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Building adaptive hospitality workforces in the AI era: A moderated mediation model of artificial intelligence and robotics awareness, digital self-efficacy, task crafting, and psychological resilience

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Abstract

Purpose: This study aims to examine how employees develop adaptive performance in response to the growing integration of artificial intelligence and robotics in the hospitality sector by testing a moderated mediation model grounded in Conservation of Resources (COR) theory and Social Cognitive Theory.

Design/methodology/approach: Using survey data from 406 full-time employees working in five-star hotels in Egypt and analyzing the model through PLS-SEM via WarpPLS, the study investigates whether Artificial Intelligence and Robotics Awareness (AIRA) enhances adaptive performance directly and indirectly through digital self-efficacy and task crafting.

Findings: The results show that AIRA significantly improves adaptive performance and strengthens both digital confidence and proactive task redesign. Digital self-efficacy and task crafting emerge as key mediators, revealing the cognitive and behavioral mechanisms through which awareness translates into adaptability. The findings also show that psychological resilience moderates several pathways: it amplifies the effects of AIRA on digital self-efficacy and adaptive performance, but weakens its influence on task crafting.

Originality/value: This study advances theoretical understanding of workforce adaptation in technology-intensive environments and offers practical guidance for developing digitally confident, proactive, and resilient employees capable of thriving in the AI era.

Keywords: Artificial intelligence and robotics awareness, Adaptive performance, Digital self-efficacy, Task crafting, Psychological resilience, Hospitality businesses

Jel Codes: J24, M12, M54, O33, D23

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1. Introduction

The modern workplace is undergoing significant transformation as artificial intelligence (AI) and robotic technologies become increasingly embedded in organizational operations and workforce structures (Gutiérrez-Diez, 2025). In environments characterized by machine-learning applications and robotic systems, employees are increasingly exposed to intelligent technologies that influence job functions, task structures, and organizational systems (Bakir et al., 2025). Scholars conceptualize AI and robotics awareness as employees' subjective evaluation of the potential implications of these technologies for career development and workplace conditions (Hu et al., 2025). Importantly, AI and robotics awareness extends beyond technical familiarity; it reflects psychological appraisals concerning potential disruption, emerging opportunities, and perceived threats. Such appraisals may be associated with either proactive adjustment or defensive responses in how employees engage with evolving technological systems. As intelligent technologies continue to expand across industries, AI/robotics awareness is increasingly viewed as a foundational factor associated with employees' engagement in role adjustment and performance adaptation (Li et al., 2025; Tasya, 2025).

Employee perceptions of emerging technologies are closely linked to how individuals interpret role evolution, anticipate changes in task requirements, and evaluate long-term career prospects within their organizations (Tasya, 2025). Within hospitality and service-oriented industries, the implementation of AI-driven systems, automation tools, and service robotics further intensifies the need for adaptive employee responses. Although these technologies enhance operational efficiency and service personalization, they simultaneously reshape task structures, redefine human–machine interaction, and require continuous skill development. Empirical evidence suggests that digital competencies, resilience, and supportive organizational environments are critical enablers of successful technological adaptation in such contexts (Zhu et al., 2025; Elshaer et al., 2024).

Digital self-efficacy has emerged as an important personal resource in AI-driven workplaces. It refers to employees' confidence in their ability to effectively use digital tools, adapt to new technologies, and accomplish digital work tasks (Kukanja, 2024). During ongoing digital transformation, employees who report stronger beliefs in their technological capabilities are better positioned to adjust their work practices in response to technological shifts. Empirical findings indicate that digital self-efficacy is positively associated with digital competence and engagement in technology-mediated environments (Zhu et al., 2025). Moreover, employees with stronger self-efficacy beliefs are more capable of translating technological change into proactive learning behaviors and performance improvement, particularly in digitally transforming workplaces (Maran et al., 2022; Chen et al., 2001). In the AI era—characterized by the continuous introduction of new software, algorithms, and robotic interfaces—digital self-efficacy functions as a personal resource that may facilitate the translation of technological awareness into behavioral engagement, including task-related adjustments and proactive work modification rather than passive resistance (Khan, 2024; Sadeghi et al., 2024).

Complementing this perspective, task crafting refers to employees' proactive adjustments to their job responsibilities, task boundaries, and work processes in response to changing technological and organizational demands. Such behavioral adjustments reflect employees' efforts to improve person–job fit under conditions of technological change. Psychological resilience—defined as the capacity to maintain performance, well-being, and motivation while facing disruption—represents a foundational personal resource associated with adaptive workforce behaviors (Law et al., 2024). Building on these constructs, the present study develops a moderated mediation framework in which awareness of AI and robotics is examined in relation to task crafting through the mediating role of digital self-efficacy, while psychological resilience is investigated as a boundary condition that may shape these relationships in AI-integrated workplaces (Kostopoulos et al., 2024).

Despite increasing scholarly attention to technology adoption and employee behavior, several research gaps remain. First, prior studies often examine AI/robotics awareness and digital self-efficacy separately, with limited investigation of the mechanism through which awareness may be associated with proactive behaviors such as task crafting via self-efficacy. Second, although task crafting has been explored in various contexts of organizational change, empirical evidence regarding its association with AI and robotics integration remains limited. Third, the role of psychological resilience as a boundary condition in these relationships has not been sufficiently examined—particularly regarding how resilience may influence the strength of the awareness–self-efficacy–task crafting association. Finally, much existing research relies on cross-sectional designs or single-industry contexts; therefore, more comprehensive moderated mediation models integrating awareness, personal resources, behavioral adaptation, and resilience across organizational settings are needed.

The present study addresses these gaps by examining how awareness of AI and robotics is associated with adaptive behavioral responses in contemporary organizations. By positioning digital self-efficacy as a mediating mechanism, this research explores how personal competence beliefs may explain the relationship between technology awareness and task crafting behaviors. Furthermore, by investigating psychological resilience as a moderating factor, the study identifies potential boundary conditions that may influence the strength of these associations. The findings are expected to offer theoretical contributions to the literature on workforce adaptability in AI-integrated contexts and practical implications for human resource management, leadership practices, and organizational policies aimed at supporting employee adjustment in technologically transformed environments.

To clarify the rationale and contributions of the current study, Table (1) summarizes the key research constructs, the gaps in existing literature, and the expected theoretical and practical contributions.

Research Construct	Literature Gap	Contribution
Artificial Intelligence & Robotics Awareness (AIRA)	Prior studies often examine AI/robotics awareness in isolation; limited understanding of its role in driving adaptive performance via mediators.	Demonstrates how awareness of AI and robotics directly and indirectly fosters adaptive performance in employees.
Digital Self-Efficacy	The mediating role of digital self-efficacy between technology awareness and proactive behaviors like task crafting is underexplored.	Clarifies the cognitive mechanism through which AI/robotics awareness translates into adaptive workforce behaviors.
Task Crafting	Limited empirical evidence on task crafting specifically in the context of AI and robotics integration.	Highlights behavioral adaptation strategies employees adopt in response to technological change.
Psychological Resilience	Its moderating role in the awareness → self-efficacy → task crafting pathway remains insufficiently studied.	Identifies boundary conditions that strengthen or weaken the translation of awareness into adaptive behavior, offering insight into resilience as a key resource.
Adaptive Performance	Research often examines adaptive performance without considering the full moderated mediation mechanisms linking awareness, personal resources, and behavioral responses.	Provides an integrated understanding of how awareness, self-efficacy, task crafting, and resilience collectively shape adaptive performance in AI-driven workplaces.

Table 1. Research constructs, research gaps, and expected contributions

2. Literature Review and Theoretical Foundation

2.1. Underpinning Theories

2.1.1. Conservation of Resources (COR) Theory

The Conservation of Resources (COR) theory posits that employees strive to acquire, retain, and protect valuable personal and psychological resources that enable them to cope effectively with work demands (Nahum, 2025). When organizational environments undergo technological transformation, employees may perceive AI and robotics as potential threats to valued resources such as professional competence, status, or job security. In such situations, individuals become motivated to invest in new resources to prevent resource loss and facilitate resource gain (Radford, 2024; O'Connor et al., 2025).

Within this framework, awareness of artificial intelligence and robotics (AIRA) functions as an informational and cognitive resource that reduces ambiguity and enhances employees' sense of control over technological change (Radford, 2024). By clarifying how intelligent systems influence job roles and performance requirements, AIRA enables employees to conserve psychological energy, minimize uncertainty, and proactively adjust work strategies in response to evolving digital demands (Chen et al., 2024). Moreover, the COR principle of resource gain spirals suggests that individuals who accumulate additional resources—such as digital knowledge and technological clarity—are more willing to engage in proactive job modification and performance enhancement (Liu, 2024). Accordingly, AIRA operates as a resource-enhancing mechanism that promotes adaptability and proactive behavior in highly technological work environments (Dorta-Afonso et al., 2025). In this sense, employees who recognize AI-driven transformation may respond not with withdrawal but with investment in further personal resources, such as digital self-efficacy and proactive task redesign, thereby strengthening adaptive functioning.

