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RESEARCH ARTICLE

How Does Trusting Belief Affect Service Robot Adoption in Hotels as an Antecedent of Affective Reaction?

Güven İnancı, Duygusal Tepkilerin Öncülü Olarak Otellerde Hizmet Robotu Kabulünü Nasıl Etkiler?

Levent Çallı[1]

ABSTRACT

The application of robot technology in the tourism and hospitality industries is becoming increasingly popular. Due to the high level of robot-human interaction, both the customer and the service provider must evaluate the adaptation of robots in this industry using an interdisciplinary approach. From the perspective of information systems, this study examines individuals' acceptance of robots used in hotel services within the framework of a trusting belief-based technology acceptance model (TAM) that includes the effect of emotional reactions. According to the results, it was observed that trusting belief have positive effects in both enjoyment and negative robot anxiety, considering hotel service robots specifically. In terms of affective reactions, enjoyment was observed to positively affect the perceived usefulness and ease of use as core TAM variables, while robot anxiety has a negative effect only on ease of use. In the context of hotel service robots, the validity of the TAM principles has been tested and verified using external variables. To the best of our knowledge, this study is the first attempt to understand the perception of hotel service robot adaptation in Turkey from the customer perspective. The study findings are expected to contribute to the literature, which is still in the early development stage, and provide practical advice to sector managers.

Keywords: Service Robots, Technology Acceptance Model, Trusting Belief, Robot Anxiety, Enjoyment

ÖZ

Turizm ve konaklama endüstrisinde robot teknolojilerinin kullanımı her geçen gün daha da popüler hale gelmektedir. Robot-insan etkileşiminin yüksek seviyesi nedeniyle hem müşteri hem de hizmet sağlayıcı, robotların bu sektördeki adaptasyonunu disiplinler arası bir yaklaşımla değerlendirmek zorundadır. Bu çalışma, bilişim sistemleri perspektifinden bireylerin otel hizmetlerinde kullanılan robot teknolojilerini kabulünü, güven inancı faktörüne dayalı Teknoloji Kabul Modeli (TKM) çerçevesinde duygusal tepkilerin etkisiyle incelemektedir. Araştırma bulguları, güven inancının algılanan eğlence üzerinde olumlu, robot anksiyetesi üzerinde ise olumsuz yönde etkisi olduğu göstermektedir. Algılanan eğlencenin temel TKM değişkenleri olarak algılanan fayda ve algılanan kullanım kolaylığını olumlu yönde etkilediği, robot anksiyetesinin ise duygusal tepki olarak yalnızca kullanım kolaylığı üzerinde olumsuz bir etkiye sahip olduğu gözlemlenmiştir. Bu açıdan, otel hizmet robotları bağlamında, TKM ilkelerinin geçerliliği harici değişkenler kullanılarak test edilmiş ve araştırma kapsamında doğrulanmıştır. Bu çalışma, Türkiye'de otel hizmet robotu kabulü algısını müşteri perspektifinden anlamaya yönelik öncü çalışmalardandır. Çalışma bulgularının henüz gelişme aşamasında olan ilgili literatüre katkı sağlaması ve sektör yöneticilerine pratik öneriler sunması beklenmektedir.

Anahtar Kelimeler: Hizmet Robotları, Teknoloji Kabul Model, İnançlara Güven, Robot Anksiyetesi, Eğlence

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1. INTRODUCTION

Today, technology has paved the way for machines to take over mechanical and routine tasks through automation and artificial intelligence (AI) systems in many industries. Huang et al. (2019) refer to this new era as the "feeling economy." According to Wirtz et al. (2018), service robots will become more widely used in many industries where they can considerably reduce costs and improve service delivery quality. Due to the Covid-19 outbreak, the positive attitude of consumers toward hotels with robot staff will also accelerate the spread of such technology (Kim et al., 2021). With robots performing routine tasks, human resources can focus on emotional, empathetic, and interpersonal relationship skills that are currently difficult for AI to emulate, thereby providing a significant competitive advantage for companies that adopt this human-oriented approach.

Undoubtedly, the nature of service plays an essential role in robot integration. For instance, a fast-food restaurant may use mechanical AI more intensively to provide customer value, whereas a French restaurant prioritizes human-intensive service (M. H. Huang & Rust, 2021). In this regard, robot adoption requires additional prudence in industries with a high level of human engagement, such as hospitality (Fusté-Forné & Jamal, 2021). Since a limited number of robots operate in just a few tourism and hospitality businesses, most of the existing tourist and hospitality robotics research tends to be conceptual (Murphy et al., 2019). Although the use of robots in such service industries as elderly care (Engelberger, 1998) and education (Nourbakhsh, 2000) has a relatively older history, robotic technologies in travel, tourism, and hospitality have been gaining traction recently after the application in the Henn-na Hotel in Japan in 2015, due to a requirement of sophisticated reactions to the customer's needs for many services (Ivanov et al., 2019). As a result, more than half of the robots used in the Henn-na Hotel began causing problems for the customers, such as failing to answer questions or waking the customer up at midnight. As such, these robots were discontinued after four years due to not being advanced enough to perform the expected tasks (Shead, 2019). Academic studies have also shown that robots may negatively impact customer perception in different aspects of the hospitality service, as in the case of the Henn-na Hotel. For example, Jia et al. (2021) discovered that service robots in hotels are an effective method of increasing visitor satisfaction; however, the high degree of anthropomorphism of the robots used in hotel services causes aversion in some guests. This is related to a phenomenon known as the uncanny valley, which expresses the feeling of interacting with a zombie in the human-robot interaction literature (Mori, 2012). On the other hand, anxiety may arise as a result of the user's interaction with the robot and could negatively affect the hotel's customers. For example, Etemad-Sajadi & Sturman (2021) observed that fear of robots has a negative impact on the intention to use the robot concierge. According to Wirtz et al. (2018), the more trustworthy a robot is, the more likely it will be adopted. Likewise, Thatcher et al. (2007) summarized users' trust in technology as their belief in its ability to perform and willingness to rely on it. Furthermore, these trusting beliefs of individuals have both positive and negative affective reactions (Mcknight et al., 2011).

In this respect, discovering the negative impacts and antecedents of robot usage in the hospitality literature, which is very scarce, is as essential as understanding the positive features that might facilitate user adaptation. One of the aims of this study is to fill this gap by investigating the antecedent of positive and negative affective reactions.

Even though robots are not currently being used in every hotel service, reports show that the robot market for the hospitality industry is on an upward trend in terms of performing routine tasks. According to the Allied Market Research (2021) report, the delivery robot segment for luggage handling or room service in the hospitality robot market, which now has a value of $60.6 million, is expected to reach $726 million by 2030, while the total market for hospitality robots, such as those used for cleaning, reception, restaurant, or entertainment, is anticipated to reach a worth of around $3 billion. However, while hospitality robots emerged as a rapidly growing market due to increasing productivity and reducing costs from the supply-side perspective, a comparable acceleration has not been observed in academic studies. Scholars believe that more studies are needed to investigate the influential variables of service robots in hospitality, especially as they relate to customer perception (Ivanov et al., 2019; Ivanov & Webster, 2019; Luo et al., 2021; I. Tussyadiah, 2020). Earlier studies on service robots are mostly theoretical in nature, emphasizing theoretical explanations of robots which currently exist in the hospitality industry and suggestions for future studies (Jia et al., 2021). Hence, examining the specific effects of robot use from different hospitality dimensions is a gap that must be filled in the literature. In this study, the perception of customers for hotels served by robots

was investigated within the Technology Acceptance Model (TAM) framework, and the effects of trusting belief on perceived enjoyment and anxiety were examined within the scope of the conceptual model seen in Figure 1.

