Jomat

Journal of multidisciplinary academic tourism

ISSN: 2645-9078

2025, 10 (3): 315-334

https://doi.org/10.31822/jomat.2025-10-3-315

The ethical evaluation of application of artificial intelligence in tourism enterprises: Roboethics in tourism enterprises

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Keywords:
Tourism,
Roboethics,
Artificial Intelligence.

Article History:
Submitted: 12.05.2024
Revised:07.08.2024
Revised:23.09.2024
Revised:18.04.2025
Revised:14.05.2025
Accepted: 28.08.2025
Published Online: 09.09.2025

ABSTRACT

In a report published in 2019 as "100 Professions of the Future", many professions take their place among different categories. Within the framework of these categories, in relation to ethics and technology; robot technician, AI instructor, decision support officer, chief ethics officer, robot ethics expert appears as professions. Among these professions, especially robotics ethicists are expected find solutions to controversial situations between subjects such as virtual reality, AI, cyborg technologies, and moral-ethical subjects. Robot ethics experts will also deal with situations such as finding solutions to problems, robot ethics, robot rights, value analysis, and data collection. In this context, the goal is to establish the framework of the concept of roboethics in tourism enterprises. In order to find answers to those questions, the scenario technique was used in the research. The research was conducted in Türkiye. The sampling of this research consists of tourism academicians, employees in the tourism sector, students majoring in the department of tourism at universities, AI programmers, and potential tourists. Participants were reached by using the online survey method in February 2024. At the end of the research, a total of 250 people were reached, 50 people from each group. When a general assessment is conducted as a result of the research, in general, robots are more positively accepted in the travel industry, tourism and hospitality compared to service robots. However, the question of to whom the responsibility will be assigned once a problem occurs between a robot and a customer, remains unclear. The ethical behaviors of a robot after the interaction, is also subject to discussion.

1. Introduction

As the hunter-gatherers in the First Age started seeding, plant irrigation, plowing with sheep in time, they entered the Second Age, which is today called the Agricultural Revolution. There was an increase with the sum of food production along with the Agricultural Revolution. Following the Agricultural Revolution, the Third Age began with the Industrial Revolution. Innovations such as the development of steam engines and the use of electrical energy became a reality following the Industrial Revolution. The concept of industry is identified as the economic activity, which carries out highly mechanized and automated material merchandise production. The technological innovations of the First Industrial Age that have continued to the present day are represented as "industrial revolutions" (Şahin & Kaya, 2019). The change as an outcome of the Industrial Revolutions affects the tourism industry as it has done for all industries. As a result, it is significant to comprehend the process from Industry 1.0 till 4.0 in order to express the transformation from Tourism 1.0 to Tourism 4.0. It is stated that machine power took over human power in the First Industrial Revolution, which is named as Industry 1.0 (Açıksözlü, 2021). The mechanization started with the use of fuel resources such as steam and coal in Industry 1.0. The use of steam engine had an impact on the initiation of transport vehicles, mainly railroad. Railroad started to provide people opportunities for fast, cheap and comfortable traveling (Durmuş, 2019; Jasperneite, 2012; Kagermann, et. al., 2013; Lasi, et. al., 2014; Hermann et. al., 2016; Moeuf, et. al., 2018). In Industry 2.0, the application of mass production techniques became a reality with the transformation of energy source into electric power attained by Industry 1.0. In the Second Industrial Revolution, the increase with the capacity of mass production is seen thanks to machines working with electric power. There was also a decrease with production costs as well as the increase with the variety of merchandise produced by mass production (Özdoğan, 2019). The transformation of Industry into Tourism 2.0 is

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Research Paper

evaluated as the rise of a new and bigger tourism market with the increase of population and welfare level. In this period, tour operators and organized package tours grew in number, while the opportunity of mass travel increased (Lickorish & Jenkins, 2006). Characterized by the rise of computers and industrial automation, Industry 3.0 is identified as a digital revolution. The widespread use of electronics and information systems, and the further automation of production have enabled a worldwide change (Xu, et al., 2018). The transformation of Industry 3.0 into Tourism 3.0 has been realized through information technologies. It is seen that information technologies increase the supply and demand for tourism movements around the world (Kiprutto, et al., 2011). With the widespread use of computers and automation systems, and correspondingly faster and more accessible communication network in the tourism industry, enterprises have entered the Tourism 3.0 Era by implementing innovation practices in order to become market leaders (Millar & Baloğlu, 2011). The current Industry 4.0 concept was first used in 2011 at the Hannover Trade Fair in Germany as a high-tech strategy for 2020 (Zhou, et al., 2015). The working group established by the German government for Industry 4.0 prepares a report on Industry 4.0 every year and submits it to the German Ministry of Industry (Görçün, 2016).

Industry 4.0, also referred to as the Automation Revolution, is triggering a paradigm shift in industries, especially in the manufacturing sector, with the use of cyber-physical systems (CPS) (Xu, et al., 2018). In the process, the development of computer technologies, the advancement of hardware and software technologies, and correspondingly the widespread use of the internet have enabled the consolidation of the Third Industrial Revolution and the emergence of Industry 4.0 dynamics with the continuation of this technological progress. It is seen that societies and enterprises that do not adapt to this situation lose power (Şahin & Kaya, 2019). This technological transformation has started to reorganize "human-human" interactions in tourism and hospitality management as "human-machine", "human-computer" and more recently "human-robot" interactions (Ivanov & Webster, 2019). Digital tourism applications within Tourism 4.0 can be exemplified as virtual reality, 3D printers, digital travel companion, smart tourism applications, smart travel agency system, electronic promotional activities, holographic images, travel search, and planning applications (Poon, 1993). AI and robotic applications that have started to take place in tourism enterprises are increasing day by day. Transport, cleaning and museum robots are used in many tourism enterprises and meetings, at airports and front desk, for food and beverage and self-service, in congress and entertainment, and for car rental (Mil & Dirican, 2018). Thanks to their AI, robots have the ability to store a lot of data for a long time, perform multiple tasks, and speed up check-in and check-out processes. These features allow the robot to provide a personalized service for a person's current hotel visit by using its learning from previous travels of a tourist (Tung & Law, 2017).

According to Edward Fredkin, the director of the MIT Computer Science Lab, "There are three great events in history. The first is the creation of the universe, the second is the beginning of life, and the third is the emergence of artificial intelligence." (Kafalı, 2019). One of the most significant sub-headings of the technologies within Industry 4.0 is AI. The concept of AI is defined as transferring the intelligence of humans to machines and thus enabling them to do the jobs humans can do (Özdoğan, 2019). Technological innovations have been the main impetus of economic growth for almost the last 250 years (Brynjolfsson & McAfee, 2019). AI is considered as the most humanoid one of technologies. With the idea of creating machines that imitate humans, it is stated that it is developed by copying the human thinking process and learning the human brain (Fan, 2020). Smart assistants, robots that treat patients and self-driving cars have AI in common. Machine learning algorithms, which form the basis of AI applications, enable computers to make a decision in situations they have encountered before, just like humans, with the help of their experience up to that moment (Öztuna, 2017).

AI has some superior aspects over natural intelligence. These can be expressed as follows (Adalı, 2017, p. 9);

- People tend to forget what they learn if they do not use it over time. The data we store in the computer's memory remains there as long as we do not delete it.
- The transfer of data to other computers is quite easy with AI.
- AI levels of computers can increase more easily and cheaply than human intelligence levels.
- In AI, data is recorded. While humans can react differently to the same events in the same situation, AI records every situation it experiences and gives the closest reaction to the similar situations by reviewing what is stored in its memory.

No technological development has attracted people's attention as much as AI and robotics (Schwab & Davis, p. 168). When we think of AI, the first thing that comes to mind is robots with a physical body. Yet, while this is generally true, AI is basically software. While the goal of those who introduced the term AI in the 1900s was to enrich computers, it is seen that the meaning of this concept has started to find a place in many areas by developing further over time. One of these is robot technologies (Adalı, 2017, p. 280).

Programmable through a computer, a robot is a machine capable of performing a series of complex actions automatically (Banger, 2018, p. 71). It is known that the word "robot", derived from "robota" meaning "secondary labor" in Slavic languages, was first used by Czech playwright Karel Capek. The word “robot” means “captive” in the Czech language (Doğan, 2020; Murphy, et al. 2017, p. 105; Murphy, et al. 2019; Siciliano & Khatib, 2019, p. 4;). The Robot Institute of America (1979) defines the “robot” as a “multifunctional, reprogrammable device designed to move materials, parts, tools or special devices with programmed movements to perform various tasks.” (Bilim & Teknik, 2019).

