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Examining the Perception of Artificial Intelligence (AI) Among University Library Librarians in Pakistan: A Survey of Khyber Pakhtunkhwa, Pakistan

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Abstract

This study explores the perceptions of librarians regarding artificial intelligence (AI) in central libraries of public-sector universities in Khyber Pakhtunkhwa, Pakistan. A quantitative, census-based survey was conducted among all chief or in-charge librarians using a structured questionnaire. The results show that the majority of respondents were male and in the mid-career age group of 31–40 years. Most participants held advanced academic qualifications such as MPhil or PhD degrees, and a significant majority reported having knowledge of AI. Overall, librarians expressed a positive perception of AI, recognizing its potential to enhance library operations, improve service delivery, and align with professional values. However, differences in confidence levels and readiness for adoption highlight the need for targeted professional development, institutional support, and strategic policies to facilitate successful AI integration in university libraries.

Keywords: Artificial Intelligence, Librarian Perceptions, University Libraries, Khyber Pakhtunkhwa, Library Services, Technology Adoption

Introduction

The concept of Artificial Intelligence (AI) dates back to research conducted by John McCarthy in 1955, which operated under the premise that any part of learning and other types of intelligence might be enhanced by the use of a machine (Wang, 2019). It is well known that there is no widely accepted definition of AI (Allen, 1998; Bhatnagar et al., 2018; Brachman, 2006; Kirsh, D, 1991; Monett & Lewis, 2018; Nilsson, 2009). AI is the ability of software or hardware to carry out tasks by mimicking human intelligence and then continuously improve itself using the data it gathers (AI, W. I. 2023). AI has been defined as “the ability of machines to do things that people would say require intelligence” ; it has been infiltrated as one of the modern technologies for library operations (Jackson, 1985). Machines that imitate some features of human intelligence, such as

perception, learning, reasoning, problem-solving, language interaction and creative work (Miao & Shiohira, 2022).Theories and techniques developed to allow computer systems to perform tasks normally requiring human or biological intelligence (Jisc, 2022a). AI is one of the emerging trends in the world. AI impacts on a wide range of disciplines, including medicine, surgery, automotive, aviation, business, industry, education, and all allied fields (Harisanty et al., 2023). A wide range of subjects are covered by AI, such as psychology, linguistics, philosophy, and other facets of life (Velander et al., 2024). The efficient use of information and communication technology (ICT) instruments is contributing to the modernization and institutionalization of library services. AI is also entering libraries through robotics, chatbot, Natural Language Processing, Big Data, and Text Data Mining (Xu, 2023). AI impacts technical and library user services of libraries. In technical services, it mange metadata of collection, users' data, and the usage of resources, through the application of tools such as Big Data and Data Mining (Lin et al., 2023). Library user services and information retrieval have seen the gradual introduction of tool such as chatbot, robotics, pattern recognition and natural language processing (Adetayo, 2023). In this era of advanced technology and modern information technologies (ITs), libraries are considered service-oriented enterprises that have undergone changes. The increasing needs of library patrons have forced librarians to alter their methods of providing services (Hussain, 2020). The use of AI in libraries is becoming increasingly popular as the world transitions to a digital economy. AI has the potential to totally transform how libraries are run, from the way resources are arranged and classified to the way that users and librarians communicate (Omame & Alex-Nmecha, 2020). University libraries must first accept and use these tools in order to properly utilize AI to fulfill their varied service needs. The efficiency of university libraries' operations in general and their reference services in particular can be improved by implementing artificial intelligence (AI). Libraries may manage their digital resources more effectively by using AI to assist organize, store, and retrieve information (Ajani et al, 2022).

Literature Review

Libraries are hubs of research activities in academic buildings. The radical changes in the era of technology have boosted up library services; AI has been deployed in numerous businesses worldwide. Some popular examples of AI are: manufacturing robots; virtual travel booking agent such as Uber and Careem; google smart maps; plagiarism check software such as Turnitin; social media apps like Facebook, twitter, Pinterest, snapchat, google translator etc. libraries are embracing these changes for many reasons (Hussain, 2020). Libraries in developed and developing countries are not yet fully aware of this technology. Although there is extensive literature on AI in libraries, most cover limited library applications (Hussain, 2023). In Pakistan, there is a reasonable level of awareness among chief university librarians about artificial intelligence. Some AI-based technologies are already being used and include natural language processing, pattern recognition, and text data mining. However, technologies being introduced internationally, such as robotics and chatbots, have yet to be deployed in Pakistani academic libraries (Ali et al., 2020). Integrating AI into Pakistani university libraries is gradually gaining momentum. Respondents highlighted the potential of AI to enhance library services and cater to user needs more effectively. However, they also voiced concerns regarding the necessary investments in funding, time, and staff training(Ali et al., 2024). The implementation of AI fosters innovative learning experiences, empowering librarians to offer intelligent library services to end users (Shahzad, et al, 2024). The incorporation of AI into libraries creates new pathways for users to explore knowledge with personalized, intelligent suggestions. This mutual collaboration between AI and libraries enhances the experiences of users and library staff alike, fostering innovation and well-informed choices. However, the adoption and understanding of AI in library services remain a subject of debate, particularly in developing countries (Barsha et al., 2024). Several conceptual papers on AI in