2. LITERATURE REVIEW

A robot is an intelligent agent that can act on the physical environment, embodied in an anthropomorphic, zoomorphic, caricature, or functional form, capable of observing, comprehending, and learning through various AI technologies, such as natural language processing and machine learning (Bowen & Morosan, 2018; Tung & Law, 2017). A service robot is defined as a social agent that can replace human providers by executing system-based functions autonomously, even without human interaction, with adaptable interfaces that interact, communicate, and deliver service to the customers (Fusté-Forné & Jamal, 2021; Wirtz et al., 2018). Murphy et al. (2017) state that when robots are classified as industrial, professional, or personnel, industrial robots have a 50-year history of performing jobs, such as food preparation for the hospitality industry. On the other hand, professional and personal robots, such as cleaning, luggage handling, serving in a restaurant, or concierge services, where social interaction, autonomy, and mobility are significantly higher than industrial robots, have about 20 years of history. From a different perspective, Ivanov & Webster (2020) suggested three types of robots that can be used in the hospitality industry considering the tourism economy, classified based on their mobility: the customer participation type (which is divided into two, as back-house and front-house), stationary, and mobile types. A further distinction relates to ownership, whether robots are owned or rented. In this proposed classification, front-of-house robots (who carry out activities such as check-in, courier, entertainment, and concierge) that require interaction with the customer need to be adapted more carefully when considering customer satisfaction because human-robot interaction inherently contains uncertainties, with negative situations potentially disappointing the customer.

In this sense, robots in the hospitality industry contribute to consumer satisfaction by providing value in the form of new experiences, enjoyment, efficiency, and productivity; yet, the unfavorable scenario that emerges throughout the interaction process leads to dissatisfaction (Jia et al., 2021; Prentice et al., 2020). For example, Prentice et al. (2020) found the concierge robot an influential factor in both satisfaction and loyalty by suggesting exciting travel destinations, answering customer questions, and entertaining them. The same study showed that customers who had a poor experience with voice-activated services were less likely to trust these robots in situations involving money, such as ordering meals. In another study conducted in China, Jia et al. (2021) stated that a user who is satisfied with the service robots will have a positive attitude toward the hotel. Furthermore, their findings reveal that customers whose satisfaction is increased by service robots are more likely to purchase a room. Based on TripAdvisor customer reviews and scores on hotels with service robots, Luo et al. (2021) discovered that robotic services provide value and are a key element in influencing overall consumer satisfaction with the hotel. Lastly, a recent study on restaurant service robots revealed that trust positively affects customer satisfaction, while the perceived risk factor has a strong negative impact (Seo & Lee, 2021).

Accordingly, the successful adoption of robot technologies, which is understood to be strongly related to customer satisfaction and customer loyalty, is related to the user's trust in robots, which is the most rooted subject of information systems (IS).

2.1. TRUSTING BELIEF

As beliefs are opinions that an individual accepts as true, it has been mentioned in the management information systems (MIS) that understanding humans' reactions to technology is critical (Agarwal & Karahanna, 1998; Thatcher et al., 2007). An individual's trust in technology is defined as the belief about how a technology will perform and their willingness to rely upon such technology (Thatcher et al., 2007). Wirtz et al. (2018) address robot adaption for the service industry in their conceptual model, arguing that the more a robot is perceived as trustworthy and concerned about the requirements of its customers, the more likely it will be adopted. According to van Pinxteren et al. (2019), trust plays a fundamental role in adopting service robots and positively impacts enjoyment; however, literature is scarce.

When comparing the customer acceptance of the novel robotic technology to e-commerce, which has been widely adopted, trust emerges as a critical determinant in the IS literature (Benbasat & Wang, 2005; McKnight et al., 2002). McKnight et al. (2002) stated that trust helps customers share personal information with web-based sellers and make purchases by overcoming

uncertainty, complexity, and risk perceptions. He further conceptualizes the trusting belief in a web-based vendor under the competence, benevolence, and integrity dimensions. Benbasat & Wang (2005) have shown that integrating this triple structure with TAM significantly impacts online recommendation agents as technological artifacts, with consumers treating computer agents as "social actors" when interacting with recommendation agents where human characteristics can be perceived. According to Mcknight et al. (2011), trust in technology has been evaluated similarly to trust in humans in previous studies; however, due to a lack of volition and morals in technology, IT-related trust belief is related to technical characteristics, just like when comparing a word processing software to a human copyeditor. When users compare the two, they consider the human copyeditor's competence and willingness to take the time to edit the paper carefully and the word processing program's ability to detect misspelled words or grammatical errors. In this sense, Mcknight et al. (2011) conceptualized trust in technology in terms of: functionality (performing its intended tasks), helpfulness (providing adequate assistance), and reliability (continuous and error-free processing). With a holistic approach based on Mcknight et al. (2011)'s triple structures, I. P. Tussyadiah et al. (2020) defined trust for IT as a user's expectation that information technology artifacts, such as robots, recommendation agents, websites, online assistants, and similar agents, would perform the expected responsibilities. However, a general measurement of trust in robots may not be clear in choosing human-like or system-like approaches because if one of the robots evaluated within the scope of the research seems more human, the respondent may tend to evaluate it more in terms of competence than functionality (Lankton et al., 2015). Furthermore, research has focused on robotics, particularly in the hospitality literature. In these studies, robot technology is first introduced to respondents through video (Choe et al., 2021; Zhong, Zhang, et al., 2020) or image (Seo & Lee, 2021) instead of interacting with robots directly, due to the minimal use of such technology today. After the respondents were introduced to the robots, a survey was given to gauge responses.

In this sense, when it comes to the general evaluation of trust in robots with different characteristics, it is thought that it would be more appropriate to use a validated scale that would be easy to understand for the respondent who has not yet experienced interacting with robots. At this point, Ivanov et al. (2018) revealed that hotel robots have disadvantages regarding perception among young adults. When the content of the proposed dimension is examined, it shows significant similarities as a general concept with the trusting belief factor in I. P. Tussyadiah et al. (2020)'s study, including the expectation that robots can malfunction during service, misunderstand questions or orders, and not fulfill special requests. Furthermore, it such a study is thought to present a more specific scale since it includes the beliefs of individuals who have not used robot services before, compared to the general trust approaches for robots that Etemad-Sajadi & Sturman (2021) and Seo & Lee (2021) have developed. Since the perception of trust toward different hotel robots will be examined in our study, the dimension from Ivanov et al. (2018) 's research was adopted as the general trusting belief.

