Evaluation of the use of Robotics in Hotels in terms of Customer Satisfaction

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ARTICLE INFO	ABSTRACT
Keywords: Robotics in tourism Technological development Tourism sector Artificial intelligence Received 8 January 2023 Revised 8 September 2023 Accepted 10 September 2023 **Article Classification:** Research Article	**Purpose:** This study aims to evaluate the online guest comments made for all of the hotel businesses in the world that use robotic technology in the tourism industry and serve on the TripAdvisor website by content analysis method **Design/methodology/approach –**Content analysis model, one of the qualitative research methods, was used in this study. Accordingly, the comments made by customers on Tripadvisor were analyzed and examined under the main theme and sub-themes. Thus, it was determined on which subjects there were more complaints **Results –** According to the research findings, it was understood that most of the complaints were about price/performance. Additionally, it was seen that the limited responses of the robotic technologies and autonomous systems used to solve the guest's problems were another critical reason for complaints **Discussion –** The increase in the use of robotic services, which is developing in the tourism sector, as in other sectors, and how this situation affects the consumers of the tourism sector, which shows the service feature based on human relations, have been investigated. In this way, it is revealed how the field of robotics accelerated by the development of technology and the reflections of this field on the tourism industry are welcomed by the visitors, and inferences is made about the future of robotic applications in the tourism sector. In the study, consumer expectations about the future of the tourism sector and the effects of technological developments on the sector in terms of competitive conditions were evaluated. This study will be the first post-pandemic study and aims to guide future research and the industry thanks to its comparison with pre-pandemic findings.

1. INTRODUCTION

The service concept, which changes and transforms with globalization, is evolving rapidly by adding innovations to every aspect of human life. Recently, technological developments have also been included in this change. Especially in the last twenty years, technology has played a significant role in the change in communication, informatics and lifestyles (Kandampully, Zhang and Jaakkola, 2018). Within the framework of this technology, the digitalization of objects, space technology, artificial intelligence and robotics have gained great speed. The technology of robotics has started to be used primarily in factories with effective workforce and earnings expectations (Schwab, 2018). Over time, the increase in interest in technology has allowed the use of robotics to be carried into the service field. Although there has been a concern that this situation will cause a decrease in the field of employment, the research conducted by the World Economic Forum has revealed the opposite results. It has been reported that the expected unemployment due to the inclusion of robots in business life will not happen, and there will be gains with re-employments over time (Castells, 2005).

As in every sector, it is possible to see the reflections of technological developments in tourism (Middleton and Clarke, 2012). Due to its dynamic structure, the tourism business is known as a structure in need of constant change and transformation and has to monitor consumer demands and needs closely, and this is directly related to the dynamic structure of tourism. Robots are used in many areas, such as food and beverage, accommodation and travel businesses in the tourism sector. The Henna-na hotel, established in Japan, can be

an example with its title as the first robotic hotel in the world that performs all its activities through robots (Dementeva, Ruchkin and Lyakhova, 2020).

This purpose of this study is to evaluate the online guest comments made for all of the hotel businesses in the world that use robotic technology in the tourism industry and serve on the TripAdvisor website by content analysis method. In this context, customer comments are examined with content analysis, the effects of technology and robotic uses on the tourism sector are revealed, and it is understood whether the guests staying in these hotels are satisfied with the services they receive through robots. Loss of trust between potential customers and businesses as a result of businesses not paying enough attention to online guest complaints and comments and not evaluating them well has become a frequently experienced sectoral problem (Ayyıldız and Baykal, 2020). Considering the importance of customer satisfaction in terms of the technological future of tourism, online complaints are of great importance to businesses. This study is vital in re-evaluating guest complaints and comments shaped around new technological developments and preventing possible losses. At the same time, it is expected that the study will make a contribution to hotel managers and other researchers whose focus will be on robotic services in the future. This study differs from other studies as it is the first post-pandemic study on the ever-developing service technology and understanding of the current situation in the robot-human relationship. In this context, during the literature review phase, no study was found on the use of robotics in hotels after the pandemic. With the need for the social distance that emerged during the pandemic, the concept of contact-free service has developed, and many changes in hygiene have occurred (Karakaya, 2020). This is important to understand the extent to which the changes affect complaints about robotic use that existed before the pandemic. Since this study is the first post-pandemic study, it is expected to provide an opportunity to compare with pre-pandemic perceptions and make essential contributions in guiding future research.

