


SERVICE ROBOTS IN THE HOTEL INDUSTRY: CUSTOMER ACCEPTANCE AMONG INTERNATIONAL AND LOCAL HOTEL BRAND


Abstract

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Purpose – This study aims to explore the customer acceptance of service robots in the hotel industry. Four determinants are analysed: perceived privacy, novelty value, service robots appearance, and attitudes towards service robots. The differences in customer acceptance between international and local hotel brands are also presented, along with the genders' distinctive results.

Methodology – The study was conducted in Indonesia, involving 120 respondents who had prior experience staying in the hotel. Data was gathered from May to June 2022 through online questionnaires and analyzed using structural equation modeling with SmartPLS.

Findings – Findings show that for international hotel customers, three determinants (perceived privacy, novelty value, and appearance) simultaneously exert a greater influence on customer attitude, compared to local hotel customers. In contrast, the service robots' acceptance of local hotel customers is influenced more by their attitude, than of international hotel customers. Furthermore, male customers have proven that they have a higher value on all constructs in this research, meaning higher acceptance and attitude, compared to their female counterparts. *Originality of the research* – This study attempts to go beyond the hotel industry as a whole, but is limited to both international and local hotel brands.

Keywords Novelty value, Perceived privacy, Service robot acceptance, Service robot appearance, Service robots in hotels

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INTRODUCTION

The hospitality and tourism industry is a very broad industry, consisting of many sub-segments including food and beverage, travel and tourism, lodging, and recreation which makes it one of the world's most diverse and fastest-growing economic sectors (Sharma & Bhat, 2023), and considered a people business as it provides services from human service providers to human guests, which requires the traditional labor-intensive nature of the business because of the complex nature of duties and communication nuances (Ivanov & Webster, 2019). The hotel industry is a complicated, dynamic, stochastic, and open business to manage in which technology is involved to enhance decision-making and guest satisfaction levels, improve hotel service quality and guest loyalty, as well as profitability and competitiveness (Pilepić, 2002; Tavitiyaman et al., 2022). As a conventional business and a technology trailblazer, it continues to learn how to embrace technological advancements in the second half of the twentieth century (Chen, 2021).

Technological innovation has disrupted many industries and the hospitality industry is no exception. The driving factor of innovation in the hospitality industry is the highly competitive environment which urges the finding of new ways for efficient performance, aiming to achieve effective satisfaction of customers' needs, win customers' loyalty, improve the service process and competitiveness of the organization (Dzhandzhugazova et al., 2016; Kazandzhieva et al., 2017). The service process transformation occurs as a response to changes in consumer behavior with the new requirements of modern technology (Kazandzhieva et al., 2017). For instance, self-service check-in kiosks, free wireless internet phone calls, digital key issuance, and robots (Bowen & Whalen, 2017; Ivanov et al., 2017; Victorino et al., 2009). Additionally, it is advised by industry leaders in the travel industry must make use of digital connectivity and deeper customer awareness in order to create experiences that take into account customers' perspectives and generate richer engagement (Reiss, 2016). In these conditions, hotels must ensure that they are implementing the appropriate enabling technology to optimize their data assets and improve their understanding of their customers for more pertinent interactions in order to promote customer satisfaction, engagement, and loyalty (Reiss, 2016).

In recent years, the development of RAISA (Robots, Artificial Intelligence, and Service Automation) in the hospitality industry has been accelerated (Bowen & Whalen, 2017). Several reasons behind this acceleration are cost-effective optimization, greater utilization of resources, precise demand prediction, better quality control, process management improvement, human error elimination (Ivanov et al., 2017; Ivanov & Webster, 2019), and labor shortage (Bowen & Morosan, 2018). As the COVID-19 pandemic occurred and the hotel industry suffered a lot because of this greatest hit (Almeida et al., 2022), it also clearly became

the catalyst of digital technology transformation in the hotel industry (Antonio & Rita, 2021; Lau, 2020). Driven by recent breakthroughs in artificial intelligence and machine learning, as well as an increase in calculation power, a decrease in hardware costs, the use of lighter materials, and enhanced utilization of computation power, robots expand into various sectors and they can now sense and react to their environment (Savin et al., 2022).

The adoption of technologies in the hotel industry is used as a solution to secure guests' and staff's safety, including the removal of direct contact between human guests and human staff which makes artificial intelligence and self-service technology stand out (Liu & Yang, 2021). The main examples of robot adoption in hotels are porter robots, front desk robots, concierge robots, delivery robots, vacuum cleaning robots, and room assistant robots (Lukanova & Ilieva, 2019). In the Indonesian hotel industry, the use of service robots is limited and is considered a new player in the market, unlike hotels in Japan and Singapore for instance, which implemented this technology way before other countries. For example, Henn Na Japan in 2015 with a service robot for check-in and luggage handling, YOTEL Singapore in 2017 with a service robot for luggage and items guest room delivery, and Hilton McLean United States in 2016 with a service robot for one-stop information. Meanwhile in Indonesia, the adoption of service robot started gaining attention after the year 2020, such as Grand Sahid Jaya Hotel Jakarta (Indonesia's local hotel brand) launched the use of service robots in 2021 for food delivery purposes in banquet operations (Pia, 2022). In the same year, Pullman Bandung Grand Central (an international hotel brand) also launched a service robot as the lobby ambassador that provides various tourism information for customers while JHL Solitaire Hotel Gading Serpong (Indonesia's local hotel brand) released the robot for air disinfectant purposes.