2.2. AFFECTIVE REACTION

In earlier studies, theories and models related to human-computer interaction in IS have focused on the cognitive and behavioral aspects of the human decision-making process in organizational contexts, with the affective reactions, such as feelings of joy or depression that occur from the interaction, being neglected (Davis et al., 1989; Hwang & Kim, 2007; Venkatesh & Davis, 2000). More recent studies in IS on technology adaptation have concentrated mainly on the consequences of users' affective reactions, such as the external variables of enjoyment and anxiety on the perceived usefulness, ease of use, and behavioral intention, with little attention paid to the antecedents of these affective responses (Abou-Shouk et al., 2021; Etemad-Sajadi & Sturman, 2021; Ghazali et al., 2020; Park & Kwon, 2016; Venkatesh & Bala, 2008). However, identifying the antecedents of affective reactions will undoubtedly contribute to a better understanding of the technology adaptation process, both academically and practically. According to Mcknight et al. (2011), when a user's plan or objective is interrupted by agents due to a service failure, trust in technology reflects positive or negative emotions. Lankton et al. (2015) statistically proved that trusting belief is an antecedent of emotion, with users feeling comfortable and enjoying reducing the feeling of risk and uncertainty. Hwang & Kim (2007) discovered that perceived online quality with service contents, such as the ease with which needed data can be obtained, had a positive effect on perceived enjoyment and a negative effect on system anxiety. In a study examining the adaptation of online payment, Rouibah (2012) also found that trust positively affects enjoyment. Individuals' prior cognitive beliefs are shaped by media or popular culture, and emotions such

as enjoyment or anxiety about technology acceptance are seen as highly important for human-robot interaction, particularly in hospitality (Tung & Law, 2017). Therefore, it has been decided that it is appropriate to examine the antecedents of enjoyment and robot anxiety, which are perceived as positive and negative affective reactions, within the scope of this research.

Anxiety is defined as a harmful mental state that perceived threats might trigger (H. L. Huang et al., 2021). Users may have negative opinions about information technologies such as computers (computerphobic) due to trait or state anxiety, with the avoidance of using them being defined as technophobia in IS literature (Brosnan, 2002). Research on human-computer interaction (HIR) has shown that when users interact with robots in daily life, their attitudes and emotions influence their behaviors, and negative attitudes against robots may coexist with anxiety, resulting in avoidance behavior with robots (Nomura et al., 2008). However, although it is challenging to eliminate trait anxiety due to its permanent personality features, state anxiety is more straightforward to eliminate due to its transitory nature (Brosnan, 2002). Detecting factors that reduce state anxiety may provide convenience in developing a positive attitude. In this regard, the first hypothesis we produced within the scope of the research is as follows.

H1: Trusting belief has a negative effect on robot anxiety

The term enjoyment refers to the perception that using a specific system is enjoyable in and of itself, regardless of any performance impact from system use (Venkatesh & Bala, 2008). According to Kuo et al. (2017), using robots in hotels provide customers with fun, enjoyment, and curiosity. For example, In Tokyo, customers tend to play and interact with social robots as a novelty while waiting for human service in restaurants, banks, or stores (Adhikari, 2017). Considering the situation suggested by Mcknight et al. (2011) and Lankton et al. (2015), trusting belief in robot technologies is expected to affect perceived enjoyment positively. Califf et al. (2020) recently observed a similar effect of enjoyment on sharing economy for Airbnb and online travel booking websites**.** To the best of our knowledge, our study will be the first attempt to explore the antecedents of affective reactions on the robot adoption process in the hospitality industry. Several TAM-based robot adaptation studies have analyzed the impact of perceived enjoyment and robot anxiety factors as independent variables, with significant results being obtained. For example, Park & Kwon (2016) found that perceived enjoyment positively impacts both the usefulness and ease of use for teaching assistant robots. Ghazali et al. (2020) revealed that the perceived enjoyment in individuals significantly affects the perceived ease of use, attitude towards using, and intention to use behavior of the persuasive robots. According to Abou-Shouk et al. (2021), the perceived enjoyment of utilizing robots in hotels and travel agencies impacts the robot's perceived easiness. In contrast, Etemad-Sajadi & Sturman (2021) claimed that fear of robots has a negative impact on the willingness to use robot concierges. Saari et al. (2022) discovered a significant but small negative effect of robot anxiety on ease of use while revealing that perceived enjoyment positively affects the ease of use with large effects for robot concierge. While investigating the effects of pleasure and anxiety on TAM variables, it was discovered that studies on the antecedents of these affective responses during the literature review on robot-human interaction are scarce. Wang et al. (2021) found that the effective use of AI-voice robot services to communicate with the government positively affected users' perceived enjoyment. An experimental field study conducted by van Pinxteren et al. (2019) discovered that anthropomorphism explains trust, with trust strongly influencing the enjoyment for a humanoid service robot. In this regard, the second hypothesis we produced within the scope of the research is as follows.

H2: Trusting belief has a positive effect on perceived enjoyment

2.3. TECHNOLOGY ACCEPTANCE MODELS

Since robots share physical space with humans, the acceptance of the robot by the human is the one factor that could produce a successful interaction (Bröhl et al., 2016). TAM is the basis for several different models that measure the acceptance of information technology (IT) in the literature. The TAM model reveals that perceived usefulness (subjective probability of increasing job performance using IT) and ease of use (the expectation of being effortless) are the determinants of attitude, leading to users' behavioral intention to use information technologies (Davis, 1989; Davis et al., 1989). TAM2 extends TAM by considering user acceptance of IT in the workplace and describes the impact of social influence (subjective norm, voluntariness, and image) and cognitive instrumental (job relevance, output quality, result demonstrability, and perceived

ease of use) on the perceived usefulness and intention to use a new system (Venkatesh & Davis, 2000). TAM3 reveals the effect of individual differences, system characteristics, social influence, and facilitating conditions on the perceived benefit and ease of use, considering the TAM-based studies conducted over the years, and is an extended version of TAM2 with computer anxiety, computer playfulness, perceived enjoyment, objective usability, perception of external control, and computer self-efficacy variables as the personal ability and intrinsic motivation (Venkatesh & Bala, 2008). UTAUAUT is a theory based on considering eight different models from various disciplines for evaluating technology acceptance. It states that the factors of performance expectancy, effort expectancy, social influence, and facilitating conditions have an impact on an individual's behavioral intention to use an IT; additionally, age, gender, experience, and voluntariness have moderator effects, influencing each group differently (Venkatesh et al., 2003). UTUAT2 is the extended version of UTUAUT and considers acceptance of technology in the consumer context to include hedonic motivations, price, and habits with moderator effects of age, gender, and experience (Venkatesh et al., 2012). This study focused on the core TAM model factors, with the adaptation of service robots in hotels being investigated using external variables. The definitions of the variables used in the study are shown in Table 1. As listed in Table 2, several studies in the literature have applied TAM and derived models for exploring the customer acceptance of robots in various industries.

Table 1

Definitions of the Variables in the Conceptual Model

Construct	Definition	References
Perceived Usefulness (PU)	The degree to which an individual believes that using service robots would enhance their performance in time-saving, assistance, and speed of service.	(Davis, 1989; Song, 2017)
Perceive Ease of Use (PEOU)	The degree to which an individual believes that using a service robot would be effortless.	(Davis, 1989; Heerink et al., 2010)
Attitude Toward Using (ATT)	An individual's positive or negative feelings towards the service robots.	(Davis et al., 1989; Heerink et al., 2010)
Intention to Stay (INT)	An individual's subjective probability that he or she will stay at the hotel served by robots.	(Chen & Tung, 2014; Davis, 1985)
Perceived Enjoyment (PE)	The perception that using a robot is enjoyable in and of itself, regardless of any performance impact.	(Heerink et al., 2010; Venkatesh & Bala, 2008)
Robot Anxiety (RA)	It is the individual's pre-existing feeling of fear due to the unpredictability of the future to solve the difficulties encountered while using the robot.	(Heerink et al., 2010; Nomura et al., 2008)
Trusting Belief (TB)	An individual's beliefs in a robot's functionality, reliability, and responsiveness.	(Lankton et al., 2015)