2.1.2. Social Cognition Theory

Social Cognitive Theory explains behavior as the result of dynamic interactions among personal beliefs, environmental influences, and behavioral consequences (Jacob & Jeannerod, 2005). Central to this framework is the concept of self-efficacy, which reflects individuals' beliefs in their capabilities to organize and execute actions required to manage prospective situations (Bandura, 1991; Bandura, 2009). According to this perspective, personal beliefs mediate the relationship between environmental stimuli and behavioral outcomes.

In AI-integrated workplaces, awareness of artificial intelligence and robotics (AIRA) represents a salient environmental stimulus that shapes employees' cognitive evaluations of technological change. Through exposure to AI-enabled systems, observational learning, and mastery experiences with intelligent technologies, employees strengthen their digital self-efficacy (Luszczynska & Schwarzer, 2015). As familiarity with digital tools increases, confidence in executing technology-related tasks grows, empowering employees to adapt, innovate, and modify job activities in response to digital transformation (Keysers & Gazzola, 2006).

Psychological resilience further reinforces this cognitive–behavioral process by strengthening self-regulation and encouraging constructive responses to AI-related challenges (Bandura, 2009). Resilient individuals are therefore better positioned to translate technological awareness and accumulated experience into heightened self-efficacy and proactive task-crafting behaviors, ultimately enhancing adaptive performance. In this context, Social Cognitive Theory elucidates how AIRA activates internal belief systems that drive adaptive behavioral responses in modern workplaces (Bandura, 1991; Bandura, 2009; Luszczynska & Schwarzer, 2015).

2.2. Artificial Intelligence and Robotics Awareness (AIRA)

Artificial Intelligence and Robotics Awareness (AIRA) refers to employees' cognitive understanding, perceptions, and expectations regarding the presence and role of AI systems and robots in work contexts (Li et al., 2025). As industries—from manufacturing and logistics to hospitality and healthcare—progressively implement robotics and intelligent technologies, employees become increasingly aware of how these systems influence job functions, task structures, and service delivery models (Hu et al., 2024). Bakir et al. (2025) emphasize that this awareness encompasses perceptions of the growing integration of service robots, collaborative robots (cobots), and autonomous systems that perform physical, analytical, and interactive tasks. Importantly, Kang et al. (2024) note that robotics awareness extends beyond technical familiarity; it includes employees' understanding of implications for job security, task distribution, performance standards, and human–machine collaboration.

Such awareness plays a critical role in shaping employees' responses to technological change. Enhanced robotics awareness has been associated with proactive behavior, adaptability, and readiness to adopt robot-assisted workflows, whereas limited awareness may induce resistance, anxiety, or avoidance behaviors (Parvez et al., 2024). Particularly in hospitality contexts—where AI and robotics directly influence service encounters, operational processes, and workforce structures—employees' structured understanding of technological transformation becomes central to adaptive performance and role adjustment (Bakir et al., 2025; Xu & Lau, 2025; Kim et al., 2025).

Although related constructs such as technology readiness, technology acceptance, and AI anxiety have been widely used to explain employee responses to digital transformation, AIRA captures a distinct form of cognitive appraisal. Unlike technology acceptance models, which primarily predict usage intentions, AIRA reflects employees' structured evaluation of how AI and robotics reshape tasks, employment structures, and service systems. Similarly, whereas AI anxiety focuses predominantly on emotional distress, it does not sufficiently account for the cognitive appraisal processes that precede behavioral adaptation. In this regard, AIRA provides stronger explanatory relevance for adaptive outcomes in AI-integrated workplaces, as it emphasizes perceived organizational impact and role transformation rather than generalized emotional reactions.

Importantly, although measurement scales of AI and robotics awareness may include items reflecting fear, pessimism, and concerns about job replacement, this does not contradict its conceptualization within a resource-based framework. From a Conservation of Resources (COR) theory perspective, awareness—even when associated with perceived technological threats—constitutes an informational resource because it reduces ambiguity and enhances employees' understanding of environmental change. Awareness of potential AI-driven disruption enables individuals to anticipate transformation, evaluate risks, and mobilize coping strategies. Thus, threat-related perceptions embedded in the construct reflect the depth of cognitive appraisal rather than purely negative emotional reactions. In this sense, AIRA functions as a psychological signal that may activate adaptive responses, including the development of digital self-efficacy and engagement in task crafting behaviors. Accordingly, negative appraisals embedded within awareness should not be interpreted as dysfunctional outcomes but rather as potential triggers for resource mobilization and adaptive behavioral adjustment.

2.3. Adaptive Performance (AP)

Adaptive performance refers to an employee's ability to effectively adjust to new, volatile, or unforeseen work situations (Krijgsheld et al., 2024). It reflects the capacity to modify behaviors, skills, and responses in alignment with evolving task demands and environmental conditions (Qiu et al., 2025). In contemporary organizations characterized by rapid technological and operational transformations, adaptive performance has become increasingly critical (Zhang et al., 2025a). Employees who demonstrate high levels of adaptability are better equipped to tolerate uncertainty, manage pressure, and sustain performance standards despite ongoing change (Shaban et al., 2025). Accordingly, adaptive performance is widely regarded as a strategic capability that supports organizational resilience and long-term competitive advantage (Yang et al., 2025).

Conceptually, adaptive performance encompasses a range of behaviors, including managing unexpected problems, coping with work-related stress, and innovating in unfamiliar situations (Aliyana et al., 2025). It also involves reprioritizing tasks, identifying and implementing alternative strategies, and applying effective solutions during periods of disruption (Priyadarshi et al., 2025). Empirical evidence suggests that highly adaptive employees tend to exhibit intrinsic motivation, strong self-efficacy beliefs, and cognitive flexibility (Zhang, Huang & Zhou, 2025). To cultivate and sustain such performance, organizations are encouraged to embed supportive leadership practices and promote a culture of continuous learning (Stokes et al., 2010). Furthermore, adaptive employees are better positioned to leverage emerging technologies—such as artificial intelligence and robotics—to improve work processes and facilitate effective technological integration (Krijgsheld et al., 2024).

2.4. Digital Self-Efficacy (DSE)

Digital self-efficacy can be defined as employees' belief in their ability to use digital tools and smart technologies effectively to accomplish work-related tasks (Zhu et al., 2025). With the rapid pace of digital transformation in organizations, this attribute has become a vital determinant of employees' capacity to accept and adapt to technological change (Kukanja, 2024). High digital self-efficacy enhances individuals' confidence to experiment with advanced technologies such as artificial intelligence, solve digital problems, and integrate modern technologies into daily activities (Mensah et al., 2024; Khan, 2024). Chen et al. (2024) further demonstrate that digital self-efficacy reduces technostress, increases motivation for learning, and fosters better digital innovation behavior across sectors.

2.5. Task Crafting (TC)

Task crafting refers to the proactive behaviors employees undertake to modify the nature, parameters, or execution of their job tasks in order to achieve a better fit with their personal strengths, interests, and career aspirations (Saleem et al., 2024). Such behaviors may include altering the breadth of tasks assigned, changing how tasks are performed, seeking more meaningful activities, or optimizing tasks to enhance efficiency and satisfaction (Wang et al., 2024). Zhang, Wang et al. (2025) demonstrate that task crafting fosters higher levels of engagement, creativity, and adaptability in response to rapid technological changes. Employees who engage in task crafting perceive greater control over their jobs, which in turn enhances intrinsic motivation (Bai et al., 2025). Consequently, as organizations undergo rapid transformations driven by digitalization and AI integration, task crafting plays a crucial role in enabling employees to proactively manage change while maintaining stable performance (Yang et al., 2024; Tan, 2025).

2.6. Employee Psychological Resilience (EPR)

Employee psychological resilience refers to an individual's ability to effectively cope with, adjust to, and recover from stressful situations while maintaining functional and emotional balance (Elshaer et al., 2024). In modern workplaces, characterized by rapid technological shifts, heavy workloads, and constant change, resilience serves as a vital resource that enables employees to navigate uncertainty constructively (O'Connor et al., 2025). In addition, Khairy and Badwy (2025) noted that resilient employees demonstrate superior problem-focused coping skills, effective emotion regulation, and an enhanced ability to sustain performance under pressure. Psychological resilience is also increasingly associated with sustained engagement, lower burnout, and greater well-being in complex work environments (Prayag, 2024). Consequently, in the context of digital transformation, resilience has emerged as a key determinant of employees' adaptability and sustained effectiveness (Yasami et al., 2024; Wong et al., 2025).

2.7. Hypotheses Development

2.7.1. Artificial Intelligence and Robotics Awareness (AIRA) and Employee Adaptive Performance

Artificial Intelligence and Robotics Awareness (AIRA) reflects employees' understanding of intelligent systems within their workplace and their capacity to respond effectively to technological transformation (Xu & Lau, 2025). Employees who possess higher levels of AIRA tend to demonstrate greater knowledge and clarity regarding the functions, capabilities, and organizational implications of AI-driven systems (Wang et al., 2022). Such awareness reduces uncertainty surrounding technological change and enhances employees' readiness to cope with evolving job demands (Liias, 2025).