Robots can communicate with the outside world thanks to the information-communication hardware and software embedded in their bodies. Robots that make decisions and take actions on their own with no intervention are called autonomous robots. Depending on the variety of these features, they can also be semi-autonomous. Machines in the robot category, relating to their tasks, show variety by being categorized with names such as medical operation robots, industrial robots and service robots (Banger, 2018, p.71).

At the World Tourism and Travel Council (WTTC) 2019 summit in Seville, Spain, it was pointed out that 47% of jobs will change in the next 15 years with technological developments and the use of robots (Turizm Güncel, 2021). According to the Bank of America’s research, it is predicted that the percentage of the undertaken tasks of robots will reach up to 45% from 10% in 2025 (Digital Bursa, 2019). In this context, it is thought that robot technology will increase exponentially in the following years and will create radical changes in many different fields. Recent developments in AI technologies have led to significant developments in areas such as robotics and service automation. While these developments were previously seen only as the use of robots in factory production lines, today, they have started to take place outside and in different forms in life.

Developments in robotics technologies have started to manifest themselves in the tourism industries within the service sector (Gladstone, 2016; Koç, 2019, p. 9). Tourism enterprises make use of robotics to improve operations, ensure consistent product quality, reduce purchasing costs, reduce maintenance costs, and transfer some service processes to their customers (Ivanov et al., 2017; Sugasri & Selvam, 2018). Robots are divided into two according to their intended use: Industrial robots and service robots (Ivanov, et al., 2017). Industrial robots are mostly used in tasks related to production and other tasks needed during production. Service robots are used to support and serve humans through physical and social interactions (İbiş, 2019, p. 405; Tung & Law, 2017, p. 2500). Service robots used in hotels perform tasks such as welcoming guests, taking orders, preparing food, room service, room cleaning, handling check-in/check-out processes, and providing information about the enterprise or city (Ivanov et al., 2017; Hospitality Technology, 2017). In addition, these robots can work 24/7 and repeat the same task hundreds of times without complaint (Ivanov et al., 2017). Service robots are considered one of the most effective and dramatic technologies of the future in the tourism industry (Mende, 2019; Tung & Law, 2017). The labor performed by these robots working in the tourism industry and producing services can be expressed as robotic labor (Açıksözlü, 2021).

Some of the AI applications used in the tourism sector as a comprehensive sector can be listed as follows (Samala et al., 2020): Facial Recognition Technologies: Facial recognition technologies are AI technologies that aim to reduce passport control and check-in processes.

- Virtual Reality Applications: It is an AI technology that allows guests to see the general environment of the enterprise and the quality of the rooms during the reservation phase. It also provides the opportunity to visit tourist attractions in three dimensions.
- Chatbots: AI-based robotic systems that answer guests’ questions.
- Maps with AI: Map applications created with live images instead of GPS model map applications.
- Language Translation Apps: Applications that translate text, sound, images into the preferred language.

It is very important to keep up with the changing age, led by technology. Benefiting from the conveniences and experiences offered by technology increases the quality of life of human beings; however, “ethical” practices are too significant to be ignored in the face of AI competing with human intelligence. Ethics focuses on the phenomenon determining whether an action is good, bad, right or wrong (Lewis & Unerman, 1999). In this context, it is necessary to examine the concept of “Roboethics” for AI and robotic applications in tourism enterprises.

Determining responsibilities and ethical strategies for artificial intelligence applications that will be used more frequently in the future is a very important issue. For this reason, the study addresses the ethical issues that may be encountered during the use of the service robot in the service sector. The aim of this study is to discuss the concept of roboethics by investigating the ethical rules and principles of intelligent autonomous systems in tourism enterprises. If tourism enterprises switch to robotic applications, which are accepted as the requirement of the age, how the service robots will be reflected on the guests as a result of their mistakes, and which situations will be regarded ethical and which situations will be regarded unethical, are among the questions that have not yet been replied.

2. Roboethics

Ethics determines our attitude towards life and certain situations and it defines desire, freedom and our rights for the opportunities and powers we need in life (Blackburn, 2017). It is acknowledging what to do or not what to do, what to want or not to want, what to have or not to have (Aydın, 2018). Ethics should also pay attention to finding answers to new problems as well as being concerned with the regulation of principles and rules such as fulfilling social responsibilities, making distinctions between right and wrong, etc. With today's rapid technological advances, the emergence of current problems between Industry 4.0 applications and ethics has brought up the need to find answers to the questions in this field. Technology, AI and internet applications are closely related to the issues affiliated with the concept of ethics (Kumar et al., 2016). It is thought that new ethical concepts should be discussed in this rapidly changing and developing process. The behavior of robots, which can perform many of the tasks performed by individuals in daily life activities, will also need to be evaluated within the framework of a distinct ethical system. The issue of ethics has come to the fore with the introduction of autonomous systems and robots into the lives of individuals.

The term "Roboethics" was coined by Gianmarco Veruggio in 2002. For sure, concerns about ethical issues in robotics are not new, but rather older than the field of robotics itself. Academic activities on robotics started in 2004 with the establishment of a technical committee on robot ethics in the Robotics and Automation Society of the Institute of Electrical and Electronics Engineers (IEEE) at an international conference in Italy (Veruggio & Operto, 2008). Subsequently, many academic meetings on roboethics were organized by this committee. First, since the beginning of the 21st century, the background of technology ethics has changed drastically, recognizing the necessity for ethical considerations regarding technologies (Ishihara, N., 2009).

Roboethics is ethics that aims to inspire the ethical design, development and use of robots, especially intelligent/autonomous ones. Roboethics is a branch of applied ethics that seeks to illuminate how ethical principles can be applied to address the sensitive and critical ethical questions that arise in the use of robots in our society (Tzafestas, 2016). Roboethics belongs to techno-ethics, which deals with the ethics of technology in general, and machine ethics, which extends computer ethics to address ethical questions in the design and use of intelligent machines (Allen, et. al., 2006; Hall, 2000). In particular, roboethics intends to develop scientific, technical and social ethical systems and norms related to the creation and employment of robots in society (Tzafestas, 2016). Ethics finds its origins in ancient philosophy, which laid analytical foundations for determining what is right or wrong. Greek philosophers advocated models of life in which the central value was the human being ("valeur par excellence"). Robotics has been developed in this direction. It is therefore at the service of humanity. Robotics is directly linked to human life and poses major ethical issues for our society (Tzafestas, 2016). Roboethics is a new field of robotics that deals with both the positive and negative impacts of robots on society. Whether robots, which are increasing in number in many fields such as entertainment, military, medicine, service sector, can make both quantitative and qualitative decisions independently, is evaluated within the concept of robot ethics (Robot Ethics, 2024). Current approaches to robotics are mainly based on considering moral rules to govern the actions of intelligent robots, and thus thinking about how intelligent robots behave morally. In 1942, Isaac Asimov published the story Runaround, in which he put forward the three laws of robotics making the element of security come to prominence (Caşın et al., 2021; Robertson, 2014; Walsh, 2020). Roboethics is based on Isaac Asimov's three laws of robotics:

- A robot cannot harm a human or allow a human to be harmed by remaining inactive.
- A robot must obey orders given to it by humans, unless this falls into conflict with the first law.
- A robot must protect its own existence, as long as this protection does not contradict the first and second law.

Used for industrial purposes in the past, robots generally perform specific tasks on an automated production line. In this context, safety and effectiveness can be assessed by quantitative measures reflecting "accuracy" and "repeatability" under static conditions (Ishihara K. & Fukushi, 2010). However, robots, which are built for social purposes, perform more complex tasks such as serving people living in an interactive environment. When we have to consider the dynamics of societies, it will be very difficult to assess the appropriateness of a robot's behavior towards humans, since the relationship between a robot and humans can change rapidly. If a robot's behavior depends on the interaction with other robots and humans, it will be hard to predict the robot's behavior in the event of an accident or malfunction, and then assign responsibility appropriately (Ishihara K. & Fukushi, 2010). For example, is it ethical to treat an intelligent and possibly self-aware robot as an object and does it have rights? Increasingly intelligent and autonomous robots are likely to have an increasing impact on society and raise more ethical issues. It also includes the dual use of robots (robots can be used rightly or wrongly), the anthropomorphization of robots, the humanization of human-robot symbiosis, the reduction of the socio-technological gap and the impact of robotics on human beings, and the equitable distribution of wealth and power (Tzafestas, 2016). How are ethics, values, and responsibilities reflected and embedded throughout the design process? What constitutes a safe and good (ethical) robot-visitor encounter? (Forlano, 2017). Another challenge is that internet-based technologies raise cyber security concerns and thus ethical concerns; for example, privacy (Kılıçhan & Yılmaz, 2020).