As in the basic model, it has been observed that the perceived ease of use and perceived usefulness positively influence the attitudes toward service robots (Abou-Shouk et al., 2021; Choe et al., 2021; Ghazali et al., 2020; W. H. Lee et al., 2018; Li & Wang, 2021; Park & Kwon, 2016; Zhong, Zhang, et al., 2020). Furthermore, some research indicates that perceived ease of use has a significant positive impact on perceived usefulness (Abou-Shouk et al., 2021; Choe et al., 2021; Forgas-Coll et al., 2021; Ghazali et al., 2020; W. H. Lee et al., 2018; Park & Kwon, 2016; Seo & Lee, 2021; Yang et al., 2021) and intention to use social robots (Forgas-Coll et al., 2021). In most research, attitudes toward service robots are considered an essential antecedent of intention (Choe et al., 2021; W. H. Lee et al., 2018; Li & Wang, 2021; Park & Kwon, 2016; Zhong, Zhang, et al., 2020). Similar to the fundamental TAM, research has shown that the perceived usefulness of service robots is a determinant of intention to use (Etemad-Sajadi & Sturman, 2021; Forgas-Coll et al., 2021; W. H. Lee et al., 2018; Park & Kwon, 2016; Saari et al., 2022; Seo & Lee, 2021; Yang et al., 2021). In this context, the hypotheses developed within the scope of the conceptual model, including the essential TAM variables, are as follows:

H3: Perceived usefulness has a positive effect on attitude toward using robots

H4: Perceived ease of use has a positive effect on attitude toward using robots

H5: Perceived ease of use has a positive effect on perceived usefulness

H6: Attitude toward using has a positive effect on the intention to stay

The factors defined as external variables in the basic TAM and the effects on perceived usefulness, ease of use, attitude toward using, and the intention to use service robots have been examined in previous research. Studies such as those carried out by (Park & Kwon, 2016), (Ghazali et al., 2020), (Abou-Shouk et al., 2021), and (Saari et al., 2022) have revealed that enjoyment positively affects perceived ease of use, with (Park & Kwon, 2016) observing that enjoyment has a positive effect on the perceived usefulness of social robots.

Table 2
Literature Review on TAM-Related Service Robots

Study	Objective	Findings	Scope, Data, Method and Location
(Park & Kwon, 2016)	· Using the technology acceptance model to investigate the factors that influence the adoption of Teaching Assistant robots.	· Ease→ Usefulness · Ease → Attitude · Usefulness → Attitude · Usefulness →Intention · Attitude → Intention · Enjoyment→ Usefulness · Enjoyment → Ease · Service Quality→ Usefulness · Service Quality → Ease	· Teaching assistant robots · 609 Respondents · Survey · SEM · South Korea
(W. H. Lee et al., 2018)	· TAM was used to investigate the customer's perception of restaurant robots, including trust, interactivity, and output quality as independent factors.	· Ease→ Usefulness · Ease→ Attitude · Usefulness→ Attitude · Usefulness→ Acceptance · Attitude→ Acceptance · Trust→ Usefulness · Interactivity→ Ease · Output Quality→ Usefulness	· Restaurants Service Robots · 382 Respondents · Survey · SEM · Taiwan
(Turja et al., 2020)	· Based on technology acceptance theories, a model is proposed for the intention to use care robots.	· Social Influence→ Intention · Attitude→ Intention · Usefulness→ Intention · Enjoyment→ Intention · Personel Values→ Usefulness · Personel Values→ Social Influence · Perceived Unemployment[-]→ Personel Values	· Care Robots · 544 Respondents · Survey · SEM · Finland
(Ghazali et al., 2020)	· Analyzing the user's acceptance of the social robot by evaluating the TAM with factors expressed trusting belief, compliance, liking, and psychological reactance that are conceptualized as social responses.	· Usefulness→ Attitude · Ease→ Usefulness · Ease→ Attitude · Ease→ Liking · Enjoyment→Ease · Enjoyment→Attitude · Enjoyment→ Intention · Enjoyment→ Liking · Liking→ Reactance · Liking→ Intention · Beliefs→ Reactance · Beliefs→ Attitude · Beliefs→ Usefulness · Beliefs→ Compliance	· Before completing the survey, participants interacted with a persuasive robot · Survey · SEM · 78 Respondents
(Zhong, Zhang, et al., 2020)	· The theory of planned behavior, the technology acceptance model, and the perceived value-based acceptance model was used to investigate hotel guests' attitudes toward robots.	· Usefulness→ Attitude · Ease→ Attitude · Sentimental Value→ Value · Self-Efficacy→ Behavioral Control · Attitude→ Intention · Value→ Intention · Behavioral Control→ Intention	· Before completing the survey, participants watched a video on hotel service robots · Survey · SEM · 217 Respondents · China
(Yang et al., 2021)	· Explores the relation between technology readiness and technology amenities as antecedents to visiting intentions using TAM.	· Ease→ Usefulness · Ease[-]→ Visiting Intention · Usefulness→ Visiting Intention · Technology Readiness→ Visiting Intention · Technology Amenities→ Ease · Technology Amenities → Usefulness	· Smart Hotels · Interview · Survey · SEM · 648 Respondents · China

(Choe et al., 2021)	·Using the technology acceptance model and theory of planned behavior for exploring behavioral intentions in the context of robotic restaurants.	· Ease→ Usefulness · Ease→ Attitude · Usefulness→ Attitude · Subjective Norm→ Attitude · Subjective Norm→ Personal Norm · Subjective Norm→ Intention · Attitude → Intention · Behavioral Control→ Intention · Personal Norm→ Intention	· Before completing the survey, participants watched a video on restaurant robots · Robotic Restaurant · Survey · SEM · 416 Respondents · South Korea
(Abou-Shouk et al., 2021)	·Using the technology acceptance model to examine the variables influencing customers' attitudes regarding robot adoption in hotels and travel agencies	· Usefulness→ Attitude · Enjoyment→ Ease · Adopter category→ Ease · Appropriateness→ Usefulness · Ease→ Attitude · Ease→ Usefulness · General Attitude→ Attitude · General Attitude→ Usefulness · Robots' interest→ Attitude · Robots' interest→ Usefulness	· Hotel Service Robot · Survey · SEM · 570 Respondents · Egypt
(Etemad-Sajadi & Sturman, 2021)	·Understanding with an extended TAM how consumers respond to a service experience provided by the robot Pepper.	· Social Presence→ Usefulness · Social Presence→ Trust · Social Presence→ Emotional Appeal · Trust→ Intention · Trust[-]→ Emotional Appeal · Emotional Appeal→ Intention · Usefulness→ Intention · Fear of Robots[-]→ Intention	· The participants interacted with the robot pepper, and then the questionnaire form was filled. · Concierge in University · Survey · SEM · 180 Respondents
(Li & Wang, 2021)	·Exploring customer acceptance of service robots with TAM where external variables are customer characteristics (role clarity and ability) and robot characteristics (anthropomorphism, autonomy)	· Attitude→ Intention · Anthropomorphism→ Usefulness · Autonomy→ Usefulness · Autonomy→ Ease · Ability→ Usefulness · Ability→ Usefulness · Ease→ Attitude · Usefulness→ Attitude · Role clarity→ Ease	· General Service Robots · 416 Respondents · Survey · SEM · China
(Seo & Lee, 2021)	·Investigating the effect of trust, perceived risk, and satisfaction on each other and TAM constructs in the robot service restaurant.	· Usefulness→ Intention · Ease→ Usefulness · Trust→ Usefulness · Trust→ Ease · Trust→ Risk · Trust→ Satisfaction · Risk→ Satisfaction · Risk→ Intention · Satisfaction→ Intention	· Service Robots at Restaurants · Before the questionnaire was completed, the participants were shown pictures of robots. · Survey · SEM · 338 respondents · South Korea
(Forgas-Coll et al., 2021)	·Based on TAM, a model is proposed to estimate the intention to use social robot technology. Differences in terms of gender were investigated.	· Usefulness→ Intention · Ease→ Intention · Ease→ Usefulness · Enjoyment→ Intention · Social Influence→ Intention	· Social Robots · The participants filled out the questionnaire after interacting with the social robot. · Survey · SEM · 219 Respondent · Spain
(Saari et al., 2022)	·Investigating the applicability of the technology acceptance model in the context of social robots. ·Examining the differences in adoption of social robots between early adopters and mass-market representatives.	· Image→ Usefulness · Output Quality→ Usefulness · Enjoyment→ Ease · Usefulness→ Intention · Result Demonstrability → Usefulness · Subjective Norm → Image · Robot Anxiety [-]→ Ease	· Respondent interacted with a robot prototype (Pepper) to check the lunch menu in the university before the survey was conducted · Survey · SEM · 132 Respondents