Although increasing numbers of service robot research have been conducted in the hospitality industry, to the best authors' knowledge, research about the differences in service robot customer acceptance between international and local hotel brands has never been done. Prior studies have been extensively investigating service robots in the hotel industry using a quantitative approach from the perspective of customer acceptance (Graaf & Allouch, 2013; Ladeira et al., 2023; Li et al., 2023; Lin & Matilla, 2021), service quality (Choi et al., 2020), customer experience (Huang et al., 2021), and employee viewpoint (Choi et al., 2020). Likewise, others have a different focus on the restaurant industry (Huang & Liu., 2022; Kim et al., 2023), the airline industry (Meidute-Kavaliauskiene et al., 2021), and cruise ship (Gonzales-Santiago et al., 2024). In contrast, many scholars also use a qualitative approach in discussing the overview of service robot trends and the future in the diverse tourism hospitality industry (Bowen & Morosan, 2018; Bowen & Whalen, 2017; Choi & Wan, 2021; Ivanov et al., 2017). This study, however, attempts to focus on a quantitative approach in the hotel industry but expands its hotel object based on two major brand countries of origin: local (Indonesia) hotel brands and foreign (international) hotel brands. In this case, the author did not emphasize one particular hotel brand. Thus, this research serves to fill the gap in understanding how local and international hotel brands can effectively implement service robots in the market. Customers may have varying levels of trust and familiarity with local versus international hotel brands. Researching the acceptance of service robots can shed light on how brand image influences perceptions of technology adoption. Furthermore, investigating the acceptance levels can provide insights into how well local and international brands adapt their robotic services to align with customer preferences as robot technologies in hotels are considered quite a new trend, especially in several markets, Indonesia one of them. The findings can help hotel brands tailor their strategies to maximize customer acceptance and satisfaction with service robots, uncovering opportunities for improvement and differentiation. Therefore this paper provides new insights by adding theoretical contributions from the lens of different hotel brands. The objective of this study is to explore the customer acceptance of service robots in the hotel industry, overseen by four determinants which are perceived privacy, novelty value, service robots appearance, and attitude toward service robots.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

1.1. Service Robots in the Hotel Industry

A robot is a controllable mechanism that can be programmed to physically interact with its environment and perform a complicated series of tasks autonomously or partially autonomously (Nichols, 2020). Robots, particularly with sophisticated artificial intelligence algorithms, are designed to execute a high variety of tasks (Busulwa et al., 2021). While industrial robots are defined as multipurpose manipulators that may be programmed in three or more axes and are automatically controlled for the use of industrial automation applications, service robots are autonomous devices that perform functions outside of industrial applications, including in both personal and professional environments (Wilson, 2015). Service robots are also explained as system-based, autonomous, and adaptable interfaces that engage, communicate, and provide services for customers (Wirtz et al., 2018). Service robots are becoming famous in the hospitality industry because of the important role of automation and self-service in customer experience (Revfine, 2022). COVID-19 also boosted the implementation of service robots as customers strongly prefer robot staff to avoid the spread of the virus (Choi & Wan, 2021). In the hospitality industry, robots are adopted to enhance the guest experience (Rahman et al., 2022; Technavio, 2021).

There are five main roles of robots in service encounters: to support, to substitute, to differentiate, to improve, and to upskill (Tuomi et al., 2021). For instance, Connie, the concierge robot by Hilton, can support operations by welcoming guests, making suggestions for dining establishments or sightseeing destinations, and responding to inquiries regarding hotel amenities and services (Muoio, 2016). A Switzerland-based barista robot called Smyze can serve customers by taking their drink orders, processing payments, and making their drinks which substitutes human barista to provide a beverage order experience for

customers (Albrecht, 2021). Keenbot, the delivery tray robot also helps to improve the restaurant's service experience as the human waiter/waitress can focus more on providing excellent service to the diners (Keenon, n.d.). Japan's Henn-na Hotel made history by being the first establishment in the world with only robot employees (Revfine, 2022). With speech and facial recognition technology, the hotel's robots are used to deliver information, front desk assistance, storage assistance, and check-in and check-out assistance (Revfine, 2022). Furthermore, the benefits of robots for businesses include cost savings, increased productivity, decreased risk, overcoming talent shortages, higher employee engagement, new or improved goods, and operational effectiveness (Busulwa et al., 2021; Wakelin-Theron, 2021; Wolfgang et al., 2017).

1.2. Acceptance of Service Robots

The notions of how customers accept the technology can be derived from existing frameworks such as the Technology Acceptance Model theory (TAM) and the UTAUT theory (Unified Theory of Acceptance and Use of Technology) (Li et al., 2023; Li & Wang, 2022). TAM concept originally posited in 1989 by Fred D Davis has also been explored and adopted in the field of robotics and the hospitality tourism industry, predicting the customer's willingness to use new technology is dependent on their evaluation of its usefulness and ease of use (Lin & Matilla, 2021; Wirtz et al., 2018). While UTAUT by Venkatesh from 2003 to 2012 evolved by emphasizing hedonic motivation, price value, and habit to the TAM. However, it is also important to consider factors such as role congruity between actors, social-emotional needs, and relational needs. These factors contribute to the development of the Service Robot Acceptance Model (sRAM), which builds on the original TAM. sRAM examines the experiences of travelers and identifies emergent themes that reveal patterns of relationships that influence consumers' preferences for service robots over human service. It is suggested that experiential or situational factors should be included in the sRAM framework, as they are likely to impact consumers' cognitive and emotional evaluations and value perceptions of service robots. It is also important to consider experiential or situational factors in the sRAM framework, as they are likely to impact consumers' cognitive and emotional evaluations and value perceptions of service robots. Hence, sRAM, in extension to TAM and UTAUT adds to the ongoing conversation about the role of service robots in the hospitality industry and the importance of considering the human element in their adoption.

Even though robotic and automation technology has already reached various hotel departments, acceptance of these technologies is still limited (Ivanov et al., 2017; Li et al., 2023). As the hotel industry lagged behind other industries in adopting technologies, this may produce only a few benefits accrued for its competitive position (Law & Jogaratnam, 2005). Various reasons hinder these technological adoptions, such as hotel operators' doubtfulness about the technology's return on investment, lack of time to manage and implement, and lack of staff knowledge (Chan et al., 2020). Furthermore, data consolidation and interfacing are perceived as one of the greatest challenges that will require hotels to adopt interface program development with low IT knowledge, creating resistance and fear in accepting the technologies (Laung & Law, 2013; Law & Jogaratnam, 2005). A significant amount of prior research on service robotics explains customer perceptions of service robots based on how much consumers treat robots as people (Choi & Wan, 2021).

The acceptance of service robots is influenced by humanoid service robots and analytic intelligence (Ladeira et al., 2023). Rahman et al. (2022) observed that there are different acceptance of service robots prior to and post-COVID-19 pandemic. During the pandemic, people were afraid of the spread of the virus thus it had a positive impact on their acceptance and perception of robots in the hospitality and tourism industry. Similar research also shows that customers' acceptance of robots grew significantly after the pandemic for similar reasons (Zhong et al., 2022; Ladeira et al., 2023). The acceptance rate is higher compared to the period before COVID-19 because of its usefulness, adaptability, enjoyment, sociability, companionship, and perceived behavioral control which are profound factors in determining customers' acceptance of robots (Graaf & Allouch, 2013).