When employees clearly understand how AI and robotics contribute to task execution, decision-making processes, and workflow optimization, they are more inclined to modify their behaviors, update their skills, and engage in digital learning activities (Majeed, 2025). Moreover, awareness fosters effective coping strategies, psychological preparedness, and openness to change in the context of digital transformation (Teng et al., 2025). By enabling employees to anticipate technological shifts and increasing confidence in interacting with intelligent systems, AIRA encourages experimentation with new work approaches and flexible problem-solving strategies (Panichayakorn & Jermsittiparsert, 2019).

Given that adaptive performance involves the ability to adjust behaviors, manage uncertainty, and maintain effectiveness under changing conditions, AIRA is expected to function as a critical antecedent. Employees who are more aware of AI and robotics are better positioned to align their behaviors with technological requirements and sustain performance during transformation. Therefore, the following hypothesis is proposed:

H1: Artificial intelligence and robotics awareness (AIRA) positively influences employees' adaptive performance.

2.7.2. AIRA and Digital Self-Efficacy

Greater awareness of artificial intelligence and robotics enhances employees' understanding of how digital systems operate within their organizational environment (Kim et al., 2021). When employees clearly comprehend the functions, usefulness, and reliability of AI-enabled technologies, uncertainty surrounding their implementation is reduced, leading to greater confidence in adopting and utilizing such systems (Ibrahim & Aldawsari, 2023). By minimizing ambiguity and technostress, awareness empowers employees to feel more competent when interacting with AI-powered platforms and digital tools (Arbulú-Pérez-Vargas et al., 2024). As a result, employees' perceived digital competence increases, strengthening their belief in their ability to successfully manage technology-driven tasks (Bui & Duong, 2024).

Moreover, exposure to AI and robotics familiarizes employees with digital troubleshooting and problem-solving processes, reinforcing their confidence in mastering new technological applications (Ibrahim & Aldawsari, 2023). Frequent interaction with automated systems provides mastery experiences—recognized as the most powerful source of self-efficacy development (Bandura, 2009). In addition, heightened awareness positively shapes attitudes toward digital transformation, encouraging employees to explore advanced technologies with greater assurance and motivation (Bui & Duong, 2024). Consequently, Artificial Intelligence and Robotics Awareness (AIRA) serves as a foundational antecedent of digital self-efficacy across diverse organizational contexts (Kim et al., 2021; Ibrahim & Aldawsari, 2023). Based on these arguments, the following hypothesis is proposed:

H2: AIRA positively influences digital self-efficacy.

2.7.3. Digital Self-Efficacy and Employee Adaptive Performance

Digital self-efficacy reflects employees' confidence in their ability to effectively utilize digital tools, troubleshoot technical issues, and master newly introduced technological systems. A high level of digital self-efficacy enables employees to learn digital applications efficiently, self-diagnose operational problems, and quickly adjust to evolving technological demands (Nusannas et al., 2020). This confidence reduces resistance to technological change and encourages experimentation with alternative work strategies, thereby strengthening adaptive performance in dynamic work environments (Torres, 2025).

Furthermore, digital self-efficacy promotes cognitive flexibility, allowing employees to modify behaviors, reprioritize tasks, and adjust work processes when new technologies are introduced or unexpected challenges arise. Employees who possess strong beliefs in their digital capabilities are more inclined to engage in continuous learning and proactive problem-solving—key mechanisms that facilitate rapid adaptation (Aliya et al., 2025). Such individuals are also more likely to remain composed under digital pressure, demonstrate resilience, and maintain performance despite rapidly changing technological conditions (Essandoh et al., 2024).

In the broader context of digital transformation, digital self-efficacy therefore functions as a critical psychological resource that enhances employees' capacity to adapt, sustain performance, and navigate technological complexity across diverse organizational settings (Budhiraja & Rathi, 2023). Based on these arguments, the following hypothesis is proposed:

H3: Digital self-efficacy positively influences employees' adaptive performance.

2.7.4. Digital Self-Efficacy as a Mediator

Employees who possess a strong awareness of artificial intelligence and robotics (AIRA) typically develop a clearer understanding of how intelligent systems function within their work environment. This structured understanding enhances their confidence and perceived competence in managing digital technologies (Ahmed et al., 2025). As employees become more knowledgeable about AI-driven systems, their digital self-efficacy increases, reducing apprehension associated with technological change and strengthening their willingness to experiment with new digital tools and procedures (Dogra & Parrey, 2024).

Heightened digital self-efficacy, in turn, facilitates adaptive behavioral responses. Employees who are confident in their digital capabilities are more likely to modify work strategies, engage in proactive learning, and adjust their behaviors flexibly in response to evolving technological demands (Mollah et al., 2024). In this sense, digital self-efficacy represents a crucial psychological mechanism through which the positive influence of AIRA is translated into improved adaptive performance (Ahmed et al., 2025).

Rather than exerting influence solely through a direct pathway, AIRA strengthens employees' digital self-efficacy, which subsequently enables more effective adaptation to technological transformation (Khan et al., 2024). The mediating role of digital self-efficacy therefore explains how awareness is converted into actionable adaptive behaviors, serving as a central explanatory pathway linking AIRA to employee adaptive performance (Mollah et al., 2024). Based on these arguments, the following hypothesis is proposed:

H4: Digital self-efficacy mediates the relationship between AIRA and employees' adaptive performance.

2.7.5. AIRA and Task Crafting

Artificial Intelligence and Robotics Awareness (AIRA) enhances employees' understanding of how intelligent systems reshape work processes and task structures. When employees clearly recognize how digital technologies transform workflows, they become more capable of identifying opportunities to optimize performance through proactive task modification (Abdullah et al., 2024). Such awareness strengthens employees' perceptions of technology-enabled opportunities, enabling them to redesign workflows, integrate intelligent tools into daily operations, and redefine task boundaries to improve efficiency and effectiveness (Yang & Jiang, 2025).

Moreover, AIRA encourages the exploration of technology-based approaches to task completion, motivating employees to engage in task-crafting behaviors such as assuming additional responsibilities, reorganizing task sequences, and experimenting with new digital procedures (Mihalca et al., 2024). By reducing ambiguity and confusion associated with technological change, awareness fosters novelty-seeking and promotes proactive attitudes toward job redesign (Gallivan et al., 2005). Employees who possess a structured understanding of advanced technologies are therefore more inclined to realign their work roles in accordance with digital transformation initiatives (Yang & Jiang, 2025).

In technology-intensive work environments, AIRA thus emerges as a significant antecedent of task crafting, as it enables employees to proactively adjust their roles to align with evolving technological demands (Mihalca et al., 2024). Based on these arguments, the following hypothesis is proposed:

H5: AIRA positively influences task crafting.

2.7.6. Task Crafting and Employee Adaptive Performance

Task crafting refers to employees' proactive efforts to reshape their job tasks, workflows, and work methods in ways that better align with their strengths and evolving job requirements. Such proactive behavioral adjustments directly contribute to enhanced adaptive performance, particularly in dynamic and technology-driven work environments (Park et al., 2020). By intentionally modifying task boundaries and optimizing work processes, employees develop greater cognitive flexibility, creativity, and readiness to manage unforeseen challenges or technological disruptions (Badran & Akeel, 2020).

Engaging in task crafting also promotes problem-solving capabilities and exploratory behaviors, enabling employees to experiment with alternative approaches and integrate innovative practices into their daily routines (Vakola et al., 2023). Through continuous refinement of workflows and increased familiarity with digital tools, employees strengthen their ability to adjust behaviors, reprioritize tasks, and sustain high performance despite uncertainty and change (Badran & Akeel, 2020). Additionally, task crafting is associated with lifelong learning and psychological resilience, both of which are critical resources for effective adaptation in rapidly evolving organizational contexts (Li et al., 2021).

Accordingly, task crafting functions as a key behavioral mechanism that enables employees to respond effectively to technological transformation and shifting job demands. By proactively redesigning aspects of their work, employees enhance their capacity to maintain and improve performance under changing conditions (Park et al., 2020). Based on these arguments, the following hypothesis is proposed:

H6: Task Crafting positively influences employees' adaptive performance.

2.7.7. Task Crafting as a Mediator

Employees who possess strong awareness of artificial intelligence and robotics (AIRA) are better positioned to recognize how intelligent technologies can optimize workflows and reshape task structures. This understanding motivates them to proactively adjust their work behaviors in alignment with technological transformation (Park et al., 2020). Enhanced awareness encourages task-crafting behaviors such as reorganizing task sequences, integrating intelligent tools into daily operations, and experimenting with new methods for performing digitally enabled tasks (Zia et al., 2025).

Such proactive task modifications strengthen employees' problem-solving capabilities and prepare them to effectively adopt new practices in response to ongoing technological change (Vakola et al., 2023). By actively redesigning aspects of their jobs, employees translate technological awareness into concrete behavioral adjustments that enhance their capacity to cope with evolving work demands. In this context, task crafting represents a critical behavioral mechanism that channels the influence of AIRA into improved adaptive performance (Sun & Li, 2025).