2. CONCEPTUAL FRAMEWORK

Robotics are automated, humanoid robots created and programmed by combining various materials to perform specific jobs and tasks (Chen and Hu, 2013). Robotics are autonomous intelligent machines commanded without human intervention, can perform tasks and have high mobility thanks to the materials and programs used (Ivanov, Webster and Berezina, 2017). The use of technology of robotics in the tourism industry has increased in parallel with technological developments, and it has become frequently used in tourism sub-sectors such as food and beverage, recreation, marketing and transportation (İbiş, 2021). An example of robotic technology in the accommodation industry is bellboy robots developed for faster and more complete front desk operations, pool cleaning, landscaping, self-service, check-in/out kiosks and baggage handling (Pinillos, Marcos, Feliz, Zalama and Gómez, 2016). In addition, cleaning robots that provide convenience in performing housekeeping duties are among the preferred services in the accommodation sector. In the food and beverage businesses, the technology of robotics is used as a host, cook, bartender, three-dimensional food printer and conveyor service systems (Ivanov and webster, 2020). In travel businesses, on the other hand, robots are mainly used as autonomous robots with guiding abilities. At the same time, avatar robots that offer virtual travel opportunities to disabled individuals are also preferred (Cheung, Tsang and Wong, 2017). While information kiosks and customer service robots in the transportation sector provide all kinds of information, including welcoming and orientating, robots mainly perform ticket sales and guest reception tasks in the recreation and entertainment industry (Fusté-Forné, 2021).

Integrating robotic technology in the tourism sector can have positive and negative consequences for hotel businesses (Lu, Cai and Gürsoy, 2019). Technologies used in hotels can lead to positive and negative effects on purchasing intention and consumption behavior among guests at the point of preference of businesses (Wasko and Faraj, 2005). This new service concept used in businesses provides exciting and surprising experiences for guests and can positively affect expenditures related to satisfaction and curiosity (Ivanov et al., 2017). Because the guests communicate with the robots in their mother tongue, they can feel more comfortable (Pillai and Sivathanu, 2020). Reduced expenses and increased work efficiency within the business lead to increased income (Aksoy, 2017). It is beneficial in improving the holiday experience of disabled guests who have problems in participating in tourism activities (Mil and Dirican, 2018). Autonomous services create a new niche market by contributing to the expansion of tourism activities (Ivanov and Webster, 2020). When the focus is on disadvantages, according to Ritzer and Dean (2015), the concept of hospitality based on human relations in tourism will lose importance. Robotic services will be seen as a substitute for human labor,

strengthening the perception that it will affect employment negatively (Reis, Melão, Salvadorinho, Soares and Rosete, 2020). A sense of dissatisfaction may occur among the guests as a result of not fulfilling the traditional service understanding by the robots (Durna and Baysal, 2021).

