


Future Employees' Perceptions Towards Adoption of 'Pepper' Service Robots in the Egyptian Tourism Industry: A Qualitative Investigation

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Abstract

The current study investigates the perceptions and attitudes of tourism and hospitality students, as future employees, towards Pepper service robots' adoption in particular and the integration of robotic technologies within the Egyptian tourism industry in general. The study at hand adopted a qualitative methodological approach. Using purposive sampling, 30 students of tourism and hospitality programs were recruited, and three focus group discussions were conducted. The collected data was analyzed through thematic analysis. Overall, the study findings revealed that most tourism and hospitality students had a positive perception of Pepper robots and a favorable attitude towards service robots' adoption. The findings also revealed a potential readiness within the future workforce to co-work with robots and implement robotic technologies within the Egyptian tourism industry. Furthermore, the findings highlighted potential benefits and drawbacks of using robots in the tourism industry and ethical considerations were identified as well. Study limitations and suggestions for future research were also provided.

1. Introduction

The global service robot market was estimated at $ 40.7 billion in 2023 and is expected to reach $ 297 billion by 2033 at a CAGR of 22% (Apollo Research, 2024). According to IFR (2023), the hospitality industry experienced a surge in the use of service robots with sales rising to over 24000 units in 2022 (i.e., an increase of 125%) where service robots were mostly used within the restaurants sector for food and beverage delivery.

The integration of service robots into the tourism and hospitality sectors was significantly accelerated by the COVID-19 pandemic (Koç, Yazıcı Ayyıldız and Baykal, 2024; Koo *et al.*, 2021). Robotic technologies appeared as an attractive solution for minimizing human contact and enhancing safety amid the pandemic (Afaq and Gaur, 2021; Zeng, Chen and Lew, 2020) where service robots emerged as a valuable asset in this challenging time, offering contactless service

delivery, and the potential to reduce the spread of infections (Seyitoğlu and Ivanov, 2021; Zeng, *et al.*, 2020).

Overall, the prospects for robot use in tourism and hospitality post-pandemic are promising ranging from enhancing operational efficiency to improving customer experiences (Messori and Escobar, 2021; Belanche *et al.*, 2020; Naumov, 2019). Service robots can automate repetitive tasks, which allows human staff to focus more on complex and personalized interactions with guests (Xu, Stienmetz and Ashton, 2020). Moreover, the potential of service robots to provide 24/7 services can lead to increased productivity and reduced operational costs for tourism businesses (Koç *et al*., 2024).

Although the adoption of service robots in tourism and hospitality gained momentum globally (Thaker, 2021), its application in developing countries like Egypt still faces significant challenges such as cost, the availability of technological infrastructure, and the need for a skilled workforce to handle and maintain robotic technologies (Touni and Magdy, 2020; Khamis and Aboud, 2015). Nevertheless, considering how rapidly research in the field of robotics is growing (Tung and Law, 2017), it is expected that more cost-effective solutions will emerge, enabling the adoption of robots in developing countries' tourism and hospitality industries.

Furthermore, recent research highlights the growing influence of Generation Z on the tourism industry, emphasizing their tech-savvy nature and preference for innovative technological solutions (Marin-Pantelescu and Ștefan-Hint, 2024; Corbisiero, Monaco and Ruspini, 2022). According to Corbisiero et al. (2022), this younger generation is reshaping the travel, tourism and hospitality industry serving as both potential customers and future employees (Seyfi, Vo-Thanh and Zaman, 2024). Generally, Gen Z particularly seeks personalized high-tech tourism experiences (Seyfi, *et al.*, 2024) and shows a strong inclination towards interactions with service robots (Marin-Pantelescu and Ștefan-Hint, 2024). Therefore, to cater to these tech-savvy generations, even tourism businesses in less technologically advanced destinations must acknowledge and address the distinctive values and preferences of Gen Z (Seyfi, *et al.*, 2024) as well as examine their perceptions and attitudes.

1.1 Research Importance

Academic research on RAISA technologies' potential applications in Egyptian tourism has recently gained momentum (Yassin *et al.*, 2022; Touni and Magdy, 2020); nevertheless, the tourism and hospitality students' perspective towards service robots' adoption has been quite neglected, even though these students are the future employees of the industry who will eventually have to deal daily with robots in the workplace (Palrão *et al.*, 2023).

It is predicted that by 2030, robots will account for around 25% of the hospitality industry's workforce, carrying out duties that were previously exclusively completed by humans (Bowen and Morosan, 2018).

Therefore, the study at hand attempts to attain deeper insights into future employees' perceptions, which is crucial for the tourism and hospitality industry managers who need to fully assess their future workforce readiness to co-work with robots to be able to conduct a sound cost-benefit analysis of service robots' adoption before deciding on the actual deployment of robots into their businesses (Ivanov and Webster, 2017). Therein, lies the importance of the current study supported by the dire need for future research to focus more on the organizational aspects of service robots' adoption in tourism (Lee, 2022).

1.2 Research Questions

Q1. What are the perceptions and attitudes of tourism and hospitality students – as future employees – towards the use of Pepper service robots in the Egyptian tourism industry?

Q2. What are the pros and cons of using Pepper service robots in the Egyptian tourism industry from a future employee's perspective?

Q3. What are the key factors that contribute to the successful integration of Pepper robots in the Egyptian tourism industry from a future employees' perspective?

Q4. What are the ethical concerns and considerations that influence the future intention to adopt and use robotic technologies?

1.3 Research Objective

The study at hand aims to investigate the perceptions of tourism and hospitality students – as future employees – towards using robotic technologies in the Egyptian tourism industry. To achieve the main objective, the study seeks to:

- Explore students' opinions and attitudes towards the use of robotic technologies in the Egyptian tourism industry.
- Assess students' readiness to use service robots in their personal and professional lives.

2. Literature Review

According to the International Organization for Standardization (ISO) 8373 standard, robots can be classified into (1) industrial robots and (2) service robots based on their intended functions (ISO, 2021). The current study is merely focused on the latter type and its application within the tourism industry.

2.1 Tourism Service Robots

There is no widely accepted definition for service robots up till now due to their diverse architectures, capabilities and applications (Koç *et al.*, 2024; Teresa, 2012).

In the late 1990s, the International Service Robot Association (ISRA) defined service robots as ***"machines that sense, think, and act to benefit or extend human capabilities and to increase human productivity"*** (Teresa, 2012).

One of the most recent definitions for service robots - an adaptation of the working definition developed by Wirtz et al. (2018) - is ***"system-based autonomous and adaptable interfaces that interact, communicate and deliver service to customers, employees and/or other (service) robots"*** (Mahr, Odekerken-Schröder and Doorn, 2025, p.1).

Autonomy refers to the ability of a robot to adapt to changes in its surroundings (Park, 2020) which is a key characteristic that distinguishes service robots from other types of technologies and determines the robot's capability to execute various tasks and operate in complex environments (Park, 2020; Beer, Fisk and Rogers, 2014).

As for interaction, it denotes the communication between humans and service robots either remotely or in proximity and due to the nature of tourism and hospitality services proximate interactions seem to be optimal (Goodrich and Schultz, 2008) (i.e. service robots being used as waiters, museum guides or as concierge).

Furthermore, according to ISO 8373 standard, a service robot can be defined as a ***''robot in personal use or professional use that performs useful tasks for humans or equipment''***. Based on the above definition, service robots are classified into two categories: personal and professional (ISO, 2021).

Personal service robots - also known as ***customer service robots*** according to the International Federation of Robotics (IFR) (Müller, Kraus and Bregler, 2024) - are non-commercial and intended for personal and domestic use by the general public (i.e. robots' operation does not require professionally trained or expert users) while **professional service robots** are designed for business purposes and should be handled by skilled personnel and previously trained customers (Robev and Patias, 2022; Lee, 2021; Merkle, 2021). The service robots currently being used in the tourism and hospitality industry fall under the category of professional service robots (Koç *et al*., 2024).

In the context of tourism, Park (2020, p.2) refers to tourism service robots as ***'autonomous intelligence'*** that aids tourists and tourism service providers in achieving their goals, whether they are personal or professional.