In other words, awareness of AI and robotics alone may not directly improve adaptability unless it stimulates proactive task redesign and behavioral engagement. Therefore, task crafting functions as a key mediating pathway through which AIRA contributes to employee adaptive performance in technology-driven work environments (Zia et al., 2025). Based on these arguments, the following hypothesis is proposed:

H7: Task crafting mediates the relationship between AIRA and employees' adaptive performance.

2.7.8. Psychological Resilience as a Moderator

Employees who possess awareness of artificial intelligence and robotics (AIRA) develop a clearer understanding of how digital technologies operate and impact work processes (Cassaretto et al., 2024). However, the translation of this awareness into perceived capability in handling digital applications significantly depends on psychological resilience (Paletta et al., 2023). Resilient employees are better able to evaluate stress, uncertainty, and technological challenges objectively, allowing them to interpret AIRA as an opportunity for mastery rather than as a threat (Shi et al., 2025; Yao et al., 2024). Conversely, employees with low resilience may respond to technological changes with anxiety, self-doubt, or avoidance, thereby weakening the relationship between AIRA and digital self-efficacy (Cassaretto et al., 2024). Therefore, psychological resilience serves as a boundary condition that strengthens the relationship between AIRA and self-perceived digital competence in technology-driven workplaces (Paletta et al., 2023). Consequently, the following hypothesis is proposed:

H8: Psychological resilience positively moderates the effect of AIRA on digital self-efficacy.

Employees highly aware of AI and robotics (AIRA) may understand the potential benefits of intelligent technologies on workflows, but the enactment of task crafting largely depends on psychological resilience (Munnisunker & Dhanpat, 2025). Resilient employees are better equipped to manage uncertainty, regulate stress, and remain optimistic throughout technological change. These qualities enhance their ability to proactively adjust task parameters and engage with new digital workflows (Hur et al., 2024). High resilience enables individuals to perceive AI-driven disruptions as opportunities for improvement, thereby amplifying the positive influence of AIRA on task-crafting behaviors such as modifying task methods or integrating intelligent tools (Rhee et al., 2024). In contrast, employees with low resilience may perceive technological change as overwhelming, reducing the likelihood that AIRA translates into active task redesign (Hwang et al., 2025). Thus, psychological resilience acts as a boundary condition that determines the extent to which AIRA influences task crafting in technology-focused workplaces (Munnisunker & Dhanpat, 2025). Consequently, the following hypothesis is proposed:

H9: Psychological resilience positively moderates the effect of AIRA on task crafting.

Psychological resilience also enhances the positive effects of AI and Robotics Awareness (AIRA) on employees' adaptive performance. Resilient individuals perceive AI-related changes as opportunities rather than threats (Krauter, 2018). High-resilience employees cope with AI-driven uncertainty more effectively and maintain stable affect, enabling proactive engagement with digital transformation (Ceken, 2025). They are able to upskill, adjust their behaviors to AI-integrated tasks, and maintain high performance in complex technological environments (Xu & Lau, 2025). Additionally, resilient employees demonstrate greater cognitive flexibility, facilitating learning, experimentation, and recovery from mistakes in tech-intensive domains (Alsetoohy et al., 2025). This resilience transforms AIRA into a catalyst for constructive adaptive behavior rather than defensive or reactive strategies (Wigayha, 2025). Organizations that foster psychological resilience therefore cultivate an agile workforce capable of thriving amid rapid AI integration (Krauter, 2018). Consequently, the following hypothesis is proposed:

H10: Psychological resilience positively moderates the effect of AIRA on employees' adaptive performance.

The theoretical framework of the study is illustrated below in Figure 1.

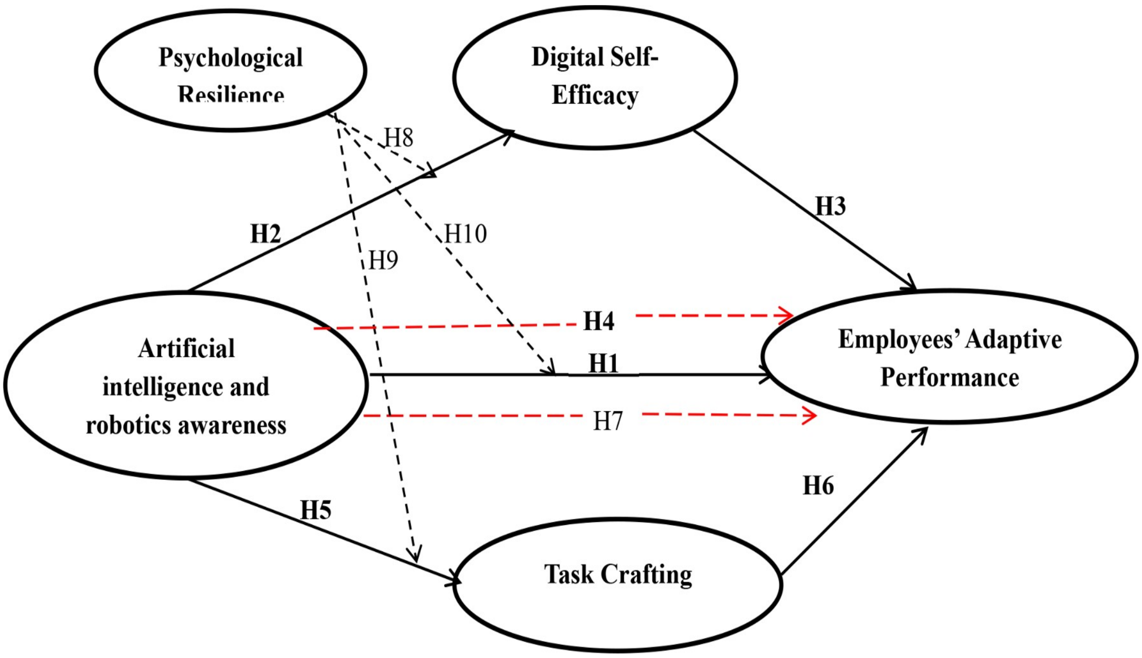

Figure 1. The theoretical framework of the study

3. Research Methodology

3.1. Survey Design and Measurement Instruments

The study employed a structured survey composed of two sections. The first section contained 33 items measuring the latent constructs of the research model (see Appendix A), while the second section collected demographic information, including gender, age, and education level. Established and validated measurement scales were utilized for all constructs.

Artificial Intelligence and Robotics Awareness (AIRA) was measured using a four-item scale developed by Li et al. (2019). Although AIRA is conceptually described as employees' cognitive understanding and perception of artificial intelligence and robotics, the operationalization adopted in this study captures a broader appraisal process that includes perceived implications, risks, and potential impact on employment conditions. This approach is grounded in appraisal-based perspectives, which suggest that awareness of technological transformation inherently involves evaluation of both opportunities and threats. Accordingly, the measurement items reflect structured cognitive assessment rather than isolated emotional reactions, thereby maintaining consistency between conceptual definition and empirical operationalization (Bandura, 1991; Bandura, 2009; Radford, 2024).

In addition, adaptive performance was captured through ten items adapted from Hartline and Ferrell (1996), and task crafting was assessed with a five-item scale from Slemp and Vella-Brodrick (2013). Digital self-efficacy was measured using an eight-item instrument based on Chen et al. (2001) and Liu and Kamioka (2025), while employees' psychological resilience (EPR) was assessed with six items from Smith et al. (2008).

All items were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). To ensure linguistic equivalence, a rigorous back-translation procedure was applied following Brislin (1980): a bilingual expert translated the English questionnaire into Arabic, and another bilingual expert back-translated it into English. The final version was validated by three academics and fifteen hotel professionals, confirming semantic accuracy and contextual appropriateness. However, a formal Content Validity Index (CVI) was not calculated, which should be considered a limitation and addressed in future research.

3.2. Ethical Considerations

The study received ethical approval from the relevant institutional review board and adhered to the principles outlined in the Declaration of Helsinki. Participation was voluntary, and respondents were informed of the study objectives, procedures, confidentiality measures, and their right to withdraw at any time. The questionnaire explicitly stated that no personal identifiers were collected and that responses would be used solely for academic purposes, stored securely, and accessible only to the principal researcher. Submission of the completed questionnaire indicated informed consent.

3.3. Sampling Strategy and Data Collection

Data were collected from full-time employees at five-star hotels in the Greater Cairo region in Egypt between October and November 2025. Given logistical challenges in accessing dispersed hotels, convenience sampling was employed, consistent with common practice in hospitality research. Five-star hotels in Greater Cairo provide a relevant context for this study, as they are actively adopting AI to enhance service quality and operational efficiency, exposing employees to technological changes that require adaptation (Salama et al., 2025). The high service standards and guest-oriented demands inherent in these hotels make adaptive performance particularly crucial, while ongoing digital transformation initiatives highlight the importance of digital self-efficacy and task crafting as mediating factors (Abdelhamied, 2024; Khairy, Fayyad & El Sawy, 2025; Khairy, Lee & Al-Romeedy, 2025). Moreover, the relatively homogeneous organizational and cultural environment in Greater Cairo helps minimize extraneous variation, enabling a controlled examination of the moderating role of psychological resilience.