The increase in service robots creates ethical dilemmas for management executives within the hospitality industry, not to mention the complex challenges of the hospitality business nowadays. On one hand, with RAISA's value creation on efficiency and novelty may make human employees being replaced by it. On the other hand, without any human employees, lack of human touch and social connection during service experience could frustrate customers (Wu et al., 2022). From a managerial perspective, the human employees and service robots combination allows hospitality companies to make use of humans' and robots' strengths while minimizing their disadvantages (Seyitoglu & Ivanov, 2020). Therefore, the mixed service systems look very suitable for the hospitality industry as they enable the delivery of quality service without sacrificing social interactions between customers and service providers as a complementary nature of tech and touch drive to experiential excellence (Wu et al., 2022). To discover tech-touch balance and gain sustainable competitive advantage, it is recommended for management executives of hospitality companies to consider the target market segment, and assess resources, activities, as well as relationships with stakeholders including impacts on chosen service delivery systems before making decisions (Seyitoglu & Ivanov, 2020). This paper provides new insights by adding theoretical contributions on how hotel customers accept service robots from the lens of different hotel brands.

1.3. Hypotheses Development

Although prior studies have widely investigated the antecedents and consequences of service robot in the tourism and hospitality industry, this study focuses only on the hotel industry based on two different settings and proposes seven hypotheses incorporating four antecedents of customer acceptance of service robot, which each elaborates in the below four subsections.

Perceived privacy, as the first determinant factor in this study, is defined as an individual's self-assessment state, where her or his information access by external agents is limited (Dinev et al., 2013). When an individual considers privacy as a state, it suggests they are in a circumstance where they must decide about their private matters (Chang et al., 2015). People will begin to use the technology if the advantages outweigh the risks, and then they tend to be willing to interact with service robots when they see the service robots as helpful and advantageous, despite possible privacy concerns (Lin & Mattila, 2021). The intended privacy can be in the form of informational privacy as well as physical privacy. Research about service robots by Krupp et al. (2017) found that privacy concerns come from worries about hackers accessing the systems, constant monitoring and recording of humiliating situations, and fears of falling victim to even more individualized marketing techniques. Moreover, a recent study finds that service personalization reduces the relationship between information sensitivity and the nonlinear effect of service robot anthropomorphism on consumer privacy concerns, which in turn also negatively affects subsequent usage intention (Xie & Lei, 2022). Prior studies have been conducted on how customer-perceived privacy influences customers' attitude toward hospitality technology, including in this case service robot in hotels. For example, in the United States setting with most participants are older people in full-service hotels, perceived privacy has proven to have a positive and direct effect on attitudes toward service robot (Lin & Mattila, 2021). Similarly, in the China setting, the result was also positive and significant (Song et al., 2023). Given the relevance of this study focuses on the Indonesian market that is tech savvy, especially those living in big cities, and therefore as a consequence being familiar with the technology development and its potential risk and privacy. Thus, in this respect, this study proposes the following first hypothesis:

H₁: Perceived privacy has a significant effect on attitude toward service robot

Novelty value, as the second determinant factor in this study, is attributed to something wow or cool that can attract customer attention and boost the feeling of excitement during the service process (Xie et al., 2022). Customers are curious to interact with service robots due to the novelty experience of the encounter (Choi et al., 2020), which refers to the customer's feeling of experiencing something new as novelty rises. Novelty is an important element for customers as it brings memorable experiences and some customers even intentionally choose a hotel or restaurant with service robots due to novelty experience curiosity (Huang et al., 2021). Earlier studies have investigated the service robot novelty in the China hotel industry to be positively and significantly influence customer satisfaction and repeat experience (Sharma et al., 2023). Despite technological developments, customers are unfamiliar with robots and encounters with them are uncommon in everyday life. As a result, the jobs delivered by service robots, such as newspapers or food delivery, might raise customers' curiosity, thereby satisfying the psychological demand for novelty, based on Choi et al. (2020) study in the Hong Kong context. In this perspective, the notion of service robot novelty brings positive value, we therefore propose the following second hypothesis:

H₂: Novelty value has a significant effect on attitude toward service robot

The appearance of service robot, as the third determinant factor in this study, is attributed to how the technology looks, whether it resembles human-like or even non-human-like (Katz & Halpern, 2014). The effectiveness and viability of service robot appearance are very dependable on customers' willingness to embrace and utilize them, as well as on the advantages and consequences of their deployment from a practical and financial perspective (Kazandzhieva & Filipova, 2019). In addition, the notion of appearance is interlinked with the term anthropomorphism, defined as the degree to which a thing resembles humans in terms of appearance, self-awareness, and emotions (Qin et al., 2023). It implies the tendency for humans to perceive objects in the environment with human characteristics (e.g. appearance, voice), which has a significant influence on people's views and decisions (Złotowski et al., 2015). Research shows that anthropomorphism's visual characteristics have been recognized as the characteristic that promotes the intention to use service robots (Kim et al., 2023). Appearance anthropomorphism, as one of the most visible and distinguishing characteristics of service robots, has a significant influence on the interaction dynamics between consumers and robots. Many scholars studied how service robots appearance impacts customers' attitude and eventually, intention to use or accept them (Belanche et al., 2020; Lin & Mattila, 2021). While the results are varied, this topic remains the spotlight to be researched (Qin et al., 2023). On one hand, appearance does matter to ensure customers perceive it positively. On the other hand, some customer might not care about the appearance as long as the functional purposes of the robot are met and satisfy their needs. Essentially, the service robot appearance is of course deployed with good objectives, apart from the operation effectiveness, but also providing a unique experience for hotel customers. None of the hotel industry implements bad or scary robot appearance to represent the service. Indeed, the hotel will go to great lengths to offer the most impressive robot appearance imaginable to make it wow. Along with this background, this study proposes the following third hypothesis:

H₃: Appearance of service robots has a significant effect on attitude toward service robot

Attitude toward service robot, as the fourth determinant factor in this study, is an attained propensity of a person's positive or negative inclination toward service robots (Katz & Halpern, 2014). Prior studies have confirmed that humans tend to have positive attitudes toward anthropomorphism robots (Seo, 2022; Pillai & Sivathanu, 2020), especially the human-like voice (Lu et al., 2019). These attitudes play an important role in influencing human-robot interactions. Research by Han et al. (2023) measures how consumers with a competition and collaboration mindset react to AI anthropomorphic service robots. The result

finds that consumers with competitive mindsets show less positive attitudes towards service robots, meanwhile, consumers with collaborative mindsets demonstrate more positive attitudes. Another research by Huang & Liu (2022) for restaurant diners demonstrates that group diners prefer humanoid robots while individual diners prefer non-humanoid robots. Concurrently, the more positive someone's attitude toward technology, including service robot, the more they develop a stage of acceptance that can further affect the intention to use, intention to reuse, and even elevate self-satisfaction. Hence, based on this assumption, this study proposes the following fourth hypothesis. In what follows, the attitude has the potential to mediate the relationship between other antecedents toward customer acceptance, and therefore we propose consequently fifth to seventh hypotheses to test the mediating effect of attitude.

