4	3.17	1.03
Total	27	9.9	82	30.2	91	33.5	64	23.5	8	2.9		

Table 4
Reasons for not using AI applications in library work ($N = 170$, 62.5 %).

Reasons	F	%
Lack of necessary infrastructure for AI	110	64.7
Lack of training in using AI	70	41.2
Lack of experience	58	34.1
Work does not need AI	43	25.3
AI technologies have high costs	38	22.4
AI is going to take my job	13	7.6
I do not want to use AI	7	4.1
I do not trust AI technologies	6	3.5
Other	1	0.6

Note: Multiple answers are permitted.

Table 5 reveals that the most frequent application of AI in Arab academic libraries is cataloging and generating metadata, with 43.1 % of respondents indicating this as their primary use. This is followed by content synthesis, such as creating social media posts, reported by 37.3 % of respondents. Only 2 % selected sentiment and trends analysis as their primary purpose for using AI.

Regarding the frequency of AI application usage in library work, Fig. 2 revealed that 39.2 % of academic librarians reported using AI daily, followed by several times a week (27.5 %), and around 3 % utilize it once a month.

As shown in Fig. 3, about 82 % of respondents indicated that enhancing work efficiency was the primary perceived benefit of perceived benefit of using AI applications in the library, followed by (62.7 %) reducing workload as AI performs repetitive routine operations.

Table 6 presents the participants' opinions about the academic library's role in supporting and utilizing AI within the university community. The highest-ranking opinion is for "intelligent support and guidance," which received 65.4 %. This is followed by "creating, categorizing, searching, and discovering content," with a score of 55.5 %. In contrast, the adoption of robotic applications is ranked the lowest, at 31.6 %.

The study's findings show that more than half of the respondents (52.2 %) perceived that AI technologies could be adopted in Arab academic libraries within 1–5 years (See Fig. 4).

Frequencies and percentages were calculated to identify the implementation of policies guiding the application and usage of AI in Arab universities. The results indicated that more than half of the respondents ($N = 157$, 57.7 %) reported that their universities did not have a policy for using AI, while the remainder ($N = 115$, 42.3 %) stated that they did have one.

When participants were asked about their opinions regarding the ethical implications of AI for the academic community, the results showed that the majority ($N = 229$, 84.2 %) believed that AI does have implications for the academic community, whereas ($N = 43$, 15.8 %) disagreed. A small number of participants ($N = 33$, 12.1 %) encountered ethical issues related to using AI during their library work, while the majority ($N = 239$, 87.9 %) did not experience any ethical issues.

Table 5
Purposes of AI usage in Arab academic libraries ($N = 102$, 37.5 %).

Purposes	F	%
Cataloging and generating metadata	44	43.1 %
Content synthesis	38	37.3 %
Responding to inquiries and reference questions	36	35.3 %
Data mining	36	35.3 %
Automated translation of content	35	34.3 %
Analysis and visual presentation of data	34	33.3 %
Suggestions concerning services or content	33	32.4 %
Automatic summarization of content	25	24.5 %
Content indexing	19	18.6 %
Decision-making analytics (resources budget, purchasing, resources allocation)	17	16.7 %
Recognizing images or digital objects	13	12.7 %
Document matching	10	9.8 %
Speech recognition	10	9.8 %
Sentiment and Trends Analysis	2	2.0 %
Other	2	2.0 %

Note: Multiple answers are permitted.

As illustrated in Table 7, responses to a question regarding ownership of intellectual property rights when using AI to create text, images, music, videos, and other digital content revealed that most participants (43.4 %) agreed that the original author of the content on which the AI was based owns the intellectual property rights. Meanwhile, about 13 % stated that students or researchers who use AI applications own the intellectual property rights for the AI-generated content.

Participants identified several key ethical considerations related to AI. According to Table 8, the majority (80.9 %) selected intellectual property and copyright as the most important issue. This was followed by privacy, security, and confidentiality of data, which 71.7 % of respondents noted. In contrast, only 21.7 % selected bias and discrimination as a primary concern.