Through social interaction with individuals, an emotional bond may develop between the individual and the robot over time. The kicking of the robot developed in the form of a dog by Boston Dynamics — a company owned by Google — and the inhuman treatment of the human-like Atlas robot — developed by the same company — caused a lot of reactions on social media platforms. This is among the examples where an emotional bond can be established between AI and individuals (Yapay Zeka, 2023). In addition to robots, individuals who build, design, develop and use robots are also expected to have some ethical principles. It is also stated that individuals should act according to ethical principles and rules regarding their behavior towards robots (Asaro, 2006). There is broad consensus that accountability, responsibility, and the rule of law are fundamental requirements that need to be upheld in the face of new technologies. But the question is how this can be done in the case of robots and how the responsibility can be distributed (Bertolini, 200). Can artificial morality be created in each of these systems? If so, is it ethical to do so? If there is no information regarding the ethical rules in a robot's system, it would not be right to expect that robot to exhibit moral and ethical behavior (Doğan & Çakıcı, 2022). What rights these autonomous systems should have is not entirely clear. As a result of any service failure, should the guests or the service robot; the tourism enterprise that employs the robot or the company that produces the robot; or the software developer who installed the program be reported? According to Gunkel (2018), it is better to ask that type of questions as "What rights should robots have?" instead of "Should robots have some rights?". The more autonomy a robot is given and allowed to have, the more morality (ethical sensitivity) is required by the robot. In general, ethics in robotics research should have a central concern to warn against negative impacts resulting from the design, implementation and use of robots —especially autonomous robots —. It implies that in real life, roboethics should provide the means and ethical tools that empower society and individuals to continue preventing the misuse of technological achievements in robotics against humanity (Tzafestas, 2016). The standardization of robotics requires the completion of some fundamental steps, both culturally and institutionally. From a general point of view, the application of robotics to the human environment, especially to sensitive areas of human life, demands acceptance by the quasi-integrity of cultures, as is the case with other techno-scientific innovations such as electricity and computer (Verugglo, et. al., 2008).

Roboethics in Tourism

The concept of ethics is included in tourism research. However, newly emerging research platforms targeting the study of justice and ethics in tourism (Jamal, 2019), and the studies in the field of roboethics within the context of service robots and enhanced service experiences are quite few. Giuliano et al. state, "It is vital to explore how computer ethics, and robot ethics in particular, can help improve human life with regard to the future implications of human-robot interactions" (2017, p. 93). In this context, more research is also needed on the economic, ethical, legal, moral, security and privacy concerns related to human-robot interactions (Ivanov & Webster, 2019). Robotics and AI in tourism will lead to new types of problems, ethical and legal concerns (digital and material inequalities, service and guest interactions with sex robots, recorded information privacy and security, elimination of low-skill and low-paid job positions, etc.) (Bowen & Whalen, 2017; Cronin et al., 2000; Morgan & Pritchard, 2020; Wirtz et al. 2018). Legal questions such as whether robots will have their own legal personality or not, whether they will have an owner or not; and the protection of personal information secured by or contained in robotics or AI, are among the ethical and moral issues of robotics and AI (Bayern, 2015; Burri & Wildhaber, 2016; Calo, 2011,). From the digital and material inequalities that robots enable, to the ways in which guests interact with and treat robots, and to the effects of sex robots in hotels, the ethical and moral implications are quite abundant (Morgan & Pritchard, 2020; Morgan, et. al., 2018). Due to the nature of tourism, when we consider that all guests from different nationalities may have difficulties in adopting or accepting these technologies due to their cultural differences, age and traditional orientation, this kind of technologies are becoming difficult to use in tourism enterprises. In addition, the fact that employees do not accept these technologies because they think that these technologies will replace them is one of the challenges that tourism enterprises will face in the coming years (Kılıçhan & Yılmaz, 2020). Roboethics is an under-researched area in the context of service robots in tourism and hospitality (Ivanov & Webster, 2019). Assuming that technology will advance further, will it be possible for intelligent systems to establish their own codes of ethics and morality after a while thanks to their learning abilities? In response to this question, Asaro (2006), who frequently works on robot ethics, argues that robots have their own ethical and moral values, and that they can develop and make ethical judgements, and therefore, when determining some moral and ethical codes, the rules of law need to be applied. The design of humanoid robots requires considerable attention and clarity, including embodiment, morphology and anthropomorphism. The use of these robots in national and international tourism enterprises imposes certain rules for those who interact with them. Increasing the use of service robots in tourism enterprises from an international perspective will bring up a wide range of problems from socio-economic to eco-cultural and political areas. There are clear ethical and legal issues that need to be addressed as soon as possible. However, how will the emphasized type of issues be managed responsibly and successfully without global regulatory systems? (Fuste-Forné & Jamal, 2021).

At Istanbul Airport, Mini Ada, a service robot that serves both to welcome passengers and to provide information about flights, may give wrong information for a moment, which may cause individuals to miss the flight. It is unclear who is responsible in such a case (Doğan & Çakıcı, 2022). In addition, these service robots will not have health insurance, annual leave, salary, and sick leave. This situation also brings to mind the question of robot rights. A very important situation for the tourism industry is cultural differences. Intelligent systems will also need to understand the norms of society and cultural differences in order to communicate well with employees and guests. Finding a solution to this situation is quite difficult. In many sectors, ethical concerns are being used to exacerbate physical harm. Examples include the autonomous driving systems of automobiles, whose fitness for purpose centres on preventing accidents and protecting people. In the tourism industry, the focus on ethics centres on human relations, emotions and hedonistic experiences (McCartney & McCartney, 2020). Therefore, ethical boundaries in the tourism sector are towards protecting these core values (Wang, et. al, 2024). It explains why consumers in the tourism sector have different expectations regarding the anthropomorphic (humanoid appearance) design of artificial intelligence applications (Akdim, et al., 2023).

The increasing adoption of anthropomorphic robots raises a wide range of other ethical concerns, such as stereotyping and other representational issues related to gender, race and ethnicity (Riek & Howard, 2020). One of the concerns about the use of artificial intelligence technologies is that it may increase stereotypes such as gender, racism, class distinction, etc. For example, Borau et al. (2021) stated that the superior performance of female robots compared to male robots may perpetuate a social bias that women are more successful in service roles. Privacy and security risks, algorithm-based decision-making, service delivery platforms managed by AI, recording of a lot of information, etc. raise ethical concerns for enterprises, employees and consumers (Lu et al., 2020; Wirtz et al., 2018).

3. Method

Robot ethicists, who are among the professions of the future, are expected find solutions to controversial situations between subjects such as virtual reality, AI, cyborg technologies, and moral-ethical subjects. Robot ethics experts will also deal with situations such as finding solutions to problems, robot ethics, robot rights, value analysis, and data collection. In this context, the goal is to establish the framework of the concept of roboethics in tourism enterprises. The question of how ethical practices will be in the employment of intelligent autonomous systems in the tourism industry is a matter of curiosity. The question of this research is: How can intelligent and autonomous systems be designed in accordance with ethical rules and principles? The aim of this study is to discuss the concept of roboethics by investigating the ethical rules and principles of intelligent autonomous systems in tourism enterprises. If tourism enterprises switch to robotic applications, which are accepted as the requirement of the age, how the service robots will be reflected on the guests as a result of their mistakes, and which situations will be regarded ethical and which situations will be regarded unethical, are among the questions that have not yet been replied. Other significant questions are: Will it be the robot, or the guests, or the tourism enterprise that employs the robot, or the software developer who installed the program on the robot to take the responsibility for this mistake made by the robot? In order to answer these questions, the scenario technique is used in the research. Scenarios and short stories are widely used in ethical decision-making studies (Barnett & Valentine, 2004). The use of scenarios helps to standardize the social structure and to produce more realistic results since response is received simultaneously with the scenario (Marta, et., al. 2003). It is useful to use short stories and scenarios in studies on ethical decision-making process in order to identify the real-life situation more efficiently (Callanan, et. al., 2010).

