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Patterns and trends in the use of AI-driven utility tools among university researchers in the Jodhpur region

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Abstract
The rapid advancement of science and technology especially Artificial Intelligence (AI) is significantly influencing various fields, with education and research being among the most affected. AI-enabled digital tools now allow users to accomplish tasks with greater speed and precision than ever before. The present study explores how researchers are engaging with AI-based technologies for scholarly communication, focusing on their usability, efficiency, awareness levels, and the challenges faced in adopting these tools.

To gather insights, an online survey was carried out among university professionals in the Jodhpur region. A total of 250 questionnaires were distributed across six universities and colleges through email and social media using a random sampling technique, and 160 responses were received. The findings reveal that although human input remains essential, the role of AI in producing research papers is steadily expanding. About 31.87% of participants reported frequent use of AI tools for research purposes. Additionally, 25% of respondents indicated a high level of familiarity with these tools, while 57.50% were somewhat familiar. AI applications are used mostly for writing research papers and plagiarism detection, showing slightly higher adoption compared to other uses. However, limited knowledge and lack of confidence in AI technologies continue to hinder broader acceptance. Despite recognizing the advantages of AI-driven tools, many respondents still hesitate to place complete trust in them.

Keywords: Artificial intelligence, natural language processing, research communication, technology sector, utility tools

1. Introduction

The rapid growth and expanding use of AI technologies are transforming numerous sectors, reshaping both professional environments and everyday life. AI has become a prominent topic of discussion, frequently appearing in media reports, academic literature, and events such as conferences and webinars. In today's demanding research landscape, scholars continually seek innovative tools that can streamline their work, accelerate their projects, and facilitate faster access to relevant information.

Researchers particularly early-career scholars are experiencing increasing pressure to produce high-quality work and advance professionally. The rising need for peer reviewers has also encouraged greater reliance on AI within academic publishing. AI tools can uncover patterns and connections in data that may go unnoticed by humans, helping researchers generate new insights, propose theories, and identify underexplored research topics. Additionally, AI systems can deliver highly accurate predictions by using machine-learning models trained to detect patterns and trends within large datasets Rainsberger [1]. AI-based algorithms have introduced new possibilities for exploring scientific knowledge in scholarly communication, potentially reshaping the responsibilities of science communication professionals.

2. The Role and Impact of AI Tools

Artificial Intelligence (AI) tools have introduced a major shift in the research landscape, reshaping traditional methodologies and accelerating advancements across multiple disciplines. These tools serve diverse purposes, enhancing how data is collected, processed, and interpreted. AI systems can also analyse existing scholarly literature to identify gaps in knowledge, helping researchers generate new hypotheses and explore innovative research directions. Furthermore, AI's predictive capabilities streamline experimental design, improve reproducibility, and support the optimisation of research protocols. By enabling

comprehensive literature exploration and knowledge synthesis, AI enhances researchers' ability to summarise complex information and extract meaningful conclusions. As AI becomes increasingly embedded in research workflows, concerns related to ethical use, fairness, and transparency in algorithms have gained prominence. Ensuring responsible adoption of AI is essential for maintaining credibility, reliability, and integrity in scientific inquiry.

2.1 Research Areas Supported by AI-driven Tools

Table 1: Key research activities and corresponding AI tools

Work Area	Role of AI Tools
Academic Search	AI-based search engines such as Litmaps, Connected Papers, and Semantic Scholar assist researchers in efficiently locating relevant publications.
Language Processing, Prompts & Conversations	Conversational AI platforms like Copilot, Bing Chat, Bard, and ChatGPT enable interactive dialogue, prompt generation, and content assistance.
Literature Review	Tools such as Elicit, Research Rabbit, and Scite help identify related studies, extract essential concepts, summarise core ideas, and retrieve key information—even when keyword matching is imperfect.
Writing Assistance	Programs like Grammarly, Paperpal, and Writesonic enhance academic writing by improving clarity, grammar, and overall language quality Bieda *et al* [2].
Summarization & Paraphrasing	AI-powered summarisation tools, including QuillBot, SciSpace, Humata, and Scholarcy, condense research content and provide paraphrased interpretations.
Plagiarism Detection	Systems like Copyleaks, Plag.ai, Duplichecker.com, and PlagiarismChecker.ai analyse documents to ensure originality and detect similarity with existing works.
Data Analysis	Machine-learning-based platforms such as Google Analytics and IBM Watson Analytics help identify patterns, trends, and insights from large datasets.
Reference Management	Reference managers like Mendeley and Zotero automate citation creation and bibliographic organisation, simplifying scholarly writing.