Generally, service robots have been widely utilized in various areas of the tourism and hospitality industry including hotels, restaurants, attractions and airports (Ivanov, Webster and Berezina, 2022; Collins *et al.*, 2017).

2.2 Pepper Service Robots

Pepper is a humanoid service robot developed by SoftBank Robotics in 2014 (Pandey and Gelin, 2018). Humanoid robots, such as Pepper, are a relatively new type of professional service robots that have the ability to mimic human behavior, and interactions (Hahkio, 2020).

Pepper robot is characterized by its anthropomorphic design (Tuomi, Tussyadiah and Hanna, 2021) and expressive body language and facial impressions (Bertacchini *et al.*, 2023). It is

optimized for streamlined human interactions (Misaroș *et al*., 2024) as it was primarily developed for safe, friendly and playful interactions with users (Ghiță *et al.*, 2020).

With facial recognition algorithms, Pepper can recognize human faces which allows for more personalized communication (Mishra *et al.*, 2023). Its basic functionalities include advanced speech and emotion recognition capabilities which enable it to understand and respond to human voice commands in 15 natural languages while also being able to detect subtle emotional cues in conversations (Pandey and Gelin, 2018; PROVEN Robotics, 2024). It is also equipped with sensors, wheels and arm/hand joints so it can perceive objects in its surroundings, easily navigate and handle objects (Mishra *et al.*, 2023).

Pepper robot is programmable, and its capabilities are further enhanced by a touchscreen tablet attached to its chest for displaying relevant information, interactive menus and digital content (i.e. photos, animation videos etc.) (RobotLAB, 2020).

Pepper service robots have been effectively deployed across hotel, restaurant, museum and airport settings. For instance, Pepper has served as a multilingual receptionist in an Italian hotel to provide check-in and guest information (Mingotto, Montaguti and Tamma, 2021). Similarly, airports like Munich and Prague have also deployed Pepper service robots to assist passengers with navigation, information, and entertainment due to their multilingual capabilities (Ivanov *et al.*, 2022; Prague Airport, 2018).

Pepper was also used in Pizza Hut restaurants for greeting guests, facilitating ordering, and completing transactions (Garcia-Haro *et al.*, 2021). Furthermore, cultural heritage institutions such as the Smithsonian Museums in Washington, D.C. integrated Pepper as an interactive guide for delivering educational content on the museums' collections and enriching visitor engagement through storytelling and posing for selfies (Ivanov *et al.*, 2022).

2.3 Service Robots Adoption Perspectives in Tourism and Hospitality

Generally, research on service robots' adoption in tourism and hospitality primarily focused on customers' perspectives. For instance, Tuomi et al. (2021) found that customers generally appreciate the efficiency and novelty of service robots such as Pepper, but their acceptance depends on how well these robots meet their needs and provide seamless interactions.

Skubis (2024) highlighted that service robots offer both practical and emotional benefits, making tourism service encounters more engaging and enjoyable thus creating memorable experiences. Similarly, Merkle (2019) pointed out that interaction with service robots evokes a range of emotions, from curiosity and enjoyment to discomfort, showing that emotional reactions play a key role in customer acceptance.

Nevertheless, customers can become frustrated when service robots fail to understand commands or respond appropriately which in turn affects their overall satisfaction, as Seo and Lee (2021) noted.

Despite the growing number of studies on customers' perspectives, there is still limited research on how future employees – current tourism and hospitality students - perceive the integration of robotic technologies into their work environment.

Ivkov et al. (2020) found that Serbian tourism and hospitality students generally had a positive attitude towards service robots as they believed robots could improve performance and operational efficiency. Similarly, Kala (2022) revealed that Indian tourism and hospitality students were excited about the potential of robots like Pepper in terms of automating routine tasks and enhancing service quality and customers' experiences but remained cautious about issues such as job displacement, cultural acceptance, and reliability in real-world settings.

Also, Palrão et al. (2023) found that Portuguese students viewed service robots positively as useful and innovative. Yet, their actual willingness to adopt and use these robots in their future careers was slightly lower than their initial interest. They further argued that understanding future employees' perspectives is essential to bridge the gap between technological innovation and practical implementation.

Accordingly, a deeper understanding of how future employees perceive service robots as well as examining their attitudes and readiness to co-work with them is crucial for the successful integration of robotic technologies within the Egyptian tourism industry.

3. Methodology

To investigate the students' perceptions towards the adoption of robotic technologies within the Egyptian tourism industry, the current study adopted a qualitative methodological approach. According to Filieri et al. (2022), qualitative analysis helps researchers obtain in-depth insights from collected data, despite the fact that it necessitates extensive manual work.

3.1 Data Collection Method

The data collection method employed was focus group discussions to allow the participants to freely express their viewpoints and share their perceptions towards robotic technologies. Using focus group discussions can yield valuable qualitative data in terms of validity and reliability (Dilshad and Latif, 2013) that helps researchers gain deeper insights into participants' perceptions and attitudes (Shabina *et al.*, 2024; O.Nyumba *et al.*, 2018). Therefore, the focus group interviews aimed to gather the opinions and viewpoints of students (Billups, 2012) about using Pepper service robots in particular and robotic technologies in general in the Egyptian tourism industry.

3.2 Population

The population for the study at hand was tourism and hospitality students currently registered in both undergraduate and postgraduate programs at the Faculty of Tourism and Hotels, Alexandria University who were enrolled in tourism information technology courses during the academic year 2023/2024 as these students should have an adequate background on the recent technological advances such as AI and its various applications in the tourism industry including robots which is crucial for informed participation (Patton, 2015; Miles, Huberman and Saldaña, 2014).

Furthermore, limiting the study to a single institution was driven by considerations of research feasibility and accessibility, allowing for more in-depth qualitative data collection (Yin, 2018).

The need for participants was announced on the academic courses' pre-established Microsoft Teams for undergraduate students while postgraduate students were contacted through email. All potential participants received detailed information on the research's importance and objectives as well as what was expected of them during the focus group sessions emphasizing that it is an extra-curricular activity, and that participation is completely voluntary.

3.3 Sampling

The participants were chosen using purposive sampling. Out of those who volunteered, only the high-performing students - who regularly attended and actively participated in the academic courses' lectures - were chosen to participate in the focus group discussions. Accordingly, only 23 students were recruited out of the 30 undergraduate students who volunteered, and two focus groups were set, consisting of 10 students per group (2nd and 3rd year students). As for postgraduate students, only seven students agreed to participate. Accordingly, a 3rd focus group was set up including postgraduate students and three senior students (4th year students). According to Billups (2012), a group of ten students is the optimal size for a focus group session. Participants profile is summarized in the table below.

Table 1. Participants Profile

Participants	Gender	Age	Year	Department	Previous Experience with Robots
Focus Group 1					
S1	Male	18	2nd	Tourism Studies Department	None
S2	Female	19	2nd	Tourism Studies Department	None
S3	Male	19	2nd	Tourism Studies Department	None
S4	Male	18	2nd	Tourism Studies Department	None
S5	Female	18	2nd	Tourism Studies Department	None
S6	Male	18	2nd	Tourism Studies Department	None
S7	Female	19	2nd	Tourism Studies Department	None
S8	Female	19	2nd	Tourism Studies Department	None
S9	Male	18	2nd	Tourism Studies Department	None
S10	Female	18	2nd	Tourism Studies Department	None
Focus Group 2					
S11	Female	20	3rd	THHM Department	None
S12	Male	20	3rd	THHM Department	None
S13	Female	21	3rd	THHM Department	None
S14	Female	19	3rd	THHM Department	None
S15	Male	20	3rd	THHM Department	None
S16	Female	20	3rd	THHM Department	None
S17	Male	20	3rd	THHM Department	None
S18	Female	19	3rd	THHM Department	None

S19	Male	20	3rd	THHM Department	None
S20	Male	21	3rd	THHM Department	None
Focus Group 3					
S21	Male	21	4th	Tourism Guidance Departmen	None
S22	Female	22	4th	Tourism Guidance Departmen	None
S23	Female	21	4th	Tourism Guidance Departmen	None
S24	Male	23	Masters' Degree	Tourism Studies Department	None
S25	Female	24	Masters' Degree	Tourism Studies Department	None
S26	Male	24	Masters' Degree	Tourism Studies Department	None
S27	Female	25	Masters' Degree	Tourism Studies Department	None
S28	Female	23	Masters' Degree	Tourism Studies Department	None
S29	Female	24	Masters' Degree	Tourism Studies Department	None
S30	Female	25	Masters' Degree	Tourism Studies Department	None

3.4 Procedures

As for establishing rapport with the participants, the moderator happened to be the lecturer who taught these academic courses, therefore the participants were already acquainted with this kind of discussion during the course of lectures.