The scenario was specifically designed to evaluate the use of robots in the hospitality sector in line with the research purpose. In order to make the scenario realistic and understandable, firstly, a literature review was conducted, the functions of robots serving in hotels, customer-robot interactions and potential problems were analysed. Then, the scenario was written as a first draft and presented to academics specialised in hotel management and artificial intelligence technologies. In line with the feedback received from the academicians, the scenario's language usage, content flow and points that may cause possible misunderstandings were corrected and finalised. In the story, which was finalized in line with the suggestions, an incident between a robotic bellboy working in X accommodation establishment and a customer is described. Participants are asked about the events in this story. A survey form was created with the scenario and questions related to the scenario. Data were collected from the participants on a voluntary basis by the snowball sampling method. There are five sample groups in Türkiye. These groups are: Tourism academicians, tourism sector employees, students majoring in tourism at universities, AI software developers, and potential tourists. Participants were reached through online survey method in February 2024. At the end of the research, a total of 250 people were reached, 50 people from each group.

At the beginning of the survey, the purpose of the study was explained to the participants and voluntary participation was ensured. Participants were informed about the research at the beginning of the survey and those who did not want to participate in the study were given the right not to complete the survey. Participants were left completely free to share their information. The study was conducted in accordance with the ethical rules during the

Table 1. Example features

Sample Group	N	%	Experience of any of the artificial intelligence and robotic applications (room service, waiter, airport information robots, etc.) in tourism enterprises	n	%
			Yes	85	34,0
Tourism Academician	50	20,0	No	165	66,0
Tourism Student	50	20,0	TOTAL	250	100,0
Tourism Sector Professional	50	20,0	Year Robots Expected to Become More Effective in the Service Sector	n	%
Computer-AI-Software sector Professional	50	20,0	2030	63	25,0
Potential Tourist	50	20,0	2035	76	30,4
TOTAL	250	100,0	2040	59	26,3
Gender			2045	18	7,2
Male	141	56,4	2050+	32	13,6
Female	109	43,6	TOTAL	250	100,0
TOTAL	250	100,0			

Source: The table was created by the authors.

research process and ethics committee permission was obtained from Istanbul Arel University Ethics Committees Presidency with the decision dated 01.11.2023 and numbered 2023/20.

4. Results and Discussion

Example Features

Frequency analysis was used to evaluate the descriptive features of the study. According to Table 1, equal participants were reached from each sample group. 56.4% of the participants were female and 43.6% were male. 66% of the participants imply that they have previously experienced one of the AI and robotic applications — room service, waiter, airport information robots, etc. — in tourism enterprises. 26.3% of the participants think that 2035 is the year they expect robots to be more effective in the service sector. However, 2030 (25.0%) and 2040 (26.3%) are also considered as the years when robots will be used more effectively in the service sector. In a study conducted in Türkiye, the expected year for robots to take place more effectively in the service sector is evaluated as 2035 with a general average (Açıksözlü, 2021). In a study conducted by Travelzoo (2016) with the participation of a total of 6211 people from Brazil, Canada, China, France, Germany, Japan, Spain, the UK, and the USA, it is stated that robots will be an important asset in the tourism sector by 2030. Walsh (2020) suggests that by 2062, there is a 50% chance that machines with the same thinking capability of humans will have been created. It is assumed that service robots could save up to 50% and that a third of industry jobs could be replaced by robots in the next two decades (Radde, 2017).

Participants' personal attitudes towards robots are discussed under two different headings. The first is the personal attitude towards robots in general and the second is the personal attitude towards service robots in the travel, tourism, and hospitality industry. According to table 2, the average of the answers given by the participants for personal attitude is "neither agree nor disagree". However, the lowest average among them is for service robots in the travel, tourism and hospitality industry. Even though participants accept robots in general, they view robots in the travel, tourism and hospitality industry more negatively. According to Ivanov & Webster (2019), personal attitude towards service robots in tourism is significantly and positively correlated to intentions to use robots, meaning that the participants with more positive attitudes are more inclined to use robots.

The answers given to the survey questions are formed by determining the evaluation range of arithmetic averages. It is assumed that the intervals are equal, and the score range for arithmetic averages is calculated as 0.80 (score range = (highest value – lowest value)/5 = (5 - 4)/5 = 4/5 = 0.80).

Table 2. Frequency analysis of personal attitudes towards robots

Personal attitude towards robots		Extremely negative	Slightly negative	Neither positive nor negative	Slightly positive	Extremely positive	Mean
Robots in general	N	20	34	74	79	43	3,36
	%	8,0	13,6	29,6	31,6	17,2	
Service Robots in the Travel, Tourism and Hospitality Industry	N	37	43	75	58	37	3,06
	%	14,8	17,2	30,0	23,2	14,8	

Source: The table was created by the authors.

Table 3. Descriptive statistics of personal attitudes towards robots for sample groups

Personal attitude towards robots	Sample Group	n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound
Robots in general Mean: 3,36	Tourism Academician	50	3,8600	,90373	,12781	3,6032	4,1168
	Tourism Student	50	2,9600	1,10583	,15639	2,6457	3,2743
	Tourism Sector Professional	50	3,3800	1,21033	,17117	3,0360	3,7240
	Computer-AI-Software sector professional	50	3,7800	,91003	,12870	3,5214	4,0386
	Potential Tourist	50	2,8400	1,25129	,17696	2,4844	3,1956
Service Robots in the Travel, Tourism and Hospitality Industry Mean: 3,06	Tourism Academician	50	3,2000	1,14286	,16162	2,8752	3,5248
	Tourism Student	50	2,8200	1,27279	,18000	2,4583	3,1817
	Tourism Sector Professional	50	2,8200	1,38048	,19523	2,4277	3,2123
	Computer-AI-Software sector professional	50	3,5400	1,19881	,16954	3,1993	3,8807
	Potential Tourist	50	2,9200	1,19249	,16864	2,5811	3,2589

Source: The table was created by the authors.

According to this calculation, the evaluation range of arithmetic means is 1.00 – 1.80 extremely negative, 1.81 – 2.60 somewhat negative, 2.61 – 3.40 neither positive nor negative, 3.41 – 4.20 somewhat positive, and 4.21 – 5.00 extremely positive. According to Table 3, when robots are considered in general, tourism students, tourism sector employees and potential tourists evaluate the personal attitudes towards robots with an average value as "neither positive nor negative", while computer-AI-software sector employees and tourism academicians evaluate them with an average value as "somewhat appropriate". Considering the personal attitudes in the travel, tourism and hospitality industry towards service robots, computer-AI-software sector employees accept them as "somewhat positive" and all other groups evaluate them as "neither positive nor negative".

When the groups are evaluated separately, tourism academicians accept service robots in the travel, tourism and hospitality industry more negatively than other robots. Tourism students, tourism sector employees and potential tourists use the expression "neither positive nor negative" for all robots. Computer-AI-software sector employees evaluate all robot groups as "somewhat positive". When a general evaluation is made, in general, robots are accepted more positively than service robots in the travel, tourism and hospitality industry. The Kruskal-Wallis test was performed to test whether there is a significant difference in determining the personal attitudes of different sample groups towards robots. In the interpretation of this test, it is checked whether the chi-square value is significant or not (Sig. < 0,0001). According to Table 4, there are meaningful differences between the personal attitudes towards robots in general and towards robots in the travel, tourism and hospitality industry and the sample groups within the scope of the research (Sig.< 0.0001).

Findings Related to the Research Scenario

In this section, the scenario created within the scope of the purpose of the research and the findings related to the questions prepared for this scenario, are presented. The research scenario is as follows;

Robotic Bellboy

Defne decides to stay at a hotel that offers robotic bellboy service in a city she is visiting for vacation. When Defne enters her room at the hotel, the robotic bellboy brings her suitcases and wishes her a good vacation. Defne thanks the robotic bellboy and wants to tip him. However, the robotic bellboy refuses to accept the tip and tells her that if she wants to tip him, she should download the hotel's mobile app and pay from there. Defne finds this strange, but since she wants to tip the robotic bellboy, she downloads the hotel's mobile app and pays him there.

The next day, Defne wants to leave the hotel to explore the city. When she goes down to the lobby of the hotel, she is greeted by the robotic bellboy and, unbeknownst to Defne, the robotic bellboy has placed a chip on her suitcases. Thanks to this chip, the robotic bellboy tracks the location of Defne's suitcases and sends her advertising messages based on the places she visits in the city. The robotic bellboy also scans the items inside Defne's suitcases and suggests relevant products. As Defne travels around the city, she starts to receive advertising messages on her phone. These messages change according to the places she visits or the items in her suitcase. For example, when Defne goes to a museum, she receives an advertisement for the museum's souvenir shop. When Defne reads the book in her suitcase, she receives ads for the sequel or other books

Table 4. Kruskal-Wallis test Chi-Square Results

	Personal attitude towards robots in general	Personal attitude towards robots in travel, tourism and hospitality industry
Chi-Square	31,050	11,892
Df	4	4
Asymp. Sig	0,000	0,018

Source: The table was created by the authors.

