

# The Acceptance Level of AI-Based Research Technologies Among Faculty Members in Private Universities: A TAM- Based Study

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## Abstract

This study examines the acceptance of artificial intelligence (AI)-powered research technologies among faculty members in private universities in Oman through the Technology Acceptance Model (TAM). Using sequential explanatory mixed-methods design with 46 faculty participants, findings reveal high overall acceptance of AI research technologies. perceived usefulness, perceived ease of use, attitude toward use, intention to use, and actual use. Based on the survey data analysis, it was demonstrated that the respondents were more likely to consider AI powerful and useful for sophisticated research as evidenced by the highest mean score of 4.39 for perceived usefulness, indicating a strong belief among faculty members that AI enhances research quality and provides advanced solutions. This finding was corroborated by interview data, where participants emphasized the benefits of tools such as ChatGPT and Perplexity AI in expediting research preparation, improving academic writing, and generating innovative research ideas. Attitude toward future use ranked second (mean = 4.31), reflecting a generally positive outlook on adopting AI tools. Behavioral intention to use AI came in third (mean = 4.30), indicating readiness to integrate these technologies into future research activities. Actual use was also evident (mean = 4.04), with interviews noting applications in hypothetical formulation, data analysis, and reference management. Despite last ranking, perceived ease of use still fell within the “high” range (mean = 3.94), suggesting general confidence in interacting with AI tools, albeit with some usability challenges. Based on these insights, the study recommends developing effective strategies to encourage the integration of AI technologies in academic research.

**Keywords:** Artificial Intelligence, Technology Acceptance Model, Academic Research, Higher Education, Private Universities, Oman

## 1. Introduction

The world is witnessing fundamental transformations in the ways information is accessed and utilized, with advanced artificial intelligence (AI) technologies playing a pivotal role in enhancing and evolving the capabilities of scientific research. These technologies simulate human cognitive functions such as analysis and learning, Including advanced search engines that contribute to improving and accelerating access to information and knowledge, understanding and analyzing data faster and more accurately, and providing innovative solutions.

AI-powered search engines utilize sophisticated techniques such as deep learning and natural language processing (NLP) to analyze and interpret textual content more effectively than traditional methods. These tools are capable of understanding context and user intent, thereby allowing researchers to retrieve highly relevant and tailored results. Unlike traditional engines that are limited to displaying results based on keyword matching only.

Moreover, AI-based search tools offer practical advantages in scientific research by accelerating and expanding analytical processes. Their ability to handle vast amounts of data with high accuracy in a short time frame enables researchers to efficiently filter information based on relevance to their topics and to access trustworthy sources.

According to Rashidov (2024), AI can analyze research trends, automate text generation, formulate methodologies, translate sources, generate hypotheses, verify originality, and detect plagiarism, all while navigating the associated challenges and limitations of its application in research processes.

As a result, higher education institutions in the Sultanate of Oman are seeking to develop their programs, policies, and strategies to align with global technological advancements and leverage AI in their activities to achieve their goals, particularly teaching and scientific research (Nguyen & Lai, 2023).

Therefore, the Technology Acceptance Model (TAM) was adopted as proposed by Davis (1989) to measure the level of acceptance of AI-based research technologies for faculty members at private universities. According to this model, perceived usefulness, perceived ease of use, attitude towards use, behavioral intention to use AI, and actual use of AI in research are considered the main factors that affect user acceptance of technology, including the acceptance of AI-based research technologies.

Given these developments, this study aims to examine the level of acceptance of private university faculty members for the use of AI-based research technologies to explore the factors influencing this acceptance based on the Technology Acceptance Model (TAM). The findings of this research may offer valuable insights for decision-makers and administrators in private academic institutions, helping guide effective strategies to promote the integration of AI into research and higher education practices.

With the above context, the researchers were able to identify the following research problems. Specifically, this study sought answers to the following questions:

**What is the level of acceptance of AI-based research technologies in scientific research among faculty members in private universities considering the Technology Acceptance Model (TAM)?**

Sub-questions derived from the main research question include:

1. What is the perceived Usefulness of using AI-based research technologies among faculty members in private universities?
2. To what extent are AI-based research technologies considered easy to use in the academic research context?
3. What are faculty members' attitudes toward using AI-based research technologies?
4. What are the behavioral intentions of faculty members toward adopting AI-based research technologies in scientific research?
5. To what extent are AI-based research technologies currently being used by faculty in private universities?
6. Is there a relationship between perceived usefulness, perceived ease of use, attitude toward use, behavioral intention, and actual use of AI-based research

## 2. Theoretical Background and Literature Review

### 2.1 AI-Based Research Technologies in Scientific Research

Artificial Intelligence has evolved from a peripheral tool to a core component of modern knowledge systems in scientific research. Chen et al. (2023) report that over 65% of researchers in both social and applied sciences now utilize AI tools at one or more stages of the research cycle, particularly for data analysis and content generation.