Open-ended questions were raised by the moderator and each participant was asked to give his/her opinion while assuring him/her that there with a no-right/no-wrong answer. Accordingly, participants freely expressed their opinions in their preferred language (either in English or Arabic).

A fellow colleague was assigned as a note-taker to record the participants' responses during the sessions. The moderator frequently asked follow-up questions to clarify some of the answers given by the participants.

The three focus group discussions were conducted during the faculty working hours to fit the schedules of both the participants and the moderator. Focus group interview sessions lasted roughly 45 to 60 minutes each and were held according to the availability of meeting spaces at the faculty. According to Billups (2012) students' focus group sessions' length should not extend to more than sixty minutes as younger generations tend to lose their attention after an hour.

Afterwards, each focus group participants were presented with a video featuring an interview with Pepper Robot *'We Interviewed Pepper – The Humanoid Robot'*. Pepper service robot was chosen for its worldwide popularity and widespread adoption (Tuomi *et al.*,2021), especially across the various sectors of tourism and hospitality (PROVEN Robotics, 2023; Ivanov *et al.*, 2022) even though it was discontinued back in 2020 due to weak demand (IEEE Spectrum, 2021).

The focus group interview was structured out of eight predetermined open questions that were adapted from previous literature **(Table 2)**. Generally, for a sixty-minute focus group, eight questions are optimal (Elliot, 2005). The questions were regarding the participants' initial impression of Pepper service robots, the most appealing aspects of Pepper, the benefits and drawbacks of adopting service robots within the tourism sector, if they fear losing their jobs to

robots, their suggestions for the successful integration of service robots in the Egyptian tourism industry, their viewpoints on whether tourists will be satisfied with Pepper robots or not, and the ethical concerns that should be taken into account if service robots are to be used within the tourism industry.

To get deeper insights into the students' readiness to use robots in their personal and professional lives, the students were finally asked if they were comfortable using Pepper robots during their travels and co-working with them and as a follow-up, they were further asked to elaborate their reasons for agreeing or disagreeing.

Table 2. Focus Group Interview Questions

No	Evaluated aspects	Questions	Reference
1	Initial Impression	Can you share your initial impression of Pepper robot?	Adapted from (Xu and Howard, 2018)
2	Appealing Aspects	What aspects of Pepper robot do you find most appealing or interesting? Why?	Adapted from (Smithsonian Organization and Audience Research, 2019)
3	Benefits vs Drawbacks	In your opinion, what are the potential benefits and drawbacks of using Pepper in the tourism industry?	Adapted from (Demir and Vatan, 2024; Kala, 2022)
4	Tourist Satisfaction	How do think tourists might react to being assisted by a Pepper robot instead of human staff? Follow-up question: Do you think Pepper robots would affect tourist satisfaction?	Adapted from (Jia, Chung and Hwang, 2021)
5	Job Replacement	Do you believe that Pepper robots have the potential to replace human employees in certain roles in the tourism field? Why or why not?	Adapted from (Seyitoğlu *et al.*, 2023)
6	Successful Integration	In your opinion, what are the key factors that contribute to the successful integration of Pepper robots in the Egyptian tourism industry?	Adapted from (Touni and Magdy, 2020)
7	Ethical Considerations	Are there any ethical concerns or considerations that should be taken into account when using Pepper robots in the tourism industry?	Adapted from (Etemad-Sajadi, Soussan and Schöpfer, 2022)
8	Readiness to Use and Co-work	Would you personally feel comfortable interacting with a Pepper robot during your travels or at work? Why? or why not?	Adapted from (Seyitoğlu *et al.*, 2023)

4. Results

4.1 Initial Impression of Pepper

To capture the participants' initial impression of Pepper robot after watching the video, they were asked to describe their first impression in just three words. The most frequently stated word

was 'funny', followed by 'cute', both 'helpful' and 'smart' came in 3rd place, and finally, in 4th place came both 'friendly' and 'interesting' **(Figure 1)**.

Along with using individual words, some participants used two-word phrases to describe what they initially thought of Pepper such as 'cutting-edge technology, high-tech, sleek design'. Almost all the words and phrases used by participants to describe their initial impression of Pepper had a positive meaning except for two participants; one described Pepper as impractical and another thought it was creepy. In other words, out of 30 participants, only two participants had a negative first impression of Pepper.

Figure (1): World Cloud of Students' Initial Impression of Pepper Robot

4.2 Appealing Aspects of Pepper

The students' answers to the second question revealed that humanoid characteristics, interactive nature and sense of humour were the most appealing aspects of Pepper robots followed by responsiveness and emotional intelligence **(Figure 2)**.

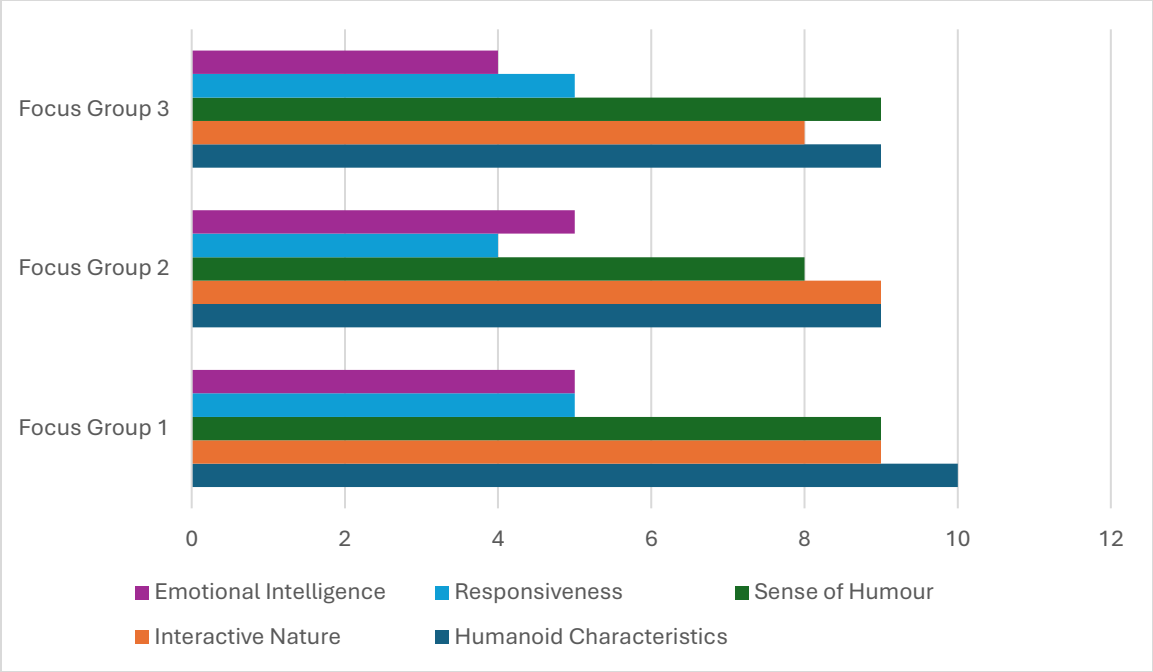

Figure (2): Appealing Aspects of Pepper Service Robots

For instance, when asked as a follow-up to clarify why they liked Pepper's humanoid appearance and behavior, some of the participants' answers were as follows: *''He looks just like humans!'', ''Its design is adorable'', ''Pepper looks familiar'', '' It is visually appealing ... its design captures attention'', ''Its humanoid design makes interaction more natural'', ''I love that it uses body language almost same as a human, like when he waves his hand while talking'', ''It has an engaging personality'', ''He is friendly and engaging'', ''He is very intelligent, friendly and kind with people''.*