H₄: Attitude has a significant effect on service robot acceptance

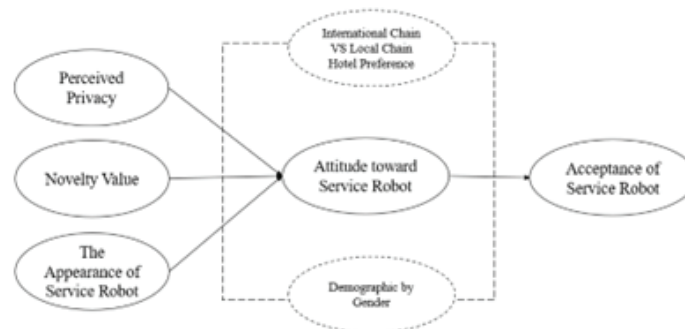
H₅: Attitude acts as a significant mediator in the relationship between perceived privacy and service robots acceptance

H₆: Attitude acts as a significant mediator in the relationship between novelty value and service robot acceptance

H₇: Attitude acts as a significant mediator in the relationship between appearance and service robot acceptance

Figure 1 shows the research framework implemented in this study, integrating four determinants of customer acceptance of service robot in the hotel industry (AC), which are perceived privacy (PP), novelty value (NV), service robot appearance (AP), and attitude (AT). This framework is based on two main existing models of the Service Robot Acceptance Model (sRAM) from Wirtz et al. (2018) and Lin & Matilla (2021), which are the extension of the united from the functional element in the Technology Acceptance Model (TAM) with the Social-Emotional Elements and Relational Elements. There are seven hypotheses in this framework as developed in the earlier section, testing the relationship and path between determinants. In addition, each relationship is also tested separately between respondents who chose local (Indonesian) hotel brands and those who chose international hotel brands, as well as between male and female respondents. The basis for further investigating gender differences is not without a reason. According to research on gender roles, men exhibit a variety of characteristics associated with being a man, including greater levels of confidence, adventurousness, and risk-taking propensity, whereas women tend to prefer safe, routine occupations and are more risk-averse (Assaker, 2020; Lynott & McCandless, 2000). Recent studies found that males scored significantly higher than females on explicit and implicit attitude measures toward service robots (Belanche et al., 2020; Lee & Yen, 2023). With that in mind, gender roles remain interesting and therefore tested in this study.

Figure 1: Conceptual Framework



2. METHODOLOGY

This is quantitative research, using the survey to collect the primary data with online questionnaires with Google Forms. The announcement invitation to voluntarily participate in the survey was posted on various channels in order to reach wider and more diverse participants, such as through social media (Facebook, Instagram, TikTok) and Instant Messaging (WhatsApp, Line). The survey was distributed within two months from May to July 2022, allowing sufficient time to get the participants.

The questionnaire consists of three parts. Part one demands a response on demographics, such as gender, age, domicile, and occupation. Part two demands responses on hotel staying behavior and characteristics that consist of five questions. Part three demands a response on measurement items of five latent variables: perceived privacy, novelty value, appearance, attitude, and acceptance of service robots. Perceived privacy, novelty value, and appearance were adopted from Lin & Mattila (2021) and measured each by three items respectively. In this part, three images were included in the questionnaire to provide a better understanding of the service robots's appearance; (1) an image of the service robots at the concierge (porter service for luggage assistance), (2) an image of service robots at the front desk (reception for check-in and check-out assistance), and (3) an image of service robots at room service (delivery assistance to the room, such as food order, minibar, and housekeeping items). While attitude toward service robots were adopted from Ivanov & Webster (2017) and measured by four items. Acceptance of service robots adopted from Kazandzhieva & Filipova (2019) and measured by five items. In total, there were 19 measurement items in this study. All items are measured with a five-point Likert scale with one being strongly disagree, two being disagree, three being neutral, four being agree, and five being strongly agree.

The sample of this study is Indonesian citizens who had experienced staying in a hotel within the last two years. The hotel requirement should be a hotel type and not a hostel or Airbnb rental, without necessarily having a service robot in its operations. It can be a hotel with full human service. The two-year hotel experience duration was chosen as one of the characteristics, instead of only six months or one year, due to the COVID-19 pandemic and associated travel restrictions in Indonesia, reducing the likelihood of staying at the hotel. To add, the travel restrictions also took place all across the world, which in turn reduces the chances of traveling abroad, including staying at the hotel outside Indonesia. Further, only a few enterprises in the Indonesian hotel sector use service robots, while the majority still rely on human service, in contrast to Japan, Germany, Switzerland, and Singapore, which use modern technology. Among 141 data gathered, 21 were dropped due to incomplete, as a result, 120 valid respondents were used for further analysis with Structural Equation Modelling (SEM) using SmartPLS software. Since the number of population of this study is unknown, and upon analyzing the data using SEM, a minimum sample of 100 should be considered, particularly for the hospitality and tourism context (Memon et al., 2020). In addition, according to Hair Jr. et al. (2017) specifically for an unknown population, this study should apply between 95 to 190 samples, in conjunction with a 5 to 10 ratio with the 19 measurement items. Thus, 120 samples in this study meet with the above recommendations.

3. FINDINGS

3.1. Respondent Profiles and Hotel Stay Characteristics

This study's respondents include 75.8 percent female and 24.1 percent male, with the majority being under 30 years old, working as an employee, or still at the education level. All are Indonesian citizens and mostly live in big cities such as Jakarta, Bogor, Tangerang, and Bekasi. In terms of the reasons for staying in a hotel, practically almost all of them are for pleasure (87%) and only 13% for business. They stayed with the family the most (78.8%), followed by couples, coworkers, and by themselves (7.9%, 7.3%, and 6% respectively).