AI technologies support multiple research phases: (1) Literature search and reference management through tools like Semantic Scholar and Elicit; (2) Generative search engines such as GPT and Perplexity AI that deliver precise answers to complex queries; (3) Academic writing platforms that generate structured content based on keywords (Al- Mahdi, 2021); (4) Research question formulation by identifying knowledge gaps (Hick & Ziefle, 2022); (5) Data analysis and pattern recognition, with Zhang et al. (2021) finding that AI-enhanced tools improved analytical accuracy by up to 40%; (6) Literature summarization, with Ali et al. (2023) indicating that intelligent summarization tools save approximately 60% of time spent reviewing sources; and (7) Academic writing enhancement, though UNESCO (2023) cautions against over-reliance without human oversight.

AI's involvement in scientific research represents a structural shift in research philosophy, leading to democratization of knowledge, acceleration of innovation, and expansion of research horizons. However, challenges include data and algorithmic bias (de Fine Licht & Licht, 2020), shallow knowledge generation, and ethical concerns regarding authorship and plagiarism. Studies by Al-Kabeer and Hijazi (2023) and Shaker (2024) highlight limited institutional training and overreliance on self-learning, suggesting a need for more structured approaches to AI integration.

### 2.2 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is one of the most prominent theoretical frameworks developed to understand the mechanisms underlying users' acceptance and adoption of new technologies. It has been widely applied across various contexts, particularly in higher education and scientific research environments. Originally developed by Fred Davis in 1986, TAM builds upon the Theory of Reasoned Action (TRA) by Ajzen and Fishbein to explain how users form decisions regarding technology usage based on their cognitive beliefs.

#### a) Theoretical Structure of TAM

TAM posits that an individual's decision to adopt a specific technology is primarily influenced by two cognitive perceptions:

- Perceived Usefulness (PU): The degree to which an individual believes that using technology will enhance their job or academic performance.
- Perceived Ease of Use (PEOU): The extent to which an individual believes that using technology will be free of physical or mental effort.

These two factors shape the Attitude Toward Use (ATU), which in turn influences the Behavioral Intention to Use (BIU) the technology. Finally, intention predicts Actual Use (AU). Subsequent studies have shown that perceived usefulness is a stronger predictor of behavioral intention than ease of use (Venkatesh et al., 2003).

#### b) Model Expansions and Integrations

Due to TAM's success in explaining users' behavior toward technology, IT has been extended and integrated into broader models, including:

- TAM2 and TAM3, which introduce new constructions such as social influence, perceived behavioral control, experience, and organizational support (Venkatesh & Bala, 2008).
- The Unified Theory of Acceptance and Use of Technology (UTAUT), which incorporates performance expectancy, effort expectancy, social influence, and facilitating conditions to provide a more comprehensive perspective (Venkatesh et al., 2003).

#### c) TAM and AI Technology Adoption in Academic Research

In the context of adopting AI-based technologies in research, TAM offers a robust analytical lens to understand how faculty members evaluate these tools. Their decision to adopt such technologies is influenced by the extent to which they perceive AI tools as useful for enhancing research productivity (PU) and how easy and intuitive they find these tools to integrate into their workflows (PEOU).

Sohn & Kwon (2023) demonstrated that perceived usefulness had the strongest impact on behavioral intention to use AI in academic institutions, Perceived utility is the most influential factor in shaping behavioral intention, followed by perceived ease, while organizational and cultural factors play an important mediating role.

Similarly, Al-Qahtani (2024) found that training in AI tools directly influenced faculty perceptions of usability, positively shaping both attitudes and intentions toward usage in various research activities.

#### d) The importance TAM to Private University:

Private universities are typically characterized by flexible administrative structures and a greater openness to innovation. However, this flexibility does not guarantee faculty adoption of new technologies, especially in the absence of institutional support or if negative perceptions toward AI persist. In this context, TAM serves as a valuable framework for:

- The extent to which faculty members are convinced of the usefulness of artificial intelligence in scientific research.
- Understanding faculty members' confidence and readiness to use AI-based tools.
- Analyzing how these perceptions influence actual intentions and behaviors.

Research by Yousafzai & Foxall (2007) affirmed TAM's ongoing relevance in explaining user acceptance of advanced technologies, provided that contextual variables such as discipline, institutional support, and training are considered.