3. Objectives

- To examine how effectively AI-driven tools are being used in research communication.
- To assess the level of awareness regarding AI-based utility tools among members of the research community.
- To analyse the advantages and challenges involved in integrating AI tools into various research activities.

4. Aim of the Study

This study focuses specifically on understanding the awareness, perceptions, and use of AI tools by researchers in Jodhpur region Universites and College for their academic and scholarly tasks. The purpose is to explore the extent, to which researchers rely on AI-based tools in their work, identify the challenges they encounter, assess the different ways these tools are incorporated into their research processes, and evaluate their overall familiarity with such technologies. A total of 6 Jodhpur region Universites and College were selected for sampling, based on the accessibility of their email addresses, phone numbers, and social media contact information.

5. Literature Review

A detailed examination of existing scholarship was carried out to identify AI-powered tools designed specifically to support research activities and to understand the challenges associated with their use. The literature search was conducted in major academic databases including SCOPUS, IEEE, Springer, and ResearchGate using keywords such as *AI-driven tools, research communication,* and *scholarly publishing.* Earlier studies, however, tend to focus more on theoretical discussions of AI and the perceptions of educators and students, rather than on practical, research-oriented applications. Razack *et al* [3]. reviewed numerous AI tools currently in development or already in use for different functions within academic publishing, highlighting their growing influence on scholarly communication. Artificial Intelligence has significantly transformed sectors such as education and research. Alqahtani *et al* [4]. explained how progress in natural language processing (NLP) has deepened our understanding of AI and enhanced its applicability in these areas. Burger *et al* [5]. explored the usefulness of AI in research workflows and demonstrated how AI can strengthen various research methodologies. Their case study on Systematic Literature Reviews (SLRs) illustrated the practical integration of AI in research synthesis.

For researchers who are non-native English speakers, academic writing often presents additional challenges. Dwivedi *et al* [6]. suggested that AI tools can support such researchers in improving scientific writing skills, aligning with principles of second-language learning. Grajeda *et al* [7]. examined the adoption of AI tools within a School of Arts in a private Latin American university, focusing on students' perceptions and attitudes toward these technologies. Javaid *et al* [8]. described ChatGPT as a tool built on advanced Machine Learning (ML), Natural Language Processing (NLP), and Deep Learning (DL) techniques. As part of the broader family of Large Language Models (LLMs), ChatGPT offers rapid text translation and serves as a valuable resource for language education. Venkatesh [9] discussed the interaction between humans and AI systems, highlighting key challenges encountered in operations management as AI tools become more widely accessible. Schepart *et al* [10]. used mixed methods to assess the current level of knowledge, perceptions, and clinical use of AI-based digital health technologies for cardiovascular care, along with barriers affecting their adoption.

6. Methodology

The study employed a mixed research methodology with a descriptive approach. The entire process involved content analysis, a comprehensive literature review, and an online survey via email and social media by using the random sampling method in the time period of September 2025-November 2025. A range of professionals from 6 Jodhpur region Universites and College were chosen based on the availability of their communication addresses. Out of 250 distributed surveys, 160 responses were recorded and analysed.

The survey consisted of two parts, A and B, and was intended to investigate statistically significant relationships

between participants' age, gender, academic standing, and participation in research. Section A concentrated on demographic data and research engagement, while Section B examined academics' knowledge about and use of AI-driven tools in their research pursuits. The statistical analysis was conducted using descriptive statistics, which included means, frequencies, percentages, and standard deviations. This gave an extensive understanding of the data as well as patterns and trends in the respondents' use of AI technologies.

