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# Generative Artificial Intelligence (GenAI) Adoption in Saudi Arabia using Technology Acceptance Model (TAM): The Role of Gender and Generations Differences

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**ABSTRACT:** The rapid emergence of Generative Artificial Intelligence (GenAI) has introduced transformative capabilities across industries, enabling machines to autonomously generate content, enhance productivity, and support decision-making. Despite its growing relevance, empirical research on the factors influencing GenAI adoption within organizational settings remains limited, particularly in the context of Saudi Arabia's digital transformation under Vision 2030. This study investigates the determinants of GenAI adoption and use among employees in a large energy company, utilizing the Technology Acceptance Model (TAM) as the theoretical framework. Specifically, it examines whether gender and generational differences influence perceptions of GenAI's usefulness, ease of use, and behavioral intentions toward its adoption.

A quantitative research design was employed using a structured survey distributed to employees across various departments and age groups. The collected data were analyzed using descriptive and inferential statistical methods to identify patterns and relationships among the TAM variables. Findings indicate that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) significantly influence users' behavioral intentions to adopt GenAI. Moreover, generational differences were found to affect adoption patterns, with younger employees exhibiting higher adoption intentions, while gender differences were not statistically significant.

The results underscore the importance of fostering digital readiness and targeted training to bridge generational gaps in technology adoption. This study contributes to the limited body of literature on GenAI acceptance in corporate environments and provides practical insights for organizations aiming to integrate GenAI effectively within the Saudi Arabian context.

**KEYWORDS:** Generative Artificial Intelligence, Technology Acceptance Model, Saudi Arabia, Digital Transformation, Gender, Generation

## I. INTRODUCTION

The emergence of Generative Artificial Intelligence (GenAI) marks a significant milestone in the evolution of intelligent systems, enabling machines to generate new and original content such as text, images, and audio through advanced data processing and pattern recognition. Unlike traditional artificial intelligence, which relies on predefined rules or supervised outputs, GenAI systems learn from large datasets to create novel results autonomously. This transformative capability is redefining the way individuals and organizations operate, communicate, and innovate (Feuerriegel et al., 2024). As GenAI technologies rapidly advance, understanding the factors influencing their adoption and use has become a central concern for both researchers and practitioners.

In the Kingdom of Saudi Arabia, the adoption of artificial intelligence is gaining momentum as part of the country's broader Vision 2030 objectives, which emphasize digital transformation, innovation, and knowledge-based economic growth. GenAI technologies, in particular, present opportunities to enhance operational efficiency, decision-making, and innovation within key sectors such as energy, finance, and education (Al-Mamary & Abubakar, 2025). However, the success of such technologies depends not only on their technical capabilities but also on users' willingness to adopt and integrate them into their professional practices. As with any new technology, acceptance among users is shaped by perceptions of usefulness, ease of use, trust, and readiness.

The Technology Acceptance Model (TAM) developed by Davis (1989) provides a foundational framework for understanding users' behavioral intentions toward adopting new technologies. Over the past three decades, TAM has

been applied extensively across various contexts, consistently demonstrating its predictive validity in explaining technology adoption behavior (Hokroh et al., 2025; Al-Gahtani, 2001; Mustafa et al., 2022). Its core constructs—Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—offer a structured lens to assess how individuals form attitudes and intentions toward technology use. Yet, while TAM has been validated in numerous domains, its application to Generative AI technologies remains limited, especially within the cultural and industrial contexts of Saudi Arabia.

Most prior studies on GenAI adoption have focused on educational institutions, exploring factors such as AI literacy, trust, and user experience among teachers and students (Al-Abdullatif, 2024; Alotaibi, 2025; Algahtani, 2025; Alharbi, 2024). However, there remains a scarcity of empirical research examining GenAI adoption in organizational and industrial settings, where the potential for large-scale impact is particularly significant. Moreover, while global studies have identified the influence of demographic variables such as gender and generation on technology adoption patterns (Choudhary et al., 2024; Almazroi et al., 2019; Abubakar, 2025), these dimensions have received limited attention within the Saudi context of GenAI usage.

Understanding generational and gender-based variations in technology adoption is essential for organizations aiming to foster inclusive and effective digital transformation strategies. Generational differences, in particular, may shape perceptions of usefulness, comfort with technology, and readiness to engage with emerging tools like GenAI. Likewise, examining gender-related factors contributes to equitable access and engagement in the workplace. Insights from such investigations can guide leaders, policymakers, and technology developers in tailoring training programs, communication strategies, and deployment approaches to enhance technology adoption across diverse user groups.