#### e) Criticism of TAM and its limitations:

Despite its widespread use, TAM has been subject to criticism, particularly for its limited consideration of social, cultural, and ethical dimensions. Its simplicity, though a strength in application, may fall short in capturing complex factors that affect technology use in contexts involving sensitive or controversial technologies like AI.

Therefore, some studies have suggested integrating TAM with more comprehensive frameworks or expanding it to include variables such as trust, perceived risk, loss of control, and ethical factors that are increasingly relevant in AI adoption (Yousafzai & Foxall, 2007).

For example, Al-Harthi & Al-Ghamdi (2024) employed the UTAUT model to explore Saudi faculty members' intentions to use ChatGPT. They found that performance expectancy, effort expectancy, social influence, and facilitating conditions all had significant positive effects on usage intention.

Al-Suhaim (2024) used TAM to study ChatGPT adoption in academic research and found that perceived ease of use significantly influenced behavioral intention, whereas perceived usefulness had no direct effect. This challenges conventional TAM assumptions and raises questions about the model's applicability across cultural and institutional contexts—including in Oman.

### 2.3 Faculty Adoption of Technology in Scientific Research

Faculty members are the cornerstone of the academic ecosystem, not only in knowledge dissemination but also in generating and advancing scholarly work through research. In the face of rapid technological advancement, understanding their perspectives toward adopting modern technologies, especially artificial intelligence, has become essential. AI is reshaping conventional research paradigms and proposing new models of knowledge creation.

#### a) Psychological and Behavioral Foundations of Technology Adoption

Technology adoption is influenced by a combination of personal beliefs, acquired competencies, and institutional support. Studies have shown that faculty members are not solely driven by the technical functionality of a tool, but also by how it aligns with their academic roles and professional values, and the extent to which it is consistent with their research values and professional ethics (Turner, 2007; Venkatesh et al., 2016).

Ahmed et al., (2023), in a study across Arab universities, found that faculty perceptions of AI range from admiration for its capabilities to apprehension about loss of human control, highlighting the ambivalence that may influence adoption decisions.

Similarly, Salem and Abdel Sattar (2022) examined faculty acceptance of AI in teaching based on the Technology Acceptance Model, revealing significant correlations between the TAM constructs and usage intentions. Though their focus was on education, their findings support the core assumptions of TAM and are relevant to research contexts as well.

#### b) Key Factors Influencing AI Adoption

Several key variables impact the extent to which faculty members adopt AI-based research tools:

- **Technological Awareness:** Limited understanding of how AI functions can inhibit adoption. Roy & Swargiary (2022) identified lack of technical knowledge as the most significant barrier to integrating AI in academic research.
- **Personal motivation for experimentation and innovation:** Faculty with a proactive and experimental mindset are more likely to adopt new technologies, regardless of their disciplinary background.
- **Institutional Support and Training:** Universities that offer structured training programs, robust digital infrastructure, and a supportive environment see markedly higher adoption rates among faculty (Nguyen & Lai, 2023).
- **Ethical Considerations:** Some faculty members remain cautious about using AI in tasks such as academic writing or student data analysis, citing concerns over research integrity and the erosion of human-driven scholarship (UNESCO, 2023).

Abdel-Ghani (2024) noted major risks related to AI use, including compromised research quality, data security concerns, and the decline of original research skills. These risks may deter faculty members from adopting AI unless addressed through clear ethical guidelines.

#### c) Disciplinary and Academic Rank Differences

Evidence suggests that acceptance of AI varies significantly across disciplines. Faculty in scientific and engineering fields are generally more receptive to AI tools than those in the humanities and social sciences. Agathursamy (2023) attributes this to greater familiarity with computational tools in applied fields.

Differences also emerge across academic ranks. Younger faculty members and recent PhD graduates tend to adopt new technologies more readily than senior academics, possibly due to their academic formation in a digital era.



**d) Role of Private Universities in Fostering Technology Acceptance**

Private universities often enjoy greater flexibility and agility in adopting innovation compared to public institutions. However, this advantage does not automatically translate into higher adoption rates among faculty unless supported by institutional policies and resources.

Mamdouh & Hussein (2024) argue that private universities can play a pivotal role by incorporating AI into their research strategies, offering targeted funding, and making AI competence a criterion in academic promotions.

Al-Shammari (2024) showed that AI positively influenced research skills among postgraduate students, regardless of gender or field of study, highlighting the potential of AI as a cross-disciplinary enabler of academic development.

Ben Fafa & Meriyah (2024) also found that AI-focused academic training improved the research quality of social science students, underscoring the importance of institutional support in the driving faculty and student adoption.