As for Pepper's interactive nature, participants described it as follows: *''I find chatting is the most appealing aspect of Pepper'', ''I like how the communication with Pepper is fast and easy'', ''I like that it can talk to people naturally'', ''I love its interactive capabilities ... it makes interaction comfortable'', ''Pepper robots have the ability to engage with humans'', ''I think it is interesting to talk with him'', ''He interacts nicely with humans'', ''I like to try a conversation with Pepper robot''.*

Participants also pointed out that Pepper has a great sense of humor, some of their comments were as follows: *"He acts like a silly child ... I love that about him'', ''Pepper Robot is so funny and witty ... I liked when the interviewer asked him about his price and he said he was priceless!'', ''I love its funny responses'', ''I love his intelligence when he doesn't know the answer to a question, he says something funny'', ''He is a little bit funny and comes up with creative answers'', ''He has a funny, cute way of speaking''.*

Other participants mentioned responsiveness and emotional intelligence as appealing aspects of Pepper. For instance, one participant said *''Emotional intelligence and speedy reaction are his most appealing features because both are qualities found only in humans''*, and another expressed his likeness to Pepper saying *''I love that Pepper is designed to be social, tries to read emotions and have natural conversations with people''.*

4.3 Previous Experience with Service Robots

As for the students' previous experiences with service robots, all participants stated that they had not encountered Pepper robots in real life, nor interacted with any robots before.

4.4 Benefits Vs. Drawbacks

Students' responses to the third question revealed several perceived benefits of using Pepper service robots in the tourism industry which were:

- Enhanced tourist experiences: according to participants, Pepper service robots could enhance the overall tourist experience by providing reliable assistance to tourists such as fast response and accurate information. Also, participants mentioned multilanguage support as service robots could be programmed to communicate in different languages which makes it easier for international tourists to comprehend needed information along with the availability of Pepper robots 27/4 and their ease of use and friendliness.
- Improved efficiency: participants believed that Pepper service robots could help improve efficiency by saving time and effort as robots can handle repetitive, dull tasks allowing human employees to focus on more complex and engaging activities. Also, it can reduce waiting time for tourists which improves overall service efficiency.
- Cost-effectiveness: participants stated that utilizing Pepper service robots could potentially cut operational costs in the long term.
- Safety: according to participants Pepper robots could perform hazardous tasks and reduce human interaction risks in certain situations. They mentioned the Covid-19 pandemic as an example explaining that they would prefer to be assisted with robots rather than human staff in such cases.

Participants believed that all these factors will result in providing tourists with high-quality services which will eventually lead to achieving tourist satisfaction. Nevertheless, participants also raised some concerns regarding robots' adoption within the tourism industry and highlighted some potential drawbacks to using Pepper robots such as:

- High initial investment and maintenance costs which pose a financial hurdle for small tourism businesses.
- Limited intelligence capabilities as Pepper struggles in complex situations and sometimes fails to respond to user inquiries and ends up giving illogical responses. One participant said*'' When Pepper doesn't have an answer to the user queries, it gives the same silly response repeatedly - I don't understand, what about a Taco?!''*. Another participant agreed stating that *''Pepper AI capabilities are limited, and it is not flexible enough''*.
- Potential technical malfunctions that disrupt the delivery of tourism services and would eventually result in tourist dissatisfaction.
- Distrust as some tourists might feel uncomfortable interacting with Pepper robots due to concerns regarding privacy or their preference for being assisted by human staff rather than robots.

Other drawbacks were mentioned such as job displacement, and lack of human interaction. The participants' viewpoint on these drawbacks is thoroughly elaborated in the upcoming sections discussing tourist satisfaction with robots and ethical considerations.

4.5 Tourist Satisfaction with Robots

When asked about the tourists' reaction to being assisted by robots, the majority of participants thought that most tourists might find using robots exciting, intriguing and amusing. In their opinion, tourists would use robots out of curiosity and novelty. For instance, one participant stated *''I think tourists will find interacting with Pepper robots a funny unique experience''*.

While some participants believed that tourists might have mixed feelings, as one participant said *''Some may find it funny, others may be creeped out by robots''*, another participant stated *''Tourists might feel nervous at the beginning but then they will get used to it''*.

The latter participants further elaborated that although most tourists will welcome it as a new experience, it could be a little bit confusing or weird to some. Some of their comments were as follows*: ''At first it might be a bit weird being served with a robot but also interesting at the same time''*, *''Tourists can be confused and distrustful at first then when they see how helpful it can be, they will use it more often''*.

All participants finally agreed that willingness to use Pepper service robots depends on the tourist's level of familiarity with technology and his/her comfort experiencing new technologies elaborating that for example, tech-savvy Gen Z tourists will find using service robots appealing while seniors could be skeptical or distrusting and more probably would much prefer interacting with humans rather than robots.

Overall, almost all participants believed that using Pepper robots might improve tourist satisfaction due to their ability to provide quick assistance, convenience, and sufficient information along with entertainment. They also highlighted that personalized interactions with robots are memorable encounters that could enhance the overall tourist experience which in turn would lead to higher levels of tourist satisfaction. Some of their answers were as follows: *''Robots serve tourists quickly reducing long lines''*, *''Robots provide services without any lagging or delay reducing wait time and this makes tourists happy''*, *''A robot is available 24/7 providing readily available information''*, *''A robot can provide personalized interactions tailored to each tourist's needs this will definitely make tourists satisfied''*, *''Pepper is funny, it can make jokes and leave tourists feeling satisfied and happy''*, *''Seamless human-robot interactions result in satisfied* tourists*''*, *''I think Pepper Robots present unique, memorable encounters for tourists that will leave them satisfied''*. However, two participants expressed their disapproval arguing that lack of human interaction would cause tourists dissatisfaction. One participant said *''They may face problems due to lack of human interaction''*. Similarly, another participant stated *''Tourists may miss human empathy''*. These participants also argued that interacting with Pepper robots could be fun at the beginning, but tourists can get annoyed, bored or lose interest especially if the robot gives them silly answers repeatedly which will eventually lead to tourist dissatisfaction.

4.6 Job Replacement

When asked if Pepper robots have the potential to replace human employees in the tourism field, the participants showed mixed opinions as half of the participants were in favor of robots replacing humans but in specific roles such as ticket reservation, greeting guests in hotels and restaurants, and guiding visitors in museums because robots can provide personalized interactions and overcome language barriers, and this, in turn, can enhance visitors' experiences. For instance, one participant stated *''Robots are designed to complement human staff and handle repetitive*

tasks'', another added *''Robots already replaced human staff in Japan''*. The participant was referring to Henna Hotel in Japan, the first hotel to be fully operated by robots.

These participants further elaborated that robots can be utilized to do simple, repetitive tasks such as paperwork, and getting feedback from tourists, and they can also replace humans in tedious and hazardous tasks because they can work for long hours without rest. For instance, robots can be used in housekeeping, waste management and lifting heavy objects.

In contrast, the other half were not convinced that robots have the potential to replace humans. In their opinion, if adopting robots is inevitable, it can only be used in performing tasks that require minimal interaction; some of their answers were as follows: *''Unlikely, especially for complex roles and tasks which require empathy and cultural understanding''*, *''No, robots have no feelings, and their intelligence is limited''*, *''No, their responses are not always accurate''*, *''I don't think so, robots are still way underdeveloped''*, *''No, robots cannot function without humans' developing and programming skills''*, *''No, a robot cannot explain why it made a certain decision, so it can sound biased in addition to lacking required flexibility in certain situations''*, *''Robots can misinterpret human emotions and accordingly take unsuitable actions''*, *''No, elder people will struggle using it''*.

To sum up this point, all three focus groups came to the same conclusion which is robots cannot fully replace humans. For instance, the 1st focus group representative concluded *''Robots can assist humans but can never replace them!''*, while the 2nd focus group representative stated *''While it seems like a good concept, robots replacing humans completely is far from possible, as they can't replicate empathy and real human interaction''*. Similarly, the 3rd focus group representative believed *''Though Pepper robot is super friendly, he won't be like a human being having genuine feelings''*. Still, some participants raised it as an ethical concern and further discussed it.