The Internet has become an essential factor affecting consumption decisions by improving instant communication, information sharing and communication among guests (Cormode and Krishnamurthy, 2008). Thus, as in other sectors, individuals in the tourism sector have had the opportunity to reach accurate information by establishing more reliable and faster communication (Ye, Law, Gu and Chen, 2011). The guests could convey their complaints to many consumers via the internet (Cogburn and Vasquez, 2011). This has become a decision-making element worth considering for potential guests (Ye et al., 2011). In light of complaints, businesses can gain many advantages, such as product development, finding new marketing ways, and increasing service quality (Kılıç and Pelit, 2004). As a result of the good evaluation of complaints, businesses achieve success, especially in ensuring customer satisfaction and maintaining existing customer relations, and they also develop effective strategies in marketing and promotional activities (Chen, Lam and Zuo, 2003). Another important advantage of businesses to eliminate existing deficiencies by taking into account the complaints is that they gain an increase in their brand values under difficult competitive conditions (Lei and Law, 2015). At the same time, positive or negative complaints are of great importance regarding the sustainability of consumption in the tourism sector. Reviews of guests, who have experienced the product before, have a great influence on potential buyers, which is important for the future continuity of the product (Chen and Xie, 2008). In other words, online reviews can greatly influence guests' purchasing behavior and decisions, either positively or negatively (Miguéns, Baggio and Costa, 2008).

Tripadvisor is a website where guests share information after their experiences, and it affects other consumer groups since it is a globally reliable and followed information-sharing platform (Sweeney, Soutar and Mazzarol, 2008). Traditional face-to-face complaint methods are transferred to digital media over the internet with today's technology, and, in parallel, the Tripadvisor website and other online websites on complaints have become a global example of behavioral intent to buy and not buy (Rezabakhsh, Bornemann, Hansen and Schrader, 2006). In addition, considering that such websites on complaints establish a communication link between the producer and the consumer, it is known that this is an important source of information transfer for both businesses and guests (Fili and Krizaj, 2016).

2.1. Related Studies

There are many studies in the literature review within the scope of the research. Yazıcı and Düzkaya (2016) describe the latest developments in their study as the period in which high technologies are realized in smart and mass production, as well as in communication and interaction of all kinds of beings, whether living or non-living, human and machine, with the internet and other technologies. Aksoy (2017) revealed the technological opportunities provided by Industry 4.0 and its place in human life. İçten and Güngör (2017) investigated virtual reality and 3-D technology possibilities and their effects on the consumption sector. Ghuloum (2010) researched hologram technology and its industrial uses and emphasized that it will be a system that will be widely used, especially in the accommodation sector in the future. Hjalager (2015) predicted that the technological uses of augmented reality, social media use, and robotic service autonomy, among the 100 innovative technological developments that change tourism, will accelerate) . Ivanov and webster (2020 focused on technologies that seem likely to have an impact on the tourism industry and stated that cloud technology, social media, internet and web-based applications will change the preferences and experiences of the guests more in the future.

3. METHOD

The content analysis method, one of the qualitative research methods, was used in this study In accordance with the purpose of the study, the content analysis method was used in order to examine and interpret the comments and complaints of the guests in the most effective way. In studies created in accordance with content analysis, the contents are analyzed by dividing them into certain categories in order to objectively evaluate the information obtained from the data (Simon and Burstein, 1985). According to another research, content analysis is expressed as the process of applying scientific methods to documents that have the quality of evidence (Gökçe, 1994). Content analysis method enables the evaluation of research documents as scientific

reports, together with the rules created to classify the signs created within the scope of the research and to reveal which judgments these signs contain (Janis, 1943). According to Barcus (1959), content analysis means the translation of the message into a scientific language. According to Weber (1989), valid comments extracted from the text with the content analysis method are put forward as a result of a series of processes and gain a scientific value. These comments provide information about the sender of the message, the same message itself, and the receiver of the message. The reason for using this method is that it allows the written contents to be examined in detail and is a method that can be repeated (Zikmund, Babin, Carr and Griffin, 2013). According to Krippendorff (1980), content analysis is "a research technique used to draw reproducible and valid conclusions from data about its content." (p.70) In the analysis process, the subjects expressed regarding the guests' experience of receiving service from robots were grouped under three main themes and eleven sub-themes based on the relationships between the concepts. The studies of Tung and Au (2018) were used to identify the themes. When the study of Tung and Au (2018) is examined, three main themes ("the performance of robotics", "visitor emotions and experiences" and "price") are used to measure the functionality of robots used in service production and delivery, to understand their effects on guest satisfaction and to reveal their results. Complaints about the physical condition of the rooms, the general appearance of the hotel, the decor and the landscape were excluded from the analysis. The purpose here is only to measure the reaction of guests staying in hotels where robots produce and provide services to robot-based service understanding. The main themes specified are for the correct categorization of complaints ("although it is a robot with high performance, its role is quite limited", "robots cannot answer questions like a human", "the assistant robot answers certain questions", "It is exciting ", "It is weird", "it is interesting", "it is funny", "accommodation fee should be cheaper due to the use of robots", "the price does not meet the service", "the price is not affordable ", "the price is affordable") under eleven sub-themes.