Table 9 provides an overview of academic librarians' awareness of AI-related ethics. Approximately 72.4 % of the respondents are aware that individuals who copy content generated by AI and present it as their own are committing plagiarism.

When participants were asked if they needed training in the ethical considerations of AI, 96 % ($N = 261$) answered "Yes," while only 4 % ($N = 11$) responded "No."

The results indicate that most respondents ($N = 239$, 87.9 %) felt their libraries did not address any ethical considerations regarding AI in the academic community. In contrast, 12.1 % ($N = 33$) confirmed that their libraries did address such issues. Among these respondents, 93.9 % ($N = 31$) reported that their libraries conducted face-to-face or online seminars and workshops on AI and its ethical implications. Additionally, 42.4 % ($N = 14$) mentioned that their libraries provided resources or links related to ethical considerations for AI and academic integrity on their websites.

Discussion

This study explored the attitudes of academic librarians in Arab countries towards artificial intelligence (AI) and their awareness of related ethical issues. Most participants were from Egypt, which is unsurprising given that Egypt has a larger population of academic librarians. The majority of respondents (57.4 %) were female, consistent with the Andrew W. Mellon Foundation's report (Doran, 2017), which highlighted the higher representation of females in the Library and Information Science (LIS) profession and academic libraries. Interestingly, while one might expect younger academic librarians to be more inclined to participate in the survey, it was older librarians over the age of 50 (22.8 %) and those with more than 15 years of experience (42.2 %) who made up a significant portion of the respondents.

Conversely, younger librarians aged 20–30 and those with 1–5 years of experience showed increasing knowledge regarding AI and its applications in library operations and services. Young librarians, from the findings, are more enthusiastic in adapting rapidly to technological changes and familiarizing themselves with new trends. Additionally, the findings indicated that male librarians reported more knowledge of AI than their female counterparts, though their mean scores converged. This trend can be explained by a survey conducted by Franken and Mauritz (2021), which suggested that men tend to see more opportunities in AI, rate their competence in AI higher, and show greater trust in AI than women. This may result from men being more involved in and gaining more experience with AI than women.

Clarivate's report (2024) confirmed that over 60 % of libraries worldwide plan to implement AI technologies. Our study indicated that 43 % of participants reported that their libraries do not yet offer AI technologies to the academic community but are working on making them available in the future. Only 37.5 % of respondents stated that

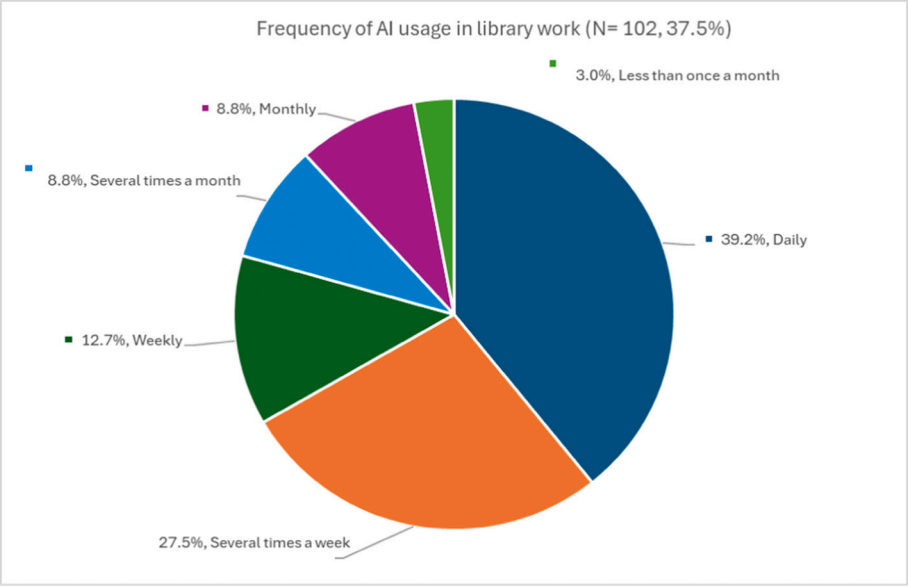

Fig. 2. Frequency of AI usage in library work (N = 102, 37.5 %).