4.7 Ethical Considerations

As for the ethical considerations of using service robots in the tourism industry, participants raised the following concerns:

- Data privacy issues when interacting with a robot that collects tourists' personal information as it could be subject to security breaches. All participants emphasized the importance of adhering to privacy regulations when collecting data using robots. Participants further elaborated that tourism organizations should ensure transparency in data usage and acquire the tourist consent as well as make sure that collected data is secured against breaches. For instance, some of the participants' answers were as follows*: ''A robot collecting my personal information could be a concern''*, *''If I am interacting with a robot, I need to be sure that my personal information is securely handled''*, *''Transparency is crucial, tourists should be aware that their personal data is being collected for later use''*, *''Data privacy is very important, I mean ensuring that tourist information is secure is a must''*, *''I would be concerned about my privacy especially if the robot is using a camera or a microphone''*. Also, some participants pointed out that robots could be subject to security risks which puts both tourism businesses and tourists at risk. For instance, one participant said *''Someone might hack into the robot's software and do something malicious like hack into the business's account or tourists' personal data or even disrupt the software and cause the robot to malfunction''*.

- Cultural differences are a concern that should be considered when developing service robots. All participants stressed that robots should be programmed to respect local customs and traditions as well as cultural sensitivities when interacting with tourists from diverse backgrounds. In their opinion, robots not being able to understand or respect cultural nuances is a major problem that could lead to inappropriate interactions with tourists. Some of the participants' comments on this issue were as follows: *''I think robots should be programmed to be suitable to each culture''*, *''Respecting the customs and traditions of Egypt or any host country using Pepper is crucial''*, *''It should respect the tourist's culture''*, *''It should be aware of cultural differences as words and gestures could have different meanings in each culture … a gesture acceptable in one country could be offensive in another''*.
- Safety and responsibility, who will be held accountable when a robot does harm to the tourist? The participants raised the issues of safety and accountability during the discussions. Some of their comments were as follows; *''Robots shouldn't pose a threat to humans''*, *''Robots actions shouldn't injure a human or allow a human being to get hurt''*, *''Who will be held responsible when robots' actions cause harm or damage?''*. All participants agreed that there should be clear guidelines regarding who is responsible when service robots' malfunctions cause errors or accidents.
- Job displacement as robots can take over human workers' jobs. Few participants expressed their concern about losing their job to a robot as one participant said *''I don't want a machine to take my place''*, however as mentioned earlier the majority were not worried about robots replacing them at work for they believed that service robots are to assist humans rather replace them because they cannot maintain emotional connections with tourists as human employees do. For instance, one participant mentioned *''As long as robots are like Pepper, they won't impact people's jobs''*, and another agreed *''I think so too, Pepper robot is more of a gimmick than anything impactful''*.
- Information accuracy and bias were among the concerns brought up by participants during focus group discussions. Participants were worried that the AI-powered service robots could be biased and unfair which could result in discrimination against certain tourist groups based on race, gender or disability. One participant said *''There could be potential biases embedded within AI algorithm''*, she further elaborated *''A robot could be biased to its programmer's beliefs or personal agenda''*, another participant agreed saying *''We don't know what entity it follows, it could provide false or misleading information''*. He further emphasized *''A robot should cater equally to all tourists regardless of their backgrounds''*. All in all, participants agreed that the AI algorithm used in service robots should be transparent, unbiased and inclusive to make sure it does not exclude certain groups of tourists based on their race, gender or disability. Another participant suggested that bias could also impact employees, and she advocated the importance of providing fair treatment for both human employees and robots at the workplace, where she expressed her idea by saying *''If I am to work alongside a robot, I need to make sure that I am treated fairly … managers could be prejudiced to robots than humans''*.

4.8 Successful Integration of Service Robots

Furthermore, students' answers to question six revealed that the successful integration of service robots in the Egyptian tourism industry, in their opinion requires:

- Training and Education: this includes providing proper training for staff working with robots within tourism institutions as well as educating tourists on service robots' capabilities and how to interact with them safely.
- Acceptance: this could be achieved through raising technological awareness among all stakeholders (e.g. the community members, tourism organizations, businesses … etc.).
- Adaptability, in other words ensuring robots' seamless integration with existing technology such as currently used booking systems and tourist databases.
- User Experience (UX) Design which means designing user-friendly robots to ensure seamless experiences for both staff and tourists this includes considering several aspects during the design process such as intuitive interfaces, multi-language support, adaptability to cultural differences … etc.
- Regular Maintenance by providing constant technical support and troubleshooting.
- Technology Infrastructure such as providing high-speed WIFI connectivity.
- Monitoring and Evaluation: this includes regular monitoring of service robots' performance as well as establishing feedback mechanisms to collect input data from both staff and tourists on their interactions with these robots to be able to improve their performance and enhance users' experiences.
- Legal Framework: developing a solid regulatory framework for using AI-enabled service robots within the tourism industry that covers various ethical aspects such as data protection, accountability, bias alleviation, security risks … etc. is also crucial for the successful integration of robots within the tourism industry.

Some of the participants' comments were as follows: *''First, the community must be familiar with the new technologies to adapt to it'', ''Before using robots in tourism settings, try educating locals about them'', ''You should provide good training for the employees'', ''A robot should be easy to deal with, supports different languages, and cultures to successfully serve tourists'', ''Robots should be able to adapt to the current workplace causing no extra technological hassles'', ''Robots should be regularly checked for malfunctions and staff must be trained to troubleshoot simple errors'', ''You should get tourists feedback on their interactions with service robots and try to fix any problems they face'', ''As a tourism business, I must be sure that using robots is completely safe for my customers, and staff and doesn't pose a legal liability on me''.*

4.9 Readiness to Use and Co-work with Robots

Finally, students' answers to the last question revealed that the majority of participants (n=21, 70%) would feel personally comfortable interacting with Pepper robots during their travels and are more likely to use robots in their daily lives and at work. Their reasons for using Pepper were convenience, efficiency, productivity, responsiveness, novelty and sense of humor. Some of the participants' responses regarding using robots in their daily lives or during their travel were as follows: *''Yes, Pepper can help me finish my daily chores easily'', ''I think having a robot at home can be helpful for doing daily chores like cleaning, doing the dishes, or even keeping me company. It would make life pretty much easier'', ''Yes, I would like to interact with Pepper, it will be very helpful, fast and informative during my travel and because it is different'', ''Yes, it responds*

quickly to my inquiries'', ''Yes, I'd likely feel comfortable interacting with Pepper robots during travel especially if it provides useful information and adds novelty to my travel experience'', ''Yes, interacting with a robot is totally ok by me, it gives me useful information instantly'', ''Yes, it provides useful information and assistance during travel'', ''I will definitely like to try it as a new experience'', ''It will be nice to interact with a robot during my travel, something new for me'', ''Yes, it will be useful providing me with all information needed during my visit like a map and information about tourist attractions'', ''Yes, I appreciate the convenience and efficiency that robots offer'', ''Yes, I think Pepper is fun to interact with'', ''Yes, from the video I watched Pepper looked pretty funny to talk to or interact with, I would have great time with it''. Also, some of their comments regarding co-working with Pepper robots were as follows: *''Yes, I think working with robots like Pepper can make my work easier by handling repetitive tasks, allowing me to focus more on creative ones'', '' I believe robots will become an integral part of the workplace in the future, and I have no problem dealing with them''.*

The rest of the participants (n=9, 30%) will not feel comfortable interacting with a robot at their homes, or during their travels and they would rather interact with human co-workers. Their reasons for refusing to interact with a robot were discomfort, distrust, robots' lack of empathy as well as limited intelligence and problem-solving capabilities. In their opinion, robots lack emotional intelligence and cannot provide the same level of understanding as human staff. Robots also struggle with complex situations and are not flexible enough. Some of their answers were as follows: *''No. I don't feel comfortable living with a machine … using robots at home seems odd, unnatural ... it will be weird having it at home'', ''I can do my daily chores on my own or with the help of my family members, I don't need a machine to set the table or get the trash out'', ''No, I won't feel any emotions or empathy during interaction … I prefer communicating with humans not a machine with no feelings'', ''I'd rather deal with a human who understands how I feel'', ''No, I don't like dealing with machines, I'd rather interact with humans where there's emotions and understanding involved'', ''No, robots won't always understand what I mean, their intelligence is limited to their programming'', ''No, robots are not as friendly and flexible as human staff when it comes to sudden problems during travel'', ''No, I can't give my trust to a robot or count on him to come up with creative solutions especially in unexpected situations'', ''I don't think robots can handle complex tasks accurately, which could lead to fatal mistakes'', ''Robots lack emotions and critical thinking and can't work as a team'', ''I am afraid to end up fixing their mistakes, which could take more time than handling tasks myself''.*