Furthermore, respondents were also asked to choose which hotel chain brands they preferred and which they visit often, with two given options to choose from: international hotel brands and national/ local/ Indonesian hotel brands. Findings in Table 1 show that 56.7 percent prefer to stay in local hotels with the remaining 43.3 percent choosing international hotel brands. This finding is consistent with previous research by Wiastuti et al. (2018), which found that Indonesian Gen Z prefers national chain hotels over foreign counterparts. In this case, the authors include the list of the hotel brands, because respondents as the customers are more familiar with the exact hotel brands than their classification into international or national. The list was customized based on the existing hotel brands in Indonesia when the survey was conducted. The given list of international hotel brands includes J.W. Marriott, Ritz Carlton, Hyatt, InterContinental, Four Season, Shangri-La, Novotel, Ibis, Kempinski, Pullman, Aloft, Double Tree, Wyndham, Best Western, Swiss-Belhotel, Ascott, and Holiday Inn. Meanwhile, the given list of national hotel brands includes Mulia, Santika, Amaris, Aryaduta, Aston, Borobudur, Sahid, Horison, Dafam, MaxOne, 101 Hotel, and Artotel.

Table 1: Hotel Staying Characteristic

Questions	Answer	n	%
Which hotel brands do I prefer and often visit?	Local (Indonesian) hotel brand	68	56.7
	International hotel brand	52	43.3
How much on average for the budget (per night)?	Less than IDR 300,000 (< 20 USD)	13	10.8
	IDR 300,000 to 600,000 (20 to 40 USD)	38	31.6
	IDR 600,000 to 1,000,000 (40 to 65 USD)	32	26.6
	IDR 1,000,000 to 2,000,000 (66 to 133 USD)	22	18.3
	Greater than IDR 2,000,000 (> 133 USD)	15	12.5
What is the most important hotel attribute for me?	Facilities (including amenities)	86	71.6
	Location	10	8.3
	Design and interior	7	5.8
	Price	7	5.8
	Advertising	6	5
	Rating	4	3.3

In terms of budget (see Table 1), the majority of respondents, 31.6 percent, prefer hotel room prices in the range of IDR 300,000 to IDR 600,000 for one night, followed by 26.6 percent between IDR 600,000 to IDR 1,000,000. In this respect, the budget fits the average room rate for two to three-star hotels and four-star hotels respectively, in the Indonesian market, both local and international hotel brands. In contrast, only 12.5 percent allocate a big budget of more than IDR 2 million, which fits the average room rate for a five-star international hotel or luxury national hotel brand. In terms of hotel attributes (see Table 1), respondents regard facilities, including amenities (71.6 percent) to be the most important attribute, followed by location (8.3 percent), design and interior (5.8 percent), price (5.8 percent), advertising (5 percent), and rating (3.3 percent). This indicates

that physical hotel attributes such as room features (including in-room amenities, technology), food and beverage features (restaurant, bar), and recreation features (swimming pool, gym, children's playground, outdoor facilities), are important to customers, in comparison to other attributes mentioned earlier.

3.2. Measurement Model

Referring to Table 2, the CR value of all constructs did comply with the rule of thumb of a minimum of 0.7 (Hair et al., 2017), as such 0.920 (PP), 0.929 (NV), 0.913 (AP), 0.816 (AT), and 0.924 (AC). The AVE value of all constructs also meets the rule of thumb of minimum 0.5 (Hair et al., 2017), which are 0.793 (PP), 0.813 (NV), 0.777 (AP), 0.610 (AT), and 0.924 (AC). Meanwhile, for the items or indicators loading factor, none were found to have a value below the minimum threshold of 0.7, thus all 18 items are retained without any deletions. To conclude, the result from the measurement model analysis confirmed that the data is valid, reliable, and fit, therefore move forward to the second step of structural model evaluation and analysis.

Table 2: Measurement items, validity, and reliability test

Items			Mean	Loading Factors	Cronbach Alpha	CR	AVE
Perceived Privacy of Service Robots (PP)	PP1	SR can protect my privacy	3.71	0.913	0.870	0.920	0.793
	PP2	SR will keep my transactions confidential	3.74	0.880			
	PP3	I would prefer SR to deliver the private items to me than a human employee	3.51	0.877			
Novelty Value (NV)	NV1	SR experience will satisfy my curiosity	3.94	0.896	0.885	0.929	0.813
	NV2	SR experience will provide an authentic experience	4.02	0.921			
	NV3	SR experience is educational	3.85	0.887			
The Appearance of Service robots (AP)	AP1	I am willing to interact and engage with the front desk using SR <i>(with illustrated image)</i>	3.78	0.853	0.856	0.913	0.777
	AP2	I am willing to interact and engage with Porter using SR <i>(with illustrated image)</i>	3.96	0.863			
	AP3	I would be willing to interact and engage with room service using SR <i>(with illustrated image)</i>	3.87	0.927			
Attitude Toward Service Robots (AT)	AT1	SR will deal with calculation better than human	3.64	0.765	0.840	0.886	0.610
	AT2	SR will be more polite than a human employee	3.49	0.801			
	AT3	SR will provide more accurate information than a human employee	3.54	0.774			
	AT4	SR can't understand a guest's emotion	3.81	0.766			
	AT5	SR can misunderstand a question or order	3.80	0.797			
Acceptance of Service robots (AC)	AC1	I am willing to sacrifice human service for SR in a hotel	3.192	0.727	0.896	0.924	0.924
	AC2	I do not mind receiving service from SR while I am staying in a hotel	3.550	0.825			
	AC3	I am willing to adapt to SR as it will greatly reduce human contact with the hotel employee	3.667	0.907			
	AC4	I would accept SR serving me at a hotel because it will be the norm in the future	3.600	0.860			
	AC5	I consent to the existence of SR in the hotel industry	3.800	0.881			

Note: SR (Service Robot)

3.3. Structural Model

To test the relationship from the model, the rule of thumb applied is a p-value < 0.05 with a t-value > 1.96 (Hair et al., 2017). As seen in Figure 2 and Table 3, three direct relationships adhere to the rules of thumbs while one does not. The first direct effect in accordance with H1 exhibits the value of $\beta=0.132$; p-value=0.212; t-value=1.250, in other words does not meet the rule of thumb. Therefore, it implies that perceived privacy does not have a significant effect on attitude toward service robots. On the other hand, the second direct effect in accordance with H2 is supported with the value of $\beta=0.354$; p-value=0.042; t-value=2.041. It confirms that novelty value has a significant effect on attitude toward service robots. The third direct effect in accordance with H3 is supported with the value of $\beta=0.406$; p-value=0.016; t-value=2.424. It confirms that the appearance of service robots has a direct positive effect on attitude toward service robots. The fourth direct effect in accordance with H4 is supported with the value of $\beta=0.841$; p-value=0.000; t-value=26.230. It confirms that customer attitude towards service robots has a significant effect on service robots acceptance. In summary, H1 is rejected, while H2 to H3 is accepted.

