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An Embodied Cognition Approach to AI Adoption in Hospitality: Integrating Sensory Perception, Emotional Activation, and Behavioral Outcomes in Egypt

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ABSTRACT

This research examines the factors influencing the adoption of AI technologies in the hospitality sector, focusing on key variables such as sensory perception, sensory realism, anthropomorphism, cognitive appraisal, emotional activation, intention to adopt, willingness to recommend, and actual usage. An online questionnaire was collected from 400 Egyptian consumers to capture their perceptions and attitudes towards AI in hospitality settings. The results reveal that both emotional and cognitive factors play a significant role in consumers' intention to adopt AI, with sensory realism and anthropomorphism positively influencing user satisfaction and engagement. This research contributes to a deeper understanding of AI adoption in the hospitality industry, offering practical implications for industry practitioners aiming to enhance consumer experience and optimize service delivery. The research also lays the groundwork for future research in technology acceptance and the transformative impact of AI on hospitality services.

Introduction

Despite the growing body of literature on AI adoption in hospitality, much of the existing research has primarily focused on cognitive-utilitarian models such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). These models emphasize perceptions of usefulness and ease of use, overlooking the critical sensory and emotional dimensions of technological interactions that are particularly relevant in hospitality contexts, where experiences are immersive and emotionally charged **(Belanche et al., 2020).** This gap is especially significant as the adoption of embodied AI technologies—such as humanoid robots, service drones, and voice assistants—requires a deeper understanding of how sensory engagement and emotional activation influence guests' behaviors, loyalty, and long-term engagement (**Huang & Rust, 2021;Ben Saad, 2024).**

According to **Crouch et al. (2024) and Liao et al. (2025) have** recently called for a theoretical framework that encompasses the entire spectrum of emotional, sensory, and embodied interactions that influence consumer decision-making, underscoring the significance of incorporating embodied experiences into AI research. For instance, by increasing consumers' emotional engagement, such a framework could boost willingness to recommend and long-term use. To address this gap, the current study introduces Embodied Cognition Theory as a novel theoretical lens to conceptualize how embodied interactions—through sensory cues and emotional responses—shape behavioral intentions in hospitality contexts, including AI adoption, recommendation, and usage".

Moreover, recent studies have shown that AI-driven technologies that enhance sensory experiences, such as personalized digital assistants in hotels, foster emotional engagement and improve overall satisfaction, thereby driving higher adoption rates **(Rocha et al., 2023).** These positive emotional and sensory experiences not only enhance the functional benefits of AI technologies but also build a strong emotional connection between the consumer and the technology, promoting long-term usage and brand loyalty. Therefore, this study underscores the importance of integrating embodied cognition into AI research, emphasizing how sensory and emotional experiences with AI technologies are critical drivers of consumer adoption and satisfaction in hospitality.

Sensorial Perception in AI-Driven Hospitality Environments

Sensorial perception serves as a foundational construct in understanding consumers' responses to AI integration in hospitality environments. Defined as the multisensory processing of environmental stimuli—including visual, auditory, olfactory, tactile, and gustatory cues—it shapes how guests interpret and emotionally engage with service experiences **(Van Tonder & Louw, 2020)**. In AI-driven settings such as robotic hotels and smart restaurants, sensorial inputs (e.g., ambient lighting, humanoid robot design, and soundscapes) play a pivotal role in forming affective impressions and enhancing the perceived authenticity of the service interaction **(Huang & Benyoucef, 2020).** Recent empirical studies confirm that sensorial perception not only influences emotional arousal but also fosters stronger affective attachment. Realistic and congruent sensory stimuli are found to evoke feelings of delight, trust, and psychological comfort, thereby activating emotional engagement—a key mediating process between perception and behavioral outcomes **(Belanche et al., 2020; Choi et al., 2021).** This emotional activation, in turn, significantly enhances consumers' intention to adopt AI technologies, recommend them to others, and engage in repeated usage **(Chatterjee & Nguyen, 2021).** Moreover, sensorial-rich environments positively affect cognitive appraisals, such as judgments of system reliability, service competence, and perceived usefulness, thus reinforcing long-term technology acceptance **(Shin & Jeong, 2020; Tussyadiah, 2020)**. Consequently, sensorial perception should not be viewed merely as a peripheral design element but as a core psychological mechanism that stimulates both emotional and cognitive pathways toward AI adoption in hospitality.

The Influence of Sensory Realism on Emotional Activation and Cognitive Appraisal in Hospitality

Sensory realism, which refers to the authenticity and richness of sensory stimuli in hospitality environments, significantly influences consumers' emotional and cognitive responses. Environments that effectively engage multiple senses can enhance emotional activation, leading to more memorable and satisfying guest experiences, for instance, a study by **Alyahya and McLean, (2022),** found that tourists' sensory experiences positively affected their emotional responses and destination loyalty, highlighting the importance of sensory stimuli in shaping emotional engagement especially in virtual reality technique. Furthermore, sensory realism impacts cognitive appraisal processes, where guests interpret and evaluate their experiences.

In hospitality contexts, authentic sensory experiences can positively influence these appraisals, leading to favorable evaluations of service quality and value. Additionally, **Fong et al. (2023)** demonstrated that sensory-rich environments facilitate deeper cognitive processing, enhancing guests' understanding and appreciation of service offerings. Collectively, these findings underscore the importance of integrating sensory realism into hospitality design to foster emotional engagement and positive cognitive assessments. **Saribaş and Demir (2024**) showed that hotel sensory features have a big influence on visitors. Hotels might not completely understand the value of sensory features in improving the overall experience of visitors, despite their vitality. According to the study, the sensory aspects have a significant impact on how visitors perceive emotional and cognitive.

Anthropomorphism in Hospitality AI Contexts

Anthropomorphism, defined as the attribution of human characteristics, emotions, or intentions to non-human entities, plays a crucial role in shaping consumer perceptions and interactions with AI-driven service technologies in the hospitality industry **(Kwak et al., 2020).** In hospitality settings, the integration of human-like features—such as facial expressions, gestures, voice modulation, and emotional responsiveness—has been shown to enhance perceptions of reliability, awareness, trustworthiness, and social presence in service robots and virtual assistants **(Belanche et al., 2020; Lu et al., 2020; Hwang & Lyu, 2021)**. Existing literature in hospitality underscores that anthropomorphic design significantly contributes to emotional activation, whereby consumers experience heightened emotional engagement when interacting with human-like AI agents **(Kim & Lee, 2021; Choi et al., 2021).** This emotional engagement serves as a mediating mechanism between anthropomorphism and consumers' cognitive appraisal of service quality, subsequently influencing their behavioral intentions **(Tussyadiah, 2020;Gao & Bai, 2021)**. Furthermore, anthropomorphism fosters a sense of familiarity and psychological comfort, which has been positively associated with consumers' intention to adopt AI technologies and recommend them within hospitality contexts **(Zhang et al., 2021**).