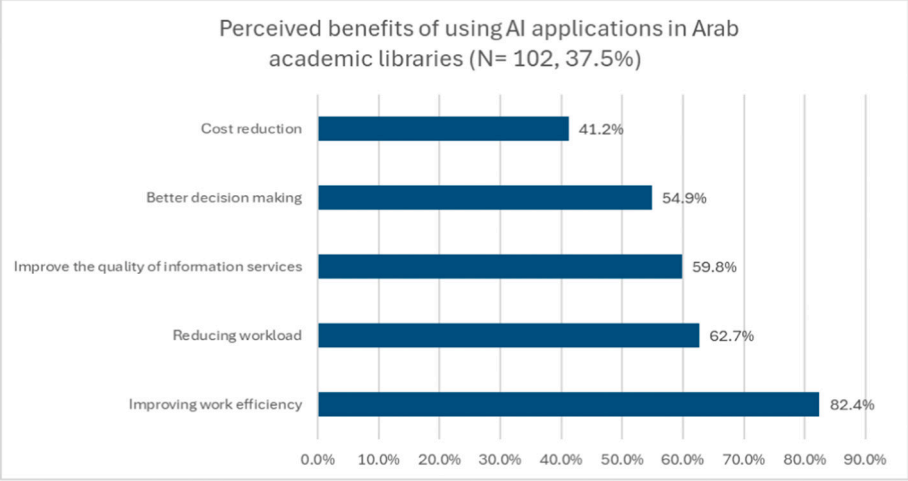

Fig. 3. Perceived benefits of using AI applications in Arab academic libraries (N = 102, 37.5 %)
Note: Multiple answers are permitted.

Table 6
Library's role in using AI at the university community.

Library's role	F	%
Intelligent support and guidance	178	65.4
Create, categorize, search, and discover content	151	55.5
Augmented reality supported by AI	133	48.9
Personalization of learning (behavior models)	123	45.2
Enhancing understanding of ethical AI practices	123	45.2
Machine translation tools	110	40.4
Robotic applications	86	31.6

Note: Multiple answers are permitted.

their libraries currently use AI, highlighting the limited adoption of these technologies in university libraries across Arab countries. These findings align with a study by Ajani et al. (2022), which revealed that academic librarians have conflicted feelings and are not yet ready to embrace AI. Similarly, a global survey by Clarivate (2024) conducted with 1500 librarians from academic, public, and national libraries found that only 7 % of respondents implement AI.

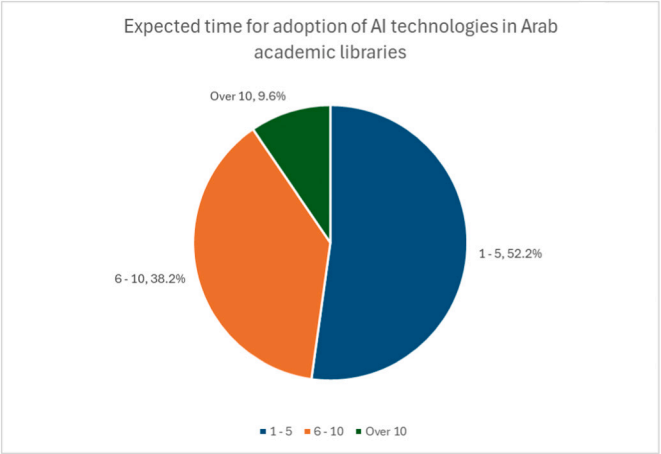

Fig. 4. Expected time for adoption of AI technologies in Arab academic libraries.

Table 7
AI and intellectual property rights.

Intellectual property rights	F	%
The original author of the content on which the AI was based	118	43.4
The institution that developed AI	64	23.5
I do not know	54	19.9
The student /or/ researcher who used AI applications	36	13.2
Total	272	100

Table 8
Awareness of AI ethical considerations.

Ethical considerations	F	%
Intellectual property and copyright	220	80.9
Privacy, security, and confidentiality of data	195	71.7
Quality and accuracy of content	144	52.9
Transparency and accountability about how data is created and used	133	48.9
Negative impact on employment	61	22.4
Bias and discrimination	59	21.7

Note: Multiple answers are permitted.