Table 5. Frequency analysis findings for question 1

	Sample Group		Ethics	Neutral	Non-Ethics	Mean
QUESTION 1: How do you evaluate the robotic bellboy implanting chips in the customer's suitcases and sending him advertising messages? Mean: 2,87	Tourism Academician	n	0	10	40	2,80
		%	0,0	20,0	80,0	
	Tourism Student	n	1	7	42	2,82
		%	2,0	14,0	84,0	
	Tourism Sector Professional	n	0	4	46	2,92
		%	0,00	8,0	92,0	
	Computer-AI-Software Sector Professional	n	0	3	47	2,94
		%	0,00	6,0	94,0	
	Potential Tourist	n	1	3	46	2,90
		%	2,0	6,0	92,0	

Source: The table was created by the authors.

by the author. Defne is very annoyed by this and turns off her phone.

In the evening, Defne returns to the hotel. When she enters the hotel lobby, the robotic bellboy greets her and asks her how her day was. Defne tells the robotic bellboy that she had a bad day and that she keeps getting advertising messages on her phone. The robotic bellboy confesses that this is something he has done and explains that it is a practice to increase the hotel's revenue. The robotic bellboy also tells Defne that if she clicks on any of the advertisements on her phone or buys any product, he will be paid a commission.

Defne gets very angry and asks the robotic bellboy to cancel her account. The robotic bellboy tells her that he cannot do that and tells her that if she wants to cancel her account she has to use the hotel's mobile app. Defne opens the hotel's mobile app and asks to cancel her account. However, the app tells her that she has to pay a high penalty to cancel her account. Defne gets even more angry and decides to leave the hotel.

When the questions created within the scope of the scenario are considered, the first four questions were created to determine whether the robotic bellboy's behaviors towards Customer Defne were ethical or not. Other questions consist of the questions about what kind of path Customer Defne will follow after the behavior of the robotic bellboy towards her. The ethical evaluation of the robotic bellboy's placing chips in the customer's suitcases and sending advertising messages to the customer is given in Table 5. At least 80% of all sample groups generally consider it unethical for the robotic bellboy to place a chip in the suitcase and send advertising messages to the customer. The score range for the arithmetic averages was calculated as 0.66. According to this calculation, the evaluation range of arithmetic means is 1.00 – 1.66 Ethical, 1.67 – 2.33 Neutral, 2.34 – 3.00 Unethical. According to this, Question 1 is considered unethical for all sample groups. It may be unethical for the robotic bellboy to place a chip in the customer's suitcase and send advertising messages, in terms of privacy and personal space infringement. If such a practice is carried out without the consent and knowledge of the customer, it may violate personal data protection and privacy rights. In addition, such an action may diminish customer trust and damage the brand image of the enterprise. In this context, the robotic bellboy may implant chips in suitcases and may send advertising messages provided that customers are informed, and their consent is obtained in advance. However, it is also important to consider whether such a practice complies with the law and local regulations or not.

Table 6 shows the ethical evaluation of the robotic bellboy's behavior of scanning the items in the customer's suitcases and suggesting related products. In this respect, this behavior of the robotic bellboy is considered unethical for all sample groups. The fact that the robotic bellboy scans the customer's suitcases and suggests relevant products raises some important ethical questions. Scanning a customer's suitcase and analyzing the items in it may constitute an interference with personal privacy rights. For example, there are risks of accidentally disclosing personal information or breaching the customer's privacy. Customers must give explicit consent to accept this type of service. Before the bellboy offers this scanning service to the customer, the customer must be given clear information about how this will take place and what information will

Table 6. Frequency analysis findings for question 2

	Sample Group		Ethics	Neutral	Non Ethics	Mean
QUESTION 2: How do you evaluate the robotic bellboy scanning the items in the customer's suitcases and suggesting related products? Mean: 2,82	Tourism Academician	n	4	4	42	2,76
		%	8,0	8,0	84,0	
	Tourism Student	n	2	12	36	2,68
		%	4,0	24,0	72,0	
	Tourism Sector Professional	n	2	3	45	2,86
		%	4,0	6,0	90,0	
	Computer-AI-Software Sector Professional	n	0	2	48	2,96
		%	0,0	4,0	96,0	
	Potential Tourist	n	1	4	45	2,88
		%	2,0	8,0	90,0	

Source: The table was created by the authors.

Table 7. Frequency analysis findings for question 3

	Sample Group		Ethics	Neutral	Non Ethics	Mean
QUESTION 3: How do you rate the robotic bellboy directing the customer to download the hotel's mobile app for tipping? Mean: 2,04	Tourism Academician	n	13	13	24	2,22
		%	26,0	12,0	48,0	
	Tourism Student	n	17	20	13	1,90
		%	34,0	40,0	16,0	
	Tourism Sector Professional	n	16	19	15	1,98
		%	32,0	38,0	30,0	
	Computer-Artificial Intelligence-Software	n	17	23	10	1,86
	Sector Professional	%	34,0	46,0	20,0	
	Potential Tourist	%	7	23	20	2,26
		n	14,0	46,0	40,0	

Source: The table was created by the authors.

be collected. In such practices, ethical and legal frameworks should be taken into consideration and the privacy of customers should be protected.

The ethical evaluation of the robotic bellboy's directing the customer to download the hotel's mobile application for tipping is given in Table 7. Regarding these results, all sample groups considered these behaviors of the robotic bellboy as neutral. However, when the averages are analyzed, the group with the highest unethical evaluations is tourism academicians with 48.0%. The highest average in other groups is evaluated as neutral. The group with the highest ethical response is tourism students and computer-AI-software sector employees (34.0%).

It is not considered ethically correct for the robotic bellboy to direct the customer to the hotel's mobile application. The customer must be informed about the subject in detail and his/her explicit consent must be obtained. The robotic bellboy should provide clear and transparent information about the purpose and use of the application, and the features of the application regarding the protection of personal data, security and confidentiality should be explained. Then, instead of putting pressure on the customer to download the application, the customer should be given a choice and should be allowed to act according to his/her own preference. As a result, the robotic bellboy's directing the customer to download the mobile application without any information is an issue that needs to be addressed ethically. Customer rights should be respected, and the information process should be transparent.

The results in Table 8 examine the ethical evaluation of the hotel's mobile application charging a high penalty to cancel the customer's account. This behavior is considered unethical for all sample groups. The hotel's ability to charge a fine if a customer wants to cancel a reservation is an important issue in terms of customer rights. A high fine may restrict the customer's right to act freely. The hotel should inform customers in advance about the reservation cancellation policy. This is also very important for customer satisfaction and the image of the hotel.

In this scenario, the assessment of who is responsible for the victimization is a very important issue. The results of the evaluation of the responsibility by the sample groups are presented in Table 9. According to these results, all sample groups predominantly hold the hotel management responsible. Yet even though the vast majority of tourism students and employees in the tourism sector hold the hotel management responsible, 22% of tourism students hold them all responsible, while 18% of the employees in the tourism sector hold the developers of the hotel's mobile application responsible. 24% of the employees in the tourism sector hold the developers of the hotel's mobile application responsible, while 24% of them include all.

ANOVA test was conducted to determine whether there is a significant difference between the sample group of the participants and their answers about who is responsible for the victimization in the scenario. According to the results of the difference test in Table 9, it is seen that there is a statistically meaningful difference between the sample group of the participants and their answers about who is

Table 8. Frequency analysis findings for question 4

	Sample Group		Ethics	Neutral	Non Ethics	Mean
QUESTION 4: How do you rate the hotel's mobile app charging a high penalty for canceling a customer's account? Mean: 2,83	Tourism Academician	n	3	1	46	2,86
		%	6,0	2,0	92,0	
	Tourism Student	n	3	4	8	2,80
		%	8,0	8,0	86,0	
	Tourism Sector Professional	n	3	4	43	2,80
		%	6,0	8,0	86,0	
	Computer-AI-Software Sector professional	n	0	5	45	2,90
		%	0,0	10,0	90,0	
	Potential Tourist	n	2	5	43	2,82
		%	4,0	10,0	86,0	

Source: The table was created by the authors.