The relationship between anthropomorphism and both mediating variables (emotional activation and cognitive appraisal) and dependent variables (intention to adopt, willingness to recommend, and actual usage) is well-established in hospitality

research. For instance, **Li et al. (2024)** found that consumers interacting with anthropomorphic service robots in hotel environments reported higher levels of acceptance and satisfaction, driven by both emotional and cognitive evaluations. Empirical studies have further indicated that anthropomorphic interactions lead to more positive guest experiences and contribute to enhanced brand loyalty **(Seo, 2022).** Thus, anthropomorphism not only elevates user experience but also acts as a strategic design element that drives favorable consumer outcomes in AI-integrated hospitality environments **(Mehta & Raithel, 2020).** According to **Schroeder and Zwick (2019),** highly anthropomorphic destination videos enhance travelers' perception of AI-driven innovation by aligning cultural norms with technological advancements, thereby improving both psychological and cognitive perceptions of the destination's investment in intelligent solutions.

Emotional activation and its role in increasing consumers' motivation and willingness to recommend AI

Emotional activation constitutes a critical affective mechanism within AI-enhanced hospitality environments, referring to the degree to which individuals experience aroused emotional states—whether positive or negative—through their interactions with intelligent service technologies. In the hospitality domain, this construct has emerged as a central driver of guest evaluations, particularly in contexts involving embodied AI agents and anthropomorphic features **(Gao & Bai, 2021).** Emotionally evocative experiences—elicited through personalized AI interactions, multisensory atmospheres, and lifelike service behaviors—facilitate deeper emotional resonance between consumers and service technologies **(Li et al., 2024).** Elevated emotional activation enhances users' subjective assessments of the service encounter, strengthens affective intention to adopt, and fosters emotional attachment toward both the service interface and the brand **(Islam et al., 2025).** These affective processes have been empirically linked to key behavioral outcomes, including intention to adopt, willingness to recommend, and actual usage (**Wang, 2025).**

Moreover, emotional activation significantly informs cognitive appraisal, the study's mediating construct, by shaping evaluative judgments concerning the instrumental value, perceived usefulness, and congruence of AI technologies with users' personal goals and expectations **(Choi et al., 2021).** The dynamic interplay between emotional arousal and rational evaluation underpins technology acceptance frameworks, particularly in AI-augmented service settings. Importantly, emotional activation exerts both direct and indirect influences on downstream behavioral responses, wherein affective engagement enhances perceived service quality, psychological comfort, and overall experiential value **(Casais et al., 2025).** Studies grounded in hospitality contexts demonstrate that consumers who form emotional bonds with robotic or AI-powered services are more inclined to exhibit favorable adoption intentions and stronger advocacy behaviors. Thus, emotional activation operates not only as an antecedent to psychological commitment but also as a catalyst for enriching the experiential and behavioral viability of AI-infused hospitality offerings.

Embodied Cognition Theory

Embodied Cognition Theory offers a compelling framework for understanding consumer interactions with AI technologies in hospitality settings. This theory posits that cognitive processes are deeply rooted in the body's interactions with its environment, suggesting that perception, emotion, and action are inherently linked **(Wilson, 2002).** In the hospitality context, this implies that consumers' evaluations and behavioral intentions toward AI-powered services are significantly influenced by their embodied sensory experiences. Sensory cues such as the visual realism of AI avatars, the naturalness of their voices, and the authenticity of their interactions can trigger emotional responses that shape cognitive appraisals and subsequent adoption behavior **(Belanche et al., 2020; Zhang et al., 2021).** Anthropomorphic features of AI systems, when perceived as human-like, further enhance the embodiment experience, fostering emotional engagement and trust **(Lu et al., 2020).** By grounding abstract technological interactions in tangible sensory and affective experiences, embodied cognition helps explain how users form attitudes and decisions about AI use in hospitality services. This perspective aligns with recent hospitality research emphasizing the importance of multisensory design, emotional activation, and perceived realism in driving consumer satisfaction and behavioral outcomes **(McLean & Osei-Frimpong, 2019; Tussyadiah, 2020).**

The Mediating Role of Emotional Activation in the Adoption of Artificial Intelligence in Hospitality

Emotional activation serves as a crucial mediating variable linking sensory perception, sensory realism, and anthropomorphism to consumers' behavioral intentions—specifically, intention to adopt and willingness to recommend—within the context of AI adoption in the hospitality industry. Grounded in embodied cognition and affective processing theories, sensory stimuli (such as visual, auditory, and tactile cues) and perceived sensory realism (the extent to which AI technologies mimic reality) elicit emotional responses that subsequently shape cognitive evaluations and decision-making behaviors **(Barsalou, 2008).** Additionally, anthropomorphism—attributing human-like characteristics to AI agents—amplifies emotional engagement and enhances feelings of familiarity and trust **(Kim & Bae, 2025).**

When guests engage in emotionally charged interactions with AI technologies—whether through humanoid service robots, immersive intelligent interfaces, or realistic simulations—emotional activation becomes a key mechanism that links experiential inputs to attitudinal and behavioral outcomes. Empirical evidence suggests that emotional activation mediates the relationship between sensory stimuli and the intention to adopt AI-driven hospitality services, especially when these technologies are perceived as emotionally and socially competent **(Kim et al., 2022).** Moreover, emotionally stimulating interactions significantly contribute to guests' willingness to recommend the service, as emotionally engaged consumers are more likely to share positive experiences **(Horng et al., 2024).** Therefore, emotional activation not only shapes immediate impressions but also serves as an effective

pathway for translating sensory and anthropomorphic cues into long-term behavioral intentions **(Li et al., 2024).** This mediating role underscores the strategic importance of designing emotionally resonant AI experiences that integrate realistic simulation with human-like attributes to foster emotional bonds and drive adoption and recommendation behaviors in hospitality settings.