This study aimed to identify the reasons that may hinder the adoption of AI technologies among Arab academic librarians. Among the participants, 64.7 % reported that lack of necessary infrastructure for AI was the primary obstacle, followed by 41.2 % who cited insufficient training in AI usage. This latter finding aligns with Clarivate's (2024) survey, which revealed that approximately 32 % of respondents indicated that no AI training is available at their universities.

Only a small percentage of academic librarians (7.6 %) expressed concerns that AI would take their jobs. This contrasts with the findings of Ajani et al. (2022), which suggested that librarians are worried about potential job loss due to AI. Additionally, research by Orr and Niegaard (2020) indicated that librarians fear that the automation of routine tasks could diminish their knowledge and value in supporting users, leading to job displacement. Furthermore, one Arab academic librarian mentioned an additional barrier: a lack of support from university decision-makers.

Cataloging and generating metadata (43.1 %) was the most common use of AI among Arab academic librarians, as AI can create catalog records or parts of them. Oladokun et al. (2023) noted that AI technologies are primarily employed for routine and repetitive tasks, such as cataloging. Furthermore, the current study's finding aligns with various studies emphasizing cataloging and metadata generation as essential library operations for generative AI (Osagie & Oladokun, 2024), mainly because both tasks are time-consuming and routine.

In the current study, only two Arab academic librarians selected "Other" as their purpose for using AI, stating they use it to write reports and generate programming codes to enhance library operations. Despite the advantages of AI tools in cataloging, a study by Brzustowicz (2023) highlighted the ongoing need for human oversight to monitor and evaluate the training data used to develop AI models. Additionally, periodic inspections and modifications of the generated records are necessary to prevent inaccuracies and discrepancies caused by biases in the training data. According to Akinyemi (2023) the integration of artificial intelligence (AI) has resulted in revolutionary changes to academic library operations and services, increasing their efficacy and efficiency. Among the academic librarians surveyed who use AI in their work, nearly 39.2 % reported using AI daily.

The findings also indicated that Arab academic librarians recognize the perceived benefits of adopting AI in libraries. Most respondents (82.4 %) identified improved work efficiency as their primary benefit, followed by 62.7 % who noted a reduced workload since AI performs repetitive routine tasks. These findings are consistent with research by Owolabi et al. (2021), which underscored the benefits of AI usage in academic libraries, including enhanced job performance for librarians and increased user satisfaction. Similarly, Olusegun et al. (2023)

Table 9
Academic librarians' awareness of AI ethical issues.

Statements	Agree		Disagree		I do not Know	
	F	%	F	%	F	%
AI tools like ChatGPT and Bard can synthesize an article. If a student or researcher copies an article and attributes it to himself, this is considered plagiarism or cheating.	197	72.4	23	8.5	52	19.1
Content created using AI tools can be treated the same as human-authored content.	81	29.8	151	55.5	40	14.7
Intellectual property rights considerations vary between AI tools.	169	62.1	35	12.9	68	25
The university library's mission is to address potential ethical concerns related to using AI tools and applications.	233	85.7	14	5.1	25	9.2
To ensure transparency and academic integrity, the researcher or student must acknowledge AI's contribution to authorship.	244	89.7	14	5.1	14	5.1
AI tools learn from the data they were trained on, so if the data contains wrong information, then the content synthesized by the AI will also contain wrong information.	210	77.2	21	7.7	41	15.1
AI tools learn from the data they were trained on, so if that data contains biases (unintentionally favoring certain groups, ideas, or language), the content generated by the AI will be biased.	198	72.8	27	9.9	47	17.3
It was allowed to use full-text electronic information resources licensed to the library (journal articles, e-books…etc.) in generative AI tools such as Chat GPT.	115	42.3	69	25.3	88	32.4
Using openly licensed materials (such as Creative Commons content) [a] in AI tools is permitted.	126	46.3	44	16.2	102	37.5
AI technologies and tools have environmental impacts (For example, they require a lot of energy, contributing to carbon emissions).	89	32.7	77	28.3	106	39
AI-generated content can be verified for authenticity.	182	66.9	30	11	60	22.1
The unequal distribution of AI technology and expertise raises concerns about the digital divide between developed and less developed societies.	211	77.6	28	10.3	33	12.1
AI algorithms can be complex, making understanding how data is generated and used difficult.	159	58.5	51	18.8	62	22.8
AI systems collect and process large amounts of personal data, which raises concerns about privacy and data security.	200	73.5	42	15.4	30	11
AI involves data collection and analysis, so handling data responsibly, obtaining consent, and protecting users' interests are essential.	225	82.7	21	7.7	26	9.6
The use of AI technologies reduces or eliminates critical thinking and originality.	170	62.5	60	22.1	42	15.4