Further, two indirect effects showed a t-value > 1.96 and a p-value < 0.05, or comply with the minimum threshold, while one indirect effect does not. The first indirect effect in accordance with H5 is supported with the value of $\beta=0.111$; p-value=0.215; t-value=1.242. It confirms that attitude toward service robots does not act as an indirect significant mediation on the relationship between perceived privacy and service robots acceptance. In contrast, the second indirect effect in accordance with H6 is supported with the value of $\beta=0.298$; p-value=0.042; t-value=2.040. It confirms that attitude toward service robots acts as an indirect significant mediation on the relationship between novelty value and service robots acceptance. The third indirect effect in accordance with H7 is supported with the value of $\beta=0.341$; p-value=0.017; t-value=2.398. It confirms that attitude toward service robots acts as an indirect significant mediation on the relationship between service robots appearance and service robots acceptance. In summary, H5 is rejected while H6 and H7 are accepted.

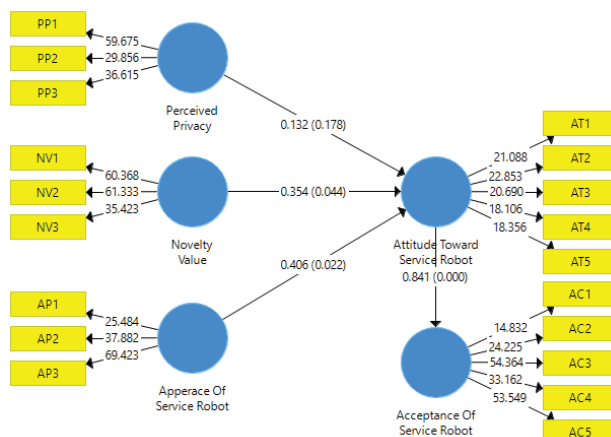
Table 3: Hypotheses result

Relationship		β	T value	P Values	Result	
Direct Effect						
H ₁	PP → AT	0.132	1.250	0.212	Positive, Not Significant	Not Supported
H ₂	NV → AT	0.354	2.041	0.042	Positive, Significant	Supported
H ₃	AP → AT	0.406	2.424	0.016	Positive, Significant	Supported
H ₄	AT → AC	0.841	26.230	0.000	Positive, Significant	Supported
Indirect Effects						
H ₅	PP → AT → AC	0.111	1.242	0.215	Positive, Not Significant	Not Supported
H ₆	NV → AT → AC	0.298	2.040	0.042	Positive, Significant	Supported
H ₇	AP → AT → AC	0.341	2.398	0.017	Positive, Significant	Supported

Note: PP (perceived privacy), AT (attitude on service robots), NV (novelty value), AP (appearance of service robots), AC (acceptance of service robots)

Also, according to Table 5, the R2 value of the attitude construct is 0.706 and 0.695 for international and local hotels respectively. This implies that attitude toward service robots for international hotel customers could be 70.6 percent influenced simultaneously by perceived privacy, novelty value, and appearance, for international hotel customers. While only 69.5 percent of local hotel customers. To add, the f2 values are 0.024, 0.109, and 0.152, respectively, representing perceived privacy, novelty value, and appearance. This implies that perceived privacy and novelty value exert a small effect on attitude, and only appearance exerts a medium effect. Meanwhile, the value for attitude is 2.407, indicating that attitude exerts a large effect on service robot acceptance.

Figure 2: Path Diagram



3.4. Customer Acceptance of Service Robots in International and Local Hotel Brands

Table 4 presents the structural model result for two different hotel choices set aside by respondents. In the case of the international hotel, the data demonstrate that only H4 is supported, whereas the other six hypotheses (H1, H2, H3, H5, H6, H7) are not. In the case of the local hotel, findings differ slightly from those of international counterparts. Three out of seven hypotheses are supported, while the other four are not. H1 and H2 are not supported since their t-values are less than 1.96 and their p-values are more than 0.05. On the contrary, only appearance (H3) is supported. Meanwhile, in terms of the indirect relationship, attitude is proven to serve as a significant mediator in the association between appearance and service robot acceptance (H7), but not with perceived privacy (H5) or novelty value (H6).

Table 4: Relationship Based on Hotel Brands and Gender

Relationships T value		International Hotel		Local Hotel		Female		Male	
		P value	T value	P value	T value	P value	T value	P value	T value
H ₁	PP → AT	0.563	0.574	1.865	0.063	1.009	0.313	1.786	0.075
H ₂	NV → AT	1.932	0.054	0.965	0.335	2.562	0.011	0.152	0.879
H ₃	AP → AT	1.344	0.180	2.223	0.027	1.612	0.108	2.287	0.023
H ₄	AT → AC	19.613	0.000	18.647	0.000	19.312	0.000	23.541	0.000
H ₅	PP → AT → AC	0.560	0.576	1.854	0.064	1.015	0.310	1.784	0.075
H ₆	NV → AT → AC	1.931	0.054	0.947	0.344	2.510	0.012	0.154	0.878
H ₇	AP → AT → AC	1.324	0.186	2.213	0.027	1.588	0.113	2.242	0.025

Note:PP (perceived privacy), AT (attitude on service robots), NV (novelty value), AP (appearance of service robots), AC (acceptance of service robots)