The Greater Cairo area includes approximately 30 five-star hotels (Egyptian Ministry of Tourism and Antiquities, 2022). Permissions were obtained from hotel management and HR departments prior to survey distribution. Questionnaires were administered on-site, and respondents were reminded of voluntary participation and confidentiality. A total of 406 valid responses were collected, exceeding the recommended minimum sample size of 330 for 33 observed items (Hair et al., 2010), ensuring sufficient statistical power for structural equation modeling. The final sample comprised operational-level employees only, ensuring homogeneity in job level and direct exposure to AI-enabled service processes within five-star hotels.

To enhance transparency, the 406 respondents were distributed across approximately 25 five-star hotels that agreed to participate in the study. The approximate number of respondents per hotel ranged from 15 to 20 participants, depending on hotel size and accessibility. Although the data were collected from multiple hotels, responses were treated at the individual level. This study acknowledges that this nested structure may introduce potential clustering effects; however, given the voluntary participation approach and the primary focus on individual-level psychological constructs, multilevel modeling was not applied in the present study.

Regarding technological exposure, the participating five-star hotels were at varying stages of digital transformation. Several hotels had already implemented AI-enabled systems such as automated check-in kiosks, digital concierge platforms, smart energy management systems, or robotic service applications, while others were in earlier phases of technological adoption. Thus, respondents' perceptions of artificial intelligence and robotics awareness were shaped by both direct exposure to implemented technologies and broader organizational communication, strategic planning, and external information sources.

3.4. Data Analysis Procedure

The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is suitable for testing complex models involving mediators and moderators (Sarstedt et al., 2021; Hair et al., 2023). Analyses were conducted with WarpPLS version 8.0, which accommodates both measurement and structural model assessment and is robust to non-normal data distributions (Kock, 2021).

Non-response bias was evaluated by comparing early and late respondents using independent samples t-tests on key variables, revealing no significant differences ($p > 0.05$). Common method variance (CMV) was assessed using Harman's single-factor test, which indicated that no single factor accounted for more than 50% of the variance. Additionally, Variance Inflation Factor (VIF) values for all constructs were below 3.3, confirming that multicollinearity and common method bias was not problematic (see Table 3).

4. Results

4.1. Participants' Profile

Table 2 summarizes the demographic characteristics of the 406 participants in the study. The sample consists primarily of male employees, who represent about 62% of respondents, while females account for roughly 38%. In terms of age, most participants fall between 30 and 45 years old, followed by those younger than 30, and a smaller portion aged above 45. The majority of respondents hold an undergraduate degree, with smaller groups reporting either high school or postgraduate qualifications.

		Frequency	Percent
Gender	Male	250	61.58
	Female	156	38.42
Age	18:<30 years	130	32.02
	30: 45 years	182	44.83
	>45	94	23.15
Education	High school or below	72	17.73
	Undergraduate degree	272	67.00
	Postgraduate degree or above	62	15.27

To ensure participants had sufficient exposure to workplace practices, only individuals with at least one year of work experience were included, consistent with Morrison's (1993) view that employees generally adapt to organizational norms within the first six months of employment.

Table 2. Participant's profile (N=406)

4.2. Measurement Model

Appendix B presents a series of model fit and quality indices based on Kock's (2021) guidelines, all of which indicate that the structural model performs well. The APC, ARS, and AARS values are statistically significant, confirming acceptable overall explanatory power. Measures of multicollinearity, including AVIF and AFVIF, fall well within recommended thresholds, suggesting no inflation concerns. The Tenenhaus GoF demonstrates a strong overall fit, and additional diagnostic ratios—such as SPR, RSCR, SSR, and NLBCDR—meet or exceed their respective criteria, indicating the absence of paradoxical or suppressor effects. Fit indices related to residuals, including SRMR and SMAR, also lie within acceptable limits, further supporting model adequacy. Finally, the standardized chi-square and threshold-related ratios (STDCR and STDSR) reinforce that the model meets the essential criteria for reliability and structural soundness.

Table 3 summarizes the psychometric evaluation of the study's measurement model, demonstrating strong reliability and validity across all constructs. Indicator loadings generally exceed recommended thresholds, confirming good item contributions. Composite reliability (CR) and Cronbach's alpha (CA) values for each construct are well above accepted cutoffs, indicating high internal consistency. The average variance extracted (AVE) values also meet the criteria for convergent validity, showing that each construct explains a substantial proportion of variance in its indicators. Additionally, all VIF values fall below critical limits, suggesting that multicollinearity is not a concern. Overall, these results confirm that the scales used to measure AIRA, adaptive performance, digital self-efficacy, task crafting, and psychological resilience demonstrate strong psychometric quality.

Table 4 presents the correlations among the study's latent variables alongside the square roots of their AVEs, providing evidence of discriminant validity. The diagonal values, representing the square root of each construct's AVE, are higher than their corresponding inter-construct correlations, indicating that each construct shares more variance with its own indicators than with others. Overall, the pattern supports the adequacy of the measurement model and confirms that the constructs are empirically distinguishable.

Table 5 reports the HTMT ratios used to assess discriminant validity among the latent constructs. All HTMT values fall below commonly accepted thresholds, indicating that the constructs are sufficiently distinct from one another. Overall, the HTMT results provide additional support for the discriminant validity of the measurement model.

Construct	Indicators	Loading	CR	CA	AVE	VIF
Artificial intelligence and robotics awareness (AIRA)	AIRA1	0.771	0.870	0.799	0.627	2.997
	AIRA2	0.839				
	AIRA3	0.854				
	AIRA4	0.693				
Adaptive performance (AP)	AP.1	0.838	0.932	0.918	0.622	1.937
	AP.2	0.745				
	AP.3	0.797				
	AP.4	0.763				
	AP.5	0.824				
	AP.6	0.780				
	AP.7	0.809				
	AP.8	0.795				
	AP.9	0.734				
	AP.10	0.794				
Digital self-efficacy (DSE)	DSE1	0.702	0.903	0.877	0.538	2.156
	DSE2	0.687				
	DSE3	0.769				
	DSE4	0.709				
	DSE5	0.721				
	DSE6	0.772				
	DSE7	0.765				
	DSE8	0.739				
Task crafting (TC)	TC1	0.714	0.877	0.825	0.589	2.552
	TC2	0.772				
	TC3	0.780				
	TC4	0.810				
	TC5	0.758				
Employees' psychological resilience (EPR)	EPR1	0.790	0.916	0.890	0.645	2.700
	EPR2	0.792				
	EPR3	0.792				
	EPR4	0.863				
	EPR5	0.817				
	EPR6	0.762				

Table 3. Results of psychometric properties

Construct	AIRA	AP	DSE	TC	EPR
Artificial intelligence and robotics awareness (AIRA)	**0.792**				
Adaptive performance (AP)	0.546	**0.789**			
Digital self-efficacy (DSE)	0.551	0.638	**0.734**		
Task crafting (TC)	0.597	0.540	0.606	**0.768**	
Employees' psychological resilience (EPR)	0.551	0.509	0.574	0.688	**0.803**

Table 4. Correlations among latent variables with the square root of AVEs

Construct	AIRA	AP	DSE	TC	EPR
Artificial intelligence and robotics awareness (AIRA)					
Adaptive performance (AP)	0.647				
Digital self-efficacy (DSE)	0.656	0.726			
Task crafting (TC)	0.691	0.633	0.716		
Employees' psychological resilience (EPR)	0.670	0.577	0.653	0.810	

Table 5. Discriminant validity (HTMT)

4.3. Structural Model and Hypotheses Testing

Table 6, Figure (2), and Figure (3) present the results of the direct and moderation effects among the study variables. All hypothesized direct relationships are supported, with AIRA positively influencing adaptive performance, digital self-efficacy, and task crafting, and both digital self-efficacy and task crafting showing positive effects on adaptive performance. Effect sizes (f^2) indicate moderate to strong impacts, particularly for the influence of AIRA on task crafting and digital self-efficacy. Regarding moderation, employees' psychological resilience significantly strengthens the positive effects of AIRA on digital self-efficacy and adaptive performance, but the expected moderating effect on the relationship between AIRA and task crafting was not supported. The model explains substantial variance in the endogenous variables, with R^2 values of 0.36 for digital self-efficacy, 0.56 for task crafting, and 0.47 for adaptive performance, highlighting the meaningful contribution of both direct and interactive effects.