As an affective reaction, users' anxiety and fear of robots aspects were found to have a negative impact on the ease of use (Saari et al., 2022) and the intention to use social robots (Etemad-Sajadi & Sturman, 2021), respectively. Additionally, anthropomorphism (Li & Wang, 2021), service quality (Park & Kwon, 2016), interactivity (W. H. Lee et al., 2018), trust (Etemad-Sajadi & Sturman, 2021; W. H. Lee et al., 2018; Seo & Lee, 2021), output quality (Ghazali et al., 2020; Saari et al., 2022), beliefs (Ghazali et al., 2020), technology readiness and amenities (Yang et al., 2021), robots' interest (Abou-Shouk et al., 2021), social presence (Etemad-Sajadi & Sturman, 2021), liking (Ghazali et al., 2020), risk (Seo & Lee, 2021), autonomy and ability (Li & Wang, 2021), result demonstrability and image (Saari et al., 2022), appropriateness (Abou-Shouk et al., 2021), general attitude (Abou-Shouk et al., 2021), role clarity (Li & Wang, 2021), subjective norm (Choe et al., 2021), social influence (Forgas-Coll et al., 2021), satisfaction (Seo & Lee, 2021), value (Zhong, Zhang, et al., 2020), behavioral control (Choe et al., 2021; Zhong, Zhang, et al., 2020), personal norm (Choe et al., 2021), emotional appeal (Etemad-Sajadi & Sturman, 2021), and adopter category (Abou-Shouk et al., 2021) are other factors exploring the effects on basic TAM variables related to service robots' studies.

In this context, we investigated the effects of perceived enjoyment and robot anxiety, which we conceptualized as affective reactions in our study, on the basic TAM variables. The hypotheses created are as follows;

H7: Perceived enjoyment has a positive effect on perceived usefulness

H8: Perceived enjoyment has a positive effect on perceived ease of use

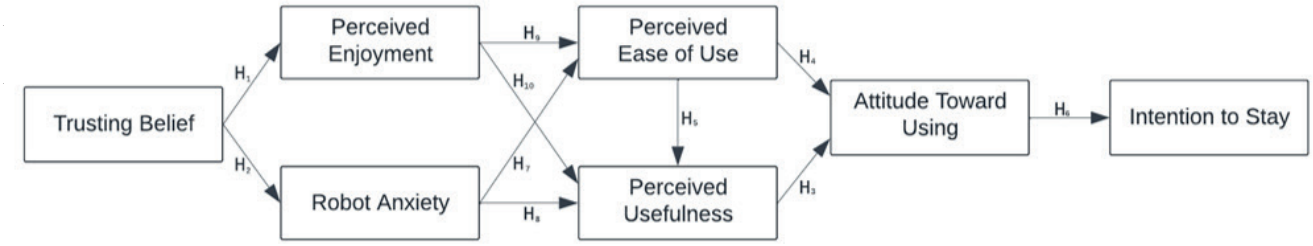


Figure 1. Conceptual Research Model

Within the scope of the literature review, it is observed that most of the studies on the adaptation of service robots are carried out in far eastern countries (Choe et al., 2021; W. H. Lee et al., 2018; Li & Wang, 2021; Park & Kwon, 2016; Seo & Lee, 2021; Yang et al., 2021; Zhong, Zhang, et al., 2020). Furthermore, questionnaires were used with the convenience sampling method for data collecting, and all studies conducted structural equation modeling (SEM) for path analysis. Sharing experiences by interacting with robots (Etemad-Sajadi & Sturman, 2021; Forgas-Coll et al., 2021; Ghazali et al., 2020; Saari et al., 2022) and giving information about service robots by showing videos (Choe et al., 2021; Zhong, Zhang, et al., 2020) and photographs (Seo & Lee, 2021) to the respondents before filling out the questionnaire is used in several TAM-related service robot studies.

3 METHODOLOGY

3.1 SAMPLES AND PROCEDURES

This study is a part of the researcher-funded project at Sakarya University on the adoption of robot technologies which took place with the approval of the ethics committee, Turkey and was conducted in 2022. The online questionnaire with non-probability convenience sampling was chosen as the data collecting method, with a total of 598 respondents volunteering to participate in the research. Before filling out the questionnaire, the respondents watched a three-minute informative video about hotel service robots. This video introduces eight different service robots, including: reservation, luggage carrier, in-room informative, room service, concierge, cleaning, waiter, and cook. Two sample screenshots of the video are shown in Figure 2.

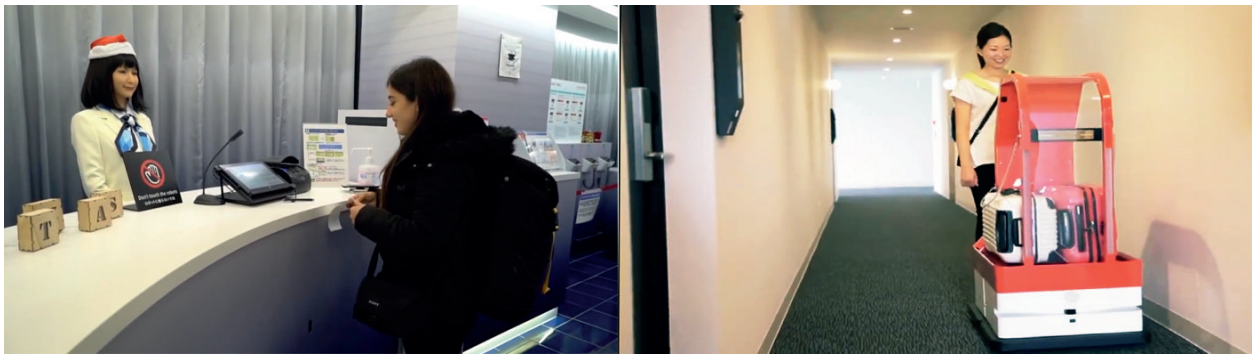


Figure 2. Screenshots from Informative Video About Hotel Service Robots

3.2. INSTRUMENT DEVELOPMENT

The scales used in the survey were adapted from various sources. Eight items from Heerink et al. (2010) and Nomura et al.(2008) for robot anxiety, five items from Zhong, Sun et al.(2020) for intention to stay, five items each from Heerink et al. (2010) for perceived ease of use and perceived enjoyment, five items from Heerink et al. (2010) and Song (2017) for perceived usefulness, three items for trusting belief from Ivanov et al., (2018) were adopted, and one question for trusting belief was developed within the scope of the research. These items were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In addition, attitude toward using, which consists of five items adapted from Lin & Mattila (2021), was measured on a 5-point Likert scale with extremely negative = 1 to extremely positive = 5.