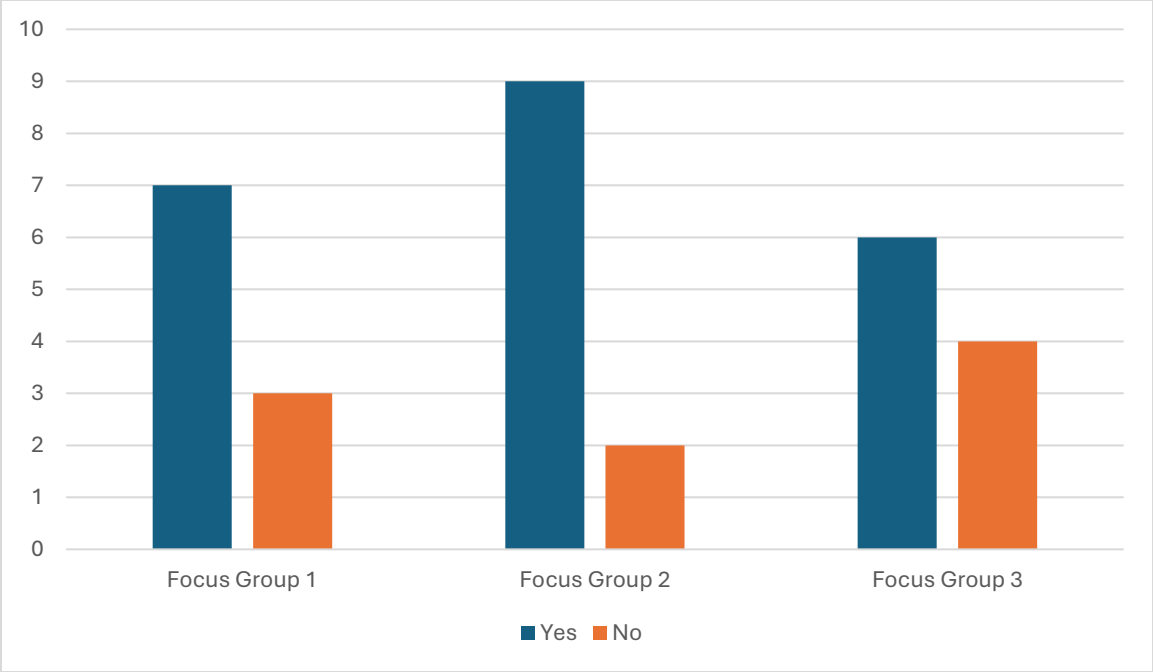

Figure (3): Readiness to Use and Co-work with Service Robots

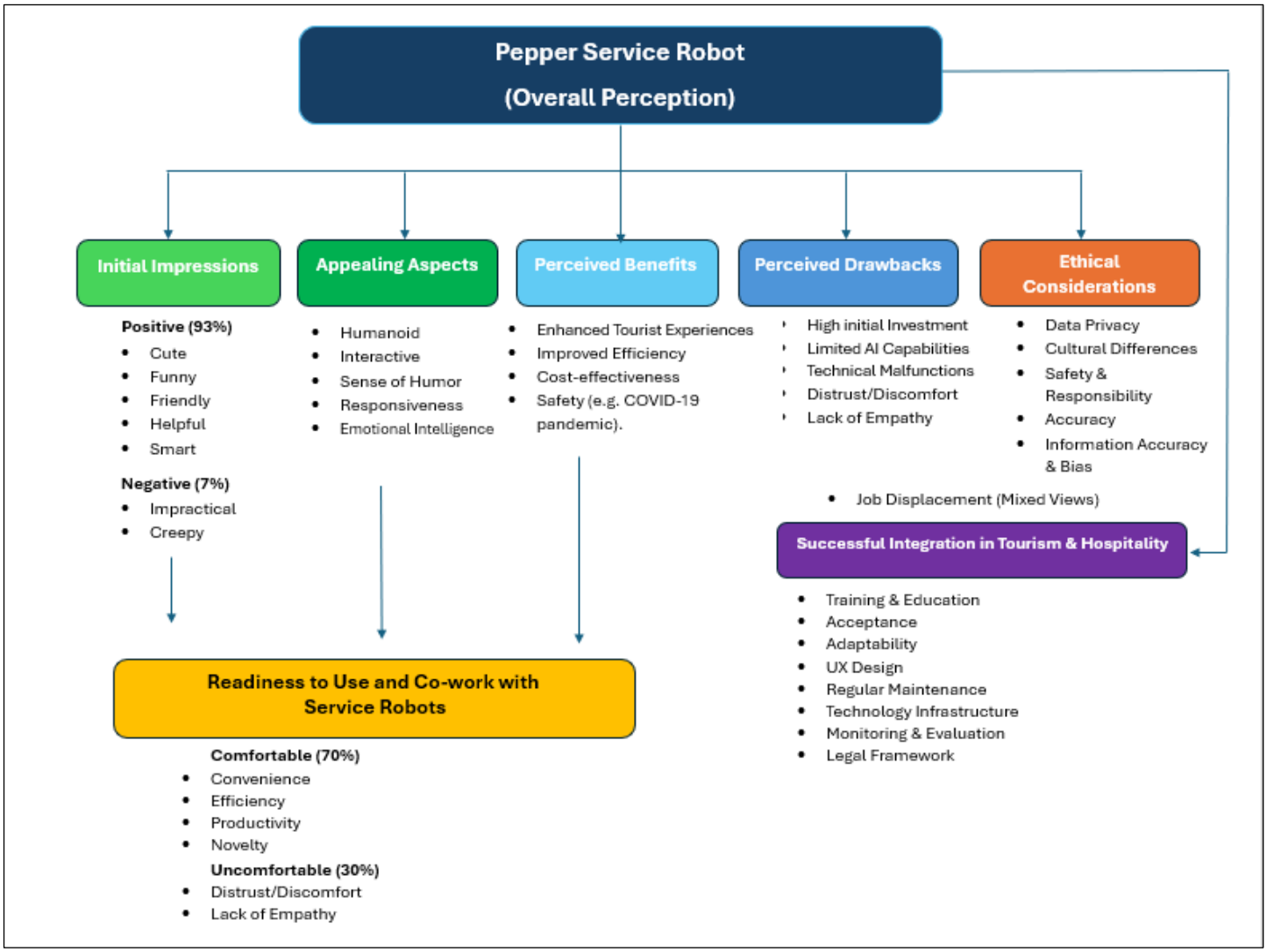

Figure (4): Thematic Map of Tourism and Hospitality Students' Perceptions of Pepper Service Robot

5. Discussion and Conclusion

To conclude, with the continuous technological advancements, the role of service robots is on the rise as an innovative solution for businesses seeking to enrich their customers' experiences. In other words, adopting service robots such as 'Pepper' robots can offer numerous benefits for the tourism industry; from improved tourist experiences to enhanced operational efficiency.

Therefore, the current study attempted to investigate students' perception of the use of 'Pepper' service robots in the Egyptian tourism industry and their readiness as future employees who will have to work in close contact with these robots. Accordingly, the study conducted three focus groups with tourism and hospitality students and the data was analyzed through thematic analysis (Stewart and Shamdasani, 2014).

Conducting focus group discussions with tourism and hospitality students regarding the use of 'Pepper' service robots in the Egyptian tourism industry revealed various insights which can be summarized as follows:

First, concerning the students' initial impression of Pepper robots, the majority had a positive first impression upon watching the interview video. The study findings showed that Pepper was adorable, entertaining, approachable, innovative and intriguing. These findings are consistent with Misaroș et al. (2024) who described Pepper robots as friendly and approachable entities and Feingold-Polak et al. (2018) who found Pepper robots funny and engaging. Moreover, the above findings agree with Huang et al. (2021) who highlighted some of the attributes of service robots which contribute to customer satisfaction and intention to use them, such as cuteness (i.e., being cute and adorable), courtesy (i.e. being friendly and approachable), enjoyment (i.e., being enjoyable and funny) along with coolness (i.e. being cutting-edge). The study findings also align with Filieri et al. (2022) who revealed that customers' interaction with service robots often resulted in joy and excitement.