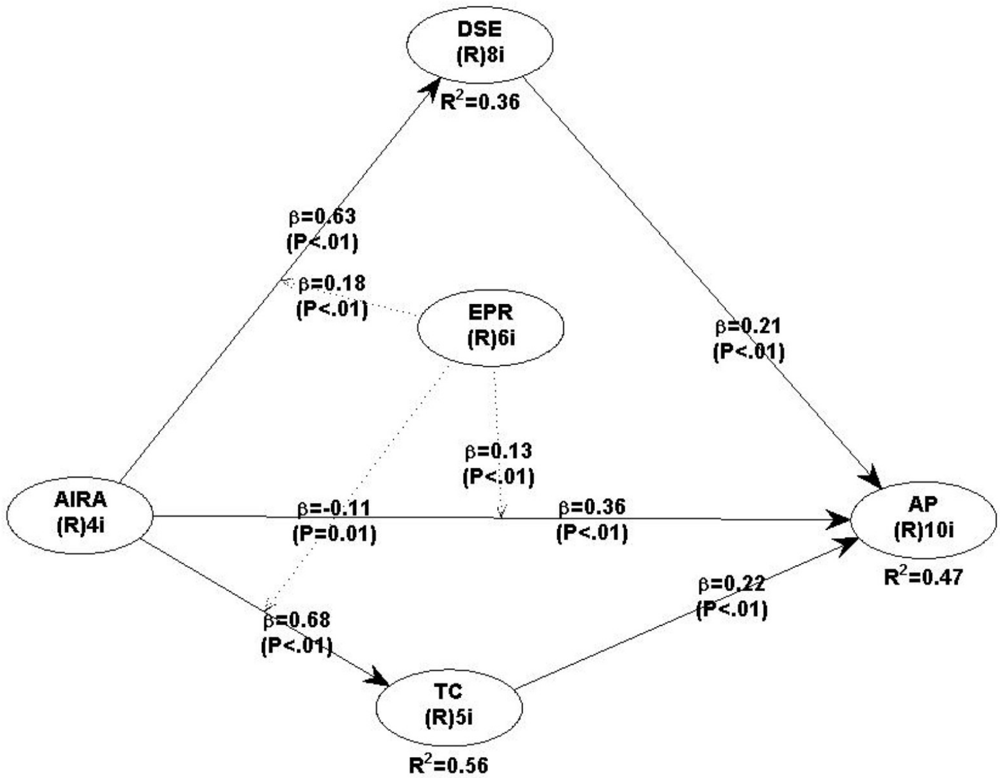

Figure 2. Final results of the study

H	Structural Paths	Path Coefficient (β)	P-values	Effect Size (f^2)	Result
Direct Effect					
H1	AIR → AAP	0.36	<0.01	0.241	Supported
H2	AIRA → DSE	0.63	<0.01	0.424	Supported
H3	DSE → AP	0.21	<0.01	0.137	Supported
H5	AIRA → TC	0.68	<0.01	0.507	Supported
H6	TC → AP	0.22	<0.01	0.135	Supported
Moderating Effect					
H8	EPR*AIRA → DSE	0.18	<0.01	0.062	Supported
H9	EPR*AIRA → TC	-0.11	=0.01	0.051	Not Supported
H10	EPR*AIRA → AP	0.13	<0.01	0.039	Supported

DSE R^2=0.36, TC R^2=0.56, AP R^2=0.47

Table 6. Direct and moderation effects

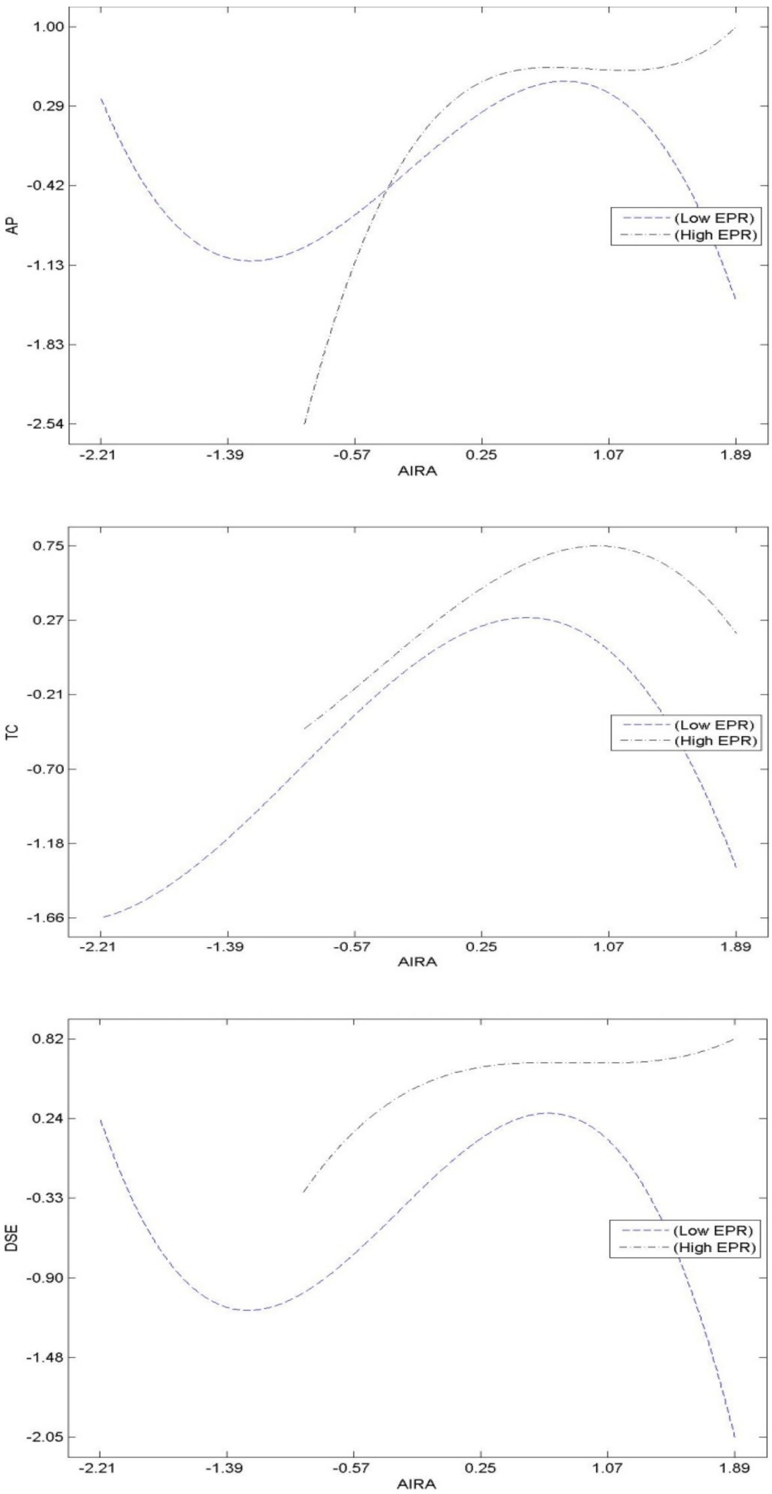

Figure 3. Moderating effect of EPR

Table 7 summarizes the results of the mediation analysis using bootstrapped confidence intervals approach suggested by Preacher and Hayes (2008). The indirect effects of AIRA on adaptive performance through both digital self-efficacy and task crafting are positive and statistically significant, as indicated by t-values above 4 and confidence intervals that do not include zero. Specifically, digital self-efficacy partially mediates the relationship between AIRA and adaptive performance, with an indirect effect of 0.132, while task crafting also serves as a significant mediator with an indirect effect of 0.150. These findings confirm that both mechanisms play meaningful roles in transmitting the influence of AIRA to adaptive performance.

Hypo.		Path a	Path b	Indirect Effect	SE	t-value	Bootstrapped Confidence Interval		Mediation
							95% LL	95% UL	
H4	AIRA → DSE → AP	0.630	0.210	0.132	0.032	4.134	0.070	0.195	Partial
H7	AIRA → TC → AP	0.680	0.220	0.150	0.032	4.675	0.087	0.212	Partial

Table 7. Mediation analysis' Bootstrapped Confidence Interval

5. Discussion

The positive association between Artificial Intelligence and Robotics Awareness (AIRA) and employees' adaptive performance underscores the importance of cognitive appraisal processes when organizations embed AI and robotics into work systems. As organizations increasingly implement AI-driven technologies such as workflow automation and integrated information systems, employee awareness of these transformations appears to be associated with how individuals interpret technological change and adjust their behaviors accordingly. In the hospitality industry — characterized by dynamic service demands and the need for flexible responses — such awareness may reduce uncertainty and enhance readiness to adapt by enabling employees to modify tasks, acquire new skills, and shift roles in response to technological change (Khairy, Fayyad & El Sawy, 2025; Khairy, Lee & Al-Romeedy, 2025). These findings align with evidence suggesting that AI integration is associated with improved employee outcomes when accompanied by transparency, access to information, and organizational support (Jia et al., 2025).

Despite the positive adaptive mechanisms identified in this study, AI awareness may also generate unintended negative reactions under certain conditions. Employees may interpret technological transformation as a threat to job security, autonomy, or professional identity, which could trigger defensive behaviors rather than proactive adaptation. The ongoing debate between AI substitution and human–AI collaboration further suggests that awareness may produce psychological ambivalence, where individuals simultaneously recognize technological opportunities and risks. Such ambivalence can influence adaptive responses depending on organizational support, leadership behavior, and perceived fairness in technology implementation. Therefore, the impact of AIRA should be understood as context-dependent rather than universally positive (Cheng et al., 2023; Yan et al., 2025; Teng et al., 2025).