3.3 DATA ANALYSIS

3.3.1 DESCRIPTIVE STATISTICS

Table 3 shows the demographic distribution of the respondents participating in the questionnaire. There is a balance in gender, with 54% of the respondents being male and 46% female.

Table 3

Descriptive Statistics

Measure	Item	Frequency	Percentage
Gender	Male	320	54%
	Female	278	46%
Age	18-29	225	38%
	30-41	140	23%
	42-53	118	20%
	54-64	97	16%
	65+	18	3%
Education	High School	32	5%
	Vocational High School	30	5%
	University	333	56%
	Master	151	25%
	Doctorate	52	9%
Marital Status	Single	317	53%
	Married	281	47%

The respondents participating in the research who are aged between 18 and 29 accounted for 38%. The percentage of respondents aged 30-41 is 23%, while the respondents aged 42 and older is 39%. Regarding education, it has been observed that 90% of the respondents have a university or higher degree. In terms of marital status, 53% are single and 47% are married.

3.3.2 STRUCTURAL EQUITATION MODELING (SEM)

SEM is a robust approach which combines factor analysis and path analysis and allows researchers to test the hypotheses between one or more dependent or independent variables. It simultaneously evaluates the theory-based measurement model, which provides a comprehensive means for analyzing and adjusting the conceptual model (Anderson & Gerbing, 1988; Hayduk et al., 2007; L. Lee et al., 2011). There are two SEM methods: covariance-based (CB) and variance-based partial least squares (PLS). Hair Jr. et al. (2017) recommend using PLS-SEM for non-normal distribution data, which is valid for most social science research. In this regard, the discrimination and construct validity test results were examined using the SmartPLS (Ringle et al., 2015), with the measurement model path coefficients being calculated afterwards.

3.3.3 CONFIRMATORY FACTOR ANALYSIS

The indicator reliability (factor loadings), multicollinearity assessment (variance inflation factor), internal consistency reliability (Cronbach's α, Composite Reliability), convergent validity (Average Variance Extracted), and discriminant validity (Fornell-Larcker Criterion) methods were used to evaluate the measurement model (Joseph F. Hair et al., 2013). The variance inflation factor (VIF), Factor loadings, Cronbach's α, Composite Reliability, and Average Variance Extracted (AVE) results were obtained using the SmartPLS software and are listed in Table 4.

Factor loading values less than 0.6 were removed from the analysis because they did not provide total structural integrity, as proposed by (Hulland, 1999) and (Joe F. Hair et al., 2011). Three items were removed from the study because they did not meet this criterion. As seen in Table 4, the Cronbach's α (≥ 0.70), Composite Reliability (≥ 0.70), AVE (≥ 0.50), and VIF (< 5) of each factor are at the accepted level as suggested by Bagozzi & Yi (1988), Fornell & Larcker (1981) and (Joseph F. Hair et al., 2013).

The normality test for the data was calculated by considering the method of Sharma et al. (2021). According to the result of a web-based tool (https://webpower.psychstat.org/) created by Cain et al. (2017), which tests the data for multivariate normality considering Mardia's (1970) technique (multivariate skewness: $\beta = 4.41$, p-value < 0.01; multivariate kurtosis: $\beta = 79.28$, p-value < 0.01), our data does not follow a normal distribution because the p-value for chi-squared tests is approximately 0 and the multivariate skewness and kurtosis are significantly larger than 0. In this regard, the non-normal distributed data, frequently seen in social sciences, is the primary reason for using PLS-SEM, which can handle fittingly in our research.

Table 4.

Confirmatory Factor Analysis

Factors and Items	VIF	FL	AVE	CR	α
Robot Anxiety [RA]					
I would feel very nervous just standing in front of a robot	2.28	0.83			
I would feel nervous operating a robot in front of other people	2.35	0.80			
If I should use the robot, I would be afraid to make mistakes with it	2.43	0.77	0.598	0.899	0.865
If I should use the robot, I would be afraid to break something	2.21	0.75			
I would feel paranoid talking with a robot	1.92	0.74			
I would feel uneasy if I was given a job where I had to use a robot	1.63	0.71			
Attitude Toward Using [ATT]					
My personal attitude towards being served by service robots in a hotel is	4.95	0.95	0.870	0.952	0.925
My personal attitude towards service robots in general is	3.32	0.92			
My personal attitude towards engaging or interacting with service robots is	3.42	0.92			
Perceived Ease of Use [PEOU]					
I find the robot easy to use	2.83	0.90			
I think I can use the robot when I have a good manual	2.70	0.88	0.756	0.925	0.892
I think I will know quickly how to use the robot	2.46	0.87			
I think I can use the robot without any help	2.07	0.81			

Perceived Enjoyment [PE]					
I find the robot enjoyable	4.12	0.91	0.726	0.929	0.902
I enjoy doing things with the robot	3.88	0.90			
I enjoy the robot talking to me	3.30	0.89			
I find the robot fascinating	2.56	0.85			
I find the robot boring	1.41	0.66			
Trusting Belief [TB]					
Any incorrect operation cannot be canceled while robots serve consumers	1.40	0.80	0.566	0.838	0.747
Robots can malfunction during service	1.51	0.77			
Robots can misunderstand a question/order	1.58	0.77			
Robots can't do special requests/they work only in a programmed frame	1.28	0.64			
Intention to Stay [INT]					
I will consider making a reservation at this hotel	2.84	0.88	0.709	0.924	0.896
I want to make a reservation at this hotel	2.91	0.88			
I am willing to recommend this hotel to my friends and relatives	2.63	0.87			
I will likely make a reservation at this hotel	2.38	0.84			
I don't want to stay at this hotel (reverse)	1.62	0.70			
Perceived Usefulness [PU]					
Using the robots in hotel services will save me time	2.88	0.89	0.784	0.935	0.908
The use of robots in hotel services would be useful	2.65	0.88			
I think things will be done quickly with the use of robots in hotel services	2.88	0.88			
The use of robots in hotel services can help me with many things	2.49	0.87			

VIF: *Variance inflation factor*, FL*: Factor Loadings,* AVE*: Average Variance Extracted*, CR*: Composite Reliability*

Discriminant validity empirically reveals whether a construct is truly distinct from other constructs in the model (Joseph F. Hair et al., 2017). Discriminant validity requires that the square root of each factor's AVE be greater than the correlations among them (Fornell & Larcker, 1981; Joseph F. Hair et al., 2014). Table 5 shows that each variable's value is at the required level. On the diagonal in Table 4, the square root of AVE values is given; the other values represent the correlations between variables.