Accordingly, this research seeks to examine the factors influencing GenAI adoption and use within a large energy company in Saudi Arabia, using TAM as the theoretical foundation. Specifically, it explores whether gender and generational differences affect users' perceptions and behavioral intentions toward adopting GenAI technologies. By addressing these questions, this study contributes to both theoretical and practical understanding of technology adoption within the rapidly evolving GenAI landscape, providing evidence-based insights to support Saudi Arabia's ongoing digital transformation journey.

## II. LITERATURE REVIEW

The Technology Acceptance Model or TAM is one of the most widely used frameworks to predict users' acceptance of information systems (Hokroh et al., 2025, Al-Gahtani, 2001, Hokroh and Green, 2018, Hokroh and Green, 2019, Hokroh et al., 2020). The model has consistently shown its effectiveness in explaining and predicating user's acceptance and utilization of wide range of technologies. More than 100 studies have applied the TAM across diverse contexts, and established it as a core model in foresting technology acceptance, adoption and use (Kruger and Steyn, 2024). TAM strength lies in its constructs' flexibility which can be adjusted to fit for different purposes and settings (Mustafa et al., 2022).

Developed in 1989 by Fred Davis, the TAM has two main constructs which play a role in influencing users' intention to use information technology (Davis, 1989). The first construct is Perceived Usefulness (PU) which refers to the degree to which users believe that using a system would enhance job performance. The second is Perceived Ease of Use (PEOU) which refer to the degree to which users believe that using a system would be free of effort. PEOU is suggested to influence PU while the later influence Behavioral Intention (BI) to use technologies. Both PEOU and PU are assumed to influence users' Attitude Toward Use (ATU) and the Actual Use (AU) of technologies.

Due to its elasticity, TAM has been extended and combined with other frameworks (Al-Gahtani, 2001). TAM was extended by Venkatesh and Davis (Venkatesh and Davis, 2000) to incorporate social and cognitive variables. Moreover, TAM has been extended to incorporate additional constructs such as individual differences, system characteristics, social influence and facilitating conditions (Venkatesh and Bala, 2008). Furthermore, TAM has been combined with other models to cover wider range of factors to better understand factors influencing the adoption of information technology which enables it to fit for new emerging technologies (Mustafa et al., 2022).

One of the newly emerging technologies is Generative Artificial Intelligence (GenAI) which refers to systems that have the capabilities to generate original content such as texts, images or audio via searching and analyzing data (Feuerriegel et al., 2024). GenAI is emerging as an integral part of information systems with the potential to transform different fields including business and engineering Feuerriegel et al., (2024). In the Kingdom of Saudi Arabia, GenAI has the capacity to expand across different fields (Al-Mamary and Abubakar, 2025) and change the way business are conducted and run. GenAI has the potential to aid more informed decision-making process by correlating, consolidating and synthesizing wide-areas of topics. Therefore, understanding its acceptance and use is becoming an important area of research (Aldossary et al., 2024).

The study of GenAI acceptance, adoption and use is a relatively new Aldossary et al., (2024), and requires more attention to understand it better. As indicated by Al-Mamary and Abubakar, (2025), there is a need for more work to be done in the

area of GenAI research as most of the work conducted evolved around the field of academia. New research focus shall offer new insights and opportunities to enhance the understanding of users' adoption of different GenAI technologies (Al-Mamary and Abubakar, 2025).

Most of the research conducted in the field of GenAI adoption and use in Saudi Arabia focused in educational institutions (Al-Abdullatif, 2024, Alotaibi, 2025, Algahtani, 2025 and Alharbi, 2024). Therefore, the work on technology acceptance in Saudi Arabia is still emerging. Al-Abdullatif, (2024) studied the factors that influence teachers' adoption of GenAI in higher education and gathered data from more than 200 university teachers via questionnaire. AI literacy and PEOU were the key factors influencing GenAI adoption in universities. Moreover, intelligent technological pedagogical content knowledge and trust in GenAI were also of moderate influence on adoption and use. Al-Abdullatif, (2024) highlighted the importance of previous experience and training in enhancing AI literacy and use. The mediating role of trust in GenAI was also reported by Alotaibi, (2025) who surveyed a total of 365 students in five public Saudi universities. Alotaibi, (2025) confirmed that previous knowledge increased users' trust in GenAI with the later positively enhancing student's academic performance. Moreover, Alotaibi, (2025) highlighted that student's personal perception and experience of GenAI tools is strongly correlated with increased trust in GenAI tools. Algahtani, (2025) studied 436 Saudi female students in Imam Muhammad bin Saudi University use of ChatGPT and highlighted that lack of knowledge of the tool capabilities was one of the challenges that influence its adoption and use. Alshehri, (2025) highlighted that one of the key challenges faced by educational institutes when integrating new technologies is the lack of adequate tailored programs for educators. A mixed-methods study by Alharbi, (2024), explored teacher's perception of AI use in Saudi universities through a survey of 192 male and female participants, followed by interviews. Alharbi, (2024) found that personalized AI features enabled student engagement and enhanced use.