Importantly, the observed positive relationship between AIRA and digital self-efficacy further supports the idea that awareness functions as a cognitive precursor to confidence in digital capabilities. Digital self-efficacy has been shown to promote workforce agility and adaptive capacity in rapidly evolving environments (Maran et al., 2022). When employees are aware of how AI and robotics influence work processes — including both opportunities and potential disruptions — they are better positioned to evaluate their own capability to engage with digital tools effectively. This cognitive evaluation strengthens beliefs in personal competence and motivates engagement with technological systems. Accordingly, digital self-efficacy operates as a key mechanism through which technological awareness is translated into adaptive behavior, consistent with our mediation findings.

Moreover, the positive influence of digital self-efficacy on adaptive performance reinforces broader technology–work research indicating that self-efficacy constitutes a critical driver of performance adaptation in digital contexts. Prior research demonstrates that digital self-efficacy predicts performance quality, engagement, and effective utilization of digital resources (Sun & Yoon, 2025). In AI-integrated workplaces, confidence in digital capabilities may shape whether employees interpret technological transformation as an opportunity for development rather than a threat. Such confidence fosters willingness to experiment with new systems, sustain effort in learning digital tools, and maintain performance under uncertainty. The mediating role of digital self-efficacy therefore highlights a cognitive–motivational pathway linking awareness to performance adaptation, suggesting that exposure to AI-related information alone is insufficient unless accompanied by strengthened self-beliefs.

Similarly, the finding that AIRA stimulates task crafting emphasizes the behavioral dimension of adaptation. Employees who recognize technological transformation may respond by proactively redesigning tasks, modifying work methods, or adjusting task boundaries to improve alignment with evolving job demands. This behavioral response is consistent with prior research indicating that AI-related organizational change can encourage job-crafting behaviors, particularly when employees appraise technological transformation as a challenge that can be managed rather than as an uncontrollable threat (Cheng et al., 2023). Through task crafting, employees exercise agency, maintain meaningfulness in their roles, and invest resources in behaviors that support long-term adaptability — consistent with the resource investment logic of Conservation of Resources Theory (COR). The positive association between task crafting and adaptive performance further confirms that behavioral adjustment complements cognitive readiness in technology-intensive environments. Human agency, autonomy, and proactive job redesign thus remain central to sustainable AI adoption (Wang et al., 2025). Together, the dual mediation pathways through digital self-efficacy and task crafting indicate that adaptive performance emerges from the interaction of internal beliefs and external behavioral adjustments. This integrated explanation helps reconcile contrasting findings in prior literature, where AI adoption has been associated with employee stress and resistance as well as proactive innovation, depending on individual perceptions and coping resources (Cheng et al., 2023).

Psychological resilience further shapes how employees respond to AI and robotics awareness by functioning as a boundary condition in the model. Employees with high resilience are more likely to interpret technological change as an opportunity for learning and growth rather than solely as a source of threat or anxiety (Alitabar & Parsakia, 2025; Khairy, Fayyad & El Sawy, 2025; Khairy, Lee & Al-Romeedy, 2025). Consequently, resilience strengthens the positive association between AIRA and digital self-efficacy because resilient individuals feel more capable of mastering new technologies and transforming awareness into skill development — a pattern consistent with evidence showing that resilience supports digital competence and adaptive functioning (Rashed et al., 2025; Shi et al., 2025). Resilience also amplifies the relationship between AIRA and adaptive performance, as emotionally stable and cognitively flexible employees are better equipped to respond proactively to technological demands (Zainol, 2025; Liu et al., 2025).

Interestingly, the results indicate that psychological resilience weakens the positive relationship between AIRA and task crafting. From a Conservation of Resources perspective, this finding can be interpreted through resource sufficiency logic. Employees with high resilience possess strong internal coping resources that enable them to manage technological uncertainty without necessarily resorting to behavioral job redesign as a compensatory mechanism. In contrast, employees with lower resilience may perceive technological awareness as a stronger threat to resource stability, motivating them to engage in task crafting as a strategy to regain control and protect valued resources. Thus, task crafting appears to function as a resource-compensatory behavior primarily when internal psychological resources are insufficient. When resilience is high, the perceived necessity for task restructuring decreases because employees rely more on internal coping capacities rather than behavioral adjustment to manage technological change (Gerçek et al., 2024; Khairy, Lee & Al-Romeedy, 2025).

An important conceptual clarification emerging from our findings concerns the nature of AI and robotics awareness as operationalized in this study. Although the measurement items include expressions of fear, pessimism, and concerns about job replacement, these indicators should not be interpreted as purely negative psychological states. Instead, from a Conservation of Resources (COR) perspective, fear-oriented awareness represents an informational signal regarding potential resource loss and technological disruption. Such threat appraisal increases environmental vigilance and encourages individuals to invest in resource-building behaviors. When employees recognize potential technological displacement, they may become more motivated to develop digital competencies and strengthen self-efficacy to preserve employability.

Accordingly, perceived technological threat embedded within awareness can stimulate cognitive activation and behavioral adaptation. Rather than leading to defensive withdrawal, fear-based awareness may function as a motivational trigger that promotes digital self-efficacy development and encourages task crafting as a strategic coping mechanism. In this sense, awareness of AI-related disruption initiates resource mobilization processes that contribute to enhanced adaptive performance. This interpretation reinforces the theoretical coherence of the model and highlights the dual nature of awareness — simultaneously capturing technological appraisal and threat perception — as both a diagnostic understanding of change and a catalyst for proactive adjustment.

Overall, the findings should be interpreted as a unified moderated mediation system rather than as separate statistical relationships. The results demonstrate that AI and robotics awareness initiates a cognitive appraisal process that enhances digital self-efficacy, which in turn promotes adaptive performance directly and indirectly through task crafting. At the same time, psychological resilience shapes the strength and direction of these relationships by determining how employees interpret technological change and mobilize personal resources. Taken together, the model suggests that adaptive performance in AI-integrated hospitality environments emerges from the dynamic interaction between technological awareness, personal beliefs, behavioral adjustment, and boundary conditions. This integrated explanation reinforces the theoretical contribution of the study by demonstrating how cognitive, behavioral, and contextual mechanisms operate simultaneously to explain employee adaptation. The strength of the proposed model lies not in individual paths but in the interaction between them, which collectively explains variance in adaptive outcomes.

6. Conclusion

This study examined a moderated mediation model explaining how artificial intelligence and robotics awareness influences employees' adaptive performance through digital self-efficacy and task crafting, while considering the moderating role of psychological resilience. The findings confirm that awareness of technological change operates through both cognitive and behavioral mechanisms to stimulate adaptive outcomes in AI-integrated hotel environments. Moreover, resilience shapes these relationships in complex ways, highlighting boundary conditions in employee adaptation. Overall, the results contribute to understanding how employees respond to technological disruption in the hospitality sector and provide actionable insights for organizations managing AI transformation.

6.1. Implications

6.1.1. Theoretical Implications

This study offers several important theoretical contributions. First, it extends COR theory by demonstrating that AIRA functions as a valuable cognitive resource that not only reduces uncertainty but also initiates resource gain spirals through increased digital self-efficacy and task crafting. The dual mediation pathways suggest that adaptation in technologically dynamic workplaces involves both internal cognitive resources and proactive behavioral investments. This layered resource activation provides a richer understanding of how employees mobilize, protect, and expand their resource reservoirs in response to technological change.

Second, the findings reinforce Social Cognitive Theory by confirming digital self-efficacy as a central psychological mechanism driving employees' adaptive performance. Awareness of AI systems strengthens efficacy beliefs, which in turn motivate adaptive behaviors. This validates the theory's assertion that cognitive appraisals play a central role in shaping work performance, especially in technology-intensive environments.

Third, the study deepens theoretical understanding of psychological resilience by identifying its differential moderating effects on cognitive and behavioral pathways. While resilience enhances the cognitive process leading to adaptive performance, it dampens the behavioral link between awareness and task crafting. This paradox highlights resilience as a complex, context-dependent resource—not universally beneficial, but selectively influential depending on whether the adaptation is cognitive or behavioral. This finding encourages a more nuanced theoretical treatment of resilience within organizational behavior.

Finally, the study contributes to broader adaptation and technology integration theories by illustrating how employees navigate AI-driven transformations. The model clarifies the mechanisms through which technological awareness becomes actionable adaptive performance, providing a multilevel framework that future researchers can extend to other sectors and technological contexts.

6.1.2. Practical Implications

The findings provide several practical recommendations for hotel managers and HR professionals seeking to support employee adaptation to AI-driven transformation. Given that awareness in our study reflects employees' cognitive appraisal of technological change — including perceptions of impact and potential disruption — managerial initiatives should emphasize informed understanding and empowerment rather than focusing solely on technological risks.

First, organizations should design structured AI and robotics awareness initiatives that promote transparency, clarity, and participation. Rather than highlighting automation threats, awareness programs should frame AI and robotics as tools for augmentation, service enhancement, and workload support. Such programs may include demonstrations of AI applications, interactive workshops, and open communication about technological changes and their implications for job roles. Importantly, awareness-building efforts should be accompanied by clear explanations of skill development opportunities and organizational support mechanisms to ensure that employees interpret technological change as manageable and developmental rather than threatening.