Table 5

Discriminant Validity

	Mean	**Std. Deviation**	**RA**	**ATT**	**PEOU**	**PE**	**INT**	**TB**	**PU**
RA	2,67	1,04	*0.773*						
ATT	3,37	1,10	-0.477	*0.933*					
PEOU	3,61	0,99	-0.488	0.536	*0.869*				
PE	3,37	1,15	-0.429	0.699	0.449	*0.852*			
INT	3,60	1,06	-0.446	0.740	0.513	0.697	*0.842*		
TB	3,42	0,91	-0.530	0.422	0.336	0.438	0.446	*0.752*	
PU	3,75	1,03	-0.419	0.679	0.517	0.621	0.663	0.342	*0.885*

3.3.4 STRUCTURAL MODEL

In PLS-SEM, bootstrapping as the non-parametric resampling method examines the estimates' accuracy and generates tests for statistical significance results (L. Lee et al., 2011). As suggested by Hair Jr. et al. (2017), five thousand samples were used for bootstrapping. Figure 3 shows the variables' structural relation, coefficient, and R^2 values.

As seen in Table 6, trusting belief has a negative effect on robot anxiety (β: -0.530, R^2: 0.279, p: 0.000) and a positive effect on perceived enjoyment (β: 0.438, R^2: 0.190, p: 0.000). For assessing effect size (f^2), J. F. Hair et al. (2017) state that values of ≥0.02, ≥0.15, and ≥0.35 represent the independent variable's small, medium, and large effects. In this context, it is seen that trusting belief has a large effect (f^2: 0.390) on robot anxiety (β: -0.530, R^2: 0.279, p: 0.000) and a medium effect (f^2: 0.237) on enjoyment (β: 0.438, R^2: 0.190, p: 0.000).

Table 6

Path Model

H_n	Structural Relation	Coefficient	Standard Deviation	T Statistics	P Values	f^2
H_1	TB→ RA	-0.530	0.031	17.273	0.000	0.390
H_2	TB→ PE	0.438	0.031	13.933	0.000	0.237
H_3	PU→ ATT	0.548	0.033	16.702	0.000	0.448
H_4	PEOU→ ATT	0.253	0.034	7.425	0.000	0.095
H_5	PEOU→ PU	0.264	0.039	6.794	0.000	0.090
H_6	ATT→ INT	0.740	0.021	35.883	0.000	1.212
H_7	PE→ PU	0.464	0.039	11.929	0.000	0.296
H_8	PE→ PEOU	0.294	0.038	7.813	0.000	0.102
H_9	RA→ PU	-0.091	0.037	2.443	0.015	0.011
H_{10}	RA→ PEOU	-0.362	0.039	9.267	0.000	0.154

T-statistics were expected to be larger than 1.96 at p<0.05 (Wong, 2013)

The significant effects of these factors as affective reactions on the main TAM variables as the perceived usefulness and ease of use were observed. While perceived usefulness (β: 0.464, R^2: 0.460, p: 0.000) and ease of use (β: 0.294, R^2: 0.306, p: 0.000) are both influenced by perceived enjoyment, it has been discovered that robot anxiety has a negative impact on perceived ease of use (β: -0.362, R^2: 0.306, p: 0.000) and perceived usefulness (β: -0.091, R^2: 0.460, p: 0.000). The effect of perceived enjoyment on usefulness is medium (f^2:0.296), and its impact on the ease of use is small (f^2: 0.102), while the effect of robot anxiety on ease of use was medium (f^2: 0.149). Although a statistically significant impact of robot anxiety on perceived usefulness has been observed, the coefficient (β: -0.091) and the effect size (f^2:0.011) are pretty low.

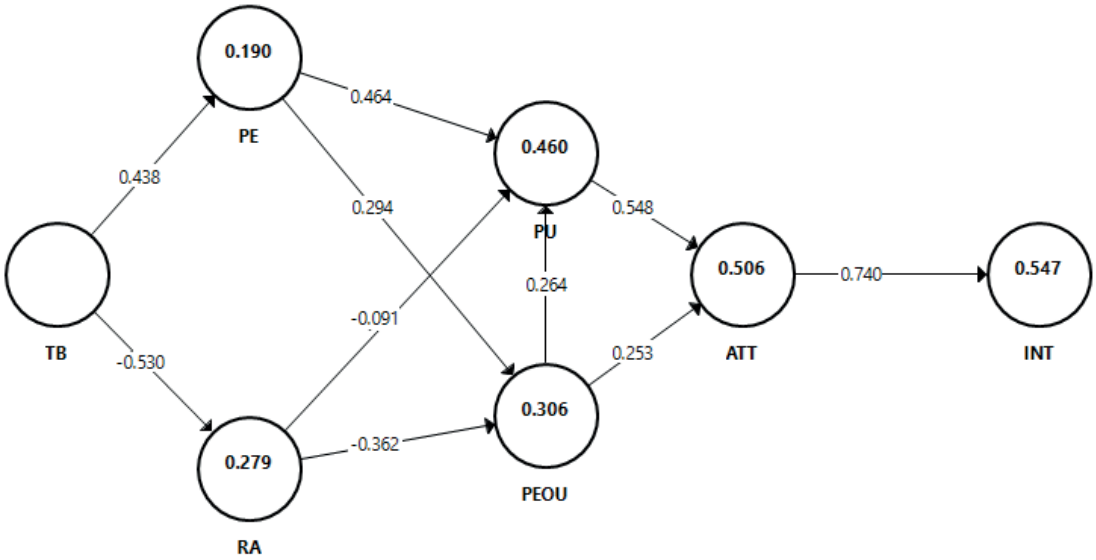


Figure 3. The Estimated Structural Model

When the relationships between the basic TAM variables were examined, it was found that perceived usefulness had a positive impact on attitude toward using (β: 0.548, R^2: 0.506, p: 0.000) with a large effect (f^2:0.448). Perceived ease of use positively impacts attitude toward using (β: 0.253, R^2: 0.506, p: 0.000) and perceived usefulness (β: 0.264, R^2: 0.460, p: 0.000) with a medium effect (f^2: 0.09). Finally, attitude toward using has the most decisive positive impact on intention to stay (β: 0.740, R^2: 0.547, p: 0.000) with a large effect size (f^2: 1.212). As a result, the hypotheses developed within the scope of the research were accepted.

Stone–Geisser's Q^2 is a method for assessing a structural model's predictive relevance, in which values greater than 0 show that the model is adequate and has predictive relevance (Joe F. Hair et al., 2011; Joseph F. Hair et al., 2013). Our analysis results show that the Q^2 value of each dependent variable is sufficient (ATT:0.439, INT:0.382, PE:0.137, PEOU:0.227, PU:0.356, RA:0.164).

Finally, The Standardized Root Mean Square Residual (SRMR) and the Normed Fit Index (NFI) were examined as model fit criteria (Bentler & Bonett, 1980; Hu & Bentler, 1999). While NFI is expected to be close to 1, SRMR less than 0.08 indicates a better model fit. For our model, the SRMR value was 0.05, and the NFI value was 0.87.

4 DISCUSSION AND IMPLICATIONS

4.1 THEORETICAL IMPLICATIONS

This study examined the effects of adding two critical variables, perceived enjoyment and robot anxiety, to the core TAM as affective reactions and the influence of the trusting belief aspect, which is an antecedent of affective reactions. Additionally, this study fills an important gap in contributing to the literature on the adaptation of hotel service robots, which is rare. This is the first attempt to explore this topic from the perspective of Turkish customers.