Table 2: Responses received from selected technical institutes for analysis

S. No.	Institutes	Distributed/Responses
1.	Jai Narian Vyas University, Jodhpur	55/36
2.	Indian Institute of Technology, Jodhpur	50/32
3.	Agriculture University, Jodhpur	30/18
4.	Sarvepalli Radhakrishnan Rajasthan Ayurved University, Jodhpur	35/20
5.	National Law University, Jodhpur	40/26
6.	Dr. Sampurnanand Medical College, Jodhpur	40/28

7. Data Analysis & Interpretation

7.1 Demographic Characteristics of Participants

A total of 160 responses were analysed to understand the demographic distribution of the participants.

The gender data shows that 65.62% of the respondents are male, while 34.37% are female, indicating that male participation is almost twice that of females.

Five age categories were considered in the survey. The age group 36-40 years accounted for the highest proportion of participants at 35%, followed by the 30-35 years group at 23.75%. The calculated mean age falls near the 36-40 range, with a standard deviation of 1.28 and a variance of 1.62, indicating a moderate spread in respondent ages.

Regarding academic designation, the largest group among the respondents is Assistant Professors (56.25%), followed by Research Scholars (25.62%), Associate Professors (14.37%), and Professors (3.75%). This diverse representation helps capture a wide range of perspectives on AI-tool usage across different academic roles.

Table 3: Demographic Profile of Respondents

Demography	Details	Frequency	Percentage (%)
Gender	Male	105	65.62
	Female	55	34.37
Age Group	30-35	38	23.75
	36-40	56	35
	41-45	36	22.50
	46-50	18	11.25
	>50	12	7.50
Academic Position	Professor	06	3.75
	Associate Professor	23	14.37
	Assistant Professor	90	56.25
	Research Scholar	41	25.62

7.2 Descriptive and Inferential Analysis

7.2.1 Frequency of Research-Related Activities

The data shows that: how often respondents engage in research activities.

- 36.25% (n = 58) engage weekly,
- 31.87% (n = 51) work on research tasks daily,
- 18.75% (n = 30) are involved occasionally.
- 13.12% (n = 21) participate monthly, and

These figures indicate that a substantial proportion of participants are actively involved in research on a daily or weekly basis. Respondents were also asked whether they used AI-driven tools in their research and how familiar they were with such technologies. The responses revealed considerable variation in both usage and awareness.

7.2.2 Perceptions and Competence Regarding AI-Driven Tools

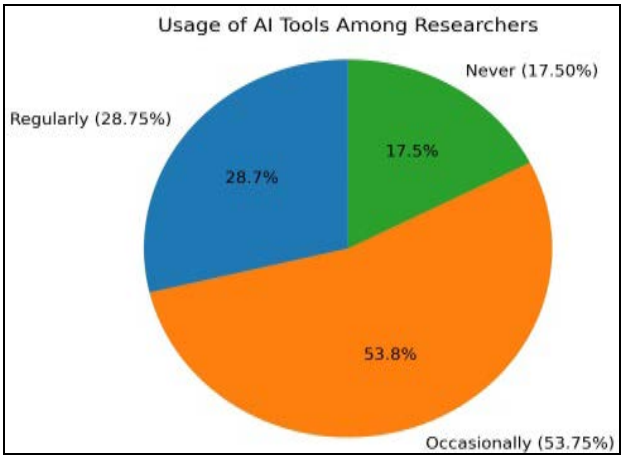

Fig 3: represents respondents' usage patterns of AI-based research tools.

The findings show that

- 28.75% (n = 46) use AI tools regularly,
- 53.75% (n = 86) use them occasionally, and
- 17.50% (n = 28) reported never using them.

In terms of familiarity

- 25% consider themselves highly familiar,
- 57.50% are somewhat familiar, and
- 17.50% are not familiar with AI tools.