[a] Creative Commons license means a license that provides a legal framework for sharing and distributing creative works while allowing creators to retain some of their rights.

demonstrated that adopting AI in academic libraries would boost librarians' productivity and facilitate delivering high-quality services to future library users.

Conversely, when participants were asked about academic library's role in promoting and utilizing AI within the university community, the adoption of robotic applications received the lowest percentage of support (31.6 %). This is attributed to the high costs associated with AI technology, as university libraries may lack the necessary funds to invest in it.

Survey respondents exhibited extreme optimistic outlook regarding the future of AI adoption in Arab academic libraries. More than half of the participants (52.2 %) believed that AI technologies will be adopted in Arab academic libraries within 1 to 5 years. This suggests a strong belief in AI's transformative potentials in these academic settings. Universities need to develop policies and guidelines that promote the responsible and effective use of AI and address issues relating to plagiarism and academic misconduct. Such policies must define acceptable uses of AI, address academic integrity concerns, ensure data privacy, tackle algorithmic bias and consider ethical implications for students, faculty, and staff (Michel-Villarreal et al., 2023).

According to the findings from the current survey, approximately 42 % of Arab academic librarians reported that their universities have established a policy regarding the use of AI. This trend likely reflects the increasing concerns among Arab higher education institutions about the role of Generative AI (GenAI) in teaching and learning in recent years. Unsurprisingly, most of the participants (84.2 %) believed that AI has implications for the academic community. The studies reviewed in the literature presented mixed views on AI—some see it as an opportunity for libraries, while others perceive it as a threat. Given the novelty of AI adoption in Arab academic libraries, only 12 % of participants reported encountering ethical issues relating to AI in their library work. One librarian mentioned experiencing many inaccuracies when using generative AI tools. In contrast, others highlighted concerns about scientific plagiarism, including the use of ChatGPT for preparing academic theses and papers and the documentation of information generated by AI tools. Generative AI tools often overlook intellectual property rights, leading some students to search the library catalog for non-existent resources mentioned by these tools.

This section assesses academic librarians' awareness of the ethical considerations of artificial intelligence (AI). This survey revealed that 43.4 % of respondents believed that the original author of the content used for AI holds the intellectual property rights. In contrast, 13 % of respondents claimed that the user of AI application or tool has those rights. In comparison, approximately 20 % were unsure who owns the intellectual property when using AI to generate text, images, music, videos, and other content. Findings of this study indicated that intellectual property and copyright were cited as the most critical issues by 80.9 % of Arab academic librarians. Conversely, bias and discrimination were reported as the least significant issues, with only 21.7 % expressing concern. On the contrary, a study by Saeidnia (2023) highlighted bias and discrimination as serious challenges in AI systems within the library and information industry, indicating that such challenges can perpetuate existing inequalities, obstruct access to information, and reinforce discriminatory practices. It is important to point out that the European Parliament intends to implement the "Artificial Intelligence Act" by 2026; however, it does not address the issue of ownership concerning works produced with generative AI tools (European Innovation Council and SMEs Executive Agency, 2024).