Generally, the initial impressions of service robots, particularly humanoid robots like Pepper, are often highly positive in human-robot interaction (HRI) literature this can be attributed to their human-like character (Corrales-Paredes *et al.*, 2023; Zhou *et al.*, 2021; Feingold-Polak *et al.*, 2018). In other words, service robots that can successfully convey social cues tend to be perceived more favorably (Song and Kim, 2022; Kahn *et al.*, 2012). Therefore, the positive first impression can be attributed to Pepper's design as a socially engaging robot that can create humanlike interactions.

While most participants had a positive initial impression of Pepper robot, two participants displayed a negative sentiment, describing Pepper as ''creepy'' and ''impractical'' which is a noteworthy opinion consistent with the findings of past research which revealed that some participants may find humanoid robots rather disturbing. For instance, Mubin, Kharub and Khan (2020) discussed Australian students' first impressions of Pepper robots in a library setting stating that students had mixed impressions of Pepper as some thought it was intriguing while others felt Pepper was scary and creepy.

Such reaction is known in HRI research as the ''Uncanny Valley'' effect - proposed by Mori (1970) - which suggests that human-like robots can evoke a sense of discomfort if they do not correctly mimic human behavior which could explain the ''creepy'' feeling sensed by one of the participants (Berg, 2011).

Also, the notion of practicality in robot interaction is consistent with the findings of Li & Wang (2022) and Song & Kim, (2022) which suggest that user perceptions of a robot's usefulness can positively impact their overall impression. Therefore, if Pepper robot is perceived as 'impractical' in real-world applications, this can lead to a negative perception among users.

To sum up, while some studies support positive initial impressions of humanoid service robots due to their human-like characteristics and emotional expressiveness, others reveal mixed or negative reactions. This variation in findings regarding participants' first impression of Pepper robot suggests that other factors may have an influence on initial impressions of humanoid service robots such as individual preferences, cultural context or the robot's specific design which requires further investigation.

Second, as for past experiences with service robots, the study findings revealed that participants have not interacted with any robots before. These findings agree with both Touni and Magdy (2020) and Yassin et al. (2022) who confirmed the absence of robotic applications within the Egyptian tourism sector.

Third, regarding the most appealing aspects of Pepper service robots, based on the study findings, most participants found the humanoid appearance of Pepper along with its sense of humor very intriguing. These findings align with the findings of Guggemos, Seufert and Sonderegger (2020) who stated that students found humanoid robots like Pepper appealing and Zhang et al. (2021) who found that humanlike appearance and sense of humor in service robots positively impact consumer acceptance. Similarly, the studies of Johanson et al. (2020) and Menne et al. (2018) highlighted the significance of robots' humor in positively influencing users' perceptions of robots.

The current study findings also suggest that robot responsiveness plays a crucial role in shaping user perceptions, and this aligns with the findings of Birnbaum et al. (2016) who stated that responsive robots are perceived more positively by users and that they are more willing to interact with them. Similarly, Hoffman et al. (2014) found that robots that displayed responsive behavior, especially in negative situations were perceived as more attractive and humanly-like.

Moreover, the participants appreciated Pepper robots' interactive nature and emotional intelligence, and this finding agrees with Betriana et al. (2022) who found that Pepper robots displayed effective interaction capabilities, Paiva (2018) who believed that robots need emotional and social intelligence to interact effectively with humans, Marcos-Pablos and García-Peñalvo (2022) who concluded that emotionally responsive robots can simulate empathy, which in turn reduces negative perceptions and increases user acceptance of robots and Oistad et al. (2016) who reached similar results stating that participants favored socially interactive robots as co-workers to functional robots and perceived interactive robots as more anthropomorphic and sympathetic. Also, Fan et al. (2017) advocated the need to design emotionally intelligent robots to gain users' trust. Nevertheless, the study findings disagree with the findings of Carvalho et al. (2022) where students perceived robot adoption in hospitality negatively due to their lack of emotion.

Fourth, the study findings highlighted some of the advantages of using Pepper service robots in tourism and hospitality such as enhanced tourist experiences, increased efficiency, and cost-effectiveness which could result in providing tourists with high-quality services and eventually achieving tourist satisfaction. Nonetheless, several disadvantages were also identified, among which high initial investment and maintenance costs. These findings are consistent with Carvalho et al. (2022), Kala (2022), Skubis (2024) and Tuomi et al. (2021) whose studies acknowledged the previously mentioned benefits and challenges as well. On the other hand, the findings of Ivanov, Seyitoğlu and Markova (2020) contradicted the above findings claiming that robot adoption could lead to a decrease in service quality emphasizing that well-trained staff is of more value to the tourism and hospitality industry.

Other challenges to adopting robots in tourism and hospitality were identified such as limited intelligence capabilities in complex or sudden situations and the risk of malfunctioning. These study findings agree with Tuomi et al. (2021) who stated that challenges appear in complex situations as Pepper sometimes fails to respond correctly to user requests and Carvalho et al. (2022) who reported that robots cannot respond appropriately, especially in unanticipated situations that require intuition, problem-solving, decision-making or empathy. The study findings also align with

Wang et al. (2023) who mentioned the risk of malfunction as one of the reasons for customer resistance to service robot adoption. Similarly, Kala (2022) identified technical glitches as one of the challenges to adopting robots in service organizations.

In addition, job displacement was identified as a drawback to adopting service robots in the tourism industry; however, the findings revealed that participants believe that robots cannot fully replace humans and can be used in repetitive tasks that do not require creativity, in hazardous and tedious tasks or back-stage tasks that require minimal interaction.

The above findings partially agree with the findings of Carvalho et al. (2022) which identified fear of job loss as the main challenge towards robot adoption in hospitality. The above study findings also align with the findings of Ivanov et al. (2020, p.527) which indicated that service robots are more suited to performing 'repetitive, dirty, dull, and dangerous tasks' rather than tasks that require social skills or emotional intelligence. Similarly, the findings agree with Kala (2022) who found that robots are more suitable for delivering basic support services.

Fifth, the study findings also revealed some ethical considerations regarding robot adoption such as privacy, information accuracy, safety, respecting cultural differences and job displacement was highlighted as well. These findings are coherent with the findings of Skubis (2024) who thoroughly discussed the ethical issues that could emerge due to robot adoption within the tourism and hospitality industry. Similarly, Etemad-Sajadi et al. (2022) addressed the above ethical issues - except for cultural differences - and their impact on robot use intention highlighting trust and safety as the most significant. Moreover, the findings align with the findings of Fusté-Forné and Jamal (2021) which highlighted some of the above ethical issues in robot adoption and pointed out the need to thoroughly address 'roboethics'. The study findings also agree with Wiegerling (2019) who emphasized the importance of respecting local customs and traditions in service robots' design.

Bias was also identified as an ethical issue according to the current study findings and this finding is consistent with Londoño et al. (2024) who emphasized the importance of avoiding bias in machine learning algorithms during robot design as it could lead to discriminatory behavior against certain groups.

Sixth, regarding tourist satisfaction with service robots, the study findings suggest that using Pepper robots can improve tourist satisfaction due to their ability to provide quick assistance, convenience, and sufficient information along with entertainment as using robots can be exciting and amusing. These findings agree with Fang et al. (2023) whose findings revealed that tourist–robot interaction can enhance tourist satisfaction due to several emotional factors (i.e. fun and playfulness) and instrumental factors (e.g. convenience and ease of use).

Moreover, the study findings also revealed that tourists would use robots out of curiosity and novelty however, over time they could get bored or lose interest. These findings align with Huang et al. (2021) whose study results revealed that the novelty experienced by being served by a robot might diminish over time and this requires enhancing the various aspects of service robots such as level of intelligence and humor to improve tourist satisfaction with service robots.