Table 5: Construct R2 and F2

Items	R2					F2				
	All	Int	Local	F	M	All	Int	Local	F	M
Perceived Privacy	-	-	-	-	-	0.024	0.007	0.073	0.015	0.162
Novelty Value	-	-	-	-	-	0.109	0.215	0.038	0.192	0.003
Appearance of Service robots	-	-	-	-	-	0.152	0.071	0.268	0.048	0.786
Attitude toward Service robots	0.706	0.722	0.687	0.669	0.804	2.407	2.600	2.195	2.022	4.094
Acceptance of Service robots	0.695	0.671	0.727	0.688	0.772	-	-	-	-	-

Note: All (all respondents), Int (International Hotel), Local (Local Indonesia Hotel), F (female), M (male)

Another finding, refer to Table 5, the R square value of respondents with international and local hotel brands is presented. The R2 value of the attitude construct is 0.722 and 0.687 for international and local hotels respectively. This implies that perceived privacy, novelty value, and appearance may all impact an international hotel customer's attitude toward service robots to the tune of 72.2 percent. In comparison, just 68.7 percent of local hotel customers. Furthermore, the R2 value of the acceptance construct is 0.671 for international hotels and 0.727 for local hotels. This implies that international hotel customers' adoption of service robots is 67.1 percent influenced by their attitude toward the service robots. In comparison, local hotel customers have a somewhat higher rate of 72.7 percent. On top of that, the f2 values for perceived privacy are 0.007 and 0.073, representing international and local hotels. There is no difference between customers who choose international and local hotels, both exert relatively small effects on perceived privacy and attitude. The values for novelty value are 0.215 and 0.038. It implies that novelty value exerts a medium effect on the attitude of international hotel customers, while a small effect on local hotel customers. On the flip side, the values for the appearance of the service robots are 0.071 and 0.268, which means that local hotel customers exert a medium effect on service robots appearance while having a small effect on international hotel customers. Last, the values for attitude are 2.600 and 2.195. It indicates that attitude exerts a large effect on service robot acceptance, either for international hotel customers or local hotels.

3.5. Female and Male Customers' Acceptance of Service Robots

Table 4 shows the direct and indirect relationship results based on gender, male, and female, in reference to the proposed model. Data reveal that among its direct relationship, H1 is not supported, both for female and male, which is PP → AT, with t value and p-value below the rule of thumb. In contrast, H4 is supported. However, H2 and H3 show slightly different results based on its gender. H2 for instance is supported for female respondents, but not for male counterparts. H3 on the other hand, is supported for male customers but not for female. Further, among its indirect relationship, H5 is not supported, either for female or male customers, which is PP → AT → AC. But, different results appear for H6 and H7 though. H6 appears to be supported for female but not for male. On the contrary, H7 supported male rather than their female counterpart.

Referring to Table 5, the R square values of female and male attitude toward service robots are 0.669 and 0.804. It means that attitude toward service robots could be 66.9% (female) or 80.4% (male) influenced simultaneously by perceived privacy, novelty value, and service robots appearance. Meanwhile, the R square value of male and female service robot acceptance is 0.668 and 0.772. It means that service robot acceptance could be 66.8% (female) or 77.2% (male) influenced by their attitude. On top of that, the f^2 values of female and male for perceived privacy are 0.015 (small) and 0.162 (medium), for novelty values are 0.192 (medium) and 0.003 (small), for service robots appearance are 0.048 (small) and 0.786 (large), and for the attitude toward service robots are 2.022 (large) and 4.094 (large).

4. DISCUSSION AND CONCLUSION

The objective of this study is to explore the customer acceptance of service robots (SR) in the hotel industry by investigating four determinants, which are perceived privacy, novelty value, service robots appearance, and customer attitude toward service robots. Findings (Table 3) reveal a positive relationship among all constructs, none have a negative relationship. However, not all exert a significant effect. Novelty value and appearance do significantly influence customer attitude toward the service robots themselves. This indicates that the more customer is willing to engage and interact while obtaining an experience with service robots, the more they will posit an attitude toward it, as they believe that service robots can serve better calculation compared to human touch, including more accurate information, as well as their believe either service robots can understand their emotion and be polite. This finding is in line with and thus supports the study of Li et al. (2023) and Li & Wang (2022). On the contrary, this is in contrast with the study of Lin & Matilla (2021) which found that novelty value has a negative effect on attitude, while on the flip side, appearance shows the same positive effect with this study.

Perceived privacy, on the other hand, does not significantly influence customer attitude toward service robot, yet in a linear relationship. This exhibits that the more customers trust service robot can protect and keep their private confidential, the more likely they will develop an attitude toward service robot. However, in this respect, the impact between both is nonsignificant. The logic underlying this is that privacy and confidentiality should be provided either by human service employees or robot service employees. It will not significantly influence their attitude because privacy and confidentiality are basic unwritten rules that companies must assure their customers, despite who the providers are. Customers, obviously, expect that the hotel should bear this responsibility. In addition, in particular, for the Indonesian market, younger customer get used to technology in all service spheres throughout their lifestyle and work environment. This is one of the reasons why privacy is not something new and become a common practice in many service industries. Conversely, this finding contradicts Xie & Lei (2022) study where privacy concerns negatively influence customer usage intention on service robot yet significant, in the China context with 57.7% female participants on an average of 30 years old. Another finding from Lin & Matilla (2021) found that perceived privacy significantly impacts the attitude of customers in the United States with the majority of participants coming from the older generation which is 61 percent of Baby Boomers and Gen X. In this sense, the older generation lives hand in hand with technology only in their adult life, and therefore consider technology privacy as something to be concerned about and focus on when dealing with service encounters. Regardless of the different results, we can argue that the younger generation (as in this study) tends to debunk technology-perceived privacy, physically and informatically, as something more casual than their older counterparts (as in the prior study). This shows that different participants in different study settings or locations can lead to different study results, even with the same topic. Hence, the respective industry needs to consider the most suitable relevance implications for each group of customers. For instance, companies with older customers should be more careful while adopting new technologies, and more importantly, it is important to gain customer trust that the technology will not diminish and invade their privacy. In what follows, sooner or later, customers will consider service robots as a norm that becomes a part of their lives.