libraries have been published, including the impact of AI in libraries (Fernandez, 2016), using AI to solve difficult library tasks (Shrivastava, 2018) and the possibility of implementing AI in libraries (Massis, 2018; Herron, 2017). The evolving landscape of AI in libraries underscores the importance of further research in domains like Digital Humanities, Machine Learning, Robotics, Data Mining, and Big Data within academic library settings. (Vasishta, P; et al., 2024). Some studies have also been conducted on the application of AI in university libraries, including AI in Iran, a taxonomy study (Asemi & Asemi, 2018), AI emergence (Omehia & Mmejim, 2020), AI for cataloging (Omame & Alex-Nmecha, 2020; Schreur, 2020), AI for service (Chen & Shen, 2019), library chatbots (Aboelmaged, et al; 2024) , robots in libraries (: Anumula, 2024; Tella, 2020; Wang, et al; 2024; Yueh et al., 2020), Growing adoption of ChatGPT among academics and reference librarians within academic libraries is becoming more prevalent (Mupaikwa & Alisha, 2024). Using AI in university libraries allows for better analysis of datasets, especially large datasets used for analysis across multiple datasets (Shahid & Hussain, 2022). It also helps to eliminate repetitive and tedious tasks. The implication of this is that applying AI in library operations helps libraries develop capabilities that can exceed the human mind (Sivarajah, et.al., 2017). Libraries, especially university libraries in developing countries like Nigeria, are yet to adopt digital technologies and have demonstrated resistance to modifying how they employ technology for many aspects of library operations (Wheatley & Hervieux, 2019). The authors attribute this to poor awareness of the relevance of digital technologies in improving library operations. Tehran University's academic librarians showed a strong reluctance to implementing AI technologies in the library (Nakhoda & Tajik, 2017). This resulted from a lack of knowledge and instruction regarding how technology relate to library functions (Omonboy, & Bobirbek 2023). Wheatley and Hervieux (2019) studied that artificial intelligence in academic libraries, with the main goal being to evaluate the function of librarians in an AI-dominated future and how they react to its use. The authors examined academic literature on the strategic strategies and programming of university libraries. The study found that librarians were not responding to the use of AI in libraries. The survey also revealed that librarians and library administrators found it challenging to integrate AI into the current library system due to a lack of understanding and awareness of the advantages and potential cost savings that the technology may have for the library. AI is a rapidly growing technology that has been utilized across various industries including commerce, defense, health, and education. Its integration into library services has the potential to drive intelligent decision-making and enhance overall efficiency (Chen et al., 2019; Hussain, 2023; Secinaro et al., 2021).

Objective of the Study

Objective of the study is

1. To evaluate the perceptions of librarians regarding artificial intelligence in university libraries in KP.

Research Question of the Study

1. What is the perception of librarians regarding artificial intelligence in university libraries in KP?

Significance of the Study

This study is significant as it provides valuable insights into the perceptions of librarians regarding the use of artificial intelligence in university libraries of Khyber Pakhtunkhwa, a region where such research is limited. By understanding librarians' views, the study will help policymakers, university administrators, and library managers design effective strategies, training programs, and infrastructure plans for AI integration. It will also contribute to existing literature by filling a

contextual gap, offering practical recommendations for improving library services, and serving as a foundation for future research and comparative studies on AI adoption in libraries.

Delimitation of the Study

This research study is limited only to public-sector universities of Khyber Pakhtunkhwa. It is also limited to librarians in charge of these universities' central libraries. The librarians'/library heads of the departmental libraries are excluded from the study. Similarly, private-sector universities and degree-awarding institutes are also not being included in the study.

Research Methodology

This research employee a quantitative approach, utilizing Census/ complete survey to fulfill its objectives. Census approach was adopted in order to allow all the targeted population to participate in this study.

Data Collection

The data collection instrument for the study is questionnaire. The questionnaire consists primarily of closed-ended questions consisting of two major sections. Section One focus on demographic information of the respondents, while Section Two tailored towards answering the question raised.