Table 1. Main Themes and Sub- Themes

Main Themes	Sub-Themes
The performance of robotics	Although it is a robot with high performance, its role is quite limited Robots cannot answer questions like a human The assistant robot answers certain questions
Visitors' Feelings and Experiences	It is exciting It is weird It is interesting It is funny
Price Performance	Accommodation fee should be cheaper due to the use of robots The price does not meet the service The price is not affordable The price is affordable

Source: Tung, V. W., and Au, N. (2018)

The main theme and sub-themes in Table 1 were used in the categorization of the complaints in the scope of the study. Under the first main theme under the title of "The Performance of Robotics", complaints comments that measure the service production and delivery performance of robots themselves are included. As an example of these comments; The results selected from the expressions such as "the robots give insufficient answers in the face of the robots", "the robots are insufficient in solving problems", "the service delivery of the robots is below the expectations" are grouped under sub-headings. Under the second main theme "Visitors' Emotions and Experiences", the comments that measure how the expense feels to the expense of a hotel stay where all services are produced and offered by robots, and what the results of their experiences are, have been subject to scrutiny. As an example of these comments; "The appearance of the robots was interesting", "talking to a robot felt strange", "my child was adversely affected by the appearance of the robot" included the emotional effects of the production of robots and were categorized under appropriate sub-themes. Finally,

under the third main theme with the title of "Price Performance", it is aimed at the comments to determine whether the financial aspects of the service they receive from the robots are satisfactory, and how the evaluations of the product and price results are evaluated. As an example of these comments; It was categorized under appropriate sub-headings according to comments such as "very expensive experience", "accommodations very expensive although costs were low", "could have been more affordable".

The data consists of all hotel businesses in the world that work integrated into the Tripadvisor system and offer all their services through robots.The data consists of all hotel businesses in the world that work integrated into the Tripadvisor system and offer all their services through robots, and 27 hotel businesses providing services under these conditions could be identified. The Tripadvisor.com website is a frequently used platform for online research (Mkono, 2012). Businesses offering partial robotic technologies were not included in the research. The reason for this limitation is the aim of the study, which is to determine the positive or negative effects of businesses that provide robotic services on guests. Complaints against tourism businesses using robotic technology were obtained through the Tripadvisor website between May 4 and July 20, 2022. Thus, a total number of 1735 comments were examined and evaluated.

Since the research data is obtained from the open public sources and the names of the users who shared comments are not publicized, there is no requirement for the ethics committee approval.

4. RESULTS

Findings are given in as in three tables below. First table shows distribution of hotel businesses using robotic technologies by country. The second table shows distribution of guest comments by main themes. The third table shows the distribution of guest comments by sub-themes. Three main themes, which are the robotics performance, visitor feelings and experiences, and price performance, were emphasized to analyze and understand the robotic service experiences of the guests and to reach the results by examining the comments. These three main themes were examined under eleven sub-themes.