Second, managers should implement targeted digital self-efficacy development interventions. These initiatives may include hands-on digital training workshops, e-learning platforms, simulation-based learning environments, and peer mentoring systems. Providing employees with structured opportunities to practice digital tools in safe, low-risk environments strengthens confidence and competence. Incremental mastery experiences are particularly effective in reinforcing employees' beliefs in their ability to work effectively with emerging technologies, thereby facilitating adaptive performance.

Third, hotels should encourage task crafting behaviors by granting employees appropriate autonomy and flexibility in structuring their tasks. Managers can create structured opportunities for employees to redesign workflow processes, integrate digital tools into service delivery, and experiment with new approaches to guest interaction. Organizational mechanisms such as innovation workshops, cross-functional collaboration sessions, and performance evaluation systems that recognize proactive job redesign can foster sustained behavioral adaptation. However, task crafting should be positioned as a development opportunity rather than as a response to technological threat.

Fourth, strengthening psychological resilience remains a strategic priority. Resilience-building initiatives — including training programs, mindfulness interventions, counseling services, and supportive leadership practices — can enhance employees' capacity to cope with technological change. Supervisors play a key role in reinforcing resilience by maintaining transparent communication, providing feedback, and framing AI adoption as an opportunity for professional growth. Because resilience enhances employees' ability to interpret technological change constructively, it supports the translation of awareness into adaptive responses.

Fifth, although resilience may reduce employees' perceived need to modify their tasks in response to technological change, it remains essential for maintaining psychological stability and sustainable performance. Managers should therefore balance resilience development with structured opportunities for task crafting, ensuring that employees are supported emotionally while also being encouraged to proactively redesign their work when necessary. Rather than creating competing expectations, these initiatives should be positioned as complementary adaptation strategies.

Finally, managers should recognize that resilience may reduce employees' perceived need to modify tasks reactively. To ensure continuous behavioral adaptation, organizations can integrate structured task-crafting prompts, periodic reflection sessions, and technology-supported job redesign programs into formal HR practices. Aligning resilience development with institutionalized opportunities for proactive adaptation ensures that both cognitive understanding and behavioral engagement remain active and mutually reinforcing in AI-integrated workplaces.

6.2. Limitations and Future Research

Given the cross-sectional design of the study, the causal directions proposed in the mediation model cannot be definitively established. Although the hypothesized relationships are theoretically grounded in Conservation of Resources theory and Social Cognitive Theory, the findings should be interpreted as associative rather than causal. It is also possible that reciprocal or reverse relationships exist; for example, employees with higher adaptive performance may develop stronger digital self-efficacy or greater awareness of technological change over time. Future research should employ longitudinal or experimental designs to provide stronger evidence regarding temporal ordering and causal inference. In other words, it is important to note that the cross-sectional design of this study limits the ability to draw definitive causal inferences among the examined variables. Although the proposed relationships are theoretically grounded, the findings should be interpreted as associative rather than causal. Future research is encouraged to employ longitudinal or experimental designs to better establish causal relationships.

Although the study was conducted using convenience sampling within five-star hotels located primarily in Greater Cairo, this approach may limit the generalizability of the findings to other geographic regions or hospitality categories. Organizational culture, technological maturity, and labor market conditions may differ across cities and countries, potentially influencing employees' perceptions of AI and robotics awareness and adaptive performance. Future research should replicate the model across different regions, hotel categories, and international contexts to test the robustness and cross-cultural applicability of the findings.

Although adaptive performance and task crafting were measured using validated self-report scales, reliance on perceptual data may introduce common method bias and social desirability effects. Future research may benefit from incorporating supervisor ratings, behavioral observations, or objective performance indicators to reduce perceptual bias and enhance measurement robustness. Multi-source data collection would strengthen the validity of behavioral constructs and provide a more comprehensive assessment of employee adaptation.

In addition, future research may apply multilevel structural equation modeling to explicitly examine hotel-level technological infrastructure as a contextual predictor of employee adaptation. Organizational-level factors such as digital infrastructure, AI implementation maturity, and technological investment may shape individual perceptions and behaviors. A multilevel approach would allow researchers to better capture cross-level influences and clarify how organizational context interacts with employee-level psychological resources.

Finally, although the theoretical framework is grounded in Conservation of Resources theory and Social Cognitive Theory, the current design limits the examination of dynamic resource processes over time. Future research could adopt longitudinal designs to explore how resource gain or loss cycles unfold during technological transformation and how adaptive behaviors evolve in response to sustained AI integration.

Declaration of Conflicting Interests

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Author contributions

Wagih M. E. Salama: Conceptualization, writing—original draft preparation, writing—review and editing, funding acquisition, supervision, visualization.

Hazem Ahmed Khairy: conceptualization, methodology, software, validation, formal analysis, data curation, writing—original draft preparation, writing—review and editing, supervision, visualization.

Data availability

Data not available.

Use of Artificial Intelligence

The authors declare that no artificial intelligence tools were used in the development, analysis, or writing of this manuscript.

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Appendix (A)

Measurement Scales	
Artificial intelligence and robotics awareness (AIRA)	AIRA1. I am worried that my work will be replaced by artificial intelligence machines. AIRA2. I am worried that what I do now in my job may be replaced by machines with AI and robotics. AIRA3. I am very pessimistic about the future of the hotel where I work because employees may be replaced by AI systems. AIRA4. I am pessimistic about the future of the hotel industry as a whole because employees may be replaced by AI systems.
Adaptive performance (AP)	AP1. I know that every customer requires a unique approach. AP2. I can easily change to another approach when he or she feels that his or her approach is not working. AP3. I like to experiment with different approaches. AP4. I do not change his or her approach from one customer to another (–). AP5. I am very sensitive to the needs of his or her customers. AP6. I find it difficult to adapt his or her style to certain customers (–).* AP7. I vary my approach from situation to situation. AP8. I try to understand how one customer differs from another. AP9. I feel confident that he or she can effectively change his or her approach when necessary. AP10. I treat all customers pretty much the same (–).
Digital self-efficacy	DSE1. I believe I can succeed at almost any endeavour to which I set my mind by utilizing digital technologies. DSE2. Even when things are tough, I can perform quite well by utilizing digital technologies. DSE3. I will be able to achieve most of the goals that I have set for myself by utilizing digital technologies. DSE4. When facing difficult tasks, I am certain that I will accomplish them by utilizing digital technologies. DSE5. Compared to other people, I can do most tasks very well by utilizing digital technologies. DSE6. I will be able to successfully overcome many challenges by utilizing digital technologies. DSE7. I am confident that I can perform effectively in many different tasks by utilizing digital technologies. DSE8. In general, I think that I can achieve outcomes that are important to me by utilizing digital technologies.
Task crafting	TC1. I will introduce new ideas to improve my work. TC2. I will change the scope or type of tasks in my job. TC3. I bring in new tasks that better match my skills or interests. TC4. I choose to take on extra tasks at work. TC5. I prioritize tasks that match my skills or interests.
Employees' psychological resilience (EPR)	EPR1. I tend to bounce back quickly after hard times. EPR2. I have a hard time making it through stressful events (R). EPR3. It does not take me long to recover from a stressful event. EPR4. It is hard for me to snap back when something bad happens (R). EPR5. I usually come through difficult times with little trouble. EPR6. I tend to take a long time to get over setbacks in my life (R).

Appendix (B)

Model fit and quality indices (Kock, 2021)			
	Assessment	Criterion	Mark
Average path coefficient (APC)	0.315, P<0.001	P<0.05	√
Average R-squared (ARS)	0.464, P<0.001	P<0.05	√
Average adjusted R-squared (AARS)	0.461, P<0.001	P<0.05	√
Average block VIF (AVIF)	1.586	Acceptable if ≤ 5, ideally ≤ 3.3	√
Average full collinearity VIF (AFVIF)	2.274	Acceptable if ≤ 5, ideally ≤ 3.3	√
Tenenhaus GoF (GoF)	0.555	Small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36	√
Sympson's paradox ratio (SPR)	0.750	Acceptable if ≥ 0.7, ideally = 1	√
R-squared contribution ratio (RSCR)	0.937	Acceptable if ≥ 0.9, ideally = 1	√
Statistical suppression ratio (SSR)	1.000	Acceptable if ≥ 0.7	√
Nonlinear bivariate causality direction ratio (NLBCDR)	0.813	Acceptable if ≥ 0.7	√
Standardized root mean squared residual (SRMR)	0.102	Acceptable if <= 0.1	√
Standardized mean absolute residual (SMAR)	0.079	Acceptable if <= 0.1	√
Standardized chi-squared with 779 degrees of freedom (SChS)	14.132, P<0.001	P<0.05	√
Standardized threshold difference count ratio (STDCR)	0.956	Acceptable if >= 0.7, ideally = 1	√
Standardized threshold difference sum ratio (STDSR)	0.854	Acceptable if >= 0.7, ideally = 1	√