Research Population

The population of this research are the chief librarians/ in-charge of the central libraries of public-sector universities of Khyber Pakhtunkhwa. There are thirty-four (HEC Website,1-oct-2024) public-sector universities in the province, so a census-based approach is used, and data is collected from the whole population.

Data Analysis

The data analysis for this study is conducted using Statistical Package for Social Sciences version 22 (SPSS). Initially, all study variables were defined within SPSS, and the corresponding responses/data was entered for each variable. Subsequently, SPSS version 22 is utilized to analyze the entered data. Descriptive statistics, including frequencies, percentages, mean, standard deviation, etc., are applied in alignment with the study objectives to derive results. The findings are presented through tables and then interpreted to draw conclusions and extract insights.

Findings

The data collected from the respondents through the structured questionnaire distributed through Google Forms via WhatsApp and Email was analyzed and interpreted. The data is then imported into the Statistical Package for the Social Sciences software (SPSS) for detailed analysis and use of descriptive and inferential statistical methods to achieve the research objectives. First, the analysis aims to cover the demographic basic of the participants systematically, and then the attitude and perception of the participants towards AI technologies.

Demographic Profile of Respondents

This section presents an overview of demographic characteristics of librarians working in public sector university libraries in Khyber Pakhtunkhwa. To understand the respondents' perceptions, relating to artificial intelligence (AI), it is necessary to understand its gender, age, designation, educational qualifications and professional experience. More specifically, these demographic insights prove to be essential in the analysis and discussion surrounding this study's objective and research question, and in examining the library professionals' readiness and capability to embrace AI technologies.

Variable	Category	Frequency	Percentage
Gender	Female	4	14.30%
	Male	24	85.70%
	Total	28	100%
Age	31–40 years	18	64.30%
	41–50 years	10	35.70%
	Total	28	100%
Designation	Additional Librarian	5	17.90%
	Assistant Librarian	9	32.10%
	Chief Librarian	2	7.10%
	Deputy Librarian	6	21.40%
	In-Charge Librarian	6	21.40%
	Total	28	100%
Qualification	Other	1	3.60%
	MLIS/BS	7	33.10%
	MPhil	11	39.30%
	PhD	9	32.1
	Total	28	100%
Experience	Up to 5 years	6	21.40%
	11–15 years	10	35.70%
	16–20 years	3	10.90%
	More than 20 years	1	3.60%
	Total	28	100%
Having Knowledge of AI	Yes	26	92.90%
	No	2	7.10%
	Total	28	100%

Based on the demographic data, from **Table 1** the majority of respondents were male (85.7%), with only 14.3% female representation, indicating a notable gender imbalance among librarians in central libraries of public-sector universities in Khyber Pakhtunkhwa. Most participants (64.3%) were between 31–40 years old, followed by 35.7% in the 41–50 years' age group, suggesting a predominantly mid-career workforce. In terms of designation, Assistant Librarians formed the largest segment (32.1%), while Additional Librarians accounted for 17.9%, and both Deputy Librarians and In-Charge Librarians made up 21.4% each; Chief Librarians were the least represented (7.1%). Regarding qualifications, the highest proportion held an MPhil (39.3%), followed by PhD holders (32.1%) and MLIS/BS degree holders (33.1%), with a small fraction (3.6%) having other qualifications, reflecting a generally well-educated professional group. Experience levels varied, with the largest share having 11–15 years of service (35.7%), while 21.4% had up to 5 years, and very few had more than 20 years (3.6%) of experience. Notably, a vast majority (92.9%) reported having knowledge of artificial intelligence, indicating strong awareness of the subject among the respondents.

Finding Related to Research Questions

What is the perception of librarians regarding artificial intelligence in university libraries in KP?

This section aims to present a comprehensive look at librarian's views on artificial intelligence (AI) in university libraries in Khyber Pakhtunkhwa (KP). As more and more AI technologies develop, it is essential to grasp librarians' perception of the possible impact of their potential use on the operation and provision of library services. A number of factors influence librarians' perceptions, including their confidence in adopting new technology, their favorable prognosis of the benefits of AI integration and their knowledge of AI. This section addresses why the perceptions in this research are important to achieving the research objectives, especially when evaluating how librarians perceive AI's function in bettering user experiences, higher operational efficiency, and transformed library services. In this section, the findings both assisted the addressing of the questions about librarians' perception of AI, providing inputs in assessing their readiness on its implementation in the university libraries in KP.