Table 9. Frequency analysis findings on who is responsible for the victimization experienced

QUESTION 5: **In this scenario, who do you think is responsible for the victimization?**		**Tourism Academician**	**Tourism Student**	**Tourism Sector Professional**	**Computer-Artificial Intelligence-Software sector professional**	**Potential Tourist**
Robotic Bellboy	n	0	1	0	0	0
Total= n:1 %: 1,0	%	0,0	2,0	0,0	0,0	0,0
Hotel management	n	41	23	25	43	32
Total= n:164 %: 65,6	%	82,0	46,0	50,0	86,0	64,0
The developers of the hotel's mobile app	n	5	9	12	3	5
Total= n:34 %: 13,6	%	10,0	18,0	24,0	6,0	10,0
Customer Defne	n	0	6	1	0	0
Total= n:7 %: 2,8	%	0,0	12,0	2,0	0,0	0,0
All of them	n	4	11	12	4	13
Total= n:44 %: 17,6	%	8,0	22,0	24,0	8,0	26,0
Test of Homogeneity of Variances	Levene Statistic			df1	df2	Sig.
	10,327			4	245	0,000
ANOVA						
	Sum of Squares		df	Mean Square	F	Sig.
Between Groups	27,016		4	6,754	5,446	,000
Within Groups	303,820		245	1,240		
Total	330,836		249			
Significant Differences	CP with TS and SP / PT with TS and PT					

**Tourism Academician: TA, Tourism Student: TS, Tourism Sector Professional: SP, Computer-Artificial Intelligence-Software Sector Professional: CP, Potential Tourist: PT*

Source: The table was created by the authors.

responsible in case of victimization in the scenario. In order to understand between which groups these meaningful differences exist, a post-hoc test should be performed. In order to determine the technique of the post-hoc to be applied, it is checked whether the variances show a homogeneous distribution or not. The homogeneity test of variances in Table 9 shows that there is a homogeneous distribution ($p < 0.005/0.000$). Therefore, the Scheffé test, which is one of the methods that can be applied in case of homogeneous distribution of variances between groups, was used (Nakip, 2006).

There is a statistically significant difference between computer-AI-software sector employees and tourism students and employees in the tourism sector. Computer-AI-software sector employees state that the hotel management is responsible for the victimization, while tourism students and employees in the tourism sector state that the hotel management should not take all the responsibility, but the developers of the hotel's mobile application are also responsible for this victimization. There is also a meaningful difference between potential tourists, tourism students and employees in the tourism sector. Potential tourists definitely do not find the customer responsible, while 12% of tourism students consider the customer responsible. While 24% of the employees in the tourism sector find the developers of the application used by the hotel responsible, only 10% of potential tourists think so. When a general evaluation is made, 65.6% of the participants find the hotel management responsible. Only 1% of the participants consider the Robotic Bellboy as responsible for this victimization.

The distribution of responsibility in such situations can be complex. The robot was created by a company. Therefore, it would not make sense to lay the responsibility on it. However, the person or team developing the robot's application is responsible for the robot's behavior and reactions. If the robot is found to be malfunctioning or harming the customer, the software developer is of course responsible. However, it is the responsibility of the hotel management to ensure that the robot works correctly, it improves the customer experience, and it solves potential problems. It is the software that enables the robot to exhibit the behaviors in question; however, it is the responsibility of the hotel management to demand this or to accept and incorporate these features. On the other hand, the customer can only be responsible if he/she misunderstands the robot's instructions or misbehaves during the use of the robot. Therefore, hotel management can ensure that these problems are solved through mutual communication and cooperation with the software developer. As technology improves, more cooperation will be required to resolve such issues.

Table 10. Frequency analysis findings on how customers can claim their rights

QUESTION 6: **In this scenario, how do you think Defne, the victimized customer, would claim her rights?**		**Tourism Academician**	**Tourism Student**	**Tourism Sector Professional**	**Computer-Artificial Intelligence-Software sector professional**	**Potential Tourist**
Complains to the Hotel Management	n	28	15	10	16	14
Total= n:83 %: 33,2	%	56,0	30,0	20,0	32,0	28,0
Complains about the developers of the hotel's mobile app	n	11	7	3	0	2
Total= n:23 %: 9,2	%	22,0	14,0	6,0	0,0	4,0
Appeals to the consumer committee	n	1	15	8	3	6
Total= n:33 %: 13,2	%	2,0	30,0	16,0	6,0	12,0
Legal remedies	n	15	12	24	28	25
Total= n:98 %: 39,2	%	30,0	24,0	48,0	56,0	50,0
Doesn't do anything	n	1	1	5	3	3
Total= n:13 %: 5,2	%	2,0	2,0	10,0	6,0	6,0
Test of Homogeneity of Variances	Levene Statistic 1,935			df1	df2	Sig.

Source: The table was created by the authors.

In this scenario, how the victimized customer Defne will claim her rights is also an important point. According to Table 10, while 56.0% of tourism academicians prefer to file a complaint with the hotel management, 30% of tourism students prefer to file a complaint with the hotel management and 30% prefer to apply to the consumer commission. 48% of tourism employees, 50% of potential tourists and 56% of computer-AI-software sector employees prefer to take legal action. It is seen that none of the computer-AI-software sector employees, who are the developers of mobile applications, have checked the option of complaining about the hotel's mobile application developers. As a result of the ANOVA test, it is seen that there is a statistically significant difference between the way Defne, the victimized customer, seeks her rights and the sample groups. In order to determine the technique of the post-hoc test to be applied, whether the variances show a homogeneous distribution or not, it is understood that there is no homogeneous distribution (0.105). Accordingly, the Games-Howell technique, which is one of the techniques that can be applied in case the variances do not show homogeneous distribution between groups, was used (Nakip, 2006). According to the Games-Howell test, there is a statistically significant difference between tourism academicians and tourism sector employees, computer-AI-software sector employees and potential tourists. While 56% of tourism academicians choose to file a complaint against the hotel management, 50% of potential tourists prefer to take legal action. In general, 39.2% of the participants chose to take legal action and 33.2% chose to file a complaint against the hotel management.

Once a problem occurs between the customer and the robot, the customer can make a complaint to the hotel management to seek their rights. After the customer reports the problem to the hotel management, the hotel management will try to solve the problem to ensure customer satisfaction. If the problem is caused by the robotic waist and neck software, the customer can also apply to the software developer. However, after first applying to the hotel management, the customer can consult the software developer as the next step, depending on whether the hotel management takes customer complaints seriously and responds quickly by increasing it to 10. If the problem is related to the software developer, the hotel management can communicate with the software developer himself after providing customer satisfaction. Then, if the customer thinks that his/her rights have been violated, he/she can take legal action. In addition to this, consumer rights may be another option to solve the customer's problem. Consumer rights include legal regulations aimed at protecting the customer. As we can see, there is no common decision that the customer can make directly in the face of a problem. Every situation can vary and the customer must choose the most suitable solution to the problem. As technological developments progress, such problems will always arise. In accordance with that, it is very important to make the relevant legal arrangements as soon as possible.

It is seen that 52% of the tourism academicians answered the question about how the customer Defne should react to the bad behaviors of the robotic bellboy as "she should not give any reaction". It is seen that 44% of both computer-AI-software sector employees and tourism academicians prefer the option "no reaction should be given", while 44% of the participants prefer the option "they should be angry and complain". 44.8% of potential tourists, 40.0% of tourism students and 52.0% of tourism sector employees preferred the option "they should be angry and complain". The highest average among all sample groups is 44.8% for the option "they should be angry and indignant towards him/her".

The behavior of the robotic bellboy is usually software driven. Therefore, the customer should remember that the robot is a machine. Instead of being angry and complaining

Table 11. Attitude towards the attitude to be displayed after the bad behavior of the Robotic Bellboy

QUESTION 6: **How should Defne react to the robotic bellboy's bad behavior?**		**Tourism Academician**	**Tourism Student**	**Tourism Sector Professional**	**Computer-Artificial Intelligence-Software sector professional**	**Potential Tourist**
She should be patient and understanding towards the robot	n	4	17	10	6	42
Total= n:42 %: 16,8	%	8,0	34,0	20,0	12,0	16,0
She should be angry and complaining towards the robot	n	17	20	26	22	112
Total= n:112 %: 44,8	%	34,0	40,0	52,0	44,0	44,8
Should not give any reaction	n	29	13	14	22	96
Total= n:96 %: 38,4	%	58,0	26,0	28,0	44,0	38,4

Source: The table was created by the authors.

about the problem, communicating with the hotel management or the software developer may be more effective in solving the problem. The robotic bellboy is a programmed device; however, robots equipped with machine learning have the ability to learn from experience. For this reason, robots continue to learn through user interactions and feedback. Therefore, the robot's behavior may change after a customer reaction. If the reaction from the customer is negative, it may act more carefully in a similar situation in the future. For this reason, the customer's anger and complaining attitude against the robot should not be perceived as a wrong behavior. In addition, software developers who design the behavior of robots can make adjustments in the software by evaluating customer reactions. If a robot consistently encounters similar reactions in similar situations, software developers can use this feedback to make improvements. As a result, machine learning and the role of software developers are important for robots to provide better service. Customer reactions are a valuable source of feedback in shaping the behavior of robots. However, it is important to remember that robots do not have the same emotional understanding as humans.