The findings validate some previous research on service robots centered on TAM. It was discovered that the attitude toward using service robots has a strong positive impact on the intention to stay in a hotel served by robots and is influenced by perceived usefulness, which has a greater effect than perceived ease of use. In this regard, similar results were found with research on the adaptation of teaching assistant robots (Park & Kwon, 2016), restaurant service robots (Choe et al., 2021; W. H. Lee et al., 2018), hotel service robots (Zhong, Zhang, et al., 2020), and general service robots (Li & Wang, 2021).

As an affective reaction, the results of our study found that enjoyment positively affects perceived usefulness and ease of use, while robot anxiety negatively affects perceived ease of use and perceived usefulness. Similar impacts on the ease of use on enjoyment may be noticed in the research findings of Saari et al. (2022), Ghazali et al. (2020), and Abou-Shouk et al. (2021). Furthermore, our research reveals a strong influence of perceived enjoyment on perceived usefulness, which we believe to be a significant contribution to the literature and consistent with Park & Kwon's (2016) findings. Our findings show parallelism with Saari et al. (2022) regarding the negative effect of robot anxiety on perceived ease of use.

Our hypothesis that robot anxiety as an affective reaction has a negative effect on perceived usefulness has been statistically confirmed but with a very small impact; hence, this result partially supports the findings of Heerink et al. (2010), which found no meaningful effect. Although the cause for such a condition has not been discovered in research on robot adaptation, it is stated in the TAM-related literature that computer anxiety does not directly affect perceived usefulness but is indirectly influenced by perceived ease of use (Chatzoglou et al., 2009; Igbaria & Chakrabarti, 1990). This result was valid in our research finding with a small coefficient value, with robot anxiety having been found to have a negative indirect effect (-0,096) on perceived usefulness.

According to the research findings, the individual's trusting belief affects enjoyment positively and robot anxiety negatively. This result will lead to a better understanding of the service robot adoption process. Shaping individuals' beliefs toward service robots positively will increase the perception of enjoyment and decrease robot anxiety. In this context, the effect of trusting belief on affective reactions supports the research of Califf et al. (2020), Lankton et al. (2015), Thatcher et al. (2007), and van Pinxteren et al. (2019).

In this sense, this study provides valuable contributions in terms of the generalizability of the research results conducted in different geographies with similar contexts. Furthermore, the current study has provided a fresh understanding of how trusting belief affects perceived enjoyment and robot anxiety as it relates to the technology adoption process.

4.2 PRACTICAL IMPLICATIONS

How users' belief systems are persuaded in terms of trusting technology is the most significant practical contribution that arises from the findings of this study. Reducing users' risk perception and uncertainty with informative advertisements and marketing activities, as well as transferring messages, such as refunds and fast human support in the event of a negative situation that may arise while receiving service from hotel robots will ensure the formation of positive beliefs about robots. This task should be taken seriously by the management of each hotel, organization, or institution by setting industry standards and educating consumers, just as in what occurred during the early adoption phase of internet banking (Jaruwachirathanakul

& Fink, 2005; Martins et al., 2014). While online banking delivered substantial cost savings for banks, users sensed a high level of risk and uncertainty at the start. However, advertising messages emphasized that this technology is trustworthy, provides assurance, is simple to use, and provides significant benefits to customers. Additionally, the promotional advantages provided to customers by performing their banking transactions online have encouraged widespread adoption of online banking.

Using robots in hotel services is still in its early stages, so it will be more reasonable to form positive beliefs by using them for routine services, such as luggage carrying or cleaning, rather than having robots which intensively interact with guests, like reception or concierge robots, as stated by Huang et al. (2019). Lin & Mattila (2021) indicate that most consumers still prefer a person at the front desk to a receptionist robot. In this regard, the Henn-na Hotel, which was totally run by robots, ceased operations in 2019, resulting in negative public perception for the industry in terms of robot use. Nevertheless, according to Shead (2019), there was only one successful robot at the Henn-na Hotel. It was the massive mechanical arm that placed and retrieved baggage from storage bins. According to our findings, creating a marketing strategy with an advertisement message that includes an image of error-free, enjoyable, useful, and easy to operate robots is essential for the hospitality industry to promote adoption.

The negative effect of the trusting belief in robots on the individual's robot anxiety will also make a significant practical contribution. When interacting with robots, users should be able to choose from various programs based on their level of technical knowledge (Miller et al., 2021). It will surely be effective for visitors who are using a robot for the first time to be guided with more information, such as the robot's capabilities, functioning, potential benefits, limits, and possible risks, to reduce state anxiety due to their beliefs.

The design and performance of robots play an influential role in the formation of trust belief (Naneva et al., 2020); for example, the appearance of the suitcase carrier robot causes an expectation about how much luggage it can carry in the mind of the customer (Luo et al., 2021), or more humanized service robots may cause the customer to perceive that it can perform more human-like tasks (Tung & Law, 2017). However, it should not be overlooked that visitors' aversion can be easily triggered by a high degree of anthropomorphism (Jia et al., 2021). In this sense, since service robot design will become influential in forming trusting beliefs, the demographic characteristics of the customer (de Kervenoael et al., 2020) and even cultural characteristics (Tung & Law, 2017) will undoubtedly mediate this effect. Therefore, service robots' integration into the mass market will be more efficient and stable after a detailed research process which considers the target market with different customer segments for the hospitality industry.

In our research findings, it has been found that perceived enjoyment has a significant positive effect on the adoption of robots, especially through perceived usefulness. According to El-Said & Al Hajri (2022), the use of multimedia for a waiter or room service robots may increase the enjoyment perception of customers by making ordering and receiving functions more effortless and more functional. Playing music or flickering light while receiving or bringing orders and playing games with robots while waiting may also be effective in entertainment.

5 CONCLUSION, LIMITATIONS, AND FUTURE STUDIES

The usage of robots in the hospitality industry is becoming more common due to the benefits they provide to service providers and customers. Trusting belief has been the main thrust of this study, and the variables of enjoyment and robot anxiety as affective reactions were integrated with the core TAM model and tested statistically. Our findings show that trusting belief influences emotional reactions, as mentioned in IS-based studies; additionally, our research on hotel service robots as novel technological agents validated the core TAM model assumptions with external variables. In this respect, this study reveals these relations for the first time, to the best of our knowledge, and fills an important gap in the literature of Management Information Systems and Tourism.

The data were collected by the survey method, with the convenience sampling approach based on the non-probability technique being preferred due to time and cost constraints. This approach especially reduces the representation ability of the universe and makes it difficult to generalize hypotheses. The results should thus be evaluated within this scope. Preferring probabilistic

sampling methods in future studies will help compare the results of our findings and other studies' results in the relevant literature.

In our study, respondents were instructed to complete the survey based on the content of the video they had watched rather than their personal experiences. Although there are experimental studies in the literature, future studies may evaluate robot adaptability in the hotel environment by enabling guests to interact with robots. Surveys or focus group studies conducted by robots would surely provide valuable information to the literature.

As we mentioned in the literature review, many different types of robots can be used in hotel services. Although the general acceptance studies of these robots provided helpful information, evaluating service robots separately in academic studies will provide much more helpful information. Focusing primarily on robots that do routine tasks is regarded as a more realistic and pragmatic contribution for today.

In most of the studies included within the scope of the research, the survey technique and structural equation modeling were used. Text mining, using data logged in robots, and predicting consumer needs and demands using a variety of machine learning algorithms will surely support method diversity and provide new visions to the literature in future research.

Furthermore, it has been observed that research is extensively carried out in the nations of the Far East. Encouraging new studies that consider different countries and cultures will significantly contribute to the literature in this context.

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