Seventh, the study findings suggested that the successful integration of service robots in the tourism industry requires training, education, raising awareness, adaptability and seamless integration with existing technologies, user experience design, regular maintenance, provision of technology infrastructure, monitoring and evaluation, and developing a legal framework.

These findings agree with Touni and Magdy (2020) and Yassin et al. (2022) who mentioned the lack of a skilled staff that can operate and maintain robots as one of the obstacles to robot adoption in the Egyptian tourism industry and they emphasized the need for educating employees on RAISA technologies and organizing training programs on how to use these technologies. They further highlighted the poor technological infrastructure as another obstacle to robot adoption and stressed the importance of investing in upgrading technological infrastructure in Egypt and raising awareness to alter managers' views regarding robot adoption within their organizations by reorganizing their budgets and modifying their policies.

In the same context, Skubis, Mesjasz-Lech and Nowakowska-Grunt (2024) addressed the need to establish a regulatory framework, technological standards, and use guidelines for the successful implementation of service robots within the tourism industry that guarantees safety along with efficiency and gains social acceptance. They further emphasized the need to improve robot capabilities to ensure smooth deployment with existing technologies and enhance tourist experiences as well.

The study findings also highlighted the importance of maintaining human interaction along with robot assistance to sustain a balance between advanced technology and human touch in tourism and hospitality which is consistent with the findings of Skubis et al. (2024) who emphasized such balance and Christou, Simillidou and Stylianou (2020) who proposed that tourism stakeholders should think about deploying well-designed robots in certain positions to complement rather than completely replace human staff. Similarly, Roy and Pagaldiviti (2024) advocated that the human element is indispensable for the authenticity of tourism services and that both human staff and AI should be used collaboratively to enhance rather than disrupt the quality of services provided.

Furthermore, the study findings emphasized that building a robust technological infrastructure is indispensable for successful robot integration in the tourism industry which necessitates collaboration between all involved parties (e.g., tourism businesses, tourism organizations, governmental bodies, technology developers ... etc.). This finding agrees with Po‘latov (2023) who advocated that the successful integration of novel technologies within the tourism sector requires the involvement of all stakeholders to be able to provide all the resources needed for implementing and maintaining these technologies.

Finally, the study findings revealed most students' willingness to use robots in their daily lives and during travel as well as co-work with them because they perceive them as useful, convenient tools that can make life easier and have a potential role in increasing productivity at workplaces in the future. These findings align with the findings of Kala (2022) and Oistad et al. (2016).

Nevertheless, a minority of participants were unwilling to use robots in their daily lives and during travel and refused robots as co-workers which agrees with De Graaf, Ben Allouch and Van Dijk (2017) who investigated the reasons for people’s non-use of robots at their homes. These same participants showed distrust in service robots expressing their concerns about robots’ reliability, robots’ lack of interpersonal skills, and the potential risks of depending on robots to perform complex tasks or respond appropriately in unpredictable situations. These concerns are also coherent with the findings of Carvalho et al. (2022) whose study revealed students’ lack of confidence in robots in terms of spontaneous actions, communication skills, empathy and their incapability of performing tasks beyond their programming.

This minority of participants also expressed their discomfort with the idea of replacing human interaction with machines, and they emphasized the importance of emotional intelligence in both work and daily life which agrees with the findings of Christou et al. (2020) who expressed concerns towards robots replacing human interaction in delivering tourism services and Fan et al. (2017) who concluded that robots should be designed as emotionally intelligent entities to be able to gain users' trust.

Overall, the majority of students had a positive perception of Pepper robots and a favorable attitude towards Pepper robots' adoption within the Egyptian tourism industry. These findings align with the findings of several studies investigating students' views - as younger demographics and future employees - of the integration of service robots in tourism and hospitality (Palrão *et al.*, 2023; Kala, 2022; Ivkov *et al.*, 2020) which indicates a potential readiness within the future workforce to adopt and implement robotic technologies within the Egyptian tourism industry.

5.1 Recommendations

Based on the study findings regarding the perceptions and attitudes of tourism and hospitality students toward the use of service robots in the Egyptian tourism industry, the following recommendations are proposed:

- Tourism and hospitality programs should integrate robotics, AI and human-robot interaction into their curriculum to improve students' awareness and readiness to co-work with service robots in the future.
- Tourism and hospitality programs should proactively educate students on the ethical implications of service robot adoption within the Egyptian tourism industry such as job displacement, data privacy, and the psychological dimensions of human-robot interaction, to cultivate informed and balanced perspectives among future employees.
- Tourism and hospitality programs should also focus on developing students' interpersonal skills such as emotional intelligence, critical thinking, complex problem-solving and delivering personalized tourist services as these skills remain indispensable for service industries such as tourism and hospitality and are crucial for success in robot-integrated environments as well.
- Tourism higher education institutions should encourage experiential learning through collaborating with technology developers to provide practical workshops and simulation-based training to enhance students' technical abilities to effectively co-work with service robots in real-world tourism settings.
- Tourism higher education institutions should also promote an entrepreneurial mindset towards robotics by encouraging students to identify niches and business models where service robots can create unique value in the Egyptian tourism context, beyond basic service automation.

5.2 Limitations and Future Research

Academic research on robotic technologies adoption within the tourism industry in developing countries is still in its infant stage. Accordingly, the study at hand tried to fill this significant gap in literature. However, the current study has some limitations.

First, the participants were chosen using purposive sampling and this limits the generalizability of the study findings. Second, although the current study offers insights into Gen Z perceptions

towards robotic technology adoption within tourism and hospitality, the study only examined the perceptions of tourism and hospitality students aged 18-25 excluding other segments of Gen Z which represents another limitation of the current study.

Third, the current study adopted a qualitative methodology and collected data using focus groups only. Employing a mixed methods research design can yield better results; therefore, it is recommended that future studies integrate both qualitative and quantitative data collection methods such as semi-structured interviews along with questionnaires for further validation and generalizability of the current findings.

Finally, future research should focus on conducting comparative studies within developing countries to analyze tourism and hospitality student perceptions of service robots and examine their attitudes towards robotic technologies adoption. This comparative approach can provide valuable insights for policymakers, tourism businesses, and technology developers as it will help them better understand local needs and cultural differences to be able to introduce robotic technologies in a way that works best for each country.

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تصورات موظفي المستقبل تجاه تبني روبوتات الخدمة "بيبر" في صناعة السياحة المصرية: دراسة نوعية

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ملخص البحث:

تستكشف الدراسة الحالية تصوّرات واتجاهات طلاب السياحة والضيافة، بصفتهم موظفي المستقبل، تجاه تبنّي روبوتات الخدمة "بيبر" على وجه الخصوص، وتجاه دمج تقنيات الروبوتات في صناعة السياحة المصرية بشكل عام.

واعتمدت الدراسة منهجية نوعية، حيث تم استخدام أسلوب العينة القصدية لاختيار 30 طالبًا مسجلين بالبرامج الدراسية للسياحة والضيافة وتم إجراء ثلاث جلسات نقاش جماعية (مجموعات تركيز). ومن ثم تحليل البيانات المجمعة باستخدام التحليل الموضوعي.

وقد كشفت نتائج الدراسة أن غالبية طلاب السياحة والضيافة لديهم تصوّر إيجابي تجاه روبوتات "بيبر"، واتجاهات داعمة لتبنّي روبوتات الخدمة بشكل عام. كما أظهرت النتائج وجود استعداد محتمل لدى القوى العاملة المستقبلية للعمل جنبًا إلى جنب مع الروبوتات وتطبيق تقنيات الروبوتات في بيئة العمل السياحية في مصر.

كذلك سلّطت النتائج الضوء على عدد من الفوائد والمخاطر المحتملة لاستخدام الروبوتات في صناعة السياحة، بالإضافة إلى الاعتبارات الأخلاقية المرتبطة بذلك. كما تم التطرّق إلى حدود الدراسة وتقديم مقترحات للأبحاث المستقبلية.

الكلمات المفتاحية: روبوت بيبر، الروبوتات الشبيهة بالبشر، روبوتات الخدمة، تقنيات الروبوتات والذكاء الاصطناعي في تطبيقات الخدمة، صناعة السياحة المصرية.