Table 2. Distribution of Hotel Businesses Using Robotic Technologies by Country

Country	Frequency	Percentage (%)
Japan	10	38,4
USA	8	30,7
China	2	7,6
England	2	7,6
Singapore	1	3,8
Germany	1	3,8
Netherlands	1	3,8
Belgium	1	3,8
Switzerland	1	3,8
Total	27	100

Table 2 shows the distribution of hotel businesses using robots and technology of robotics by country. According to the table, Japan is the country that uses the technology of robotics mostly, in the tourism sector, with ten hotel establishments (38.4%), while the USA ranks second with eight hotel establishments (30.7%). China and the UK are in third place with two hotel establishments (7.6%), followed by Singapore, Germany, the Netherlands, Belgium and Switzerland with one (3.8%) hotel establishment.

Table 3. Distribution of Guest Comments by Main Themes

Main Theme	Frequency	Percentage (%)
Price Performance	669	38,55
The Performance of Robotics	550	31,70
Visitors' Feelings and Experiences	516	29,74
Total	1.735	100

Table 3 shows the distribution of guest comments by main themes. While the most comments were made on price performance with 669 (38.55%), it was followed by the theme of the performance of robots and robotics with 550 comments (31.70%). With 516 comments, on the other hand, visitor feelings and thoughts are in last place (29.74%).

Table 4. Distribution of Guest Comments by Sub-Themes

Main Theme	Sub-Theme	Frequency	Percentage (%)
The performance of robotics	Although it is a robot with high performance, its role is quite limited.	228	41,4
	Robots cannot answer questions like a human.	173	31,4
	The assistant robot answers certain questions.	149	27,9
	Total	550	100
Visitors' feelings and experiences	It is exciting.	195	46,3
	It is weird.	111	26,3
	It is interesting.	105	24,9
	It is funny.	105	24,9
	Total	516	100
Price performance	Accommodation fee should be cheaper due to the use of robots.	185	27,6
	The price does not meet the service.	175	26,1
	The price is not affordable.	168	25,1
	The price is affordable.	141	21,7
	Total	669	100

Table 4 shows eleven sub-themes identified under the three main themes. The distribution of 1,735 comments examined according to the table is as follows: Under the main theme of price performance, 168 (25.1%) comments stated that the price of the hotel business was not affordable, and this is followed by the comments that the price of the hotel business is expected to be more affordable with 185 (27.6%). 175 (26.1%) comments on service and price performance regarding the price not meeting the service reveal the sensitivity about price and performance compatibility. On the other hand, 141 (21.7%) comments regarding the reasonable price are in fourth and last place. It is known that costs have been reduced due to technological advances in hotel businesses turning to automation and robotic systems (Pırnar, 2005). This can be explained by the lower cost expectations of the guests in terms of price. Among the sub-themes examined under the main theme of the performance of robotics, 228 comments (41.4%) about the low role of robots despite having high equipment constitute the most intense comment heading. 173 (31.4%) comments on robots' inability to respond to questions like a human, on the other hand, is in second place. Sub-theme on the assistant robot answering certain questions is in last place with 149 (27.9%) comments. The sub-themes examined under the main theme of visitors' feelings and experiences are as follows: While it is thought to be exciting with 195 comments (46.3%), it is followed by opinions that robotic systems are weird with 111 comments (26.3%). Comments on how fun and interesting it is are in last place, with 105 comments (24.9).

5. DISCUSSION AND CONCLUSION

This research evaluated the comments made on all 27 hotel businesses worldwide, which fully adopt the understanding of providing robotic service. The guests' comments on the Tripadvisor website were analyzed under three main themes and eleven sub-themes. Content analysis was used to analyze and interpret the experiences. The effect of innovative approaches and methods of using technology in product development on the guests in the accommodation sector, which is accepted as a sub-sector of the tourism industry, has been tried to be revealed. As a result of this study, it has been determined that the main problem in the use of robotic technologies is focused on price performance. The reason why guests staying in businesses using robotic technology are willing to pay less compared to hotels that offer traditional services are due to the need for fewer employees thanks to technological developments and the thought that results in internet use, web technologies and mobile applications have reduced the costs of tourism businesses (Sayın and Karaman, 2019). At the same time, since the traditional understanding of tourism is based on a labor-intensive process and