Respondents were asked to indicate their opinions (Agree, Disagree, I Do Not Know) regarding 16 statements aimed at assessing their awareness of AI-related ethics, as shown in Table 9. About 30 % of participants believed that AI-generated content could be treated similarly to human-authored content when it comes to copyright protection. Moreover, while most publishers and vendors prohibit uploading copyright-protected resources to third-party platforms, including generative AI tools, our findings revealed that 42.3 % of respondents believed it was permissible to use full-text electronic resources licensed by the library in generative AI tools. Additionally, 39 % of respondents were unsure whether AI has environmental impacts, and 25 % did not know if considerations regarding intellectual property rights differ between AI tools.

Based on our findings, lack of training may hinder the effective and efficient adoption of AI in libraries because an overwhelming majority of academic librarians (96 %) expressed strong need for training on the ethical implications of AI. This aligns with the findings of Lo (2024), who stated that 74 % of respondents agreed or strongly agreed that there is an urgent need for training in order to address ethical and privacy issues related to AI usage.

Only a small percentage of academic librarians (12.1 %) reported that their libraries appropriately address ethical considerations of AI within the academic community. When asked to identify their libraries' actions regarding AI ethics, the only activities noted were face-to-face or online seminars and workshops on AI ethics, along with providing ethical guidelines for AI and academic integrity on the library's website. None of the respondents selected other potential actions, such as developing a guide for AI usage in the academic community, creating a Q&A page on the library's website about ethical considerations for AI and academic integrity, formulating library policies regarding AI usage and user privacy, establishing ethical frameworks or regulations governing AI use, or implementing advanced automated systems based on AI to detect plagiarism.

Conclusion

The current study aimed at highlighting the competencies of academic librarians in Arab countries, identify gaps that need addressing, and provide guidance for enhancing literacy around ethical issues relating to artificial intelligence (AI) among them. The findings indicated that AI is expected to play a significant role in library environments in the coming years, with many participants expressing positive views about the adoption of AI in libraries. A critical finding of the study is that academic librarians generally share a common understanding regarding the current usage of AI in their libraries, as well as their perceptions and awareness surrounding its adoption. However, they also expressed concern about unresolved issues relating to AI, particularly regarding the unknown legal implications, such as the ownership of AI-generated works and potential copyright infringement.

The study concludes that the most perceived benefits of AI usage in various aspects of library operations and services include enhancing work efficiency and a reduction in workload. Despite these advantages, the adoption of AI in Arab academic libraries has been slow, and implementation is still in its early stages. Key challenges include lack of necessary infrastructure and training in AI applications among the participants. This underscores the need for greater attention from Arab academic libraries towards readiness and infrastructure development, as well as the professional development of staff in AI technologies. There is also a pressing need to establish AI policies and guidelines for ethical usage within the university community. Moreover, more emphasis should be placed on library activities that promote AI ethical literacy, as these activities often do not require significant funding. Arab academic libraries should collaborate with other units within their institutions to integrate AI ethics awareness into their curricula.

The practical insights from this study can serve as a valuable guide for university library managers who wish to implement AI. Additionally, the findings will assist decision-makers and librarians in enhancing library operations and services. This study contributes to the existing body of knowledge on AI adoption in Arab libraries and provides significant insights for future research and practice. It paves the way for more effective technological advancements within academic libraries in Arab countries.

The study acknowledges limitations regarding the snowball sampling method used, which may not be generalizable beyond Arab

academic libraries. Furthermore, the study assessed participants' self-evaluation of their knowledge about AI by asking a single question about their knowledge of how AI and its applications are utilized in library operations and services. This approach has the potential of drawing the participants back from being able to accurately assess their own knowledge levels. Finally, areas for further research include exploring the evolving relationship between AI, libraries, and their users, examining library users' roles in AI-based services, investigating the use of AI tools such as robotics, chatbots, and virtual reference assistants, and studying AI policies and strategies in Arab libraries.

CRediT authorship contribution statement

Amany M. Elsayed: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Majed Mohammed Abusharhah:** Resources, Data curation.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Ethical approval was provided by the Institutional Review Board at *Imam* Abdulrahman Bin Faisal University (No. IBR-2024-17-452).

Funding

Not applicable.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Not applicable

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.acalib.2025.103083.

Data availability

Data will be made available on request.

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