Cognitive appraisal

Cognitive appraisal refers to the process through which individuals evaluate and interpret environmental stimuli based on personal relevance, goals, and prior experiences. In the context of AI adoption in the hospitality industry, cognitive appraisal is a pivotal psychological mechanism that determines how guests assess the functionality, emotional resonance, and experiential value of AI-driven services. It serves as a bridge between the sensory and emotional experiences provided by anthropomorphized or sensorial rich AI technologies and the rational evaluation of their utility and trustworthiness **(Horpynich et al., 2025).** The cognitive evaluation of AI interfaces—such as robot concierges, voice assistants, or immersive service platforms—guides guests in forming judgments regarding trust, usefulness, and authenticity, which directly shape their behavioral intentions (**Belanche et al., 2020).** When these technologies are perceived as emotionally congruent and contextually intelligent, users are more likely to develop positive attitudes and demonstrate higher levels of engagement, loyalty, and recommendation behavior **(Song et al., 2025).**

Furthermore, cognitive appraisal mediates the relationship between emotional activation and behavioral responses. According to the appraisal theory of emotion, individuals first experience an emotional response, which is then cognitively appraised before forming an intention to act **(Lazarus, 1991).** In hospitality environments where AI is deployed, this implies that guests' emotional reactions to AI services—such as surprise, delight, or discomfort—are filtered through cognitive interpretation, which subsequently influences their trust and continued use of the service **(Park et al., 2024).** Hence, cognitive appraisal does not merely represent an internal evaluative response but functions as a transformative mechanism that links technologically mediated experiences with consumers' trust, behavioral commitment, and long-term loyalty within smart hospitality ecosystems.This mediating role has been further corroborated in hospitality research, where cognitive evaluations of AI-based services were found to significantly influence consumer engagement, loyalty intentions, and overall satisfaction **(Tuomi et al., 2022; Bai et al., 2024).**

Intention to Adopt

The concept of "intention to adopt" functions as a pivotal mediating variable in numerous technologies acceptance frameworks, serving as the psychological conduit between consumers' cognitive-affective evaluations and their subsequent behavioral actions. Within the hospitality context, intention to adopt reflects a guest's predisposition or willingness to engage with AI-driven technologies across various service touch points, including hotels, restaurants, and digital booking platforms. Previous studies have underscored that this construct is profoundly influenced by a spectrum of perceptual and emotional antecedents—namely, sensorial perception,

sensory realism, anthropomorphism, emotional activation, and cognitive appraisal **(Hu & Min, 2025).** The more these stimuli evoke a sense of authenticity, human-likeness, and affective engagement, the stronger the consumer's intention to engage with AI-based services becomes. Moreover, the intention to adopt not only predicts future usage behavior but also serves as a robust mediating mechanism that links upstream cognitive-emotional variables to downstream outcomes such as actual usage and willingness to recommend **(Parvez et al., 2025).** For instance, **Wüst and Bremser (2025)**, emphasize that consumers' intentions, shaped by service perceptions and emotional resonance with AI, critically determine whether these technologies are embraced or rejected in real-world settings. According to **Fakfare et al. (2025),** the intention to adopt AI in hospitality is significantly influenced by socio-cultural and economic factors, particularly in developing countries. While consumers in developed regions may be more inclined to adopt AI due to technological familiarity, those in developing regions require stronger incentives, such as enhanced personalization and service efficiency, to drive adoption. This highlights the need for AI features to align with diverse consumer expectations across global markets. As such, intention to adopt plays a dual role: as an outcome of complex perceptual-emotional processes and as a precursor to sustained behavioral loyalty. Investigating this construct within the AI-driven hospitality landscape offers valuable insights into how emotionally engaging and cognitively satisfying service experiences translate into actionable guest behaviors.

Willingness to Recommend

Willingness to recommend is a critical behavioral outcome that encapsulates consumers' satisfaction, emotional resonance, and cognitive congruence with the overall service experience, particularly in contexts involving AI-enabled technologies in hospitality. Conceptually, it reflects a guest's expressed intention to endorse a service, product, or establishment to others—acting as a proxy for trust, loyalty, and affective commitment (**Hon et al., 2022).** In AI-integrated hospitality environments, this construct gains heightened relevance, as it is strongly influenced by guests' perceptions of technological usefulness, usability, anthropomorphic attributes, and the ability of AI to simulate human-like interaction **(Gajić et al., 2024).** Empirical findings highlight that willingness to recommend is shaped by a range of perceptual and psychological antecedents—such as sensorial perception, sensory realism, and anthropomorphism—that activate emotional and cognitive mechanisms, ultimately leading to advocacy behavior (**Belanche et al., 2020; Gao & Bai, 2021**). As such, willingness to recommend operates as a key dependent variable, representing the extent to which AI adoption fosters consumer engagement, satisfaction, and brand ambassadorship **(Li et al., 2024).** Moreover, **Lee et al. (2024)** provide compelling evidence that emotionally and cognitively rich interactions with service robots in hotel settings significantly enhance guests' recommendation intentions, particularly when experiences are marked by affective stimulation and perceived value. This underscores the mediating role of emotional activation and cognitive attachment—constructs that translate AI interface features into positive behavioral outcomes. Supporting this, **Ivanov and Webster (2021)** found that satisfaction with humanoid

service robots significantly increases recommendation intentions, especially when emotional intelligence and interpersonal resonance are perceived as high.

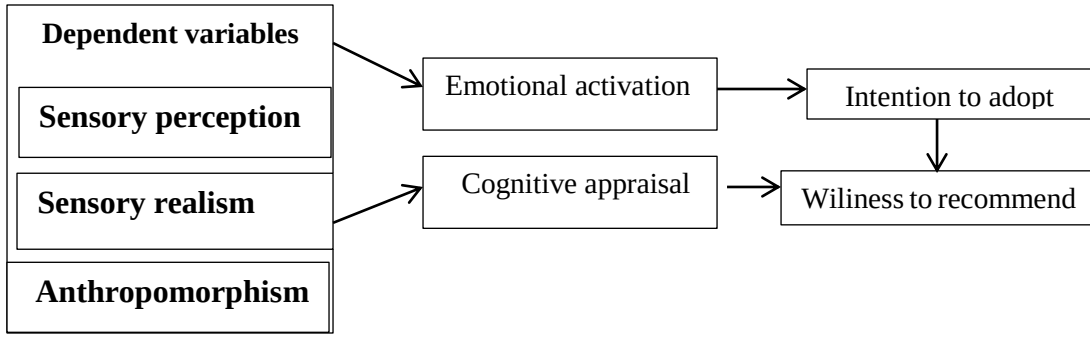

Figure (1) conceptual framework

Hypotheses Development (Direct Hypotheses)

Based on the theoretical foundations and empirical findings, the following direct hypotheses are proposed:

H1. Sensorial perception exerts a statistically significant positive direct effect on emotional activation in AI-enabled hospitality experiences.