The broader landscape of GenAI research in Saudi Arabia is yet to be explored requiring more work to be conducted in non-educational context. Given its uniqueness, there is limited empirical research on how organizations and people adopt and use GenAI in Saudi culture. While the difference between genders acceptance of technology was explore ed in some research, that variance is yet to be fully discovered for GenAI. In a study conducted by Almazroi et al. (2019) on cloud computing acceptance among 451 Saudi university students, females were found to be influence more by trust in the system more than males. On the other hand, Almazroi et al. (2019) found that image (the degree to which prestige is enhanced via system use) was a major factor influencing system use and adoption for male than females. Alayed and Sultan (2024) explored gender differences in system adoption for digital retail services in Saudi Arabia and found that PU influenced attitude for males more than females. Abubakar (2025) investigated the adoption of digital technology in Saudi Arabia surveying 523 participants and highlighted the important role of individual and social dimensions in technology adoption.

Choudhary et al. (2024) conducted a systematic literature review on generational differences in technology adoption, analyzing over a thousand studies. Their findings suggest that shifts across generations necessitate differentiated approaches to technology adoption and implementation. Choudhary et al. (2024) study compared three main generations which are Generation-X (Gen-X), Generation-Y (Gen-Y) and Generation-Z (Gen-Z) and reviewed more than one thousand studies. Gen-X refers to people born between the period of 1965 to 1980, Gen-Y is another name for Millennials which refers to people born between the years of 1981 to 1996 while Gen-Z refers to people born between 1997 to 2012 (Choudhary et al., 2024). A study by Alkadi and Abed (2025) looked into the factors influencing Saudi Gen-Z adoption of AI-enabled voice assistant technology and surveyed 292 users. Using the TAM, Alkadi and Abed (2025) found that PU, attitude, subjective norms, personal innovativeness, and trust were all significant factors influencing the intention to adopt and use AI-enabled voice assistant technology.

The broader land scape of technology adoption research in Saudi Arabia remains unexplored including gender preferences and generation differences. Research incorporating exploring these factors provide an opportunity gain for both industrial and academics to maximize systems adoption, improve management of change processes and reduce cost of training and deployment. In this research two questions are asked: 1) is there a gender difference when it comes to GenAI adoption? 2) is GenAI adoption differs among users of different generations?

In order to answer these questions, a survey questionnaire is distributed to 500 users in a major company in Saudi Arabia. The targeted users include both genders and different generations. This research study provides practitioners and academics with insights on GenAI adoption through empirical-based approach. GenAI technology differs from traditional technology in terms of user experience, functionality (Singh, 2024) and the ability to interact with users given them a personalized experience based on unique interest (Al-Samarraie et al., 2024). In a study of GenAI in the Arab world, it was found that users exhibited concerns including fear of job replacement and lack of readiness limiting research in this area (Sallam et al., 2025). Privacy and data security concerns were also among the factors limiting empirical studies on GenAI adoption in industry compare to academia (Almarzouq and Albashrawi, 2025).
This study holds both theoretical and practical significance by contributing to the growing body of knowledge on technology adoption within the GenAI context which is an emerging and transformative technology. Although TAM has been widely applied in different contexts, there remains a lack of empirical evidence on its application to GenAI, especially in Arabian culture. Accordingly, a new dimension to TAM research is added by offering insights into how demographics

influence adoption of GenAI. From a practical standpoint, this research study provides policymakers, industry leaders and technology with insights to enhance GenAI adoption and use in organizations. Understanding how generations and genders perceive and engage with GenAI is crucial for developing inclusive organizational strategies to foster better development and reduce cost of deployment. A better understanding of gender and generational perspectives reenforces equitable access and engagement of users.

## III. METHODOLOGY

This research study is based on a quantitative research design to examine the factors that influence the adoption and use of GenAI in large energy company in Saudi Arabia focusing on the differences between genders and generations. The TAM serves as a theoretical foundation to answer two questions: 1) is there a gender difference when it comes to GenAI adoption? 2) is GenAI adoption differs among users of different generations?