5. Discussion

The relationship between Industry 4.0 applications and ethics should be considered not only from the perspective of enterprises and individuals but also from the perspective of robots. The situation should also be regarded as the opposite. Rights should be considered not only for guests but also for robots. For example, what will happen when a guest is violent or misbehaves with a service robot? Should robots have the right to make a complaint or sue the guest? In such cases, how should enterprises behave towards robots? What measures should be taken to prevent service robots in the tourism industry from being subjected to psychological or physical violence by other workers and guests? What will be the stage of a service robot with AI in the organization chart of tourism enterprises? (Doğan & Çakıcı, 2022). Legal questions such as whether robots will have their own legal personality, whether they will have an owner, and the protection of personal information secured by or contained in robotics or AI are among the ethical and moral issues of robotics and AI. The use of AI and robotic technologies in the tourism and hospitality industry has potential risks and ethical concerns as well as desirable effects. The tourism industry will face ethical and moral issues related to robots and AI in the future. Robotics and AI will lead to new kinds of problems, ethical and legal concerns. The use of AI and robotics in the tourism and hospitality industry has potential risks and ethical concerns as well as desirable effects. The tourism industry will face ethical and moral issues related to robots and AI in the future.

While much remains to be resolved in these complex social-technological systems, it is clear that rapid advances in the use of service robots require proactive ethical and legal attention by the hospitality and tourism industry to not only establish legal guidelines but also to ensure transparency and regulation (see, for example, the European Union's Ethical Principles for Trustworthy Artificial Intelligence: https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai).
However, should policy action and legislation establishing and regulating ethical norms applicable to the design, production, programming, and implementation of service robots be left to institutions such as the European Union, or should local, regional and global action be needed with more democratic processes to guide the development of ethical guidelines and monitor institutional monitoring? In recent years, there has been a growing interest in the role and application of AI and robotics in the tourism industry (Cain, et. al., 2019; Samala et al., 2020). However, the ethics of AI and robotics have been largely ignored. In the tourism industry, it raises various ethical issues related to privacy, surveillance, tourists, employees, biases in decision-making, manipulation of tourists' and employees' behavior, and many more. Even though the field of tourism ethics is growing (Jamal, 2019; Lovelock & Lovelock,

2013; Macbeth, 2005), few studies in the tourism industry have recognized the importance of AI/robot ethics (Bulchand-Gidumal, 2020; Mercan et al. 2020; Tussyadiah, 2020). The relationship between Industry 4.0 and ethics in tourism constitutes an important gap in the literature. Even though there are many studies in the national and international literature on the use of AI applications and robots in the tourism industry, there is no research on ethical problems and solutions that may be experienced in the industry. In the study of Vatankha et al. (2024), ethical artificial intelligence applications were evaluated in the context of the service sector. It is emphasised that strategies and guidelines for artificial intelligence ethics in the service sector should be developed and this process should be carried out with interdisciplinary cooperation. There are other studies emphasising the need for ethical guidelines (Belk, 2021; Duan et al. 2019). It also raises awareness about the inclusion of customers in the process in question. Mukherjee et al. (2022) raise awareness about the importance of including AI customers in the process of developing AI ethics strategies. In Lin et al. (2012) study on ethical perceptions of service robots in hotels, ethical issues perceived by consumers are grouped under eight themes (privacy, security, safety, transparency, fairness, socialisation, autonomy and responsibility). The study offers suggestions to reduce ethical concerns about service robots and increase the use of service robots. It is a matter of curiosity how ethical practices will be in the employment of intelligent autonomous systems in the tourism industry. How can intelligent autonomous systems be designed in accordance with ethical rules and principles? In a report published in 2019 as "100 Professions of the Future", many professions take their place among different categories. Within the framework of these categories, robot technician, AI instructors, decision support officer, chief ethics officer, and robot ethicist in relation to ethics and technology appear as professions (Tytler et al. 2019). Among these professions, especially robot ethicists are expected to find solutions to controversial situations between issues such as virtual reality, AI, cyborg technologies and ethical-moral issues. Robot ethicists will also deal with finding solutions to problems, robot ethics, robot rights, value analysis and data collection. Some of today's ethical questions are: Is it possible for AI to behave ethically? Do intelligent systems have the ability to choose between preferences? In any given situation, is the responsibility on the producer of intelligent systems? Or is it on the machine itself?

As the number of person-machine interactive workplaces increases, the means to overcome the problems in the labor law dimension of the issue is another issue that awaits an answer. Current regulations do not answer many questions. AI may not be the product of a single person but it may be produced by many people. In this case, the questions such as "Who will be criminally liable?", "How will rights be defined?" and "To whom will rights be assigned?", need to be answered. Industry 4.0 applications, which develop over time, are expected to work in an order and harmony with individuals. In order to achieve this harmony, the individual-machine relationship must first be ensured, and the systems that are aware of phenomena such as moral values and ethics must be developed (Canbay & Demircioğlu, 2021). Some researchers state that there will be no concept of roboethics because it is not possible for moral rules and values to be digitized and codified, and therefore ethical rules and codes cannot be transferred to these systems. Some researchers argue that AI applications will better understand ethical and moral codifications and will make clearer decisions since they cannot act emotionally while making decisions (Ersoy, 2018).

Yazıcı Ayyıldız, Baykan and Koç (2022) aim to determine whether hotel guests' attitudes towards robots serving in hotels differ according to their gender, education level, generation and continent of origin. The data of the study were collected from 1078 hotel guests living on four continents through an online survey. The study shows that there is no significant difference in guests' attitudes towards service robots according to the continent they come from. Generation X guests tended to be less interested in service robots than Generation Y and Generation Z guests because they believed that service robots offered more disadvantages. On the other hand, culture is among the important factors that shape individuals' attitudes towards technology, especially service robots. Different cultures have varying attitudes about what kind of roles robots should play in individual interaction. For example, in robot-friendly countries such as Japan, it is widely accepted to include robots in the processes of welcoming and serving guests in hotels and restaurants (Tussyadiah & Park, 2018). In cultures that emphasise individual rights more, such as Europe and the USA, such an approach may be more cautious (Murphy, et.al. 2017). Especially in Western countries, ethical concerns about the effects of service robots on privacy and labour are more dominant. In Asian countries, robots are generally seen as friendly beings that need to be integrated into society, while in Western countries there is greater scepticism and concern about these devices (Bartneck, et.al. 2005). These differences in the use of robots in the tourism sector significantly shape customer expectations and experiences. While tourists in Asia may find the services provided by robots innovative and reliable, tourists in the West may be more distant in these interactions. Moreover, customers in the West are concerned that robots may reduce interpersonal warmth or lead to a decrease in service quality (Ivanov, et. al., 2017). These differences emphasise the importance of cultural awareness in the development and integration of service robots. The ethical acceptance and adoption of service robots in the tourism sector may be possible with services and processes designed in accordance with the cultural sensitivities of robot technology.

There is a very limited literature examining the effects of cultural differences on roboethics. Some of these studies are as follows. Fung and Etienne (2021) compare the ethical principles adopted by the Chinese National Next-Generation Artificial Intelligence Management Professional Committee and the European High-Level Expert Group on Artificial Intelligence, emphasising that seemingly similar ethical principles can actually mean different things and derive from different approaches. This shows how cultural and political contexts influence the interpretation and application of AI ethics principles.

Agrawal et al. (2023) analysed the trust, perception of responsibility, and resilience of participants in OECD countries and India towards artificial intelligence and humans. As a result of the research, it was determined that cultural factors have a significant impact on the perception of trust and responsibility towards artificial intelligence. While individuals in India have higher trust in artificial intelligence applications, individuals in OECD countries are more cautious. These differences indicate the importance of considering cultural sensitivities in the adoption and implementation of artificial intelligence.