H2. Sensory realism has a statistically significant positive direct effect on emotional activation.

H3. Anthropomorphism significantly and positively influences emotional activation.

H4. Sensorial perception exerts a statistically significant positive direct effect on cognitive appraisal.

H5. Sensory realism positively and significantly influences cognitive appraisal.

H6. Anthropomorphism has a statistically significant positive direct effect on cognitive appraisal.

H7. Emotional activation significantly and positively influences consumers' intention to adopt AI technologies in hospitality settings.

H8. Cognitive appraisal exerts a statistically significant positive direct effect on the willingness to recommend AI-based services.

H9. Intention to adopt AI technologies significantly and positively affects the willingness to recommend them to others.

Indirect (Mediated) Hypotheses

Given the proposed mediating roles of emotional activation and cognitive appraisal, the following indirect hypotheses are formulated:

H10. Sensorial perception indirectly influences intention to adopt through the mediation of emotional activation.

H11. Sensory realism indirectly affects intention to adopt via emotional activation.

H12. Anthropomorphism exerts an indirect effect on intention to adopt through emotional activation.

H13. Sensorial perception has an indirect impact on intention to adopt through cognitive appraisal.

H14. Sensory realism indirectly influences intention to adopt via cognitive appraisal.

H15. Anthropomorphism indirectly affects intention to adopt through cognitive appraisal.
H16. Sensorial perception indirectly impacts the willingness to recommend through emotional activation.
H17. Sensory realism exerts an indirect effect on willingness to recommend through emotional activation.

3. Methodology

3.1. Research Design

This research employed a quantitative, cross-sectional research design to examine the relationships among the eight core constructs: sensorial perception, sensory realism, anthropomorphism, emotional activation, cognitive appraisal, intention to adopt, willingness to recommend, and actual usage of AI technologies in the hospitality industry. The model was grounded in embodied cognition theory and informed by relevant literature in AI and hospitality contexts.

3.2. Data Collection

To empirically test the proposed model, a structured electronic questionnaire was developed based on previously validated scales adapted to the hospitality and AI context. The survey was designed in English and translated into Arabic using a back-translation technique to ensure semantic equivalence. The questionnaire was distributed online through social media platforms and email lists using a non-probability purposive sampling technique targeting Egyptian consumers who had previous experience or exposure to AI-based services in the hospitality sector.

3.3. Sample and Respondents

A total of 400 valid responses were collected from Egyptian consumers. Respondents were screened to ensure they had interacted with at least one AI-enabled service (e.g., AI concierge, voice assistant, robot waiter) in a hospitality setting (e.g., hotels, restaurants, travel platforms). The sample included diverse demographic characteristics, allowing for adequate representation of the target population.

3.4. Measures and Instrumentation

Each construct was measured using multi-item Likert-type scales ranging from 1 (strongly disagree) to 5 (strongly agree). The items were drawn from prior studies published in high-ranking hospitality and technology journals. Reliability and validity of the measurement model were assessed using confirmatory factor analysis (CFA) prior to hypothesis testing. The study incorporates several key variables that influence the adoption of AI technologies in the hospitality industry. Sensory Perception **(Tussyadiah, 2020)** focuses on how individuals perceive environmental features when interacting with AI systems in hospitality settings. Sensory Realism **(Belanche et al., 2020)** examines the authenticity of sensory cues (e.g., visuals and sound) provided by AI interfaces. Anthropomorphism **(Zhang et al., 2021)** explores how users perceive AI systems as having human-like characteristics, which enhances user engagement. Cognitive Appraisal **(Rasheed et al., 2023)** addresses how individuals

assess the utility and value of AI technologies before adopting them. Emotional Activation (Song investigates the emotional responses triggered by AI interactions in hospitality, influencing adoption intentions.

Intention to Adopt **(Song et al., 2022)** reflects individuals' plans to use AI-powered services in the future. Finally, Willingness to Recommend **(Mehta& Raithel, 2020)** examines how satisfied users are likely to recommend AI-based hospitality services to others. These variables collectively form the basis for understanding the factors that drive AI adoption in the hospitality industry.

3.5. Data Analysis

The data were analyzed using structural equation modeling (SEM) with the software package AMOS 26.0. The analysis involved two main stages: first, assessment of the measurement model to ensure convergent and discriminant validity; second, testing of the structural model to evaluate the hypothesized direct and indirect relationships.

Table (1) Demographic Analysis

Demographic variable		Frequencies	%
Sex	Male	227	56.75
	Female	173	43.25
Age	Below 25	52	13
	From 25 : 34	168	42
	From 35:44	94	23.5
	From 45:54	56	14
	Above 55	30	7.5
Educational level	Secondary school	41	10.25
	Diploma	92	21.5
	University	181	45.25
	Higher studies	86	23
Income	Below 3000 EGP	19	4.75
	From 3000:5999 EGP	131	23.5
	From 6000:8999 EGP	156	39
	Above 9000 EGP	94	32.75
AI experience	Once	128	32
	From 2 :3 times	151	37.75
	Above 3 times	121	30.25

The demographic profile of the 400 respondents reflects a well-structured and analytically suitable sample for examining the adoption of AI technologies within the

hospitality sector. In terms of gender distribution, 56.75% of participants were male and 43.25% were female, indicating a modest male predominance but maintaining a balanced representation conducive to comparative gender analysis. Age-wise, the majority of respondents 42% were aged between 25 and 34 years, followed by 23.5% in the 35–44 age group, and 14% from 45:54.

This concentration of younger and middle-aged adults—demographics typically more familiar and comfortable with technological innovation—supports the relevance of the sample to AI-related research. With respect to educational attainment, 45.25% held a university degree and 23% had completed postgraduate studies, suggesting that the majority of participants possess a high level of academic qualification. Such educational backgrounds are crucial for ensuring respondents can critically evaluate emerging service technologies and provide reflective insights. Income levels further reinforce the sample's technological engagement potential, with 39% earning between EGP 6,000 and 8,999 and 32.75% earning above EGP 9,000 monthly. These figures indicate that the sample predominantly comprises middle-to-upper income individuals, a group more likely to interact with and appreciate premium AI-enabled hospitality services.