A survey-based approach was employed to obtain measurable insights from users while ensuring anonymity, flexibility and consistency. The questionnaire was taken from Davis, (1989) and modified for the purpose of this study. The survey instrument demonstrated high internal consistency, with a Cronbach's Alpha coefficient of 0.936 for the 17 scalable items. The survey instrument consisted of six sections: (1) demographic information (4 items), (2) Perceived Usefulness (PU) (4 scaled items), (3) Perceived Ease of Use (PEOU) (4 scaled items), (4) Attitude Toward Use (ATU) (4 scaled items), (5) Behavioral Intention to Use (BIU) (4 scaled items) and (6) Actual Use (AU) (2 items, one of which was scaled items). All 17 scaled items were measured using five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

This study applies non-probability sampling technique of self-selection to access the targeted population This technique is used due to the nature of this study – where participation was open and voluntary – to align more accurately with self-selection sampling technique (Etikan et al., 2016). A structured online survey was distributed to 500 users in a large-scale energy company in Saudi Arabia between the month of June until August 2025. The participation was voluntary and informed consent was obtained prior to participation. Accordingly, a total of 121 users responded to the survey representing a response rate of 24.2%, of these 104 respondents have fully completed the survey, representing a rate 20.8% of the total surveyed sample.

| Category | Females | Males | Total |
|---|---|---|---|
| Chief Position Holders (CPHs) | 1 | 26 | 27 |
| Individual Contributors (Employees) | 16 | 61 | 77 |
| **Total** | **17** | **87** | **104** |

*Table-1*

The respondents of 104 users, included 87 males (83.7%) and 17 females (16.3%) with varying years of professional experience, ranging from less than 5 years to over 20 years. The majority of CPHs were males (96.3%) and one female (3.7%), similarly, males represented the majority of individual contributors (79%) followed by females (21%). Table-1 illustrates the gender distribution of CPHs and individual contributors (employees).

| | | Age Range | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **20-25** | **25-30** | **30-35** | **35-40** | **40-45** | **45-50** | **> 50** | **Total** |
| | **CPHs** | **2** | **1** | **4** | **6** | **8** | **1** | **5** | **27** |
| **Experience Years** | 10-15 | | | 1 | | 1 | | | 2 |
| | 1-5 | 1 | 1 | 2 | 5 | 3 | | 4 | 16 |
| | 15-20 | | | | 1 | 2 | | | 3 |
| | 5-10 | 1 | | 1 | | 1 | | | 3 |
| | > 20 | | | | | 1 | 1 | 1 | 3 |
| | **Employees** | **16** | **29** | **14** | **6** | **6** | **2** | **4** | **77** |
| | 10-15 | | | 2 | 1 | | | | 3 |
| | 1-5 | 16 | 27 | 9 | 3 | 5 | 2 | 3 | 65 |
| | 15-20 | | | | 2 | 1 | | | 3 |
| | 5-10 | | 2 | 3 | | | | | 5 |
| | > 20 | | | | | | | 1 | 1 |
| | **Total** | **18** | **30** | **18** | **12** | **14** | **3** | **9** | **104** |

The majority of participants (61.5%) reported having between 1 and 5 years of experience, and most were under the age of 40. Regarding job roles, 25.9% held Chief Position Holder (CPH) roles, while the remaining 74.1% were individual contributors (employees). Table-2 shows the years of experience and age range of the respondents.

**Generations Distribution**

| Generation | Users (#) | Percentage (%) | Males | Females |
|---|---|---|---|---|
| Gen-X | 26 | 25 | 25 | 1 |
| Gen-Y | 60 | 58 | 49 | 11 |
| Gen-Z | 18 | 17 | 13 | 5 |
| **Total** | **104** | **100** | **87** | **17** |

The majority of the participants pool belonged to Gen-Y (60 users, 58%), followed by Gen-X (26 users, 25%) and Gen-Z (18 users, 18%). In terms of gender, males represented the majority across all generations with a total of 87 users (84%), while females accounted for 17 users (16%). Gen-Y represented the largest pool of participants and the highest among females with 11 out of 17 female users.