Next, attitude can also be employed as the mediator between perceived privacy, novelty value, and appearance on service robot acceptance. It confirms that the mediation effect of attitude on the relationship between novelty value and SR acceptance is significant, as well as between appearance and SR acceptance. Along with the direct relationship discussion above where perceived privacy is proven to be not significant, so does when it is mediated with attitude. This is the same result as opposed to the prior study of Lin & Matilla (2021). It implies that customer acceptance of service robots is not influenced by their attitude despite the perceived privacy. However, another case if it is influenced by novelty value and appearance. In this case, attitude plays an important role in enhancing the outcomes of customer acceptance. Interestingly, customers tend to show a greater willingness to engage with service robots in roles such as porters or concierges as compared to receptionists or room service (Table 2). This could be attributed to the fact that the tasks performed by service robot porters, which involve only physical processes without any two-way communication, are relatively straightforward. As a result, customers often prefer this type of service robot over human porters. On the other hand, the receptionist service involves several steps involving documents and payment, such as providing reservation details, identity cards, prepayment, deposit, agreement on the registration card, and obtaining the room key and hotel information. In this case, the use of service robots for the above tasks may be a little bit uncomfortable for some customers who prefer the human touch, hence allowing two-way communication or direct interaction. Likewise, since this study is conducted in Indonesia, where the hotel industry entirely adopted the service robot, the porter-type service robot is one of the most common and acceptable to newcomers. Hence, it gains more trust than a receptionist or room service type of service robot.

Furthermore, the study found that perceived privacy and novelty value did not significantly influence the attitude toward service robots for customers who chose either international or local hotel brands (Table 4). Likewise, the appearance of the service robots did not significantly impact the attitude of local hotel customers. However, for international hotel customers, the appearance of the service robots was found to be significant. Along the same thread, when it is tested on service robots acceptance through attitude as the mediator, the result is also not significant. Towards this end, this study reveals that the simultaneous influence of perceived privacy, novelty value, and appearance on attitude had a higher value for international hotel customers compared to local ones. However, the acceptance of service robots was higher among local hotel customers than international ones (Table 5). Local hotel customers have proven that they have a higher value on all constructs in this research, meaning higher acceptance and higher attitude, compared to international hotel customers. Similarly, the same thing applies to the three determinants. Nevertheless, this study finds that male customer shows higher attitudes and acceptance than their female counterpart. For instance, if a hotel launches a new robot in their service operation, female customers will be more reluctant to it, showing their hesitation to adopt and engage with it. Instead, if there is an option for human employees, female customers will be more likely to choose humans than robots. Meanwhile, the male customer accepts the service robot and shows a favorable attitude toward it. This study complements prior research of Lee & Yen (2023) and Katz & Halpern (2014) who concluded that males are more likely to show a positive preference for robot service than females. The discussion and conclusion in this section finally lead to how this study contributes to the theory as elaborated in the below section.

Theoretical Contributions

This study provides a theoretical contribution to the knowledge of hospitality management by attempting to empirically study hotel service robots acceptance through attitude, perceived privacy, novelty value, and appearance. This study then confirms that service robot acceptance can be influenced and therefore enhanced through customer attitude toward the service robots themselves. The result is in line with the prior study of Lim & Matilla (2021) in the hotel context. But beyond just hotels in general, this work tries to extend the hotel prolonged based on two different hotel settings, which most research did not, and as far as the authors' knowledge, no similar research has been published. For international hotel customers, three determinants (perceived privacy, novelty value, and appearance) simultaneously exert a greater influence on customer attitude, compared to local hotel customers. However interestingly, on the flip side, the service robots acceptance of local hotel customers is influenced more by their attitude, than by international hotel customers. Ultimately, this study extends the foundational theory of the Service Robot Acceptance Model (sRAM) from Wirtz et al (2018) by focusing on the hotel industry based on international or local hotel brands from younger customers. This study also covers not only the proposed model but also how female and male customers show different results. Male customers show higher service robot acceptance than their female counterparts. This finding supports previous research by Belanche et al. (2020), Lynott & McCandless (2000), and Lee & Yen (2023) on how gender scored differently toward technology.

Practical Contributions

This research provides valuable practical contributions that can be useful for hotel business, specifically those that already provide or plan to provide service robots into their operations, especially to younger customers, whether it is local or international hotel brands. To ensure customer higher customer acceptance of service robots, several considerations should be taken into account. For instance, customer attitude toward service robots is the most crucial. In this sense, hotels should be able to assure their customer that this non-human service will be able to understand their order, be polite, provide better calculations, and provide more accurate information. Creative ways to enhance this exposure can be through the display in the lobby. The hotel can consider displaying some of the service robots that can be observed in detail by customers in person, and obviously, customers may enquire about this technology to the respective hotel staff in charge in person. This will create personal experiences that sometimes can impact someone's beliefs and willingness (Wiastruti et al, 2020). In addition, local brand hotels must emphasize more on the service robot technology, more than their international brand counterpart. Interestingly, customers show a low willingness for human sacrifice. Therefore, hotel must educate and increase awareness about the actual fact that having service robots in hotel operations involves no human sacrifice for the sake of management effectiveness or saving cost. This may be accomplished through exposure on social media and even on hotel bulletin boards, and creative fun fact flyers in the in-house room TV or compendium. As a result, the customer might stay at ease without worrying much about their negative contributions. Female and male customers also differ in how they behave toward service robots. Male customers are definitely more into technology adoption than female. Therefore, hotels that have a particular market such as business travelers, who mostly are male, might consider adapting to new and advanced technology, as it likely brings them novelty value. But one thing that stands out the most is that, male customers are not only concerned with the technology's functionality but also its appearance. It matters the most for them, even more important than providing privacy and the feeling of novelty. Thus, it is crucial for hotel companies to not only apply new technology but also equip with a good and representative appearance, which eventually will significantly influence male customer attitude and acceptance.

Limitations and Future Research Recommendations

The first limitation of this study is from the participants' context. It comprises an unbalanced proportion between male and female respondents, with roughly two-thirds of the respondents being female. Therefore, future studies should consider providing a balanced respondent gender to avoid any biased data. The majority of respondents also tend to be younger people with age

below 30 years old. It may be appropriate to limit the study to one generation cohort, but the issue may be more fascinating if examined with a varied generation cohort. Fast-changing technology may be intriguing and easy to understand for younger generations, but it may be another thing for older generations that are less tech-savvy. As a result, a future study spanning all generations is almost certain. The second limitation is that the study's settings do not focus on a particular hotel brand. As a result, even when dealing with the same issue of service robots, respondents' perspectives may differ. As a result, future studies should try investigating this problem from a certain hotel brand, as this will give a consistent grasp of the topic, and include a respondent who had actual experience with service robots during their past stay in a hotel.

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