Table 2 offers insightful information about respondents' opinions about AI in libraries. The mean and standard deviation tell how respondents agreed with the statement on average and how widely their answers were. The mean indicates how much the average level of agreement or disagreement with each statement. When librarians asked about their perceptions of artificial intelligence, the data obtained indicated that they generally viewed it as beneficial, although their opinions on its implementation and impact were subject to variation. The statement "AI had the potential to transform and improve library services" had the highest mean of 4.04, suggesting a strong belief in AI's potential. However, the standard deviation of 0.96 suggested some uncertainty, with a fraction of respondents being less convinced. Similarly, "AI aligned with library values" had a mean of 3.82 and a higher standard deviation of 1.06, showing more mixed opinions on whether AI fit with the core mission of libraries. The mean for "AI integration was a top priority" was 3.79, with a standard deviation of 1.07, revealing that while many librarians saw AI as important, there were differing views on its priority. Optimism about AI's future was moderate (mean = 3.64) with a higher standard deviation of 1.16, pointing to varying levels of hope for AI's role in libraries. Regarding knowledge of AI, the mean score of 3.39 suggested that librarians felt somewhat informed, but the standard deviation of 1.03 showed there was a range of opinions about how much they knew. Opinions on AI's role in specific tasks like automated cataloging were more consistent (mean = 3.25, SD = 0.93), while views on AI being underutilized in libraries were divided (mean = 3.18, SD = 1.06). Overall, the data showed a general recognition of AI's potential, but the standard deviations highlighted significant variation in how librarians viewed its implementation, usefulness, and future in libraries.

Table 2: *Perceptions of Librarians Regarding Artificial Intelligence (N=34)*

Rank	Statements	Mean	SD	Variance
1	I believe that AI has the potential to transform and improve library services and operations	4.03	.961	.925
2	AI technology aligns with the values and mission of libraries in providing access to information and knowledge	3.82	1.05	1.115
3	The integration of AI in libraries is a top priority for enhancing user experiences and services	3.78	1.066	1.138
4	I am optimistic about the future of AI in the field of librarianship	3.64	1.161	1.349
5	I am actively seeking opportunities to learn more about AI and its relevance to librarianship	3.60	1.030	1.062
6	I am well-informed about the concepts and applications of Artificial Intelligence (AI) in the field of Library and Information Science	3.39	1.030	1.062
7	I am confident in my ability to adapt to AI advancements and incorporate them into my library work	3.28	.854	.730
8	AI has the potential to assist in tasks like automated cataloging and information retrieval, reducing manual work	3.25	.927	.861
9	AI technology is currently underutilized in my library	3.17	1.05	1.115

Note: Scale: 1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Overall, the data shows that although librarians usually view artificial intelligence as helpful and transforming, attitudes on how it should be used, given top priority, and included into library services vary. The different standard deviations draw attention to the uncertainty and different degrees of support or worry about the use of artificial intelligence in libraries

Conclusion

The study shows that librarians in public-sector universities of Khyber Pakhtunkhwa generally recognize AI's transformative potential for enhancing library operations, improving user experiences, and streamlining services. Their high academic qualifications and reported knowledge of AI provide a strong foundation for adoption. However, variability in perceptions indicates differences in readiness, priority, and confidence, suggesting that enthusiasm is tempered by uncertainty over integration processes and resource availability. To move toward effective AI adoption, there is a need for structured institutional support, targeted professional training, and strategic policy frameworks that address both technical and operational challenges. Bridging these gaps will enable university libraries to fully leverage AI's capabilities while maintaining their commitment to equitable access to information.

Recommendations

The findings of the research on "Examining the perception of Artificial Intelligence (AI) among University Library librarians in Pakistan: A Survey of Khyber Pakhtunkhwa, Pakistan" enable the following recommendations to boost AI usage and integrate it meaningfully into library operations.

Professional Development and Training

- Conduct workshops, seminars, and hands-on training focused on AI applications in library services, including automated cataloging and virtual reference systems.
- Integrate AI literacy into continuous professional development (CPD) programs for library staff.

Institutional Policy and Strategic Planning

- Formulate clear policies for AI integration that align with library goals, ethical standards, and privacy protocols.
- Include AI adoption as a priority in long-term library development strategies.

Collaborative Networks and Knowledge Sharing

- Establish regional collaboration among libraries for sharing best practices, pilot results, and technical expertise.
- Partner with academic and technology institutions to co-develop AI projects.

Resource Allocation and Infrastructure Development

- Allocate specific budgets for AI-related technologies and digital infrastructure upgrades.
- Ensure robust systems to support cloud-based AI tools and services.

Pilot Projects and Gradual Integration

- Begin with small-scale AI projects in selected service areas to test feasibility and user acceptance.
- Use pilot feedback to refine approaches before full-scale implementation.

User Awareness and Engagement

- Conduct orientation programs for library users to promote understanding and acceptance of AI services.
- Collect user feedback to guide ongoing improvements in AI-based solutions.

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