**3. Methodology and Techniques Use****3.1 Research Design**

This study employed a sequential explanatory mixed-methods approach, integrating quantitative and qualitative research methods through structured questionnaires and semi-structured interviews. Each instrument was designed in alignment with TAM to explore the five key constructs influencing AI adoption. The sequential nature allowed findings from the quantitative phase to inform and refine the qualitative investigation.

**3.2 Study Sample and Boundaries**

A purposive sample of 46 faculty members was selected from various private universities in Oman, representing diverse academic specializations, age groups, and cultural backgrounds. The study operated within specific boundaries: population (faculty members at private universities in Oman), temporal (second semester of 2024–2025 academic year), geographical (private universities in Oman), and topical (AI-based research technologies within the TAM framework).

**3.3 Data Collection Tools****3.3.1 Quantitative Instrument**

A structured questionnaire measured AI-based research technology acceptance levels based on TAM. The instrument contained a demographic section and a TAM constructs section with 25 items across five dimensions (5 items per construct): perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and actual use. Responses were captured using a five-point Likert scale. Content validity was established through expert panel review, and internal consistency was assessed using Cronbach's Alpha, yielding values above 0.80 for each subscale. Data were analyzed using descriptive and inferential statistics.

**3.3.2 Qualitative Instrument**

Semi-Structured Interviews To complement the quantitative data, a qualitative phase was conducted using semi-structured interviews with selected faculty members. The interview questions were designed to reveal the level of acceptance of AI-based research technologies on the Technology Acceptance Model (TAM). The researchers based the questions on the dimensions of the TAM to ensure they covered all aspects related to the level of acceptance of these technologies and identified all factors that could

influence it. Participants were purposefully chosen to represent diverse academic backgrounds, age groups, and institutional affiliations within the private university sector in Oman.

#### Interview Data Analysis:

The interview data were analyzed using thematic analysis, which relies on identifying recurring patterns in participants' responses and categorizing them into codes and themes. The analysis process began with open coding, where the texts were carefully read to extract recurring concepts or concepts that expressed participants' attitudes toward the use of AI technologies in scientific research. This was followed by axial coding, in which codes with similar meanings were grouped into categories or themes that reflect the dimensions of the Technology Acceptance Model (TAM), including: expected benefit, ease of use, attitude toward use, behavioral intention, and actual use.

### 3.4 Integration of Findings

Data sources were integrated during interpretation to provide holistic understanding of faculty acceptance of AI-powered research technologies. This comprehensive methodological strategy ensured that the study not only measured acceptance levels but also unpacked underlying factors influencing AI tool adoption in academic research environments.

## 4. Results and Discussion

### 4.1 Overall Acceptance Levels

The results of the study indicate a high level of acceptance among faculty members at private universities in the Sultanate of Oman of AI-based research technologies. This acceptance was measured using the Technology Acceptance Model (TAM), which focused on the following dimensions: expected usefulness, ease of use, orientation toward use, behavioral intention, and actual use. Table 1 presents the overall acceptance levels across TAM dimensions:

Rank	TAM Dimension	Mean	Standard Deviation	Acceptance Level
1	Perceived Usefulness	4.39	0.62	Very High
2	Attitude Toward Use	4.31	0.58	Very High
3	Behavioral Intention	4.30	0.64	Very High
4	Actual Use	4.04	0.71	High
5	Perceived Ease of Use	3.94	0.79	High
—	<b>Overall Average</b>	<b>4.20</b>	<b>0.67</b>	<b>High</b>

These results demonstrate that faculty members generally hold positive perceptions toward AI-based research technologies, with the overall mean score of 4.20 indicating high acceptance.

### 4.2 Perceived Usefulness

The survey results revealed that perceived usefulness scored the highest among the studied dimensions, with a mean of 4.39. This reflects a strong conviction among faculty members that artificial intelligence enhances research quality and provides advanced solutions. This consistency was also evident in the interview responses, where participants emphasized that tools such as ChatGPT and Perplexity AI contribute to accelerating the preparation of research papers, improving scientific writing,

"ChatGPT has significantly accelerated my literature review process. What previously took weeks can now be accomplished in days, allowing me to focus more on analysis and interpretation." (Participant 7, Engineering)

"Perplexity AI helps me generate research questions I might not have considered. It broadens my perspective by identifying connections between concepts that weren't immediately apparent to me." (Participant 12, Business Administration)

These findings align with the results of Al-Suhaim (2024), which highlighted that perceived usefulness serves as a strong motivator for usage, despite variations in its correlation with behavioral intention. Similarly, this outcome reinforces the conclusions of Al-Shammari (2024), who demonstrated the positive impact of AI tools on improving students' research skills—corroborating the beliefs of the current sample.