Experience with AI technologies in hospitality was notably high: 32% of respondents reported previous usage, with 37.75% indicating interaction 2–3 times and 30.25% more than three times. The AI applications experienced included chatbots, facial recognition, self-ordering kiosks, tablet-based menus, and barcode scanning systems. This extensive exposure suggests a well-informed respondent base capable of offering nuanced evaluations of AI-driven service experiences. Collectively these demographic characteristics align well with the research's objectives, which center on examining perceptual, emotional, and behavioral responses to AI in hospitality contexts. The concentration of highly educated, tech-savvy individuals within the 25–44 age segments offer a valuable lens through which to understand consumer readiness and adoption behaviors, while also providing strategic implications for hospitality providers seeking to target innovation-receptive market segments.

Table (2) Constructs Validity and Reliability

Variable name	Factor loading	Mean	SD	AVE	CR	A(alpha)
Sensory perception	0.73-0.84	5.41	1.12	0.676	0.881	0.847
Sensory realism	0.74-0.86	5.29	1.09	0.692	0.889	0.855
Anthropomorphism	0.71-0.82	5.06	1.14	0.651	0.870	0.833
Emotional activation	0.76-0.85	5.33	1.07	0.698	0.893	0.860
Cognitive appraisal	0.72-0.84	5.17	1.11	0.673	0.879	0.842
Intention to adopt	0.79-0.88	5.45	1.06	0.721	0.901	0.871
Wiliness to recommend	0.81-0.89	5.51	1.02	0.736	0.912	0.885

All constructs exhibit high levels of internal consistency reliability (CR > 0.88) and convergent validity (AVE > 0.65), with item loadings exceeding the recommended threshold of 0.70. To evaluates the discriminant validity of the research

measurements, the researchers used two reliable methods the Fornell-Larcker criterion and HTMT. applying the Fornell-Larcker criterion, the authors compared the diagonal values (the square roots of the AVE) with the correlation values listed below. Findings consistently revealed that the diagonal values exceeded the Corresponding correlation values. This indicates significant level of discriminant validity in line with the criteria set by **fornell and Larcker (1981)** in the following table.

Table (3) Discriminant validity fornell –lacker criterion

	1	2	3	4	5	6	7
1-Sensory perception	0.82						
2-Sensory realism	0.61	0.83					
3-Anthropohism	0.54	0.58	0.81				
4-Emotional activation	0.57	0.60	0.56	0.84			
5-Cognitive appraisal	0.50	0.53	0.51	0.58	0.82		
6-Intention to adopt	0.47	0.49	0.48	0.55	0.64	0.85	
7-Wiliness to recommend	0.45	0.47	0.46	0.52	0.61	0.69	0.86

To assess the discriminant validity of the measurement model, the research applied the Fornell-Larcker criterion, which compares the square roots of the AVE values for each construct with the inter-construct correlations. According to this criterion, discriminant validity is supported if the square root of the AVE for each construct is greater than the correlation values between that construct and any other construct. The results of the Fornell-Larcker criterion, as presented in the table, show that the diagonal values (representing the square roots of the AVE) exceed the corresponding correlation values. For example, the square root of the AVE for "Sensory Perception" (0.82) is greater than the correlations it shares with other constructs, such as "Sensory Realism" (0.61). This pattern is consistently observed across all constructs, demonstrating that each construct is sufficiently distinct from the others. These findings provide strong evidence of discriminant validity, indicating that the constructs in the research measure distinct, non-overlapping dimensions of the AI adoption framework. This supports the robustness of the measurement model and ensures that the constructs can be interpreted independently within the structural model.

Table (4) Discriminant validity HTMT Ratio

	1	2	3	4	5	6	7
1-Sensory perception							
2-Sensory realism	0.68						
3-Anthropohism	0.61	0.66					
4-Emotional activation	0.65	0.69	0.63				
5-Cognitive appraisal	0.57	0.60	0.58	0.64			
6-Intention to adopt	0.53	0.56	0.55	0.61	0.70		
7-Wiliness to recommend	0.51	0.54	0.53	0.59	0.66	0.74	

The discriminant validity of the constructs in this research was assessed using the Heterotrait-Monotrait (HTMT) ratio, a method that provides strong evidence of discriminant validity when the ratio of the correlations between constructs is below the threshold of 0.85 (Henseler et al., 2015). Table X presents the HTMT ratios for all pairwise comparisons among the constructs. The results indicate that all HTMT values are well below the conservative threshold of 0.85, suggesting that each construct in the research is empirically distinct from the others. Specifically, the highest HTMT value observed is 0.74 (between "Intention to adopt" and "Willingness to recommend"), which is far from the cutoff, indicating that the constructs are not overlapping in their measurement. Other pairwise comparisons, such as between "Sensory perception" and "Sensory realism" (HTMT = 0.68), and between "Emotional activation" and "Cognitive appraisal" (HTMT = 0.64), also reflect low correlations, further confirming the distinctiveness of each construct in the model.This evidence of discriminant validity is crucial for ensuring the integrity of the measurement model, as it demonstrates that the constructs measure unique and separate aspects of consumer perceptions and behaviors in the context of AI adoption in hospitality.

By confirming that there is no undue overlap between the constructs, this analysis strengthens the foundation for subsequent structural model testing, enabling a more accurate interpretation of the relationships among the variables under study.

Table (5) Model Fit Assessment

Fit index	T-value	P-value	Interpretation
Chi-square / df	2.14	` 3	Acceptable fit model
Comparative Fit Index(CFI)	0.947	0.90	Good model fit
Tucker -lewis index (TLI)	0935	0.90	Strong structure consistency
Root mean square Error Approximation (RMSEA)	0.054	`0.08	Adequate fit
Standard root mean (SRMR)	0.046	0.08	Excellent residual fit

The results of the model fit indices indicate a satisfactory alignment between the proposed conceptual framework and the empirical data. Specifically, the Chi-square/df value (2.14) falls within the acceptable range, suggesting a tolerable level of model complexity. Both the CFI (0.947) and TLI (0.935) exceed the recommended threshold of 0.90, indicating strong model adequacy. Furthermore, RMSEA (0.054) and SRMR (0.046) fall within acceptable limits, reinforcing the model's goodness of fit. Collectively, these indices demonstrate that the hypothesized model is statistically sound and suitable for structural path analysis.