These observations highlight the need for more training initiatives to improve skill levels and reduce the existing knowledge gap among researchers.

Table 4. Types of AI Tools Used in Research Activities

Table 4: summarises the specific categories of AI-driven tools used by respondents and the extent of their adoption.

Category of AI Tool	Usage (%)
Reference management tools	75.49%
Data analysis tools	73.98%
Summarisation & paraphrasing tools	69.96%
Research organisation tools	61.67%
Other tools (ML model development, training tools, data visualisation, etc.)	18.92%

The data shows that reference management, analytical tools, and summarisation tools are among the most frequently used categories. Respondents selecting "Other" commonly mentioned tools for machine-learning model development, training modules, and data-visualisation activities.

Table 5. Common Research Tasks Supported by AI Tools

Table 5: highlights how researchers incorporate AI tools into various stages of the research workflow.

Research Activity	Usage (%)
Drafting research papers	40.97%
Plagiarism detection	39.17%
Data analysis	34.67%
Reference organisation	26.35%
Literature review	(value implied as “common,” but not explicitly provided)*

These findings suggest that AI-driven systems are applied across multiple phases of scholarly work, offering flexibility and support in writing, citation management, data interpretation, and originality checking.

Effectiveness of AI Tools in Research Advancements

To assess how effectively AI-driven tools support research communication, respondents were asked to rate their satisfaction using a three-point Likert scale consisting of *very effective, somewhat effective,* and *not effective at all.* The summarized responses are shown in Table 8.

The analysis reveals that researchers hold varied opinions about the usefulness of AI tools in enhancing their research processes. A significant group rated AI tools as *very effective,* reflected in a mean score of 7.45 (52.55%), indicating strong confidence in the contribution of these technologies. A nearly equal proportion of respondents viewed AI tools as *somewhat effective,* with a mean score of 7.31 (48.40%), demonstrating moderate support for their usefulness.

Conversely, a smaller number of researchers felt that AI tools offer minimal benefits, as shown by the lower mean score of 6.85 (19.68%) under the *not effective at all* category.

Overall, the results suggest that the majority of participants acknowledge the positive impact of AI tools on their research work, though the level of perceived effectiveness varies across users.

Table 6: Preferred AI Tools Used by Respondents

AI Tools	Use (%)	Cumulative (%)	Not Use (%)	Cumulative (%)	Total
Natural Language Processing (NLP) Tools	45 (44.11)	9.10	57 (55.88)	17.98	102
Literature Mapping / Review Tools	56 (53.33)	20.44	49 (46.66)	33.43	105
Reference Management Tools	91 (78.44)	38.86	25 (21.55)	41.32	116
Summarization / Paraphrasing Tools	80 (71.42)	55.06	32 (28.57)	51.41	112
Prompt and Conversation Tools	41 (45.55)	63.36	49 (54.44)	66.87	90
Data Analysis Tools	92 (75.40)	81.98	30 (24.59)	76.34	122
Research Organization Tools	77 (65.25)	97.57	41 (34.74)	89.27	118
Other Tools	12 (26.08)	100	34 (73.91)	100	46

Table 7: Research Activities Supported by AI Tools

Purpose	Number of Respondents	Percentage (%)
Preparing abstracts	30	18.75
Writing research articles	63	39.375
Writing book chapters	15	9.375
Writing reviews	26	16.25
Conducting literature review	39	24.375
Summarizing literature	31	19.375
Plagiarism checking	65	40.625
Preparing thesis/dissertation	27	16.875
Data analysis	46	28.75
Organizing references	49	30.625
Other purposes	7	4.375

Note: Researchers utilized AI tools for a variety of tasks, with writing research articles, plagiarism checking, and organizing references being the most common.

Table 8: Perceived Effectiveness of AI Tools in Research

Effectiveness Level	Mean Score	Standard Deviation	Variance
Very effective	7.45	0.65	0.42
Somewhat effective	7.31	0.69	0.48
Not effective at all	6.85	0.73	0.53

Note: Overall, AI tools were considered highly effective in supporting research, though responses varied slightly across individuals.