**Correlation Analysis**

| | GenX | GenY | GenZ | Males | Females | PU | PEOU | BIU | ATU | Actual Use |
|---|---|---|---|---|---|---|---|---|---|---|
| GenX | 1 | -.674** | -.264** | .195* | -.195* | -.275** | -.248* | -.136 | -.131 | -.151 |
| GenY | -.674** | 1 | -.534** | -.063 | .063 | .148 | .137 | -.006 | .037 | .065 |
| GenZ | -.264** | -.534** | 1 | -.141 | .141 | .122 | .105 | .164 | .101 | .087 |
| Males | .195* | -.063 | -.141 | 1 | -1.000** | -.179 | -.113 | -.169 | -.167 | .012 |
| Females | -.195* | .063 | .141 | -1.000** | 1 | .179 | .113 | .169 | .167 | -.012 |
| PU | -.275** | .148 | .122 | -.179 | .179 | 1 | .401** | .665** | .680** | .260** |
| PEOU | -.248* | .137 | .105 | -.113 | .113 | .401** | 1 | .430** | .327** | .330** |
| BIU | -.136 | -.006 | .164 | -.169 | .169 | .665** | .430** | 1 | .780** | .386** |
| ATU | -.131 | .037 | .101 | -.167 | .167 | .680** | .327** | .780** | 1 | .353** |
| Actual Use | -.151 | .065 | .087 | .012 | -.012 | .260** | .330** | .386** | .353** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis revealed significant relationships among the key constructs of TAM and demographic variables. The correlation showed strong positive association between PU and PEOU, ATU, BIU and Actual Use. PU was strongly correlated with BIU ($r = .665$, $p < .01$) and ATU ($r = .680$, $p < .01$), indicating that user who perceive higher usefulness are more likely to develop positive attitudes and stronger intentions toward using GenAI. On the other hand, PEOU correlated positively with PU ($r = .401$, $p < .01$) and BIU ($r = .430$, $p < .01$), underscoring the influence of perceived ease on usefulness and intention. BIU showed a strong association with ATU ($r = .780$, $p < .01$) and a moderate correlation with Actual Use ($r = .386$, $p < .01$), illustrating that BIU as a vital predictor of actual behavioral outcomes.

Looking at demographic variables, generational differences were noticeable. GenX users correlated negatively with PU ($r = -.275$, $p < .01$) and PEOU ($r = -.248$, $p < .05$), signifying lower perceptions of technology usefulness and ease compared to younger cohorts. Conversely, GenY and GenZ users displayed weak yet positive associations with TAM constructs, reflecting a greater openness to technology adoption. Gender showed no correlations with the TAM variables ($r < .18$), indicating that technology acceptance patterns were largely gender-neutral. In general, the results validated the theoretical structures of TAM within the study context and generational variation as an influential factor than gender in explaining technology acceptance behavior.

## IV. FINDINGS

The study investigated the factors influencing the adoption and use of GenAI technologies within a large energy company in Saudi Arabia, using the TAM as the theoretical foundation. The analysis focused on identifying whether gender and generational differences influence users' perceptions and behavioral intentions toward GenAI adoption.

The results of the correlation analysis revealed that all main TAM constructs—Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Use (ATU), Behavioral Intention to Use (BIU), and Actual Use, were significantly and positively correlated with one another. PU showed a strong positive association with both BIU ($r = .665$, $p < .01$) and ATU ($r = .680$, $p < .01$), indicating that users who perceive GenAI as useful are more likely to develop favorable attitudes and stronger intentions toward use. Similarly, PEOU was significantly correlated with PU ($r = .401$, $p < .01$) and BIU ($r = .430$, $p < .01$), suggesting that the easier users find GenAI to use, the more likely they perceive it as beneficial and the stronger their intention to adopt it. Furthermore, BIU was highly correlated with ATU ($r = .780$, $p < .01$) and moderately correlated

with Actual Use ($r = .386$, $p < .01$), emphasizing the critical role of behavioral intention in predicting actual technology utilization.

When examining demographic differences, generational variation emerged as a more influential factor than gender. GenX participants demonstrated significant negative correlations with PU ($r = -.275$, $p < .01$) and PEOU ($r = -.248$, $p < .05$), implying that older employees perceive GenAI as less useful and more challenging to use compared to younger generations. In contrast, GenY and GenZ participants displayed weak yet positive associations with all TAM constructs, indicating a higher degree of openness and readiness to adopt GenAI technologies. Gender differences, however, were statistically insignificant ($|r| < .18$), suggesting that male and female users share similar perceptions and behavioral intentions regarding GenAI adoption.

Overall, the findings validate the applicability of the Technology Acceptance Model (TAM) within the Saudi Arabian context. The strong correlations among PU, PEOU, ATU, BIU, and Actual Use confirm that perceived usefulness and ease of use remain central determinants of GenAI acceptance and usage behavior. Moreover, the results indicate that generational differences, rather than gender, play a more decisive role in shaping employees' attitudes and adoption patterns toward GenAI technologies. This insight highlights the importance of designing targeted awareness and training programs to bridge generational gaps in technology perception and readiness.

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