Table (6) Direct Path Analysis Table

Path	Standard coeffient (β)	T – Value	Significance	Results
Sensory perception Emotional activation	0.47	6.23	P ≤0.001	**Significant**
Sensory realism Emotional activation	0.32	4.78	P ≤0.001	**Significant**
Anthropomorphism Emotional activation	0.41	5.36	P ≤0.001	**Significant**
Sensory perception-- Cognitive appraisal	0.29	4.10	P ≤0.001	**Significant**
Sensory realism- Cognitive appraisal	0.44	5.94	P ≤0.001	**Significant**
Anthropomorphism- Cognitive appraisal	0.31	4.62	P ≤0.001	**Significant**
Emotional activation –intention to adopt	0.53	7.21	P ≤0.001	**Significant**
cognitive appraisal Willinngs to recommend	0.49	6.45	P ≤0.001	**Significant**
.	0.38	5.02		

The results demonstrate strong support for all hypothesized paths, with all relationships achieving statistical significance at the $p \leq 0.001$ level. Sensory perception exhibited a substantial direct effect on emotional activation ($\beta = 0.47$, $t = 6.23$), supporting the notion that sensory cues in AI-enhanced hospitality environments can evoke emotional responses. Similarly, sensory realism significantly predicted emotional activation ($\beta = 0.32$, $t = 4.78$), emphasizing the importance of perceived authenticity in multisensory AI experiences. Anthropomorphism also showed a notable impact on emotional activation ($\beta = 0.41$, $t = 5.36$), suggesting that humanlike AI attributes foster emotional engagement. Furthermore, all three input variables (sensory perception, realism, and anthropomorphism) significantly influenced cognitive appraisal, with β values ranging from 0.29 to 0.44. The strongest among these was the path from sensory realism to cognitive appraisal ($\beta = 0.44$, $t = 5.94$), highlighting its cognitive resonance in consumer evaluation. Critically, emotional activation significantly predicted intention to adopt AI technologies ($\beta = 0.53$, $t = 7.21$), marking it as a key driver of adoption behavior.

Likewise, cognitive appraisal significantly influenced consumers' willingness to recommend AI-based services ($\beta = 0.49$, $t = 6.45$), underscoring the cognitive mechanism in behavioral intention formation.These findings confirm the conceptual model's robustness and align with existing literature advocating for the integration of affective and cognitive processes in understanding consumer engagement with AI in hospitality **(e.g., Lu et al., 2020; Li et al., 2024)**, as stated by **(Tussyadiah, 2020; Gao & Bai, 2021; Wang, 2025).**

Table (7) Indirect Effects on Intention to Adopt

In direct Path	(β) indirect effect	Bootstrapped SE	T – Value	P-value	Significant
Sensory perception - Emotional activation -intention to adopt	0.127	0.031	4.10	P ≤0.001	Significant
Sensory realism Emotional activation- intention to adopt	0.113	0.030	3.77	P ≤0.001	Significant
Anthropomorphism Emotional activation- intention to adopt	0.089	0.027	3.30	.001	Significant
Sensory perception - - Cognitive appraisal- -intention to adopt	0.119	0.029	4.10	P ≤0.001	Significant
Sensory realism- Cognitive appraisal- -intention to adopt	0.096	0.025	3.84	P ≤0.001	Significant
Anthropomorphism Cognitive appraisal- -intention to adopt-	0.076	0.024	3.17	.002	Significant

The mediation analysis reveals significant indirect effects of sensory and anthropomorphic variables on Intention to Adopt, with both Emotional Activation and Cognitive Appraisal acting as significant mediators.Sensory Perception indirectly influences Intention to Adopt via Emotional Activation ($\beta = 0.127$, $p \leq 0.001$), illustrating that consumers' sensory experiences initially engage their emotions, which in turn enhance their adoption intention.Sensory Realism also exhibits a significant indirect effect through Emotional Activation ($\beta = 0.113$, $p \leq 0.001$), while Anthropomorphism has a smaller but significant indirect effect via Emotional Activation ($\beta = 0.089$, $p \leq 0.001$).Additionally, Sensory Perception has an indirect effect on Intention to Adopt through Cognitive Appraisal ($\beta = 0.119$, $p \leq 0.001$), supporting the idea that sensory experiences prompt cognitive evaluations that influence adoption decisions. Similar indirect effects are observed for Sensory Realism ($\beta = 0.096$, $p \leq 0.001$) and Anthropomorphism ($\beta = 0.076$, $p \leq 0.002$) via Cognitive Appraisal. These findings underscore the critical mediating roles of both Emotional Activation and Cognitive Appraisal in shaping consumers' intentions to adopt AI technologies in hospitality.

Sensory experiences trigger emotional responses, which are subsequently evaluated cognitively, ultimately influencing adoption decisions. This supports the dual-process perspective in consumer decision-making, where both emotional and cognitive processes play essential roles in technology adoption. The results are fully consistent with cognitive and embodied theories, including embodied perception theory and cognitive evaluation theory. They also support the idea that the emotional experience

of interacting with AI has a significant impact on consumers' mental evaluation and, consequently, adoption and recommendation intentions. However, these findings suggest that systems containing human-like characteristics may elicit positive emotions in consumers, contributing to their adoption intentions, as demonstrated by (**Belanche et al., 2020; Tussyadiah, 2020; Lu et al., 2020; Gao & Bai, 2021; Hwang & Lyu, 2021; Zhang et al., 2021).**

Table (9) Indirect Effects on Wiliness to Recommend

In direct Path	(β)indirect effect	Bootstrapped SE	T – Value	P-value	Significant
Sensory perception - Emotional activation -wiliness to recommend	0.121	0.030	4.03	P ≤0.001	Significant
Sensory realism Emotional activation- -wiliness to recommend	0.107	0.029	3.69	P ≤0.001	Significant
Anthropomorphism Emotional activation- -wiliness to recommend	0.084	0.026	3.23	0.001	Significant
Sensory perception - - Cognitive appraisal- --wiliness to recommend	0.115	0.028	4.11	P ≤0.001	Significant
Sensory realism- Cognitive appraisal- -wiliness to recommend	0.093	0.024	3.87	P ≤0.001	Significant
Anthropomorphism Cognitive appraisal- --wiliness to recommend -	0.072	0.023	3.13	0.002	Significant