Table 9: Challenges Faced While Using AI Tools

Difficulty	Percentage of Respondents (%)
Lack of technical expertise	51.30
Limited infrastructure	54.48
Insufficient quality datasets	47.51
Difficulty integrating AI into workflow	48.03
Ethical concerns related to AI	47.42

Note: Despite the advantages of AI tools, researchers encountered challenges such as limited technical skills, infrastructure issues, and ethical considerations.

Discussion

This study aimed to examine how AI-driven tools influence researchers' workflows, particularly in literature mapping, literature review, academic searches, summarization, plagiarism detection, and reference management in the modern era of Artificial Intelligence (AI).

A significant portion of the participants reported that AI technologies have considerably accelerated their research processes. The primary benefit of AI use was faster data analysis, with majority of respondents noting that tasks previously requiring weeks or months can now be completed in minutes or even seconds due to AI algorithms. This efficiency enables researchers to handle large datasets and generate insights much more quickly compared to traditional methods. However, some respondents encountered challenges in leveraging AI tools effectively. Over half indicated a lack of technical knowledge (51.30%) and inadequate infrastructure (54.48%) as barriers. Similar concerns were highlighted by Memarian *et al* [11], who emphasize the importance of proper technical infrastructure and training for educators and students to fully benefit from AI tools. Schepart[9] also noted comparable challenges in the medical sector, where sophisticated infrastructure and technical skills are essential for the effective use of AI.

Ethical concerns were also prominent, with 47.42% of respondents highlighting issues related to accountability, transparency, and potential biases in AI-generated results. AI systems can unintentionally perpetuate biases present in datasets, raising questions about fairness and responsibility. Duymaz *et al* [12] similarly point out that while AI can enhance academic writing and content quality, it also brings ethical considerations that need careful management. Additionally, many respondents expressed uncertainty about the reliability of AI tools due to the variability in dataset quality (47.51%) and the absence of standardized evaluation metrics. Security and privacy concerns were also noted, as AI systems often require access to personal or sensitive data, creating potential risks for data breaches or misuse if proper safeguards are not in place. Overall, the findings suggest that AI tools have the potential to enhance research communication, and their adoption may increase over time, helping to bridge the digital divide in research practices.

Limitations

The generalizability of this study may be limited, as it focused on a specific group of professionals. The findings and participant responses could have been influenced by their limited access to resources and varying levels of AI knowledge. Future research should address these gaps to provide a more accurate assessment of AI's role and potential in research communication. Despite these limitations, the study offers a foundation for further exploration into this rapidly evolving field. It highlights the importance of considering researchers' perspectives in discussions about the integration and regulation of AI-driven tools in academic work. Continued investigation into usage patterns will be critical to establishing effective frameworks, given the fast-paced development and evolving

applications of AI technologies.

It is also important to note that the data were collected in November 2025, representing a snapshot in time within a dynamic AI landscape. As new tools emerge and awareness of AI applications grows, researchers' usage patterns and attitudes may change. Therefore, these findings should be interpreted within the context of the constantly evolving nature of AI technology.

Conclusion

The use of AI technologies in research is rapidly expanding, and understanding both its applications and associated challenges is essential for maximizing its potential. By exploring these aspects, researchers can leverage AI more effectively, enhance the quality of their work, and foster more personalized and diverse learning environments. The findings of this study indicate that AI adoption in research is growing and viewed as effective by a more the half portion of respondents. However, there is a need for further research to identify and address the barriers that may hinder its optimal use. Understanding these challenges will allow researchers to make informed decisions, improve research outcomes, and utilize AI tools more efficiently.

During the study, it was observed that a large majority of researchers were eager to learn and willing to undergo training in new technologies, demonstrating a positive attitude toward adopting AI tools in their work. Furthermore, most respondents suggested implementing AI models in the future to support intelligent search, recommendations, collaborative work, data analysis, and modeling. Overall, participants recognized significant opportunities for AI to connect knowledge with knowledge creators and enhance the research ecosystem.

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