#### 4.3 Attitude Toward Use

The survey indicated a positive attitude toward using AI tools in the future, with a mean of 4.31. This was affirmed through interviews in which participants described AI tools as contributing to increased productivity, improved research accuracy, and reduced time spent on procedural tasks.

"I view AI as a collaborative partner rather than a replacement for human intelligence. It handles routine tasks efficiently, freeing me to engage in more creative and conceptual aspects of research." (Participant 3, Social Sciences)

These perspectives are supported by the findings of Al-Harthi and Al-Ghamdi (2024), which revealed a clear positive effect of expected performance and facilitating conditions on faculty members' attitudes toward using ChatGPT. This demonstrates strong alignment between the current study's results and previous research regarding this dimension.

#### 4.4 Behavioral Intention to Use

Behavioral intention scored highly (mean=4.30), indicating strong faculty readiness to adopt AI tools in future research endeavors. Interview data confirmed this intention:

"After experiencing how AI tools streamline data analysis, I'm committed to incorporating them into all my future research projects. The efficiency gains are simply too significant to ignore." (Participant 5, Computer Science)

These statements demonstrate that positive experiences with AI tools strengthen intention for continued use. This finding aligns with Salem and Abdul Sattar's (2022) research showing significant correlational relationships between behavioral intention and core UTAUT constructs.

#### 4.5 Actual Use

The survey revealed substantial actual use of AI tools (mean=4.04), confirmed through interview responses. Faculty reported using various tools including ChatGPT, Perplexity AI, and Scite.ai for tasks such as hypothesis formulation, data analysis, and reference management:

"I regularly use ChatGPT to help formulate research hypotheses based on literature review findings. It helps me identify potential relationships between variables that merit investigation." (Participant 8, Psychology)

This finding corresponds with Ahmed Al-Kabeer's (2023) study showing Google Scholar and Data Search as frequently used tools among faculty and aligns with Bin Fafa and Mrayah's (2024) demonstration that training enhances AI tool efficacy.

#### 4.6 Perceived Ease of Use

Perceived ease of use ranked lowest among dimensions (mean=3.94), though still within the "high" range. Interview data clarified this finding:



"While basic AI tools like ChatGPT are relatively intuitive, more specialized research tools like Scite.ai require significant learning investment. The learning curve can be steep for those without technical backgrounds." (Participant 11, Humanities)

These insights reveal that ease of use is influenced by researchers' digital skills, with some tools requiring higher technical proficiency than others. This finding aligns with Shaker's (2024) emphasis on training deficits as major barriers to AI adoption.

#### 4.7 Relationships Among TAM Variables

Correlation analysis revealed significant positive relationships among all TAM dimensions, with particularly strong associations between perceived usefulness and behavioral intention ( $r=0.78$ ,  $p<0.01$ ), attitude toward use and behavioral intention ( $r=0.72$ ,  $p<0.01$ ), and perceived ease of use and actual use ( $r=0.65$ ,  $p<0.01$ ). These relationships suggest that perceptions of usefulness strongly influence intention to use AI tools, while ease of use significantly impacts actual adoption—supporting TAM's theoretical structure.

#### 4.8 Challenges and Barriers

Interview results revealed a range of challenges, most notably technological gaps, lack of training, and ethical concerns such as intellectual property theft and privacy violations.

"I worry about maintaining research integrity when using AI tools. Without clear guidelines on appropriate use and attribution, there's risk of inadvertent ethical violations." (Participant 4, Law)

Therefore, limited ease of use and the accumulation of technical and ethical barriers may hinder broader implementation of AI tools—despite the strong behavioral intention and high motivation among faculty members. This aligns with the Technology Acceptance Model (TAM), which suggests that technological acceptance requires not only the perception of usefulness but also the removal of barriers related to technical capability and organizational context

These concerns align with Abdul Ghani's (2024) identification of research quality and data security risks as potential adoption deterrents—highlighting the need for comprehensive institutional policies addressing both technical and ethical dimensions of AI use.

### 5. Conclusion

The integration of quantitative and qualitative findings provides a comprehensive perspective, indicating that faculty members' acceptance of artificial intelligence technologies in academic research is high and stable. However, this acceptance is contingent upon the availability of adequate digital skills, ongoing training, and clear regulatory policies that support ethical use. The results also demonstrate strong alignment with previous studies conducted in both Arab countries and across various academic disciplines, thereby reinforcing the validity of the Technology Acceptance Model (TAM) in explaining acceptance behavior within the Omani academic context.

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