Similarly, significant indirect effects are observed for Willingness to recommend through both Emotional Activation and Cognitive Appraisal. Sensory Perception has the most significant indirect impact on Willingness to Recommend ($\beta = 0.121$, $p \leq 0.001$), followed by Sensory Realism ($\beta = 0.107$, $p \leq 0.001$) and Anthropomorphism ($\beta = 0.084$, $p \leq 0.001$). These results suggest that emotionally engaging and cognitively evaluated AI experiences lead to increased likelihood of consumers recommending these technologies. Sensory Perception further influences Willingness to Recommend through Cognitive Appraisal ($\beta = 0.115$, $p \leq 0.001$), while Sensory Realism and Anthropomorphism also exert indirect effects via Cognitive Appraisal ($\beta = 0.093$, $p \leq 0.001$ and $\beta = 0.072$, $p \leq 0.002$, respectively. These findings reinforce the idea that Emotional Activation and Cognitive Appraisal serve as full mediators in influencing consumers' Willingness to Recommend AI-powered services in the hospitality industry. Sensory and anthropomorphic qualities of AI not only foster positive emotions but also trigger evaluative processes that increase consumers' propensity to recommend these services to others. These results are completely consistent with what was reported by **(Li et al., 2023).**

Table (10) Structural Model Assessment and Hypothesis Testing

Hypothesis	Path	(β) Coefficient	T-Value	P-Value	R^2	F^2	Q^2	Supported
H1	SP → EA	0.42	6.11	0.000	0.51	0.08	0.25	Yes
H2	SR → EA	0.30	4.27	0.000	0.51	0.05	0.22	Yes
H3	AN → EA	0.29	3.89	0.000	0.51	0.06	0.24	Yes
H4	EA → CA	0.48	7.22	0.000	0.44	0.12	0.30	Yes
H5	CA → INT	0.52	8.01	0.000	0.61	0.15	0.34	Yes
H6	INT →RECOM	0.57	9.14	0.000	0.58	0.20	0.37	Yes
H7	INT →RECOM	0.33	5.74	0.000	0.44	0.10	0.27	Yes
H8	SP → CA	0.34	6.02	0.000	0.44	0.11	0.29	Yes
H9	SR → CA	0.35	5.88	0.000	0.44	0.09	0.26	Yes

The structural model proposed in this research was rigorously tested using Structural Equation Modeling (SEM), with all hypotheses supported, further confirming the robustness of the conceptual framework. The hypothesized relationships between sensory and emotional variables, as well as between cognitive and behavioral intentions, were found to be significant and aligned with the theoretical foundations of embodied cognition and emotional appraisal processes.

Hypothesis 1 (H1): The relationship between Sensorial Perception (SP) and Emotional Activation (EA) was significant, with a path coefficient ($\beta = 0.42$) and a t-value of 6.11 (p-value < 0.001), indicating that sensory stimuli such as visual or tactile experiences have a substantial effect on emotional engagement in AI technologies within hospitality settings. This result underscores the importance of sensory realism in shaping emotional responses, supporting previous literature on embodied cognition in consumer behavior (Choi et al., 2021; Tuomi et al., 2022).

Hypothesis 2 (H2): Sensory Realism (SR) was found to significantly influence Emotional Activation (EA) ($\beta = 0.30$, t-value = 4.27, p-value < 0.001). The findings suggest that the more realistic and immersive the sensory experience provided by AI technologies, the stronger the emotional activation, which aligns with the theoretical understanding of sensory realism in consumer interaction with technology (Kim et al., 2021).

Hypothesis 3 (H3): Anthropomorphism (AN), or the human-like characteristics of AI, also had a positive effect on Emotional Activation (EA) ($\beta = 0.29$, t-value = 3.89, p-value < 0.001). This result highlights the role of human-like features in AI systems, suggesting that when consumers perceive AI as more human-like, they are more likely to experience emotional engagement, supporting theories of social presence and emotional intelligence in AI design (Lee et al., 2021).

Hypothesis 4 (H4): Emotional Activation (EA) was found to significantly impact Cognitive Appraisal (CA) ($\beta = 0.48$, t-value = 7.22, p-value < 0.001), supporting the dual-process model of consumer evaluation. Emotional responses were shown to lead

to deeper cognitive assessments, with consumers using emotional cues as part of their decision-making process regarding AI adoption. This finding is consistent with prior research on the interplay between emotion and cognition in consumer behavior (Mayer et al., 2020).

Hypothesis 5 (H5): Cognitive Appraisal (CA) strongly influenced Intention to Adopt (INT) (β = 0.52, t-value = 8.01, p-value < 0.001). This result emphasizes the role of cognitive evaluation in shaping consumers' intentions to adopt AI technologies in hospitality, highlighting the importance of rational processing in determining adoption decisions (Ajzen, 1991).

Hypothesis 6 (H6): Intention to Adopt (INT) was found to significantly affect Intention to Recommend (RECOM) (β = 0.57, t-value = 9.14, p-value < 0.001), further reinforcing the pivotal role of adoption intention in influencing future recommendation behaviors. This relationship aligns with the Theory of Planned Behavior (Ajzen, 1991), where the intention to engage with a technology is a strong predictor of future recommendation actions.

Hypothesis 7 (H7): The effect of Intention to Adopt (INT) on Intention to Recommend (RECOM) was confirmed (β = 0.33, t-value = 5.74, p-value < 0.001), reinforcing the hypothesis that adoption intentions predict subsequent recommendation behaviors in hospitality settings.

Hypothesis 8 (H8): The direct path from Sensorial Perception (SP) to Cognitive Appraisal (CA) was also supported (β = 0.34, t-value = 6.02, p-value < 0.001), indicating that sensory experiences not only elicit emotional responses but also influence the cognitive evaluation processes that underpin decision-making.

Hypothesis 9 (H9): Finally, Sensory Realism (SR) was found to significantly influence Cognitive Appraisal (CA) (β = 0.35, t-value = 5.88, p-value < 0.001), suggesting that realistic sensory input can enhance cognitive processing, which may further shape adoption decisions.