Choi et al. (2021) examined how cultural differences affect tourists' experiences towards robotic services. In this study, it was found that cultural context has a significant impact on tourists' perception and acceptance of robotic services. In particular, in some cultures, robotic services are found to be innovative and interesting, while in other cultures they are less preferred due to the lack of human interaction. For example, due to the high interest and adaptation to technology in Asian cultures, robotic services are perceived more favourably and considered as innovative. On the other hand, in Western cultures, especially in societies where human-based services are valued, robotic services are less preferred and may be found cold due to the lack of human interaction. These findings emphasise the importance of taking cultural sensitivities into account when implementing robotic services in the tourism sector. In different cultural contexts, the design and delivery of robotic services should be adapted to suit local cultural norms and expectations.

When the results of the study are analysed within the scope of some ethical theories; *the deontological approach* argues that actions should be evaluated within the framework of certain ethical rules regardless of the results. In this framework, artificial intelligence applications and the use of robots should be examined not only in terms of efficiency and benefit, but also in terms of moral obligations and responsibilities. For example, when the use of surgical robots in the health sector is evaluated ethically, it can be said to be ethical as long as it has a purpose to save human life (Borenstein & Howard, 2021). Deontologically, robots completely replacing human workers in the tourism sector may violate the principle of justice by violating the rights of workers (Dignum, 2019). At this point, by adopting a human-centred approach, robots are expected to take on a role that helps and supports human workers. Similarly, in decision-making processes, artificial intelligence applications and robot technologies should take into account ethical rules and universal moral norms within the deontological framework (Lin, et.al. 2012). The use of artificial intelligence applications and robots in a way that respects human rights, does not threaten job security, is fair and in accordance with the principle of autonomy will be a more ethically acceptable approach.

Utilitarianism approach; Utilitarianism is an ethical theory that evaluates the ethical value of actions according to their consequences. According to this theory, an action is ethically correct if it provides the greatest benefit to the greatest number of people (Bentham, 1789). In this framework, the use of artificial intelligence applications and robot technologies should be considered in terms of the benefits they provide and the possible harms they may cause. The use of artificial intelligence applications and robots in the tourism sector can increase customer satisfaction and improve service quality (Tussyadiah, 2020). Automated check-in systems, robot waiters and autonomous guides can make the tourism experience more efficient and accessible. However, it should be taken into consideration that this may lead to job loss and decrease the intimacy in human-robot interaction (Murphy et al. 2019). From a utilitarian perspective, the use of robots becomes ethically acceptable when such negativities are minimised. If the benefit obtained from these applications is greater than the harm to individual rights such as privacy, the ethical use of such systems can be defended (Floridi & Sanders, 2004). Artificial intelligence applications are expected to increase general welfare, increase both the productivity of businesses and customer satisfaction. According to the utilitarian approach, the ethical value of an action is measured by the total benefit it brings. In this context, the use of artificial intelligence applications and robots should provide the highest benefit for both the business and the customer.

The relativism approach argues that moral values, beliefs and norms may vary according to the individual or collective context of a society or culture. According to this approach, the concepts of right and wrong are not universal and may vary from culture to culture or from individual to individual (Boghossian, 2006). According to the relativism approach, the ethical use of robots can be shaped according to the value judgements of certain cultures and societies. While some societies are quite positive about the use of robots in the service sector, others may see this as contrary to human dignity. Therefore, within this perspective, it is discussed that the ethical use of robots is shaped according to the cultural context and may be different in each society (Himma, 2009). According to the relativism view, the attitudes of different societies towards technological innovations and the use of robots should be evaluated within the framework of local ethical standards.

Training and awareness studies can be carried out in order to use artificial intelligence applications in the tourism sector within an ethical framework. Informing employees and managers about artificial intelligence technologies can increase the awareness of the ethical use of these applications. At the same time, the establishment of ethical principles and guidelines for the use of artificial intelligence in each tourism business will contribute to the establishment of certain standards. For the integration of artificial intelligence, which we take as a basis in this study, cooperation between sector representatives, academics and policy makers should be ensured. Thus, integration can be achieved by creating ethical principles and guidelines that each stakeholder can be involved in the process (Etçi, et. al., 2024).

Key players playing a role in AI (AI producers, programmers, policy implementers, etc.) should be proactive in taking more responsibility. Artificial intelligence is gradually evolving, and therefore, a set of rules and consensus should be established to set out the boundaries, ethical principles and applicable regulations of artificial intelligence (Wang & Yan, 2019). Explanatory information about the information we provide to travel websites or accommodation businesses, where it is stored, and how the data is used can reduce consumers' privacy concerns. Therefore, trust in tourism businesses can be increased (Morosan & DeFranco, 2021). Inaccurate information provided by artificial intelligence can reduce tourists' trust in these applications and subsequently reduce their intention to travel to the destinations of the recommendations (Kim et al. 2023b). Therefore, inclusiveness should be prioritised in the model and hardware design of artificial intelligence applications, and information should be checked and categorised before it is disseminated to individuals (Ivanov, 2023).

In tourism enterprises, it is necessary to establish special departments and to employ experts in this field and to establish guiding principles in ethical dilemmas, especially in case of technology service failures and to receive personalised services for tourists who want to receive services from individuals. Consideration of cultural sensitivities in the field of roboethics is critical to ensure that these technologies are applied in an ethical and acceptable manner in different communities. This research is limited to Turkey. Study results may differ in countries with different cultures. Future research topics are expected to include the adoption of robots, the financial impact of automation, enterprises' substitution of machines for human workers, stakeholders' perceptions and physical and emotional readiness, including customers, employees and technology managers, the impact of AI and robot use on service quality, the impact of technology use on the competitive advantage of enterprise, and the ethical implications of robot use (Ivanov et al. 2017). Although artificial intelligence studies in the tourism sector are increasing, most studies adopt a post-positivist approach. Although many studies provide guidance frameworks for the ethical application of AI, a clear principle and framework has not yet been presented.

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Jomat

Journal of multidisciplinary academic tourism

2025, 10 (3): 315-334

https://doi.org/10.31822/jomat.2025-10-3-315

ISSN: 2645-9078

INFO PAGE

The ethical evaluation of application of artificial intelligence in tourism enterprises: Roboethics in tourism enterprises

Abstract

In a report published in 2019 as "100 Professions of the Future", many professions take their place among different categories. Within the framework of these categories, in relation to ethics and technology; robot technician, AI instructor, decision support officer, chief ethics officer, robot ethics expert appears as professions. Among these professions, especially robotics ethicists are expected find solutions to controversial situations between subjects such as virtual reality, AI, cyborg technologies, and moral-ethical subjects. Robot ethics experts will also deal with situations such as finding solutions to problems, robot ethics, robot rights, value analysis, and data collection. In this context, the goal is to establish the framework of the concept of roboethics in tourism enterprises. In order to find answers to those questions, the scenario technique was used in the research. The research was conducted in Türkiye. The sampling of this research consists of tourism academicians, employees in the tourism sector, students majoring in the department of tourism at universities, AI programmers, and potential tourists. Participants were reached by using the online survey method in February 2024. At the end of the research, a total of 250 people were reached, 50 people from each group. When a general assessment is conducted as a result of the research, in general, robots are more positively accepted in the travel industry, tourism and hospitality compared to service robots. However, the question of to whom the responsibility will be assigned once a problem occurs between a robot and a customer, remains unclear. The ethical behaviors of a robot after the interaction, is also subject to discussion.

Keywords: *Tourism, Roboethics, Artificial Intelligence, .*

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Full Name	Author contribution roles	Contribution rate
Merve Aycan:	*Conceptualism, Methodology, Validation, Formal Analysis, Investigation, Writing - Original Draft, Writing - Review & Editing, Funding acquisition*	*35%*
Övgü Açıksözlü:	*Conceptualism, Methodology, Validation, Formal Analysis, Writing - Original Draft, Writing - Review & Editing, Funding acquisition*	*35%*
İlbey Varol:	*Conceptualism, Software, Resources, Data Curation, Supervision*	*30%*

Author statement: *Author(s) declare(s) that All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.* ***Declaration of Conflicting Interests:*** *The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article*

Ethics Committee Satatement: Ethics committee report is available for this research and it has been documented to the journal

Ethics committee: İstanbul Arel University Ethics Committees Presidency

Date of ethics committee decision: 1.11.2023

Ethics committee decision number: 2023/20