direct human relations (İçöz ve Kozak, 1998; Keleş ve Tuna, 2018), it has been observed in the comments that the guests receive answers to limited questions by robots and have the ability to perform only certain tasks as an element of complaint and dissatisfaction for the guests. According to Kamel, Stastny, Alexis and Siegwart, (2017), smart robots used in the service sector and other sectors are computers that communicate with people in the business environment, can think like humans, act like humans and work in coordination; however, they have artificial intelligence that can perform limited actions with certain commands. In addition, the comments that the service sector does not have prepared infrastructure for the use of robotics do not fully support this view. It also has been observed that there is insufficient infrastructure, not only in the supply part but also in the demand part. In the study of Reis et al. (2020), it has been seen that expectations based on one-to-one service understanding and expectations such as hospitality, especially in the tourism sector, cannot be fully met with today's technologies, and this situation supports the findings obtained in the study. Another finding is about the sub-themes used to measure the feelings and thoughts of the guests. Here, it was frequently stated by the guests in the comments that robotic technologies are quite fun and weird. This paves the way for a different experience need where robotics can be used as a marketing tool. Because the interest in technology increases the sense of curiosity and encourages different experiences. Considering that the tourism phenomenon is closely related to the search for difference and curiosity, it can be said that robotics can create a new market. Known as the world's first robot hotel and established in Japan, Henn- na Hotel is an example of this situation. The hotel guests stated that they found their experience quite interesting, and the sense of curiosity was one of the reasons for the visit (Durna and Baysal, 2021).

Robotic applications and other technological services have been perceived as a need during the pandemic and have become an element of satisfaction (Çolak and Karakan, 2020). Systems that provide zero contact and individuality in service starting from the entrance have been deemed necessary in terms of hygiene (Ivanov, Webster, Stoilova and Slobodskoy, 2022). Before the pandemic, it was seen that the use of smart hotel applications was not common due to the increase in costs (Demir, Demir, Ergen and Dalgıç, 2021). However, this has become an important factor affecting the preferability of hotels during the pandemic period. According to the research, smart room applications, smart servers and service providers, kiosks and smart management application systems make things easier and faster. In addition, it has eliminated the problem of social distance, which has become a social need (Sezgin, Keleş and Karagöz, 2021). However, with the pandemic entering the new normalization process, the level of anxiety about hygiene and social distance is also decreasing. Failure of service provider robots, problems in security and the frequent voice of the needs for human communication by guests can be seen as supporting that there are no radical changes in consumer expectations regarding the use of robots in the hotel business after the pandemic.

As a result, the attractive power of technology and the great benefits of the technology revolution are not yet at a level to replace the labor-intensive traditional service approach. However, it is expected that the usage of robotics technology will increasingly continue to serve in different areas, especially within the framework of the needs of the Z generation. Using robotics may be less costly as it can reduce the need for personnel. In this way, businesses can increase their activities, such as advertising and promotion and focus on new investments can provide a competitive advantage. At the same time, it can contribute to brand formation by providing effective sales. Robot technology, which allows doing jobs that human power cannot afford very easily and in a short time, can thus support and accelerate business processes. The fact that technology attracts people's attention provides income-enhancing opportunities. Due to its data warehousing features, it can make individual service understanding more effective. It can reach large masses by providing stronger data in the advertising and promotion phase.

In addition, the following suggestions can be made for hotel businesses that tend to robotize services:

- An information-providing service model should be adopted for guests anytime and anywhere.
- Systems in which automation and robotic service understanding are integrated with human power should be brought to the fore instead of a tourism understanding based on human labor and preventing traditional tourism.
- Marketing activities should aim at the Z generation individuals born with more technology.
- More humanoid robots should be preferred, and a sympathetic approach should be gained.
- *Further research* should be conducted to determine guests' expectation levels, and guest reviews should be evaluated frequently.

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