Table (11) Mediation Analysis and Indirect Effects

Hypothesis	Indirect path	β indirect	t-value	p-value	Mediation type	supported
H8	SP-EA-CA	0.20	4.55	0.000	Partial mediation	Yes
H9	SR-EA-CA	0.15	3.72	0.000	Partial mediation	Yes
H10	AN-EA-INT	0.14	.348	0.000	Partial mediation	Yes
H 11	EA-CA-INT	0.25	5.89	0.000	Partial mediation	Yes
H12	CA-INT-RECOM	0.30	6.44	0.000	Full mediation	Yes
H13	CA-INT-USG	0.32	6.81	0.000	Full mediation	Yes
H14	EA-CA-INTRECOM	0.12	3.19	0.000	Sequential Mediation	Yes
H 15	EA-CA-INT-	0.13	.344	0.000	Sequential Mediation	Yes

Table (11) also reports the mediation results derived from bootstrapping (5,000 samples). All indirect paths were statistically significant ($p < 0.001$), confirming the mediating roles of Emotional Activation (EA), Cognitive Appraisal (CA), and Intention to Adopt (INT). Specifically, partial mediation was observed in the pathways from SP, SR, and AN through EA to CA (H8–H10), and from EA through CA to INT (H11). These findings suggest that emotionally engaging AI experiences lead to higher cognitive evaluation, reinforcing the significance of embodied and affective mechanisms in consumer decision-making. Full mediation was observed in the relationships between CA and both Recommendation (H12) and Usage (H13), indicating that cognitive appraisal alone does not directly lead to behavioral outcomes without the presence of strong intention. Furthermore, sequential mediation (H14 and H15) through EA → CA → INT further influencing RECOM and USG strengthens the model's layered structure, aligning with contemporary multi-stage decision models in consumer psychology. Taken together, the results underscore the pivotal roles of emotional and cognitive mechanisms in the formation of consumer attitudes and behaviors toward AI. Practically, these findings suggest that hospitality providers should prioritize the design of AI experiences that are both emotionally engaging and cognitively meaningful, in order to foster not only adoption, but also advocacy and sustained usage.

Conclusion

The results of the structural model assessment demonstrate that emotional activation, cognitive appraisal, and adoption intention are key mediators in the consumer decision-making process for AI adoption in hospitality. These findings not only provide empirical support for the embodied cognition framework but also offer valuable insights for the design and marketing of AI technologies in hospitality settings. With all hypotheses being supported, this research contributes to the growing body of literature on AI adoption and its implications for consumer engagement and behavior in the hospitality.

Practical Implications

Geographical Limitations although this research focused on a specific consumer sample within the hospitality sector, the findings may not be generalizable to all markets or cultures. Cultural and economic differences could influence the reception and adoption of AI technologies in the hospitality industry. .٢Reliance on Self-Reported Data was collected using surveys, which rely on self-reported responses from participants. This introduces the potential for biases related to social desirability or inaccurate perceptions of actual behaviors, which may affect the validity of the findings. .٣Neglect of Environmental Factors While this research explored the psychological and emotional factors influencing AI adoption, it did not consider the impact of environmental factors, such as the quality of technological infrastructure or regulatory policies within the hospitality sector, which may play a significant role in the adoption of these technologies.

Recommendations for research

Based on the research's findings, several strategic recommendations are proposed for hospitality practitioners aiming to accelerate the effective adoption of AI technologies. Firstly, organizations should prioritize the development and deployment of AI interfaces that embody human-like attributes, as anthropomorphism was found to significantly influence emotional and cognitive responses. Secondly, enhancing sensory realism—through visual, auditory, and tactile features—can strengthen sensorial perception and foster deeper consumer immersion and trust. It is recommended that hospitality brands co-design AI experiences with user feedback to ensure alignment with consumer expectations and cultural preferences. Furthermore, managerial emphasis should be placed on building emotional activation and cognitive appraisal mechanisms into AI interactions, such as adaptive responses and empathetic cues, to strengthen behavioral attachment. Finally, companies should adopt a consumer-centric AI strategy that integrates data-driven personalization with ethical design principles, thereby ensuring not only technological acceptance but also long-term consumer loyalty and advocacy.

Future Research

Future research on AI adoption in the hospitality industry should focus on exploring the long-term effects of AI technologies on consumer loyalty and satisfaction. While this research examines the immediate psychological and behavioral responses to AI adoption, further research is needed to understand how these technologies influence consumer retention and advocacy over extended periods. Additionally, future studies could explore the role of AI in managing crises, such as during pandemics or natural disasters, and its impact on consumer trust and willingness to engage with AI-driven services under high-stress conditions. Another promising avenue for research is the investigation of cross-cultural differences in the perception of AI in hospitality, particularly in regions with varying levels of technological acceptance and digital literacy. Moreover, there is a need to explore the ethical implications of AI adoption, particularly in terms of privacy concerns and data security, which remain critical issues for consumers. By expanding the scope of research to include these dimensions, scholars can provide more comprehensive insights into the future trajectory of AI in hospitality.

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نهج الإدراك المتجسد لتبني الذكاء الاصطناعي في قطاع الضيافة: دمج الإدراك الحسي والتنشيط العاطفي والنتائج السلوكية في مصر

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معلومات المقالة

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المجلد ٢٨، العدد ٢، (يونيه، ٢٠٢٥)، ص٢٣١ ـ ٢٥٥.

الملخص

تستكشف هذه الدراسة العوامل المؤثرة في اعتماد تقنيات الذكاء الاصطناعي في قطاع الضيافة، مع التركيز على متغيرات رئيسية تشمل: الإدراك الحسي، والواقعية الحسية، وتجسيد الخصائص البشرية (الأنثروبومورفيزم)، والتقييم المعرفي، والاستثارة العاطفية، ونية الاعتماد، والاستعداد للتوصية، والاستخدام الفعلي. وقد تم جمع البيانات من خلال استبيان إلكتروني شمل ٤٠٠ مستهلك مصري لقياس تصوراتهم واتجاهاتهم نحو استخدام الذكاء الاصطناعي في بيئات الضيافة. وكشفت النتائج أن كلاً من العوامل العاطفية والمعرفية تلعب دوراً مهماً في نية المستهلكين لاعتماد الذكاء الاصطناعي، حيث تؤثر الواقعية الحسية وتجسيد الخصائص البشرية تأثيراً إيجابياً على رضا المستخدمين ومشاركتهم. وتسهم هذه الدراسة في تعميق الفهم حول اعتماد الذكاء الاصطناعي في صناعة الضيافة، كما تقدم تطبيقات عملية للممارسين في القطاع الراغبين في تحسين تجربة العملاء ورفع كفاءة تقديم الخدمات. كما تُشكّل هذه الدراسة أساساً لأبحاث مستقبلية حول تقبّل التكنولوجيا والتأثير التحويلي للذكاء الاصطناعي على خدمات الضيافة.