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## Potential Tourists' Opinions on Augmented Reality Applications in Tourism Industry


### Research Article

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### Abstract

The aim of this study is to reveal how augmented reality (AR) applications affect the preferences of potential tourists before purchase. In this respect, 30 volunteer participants were interviewed between February 1 and February 22, 2022. The obtained data were analyzed with the MAXQDA 2022 package program. According to the findings obtained from the research, it was observed that the sample group had basic information about augmented reality applications. It has been concluded that using of AR applications in tourism can positively or negatively affect the potential tourists' opinions making touristic purchase plan.

**Keywords:** Tourism, Augmented Reality (AR), Virtual Reality, Purchasing Behavior, Technology

## Potansiyel Turistlerin Turizm Sektöründeki Artırılmış Gerçeklik Uygulamaları İle İlgili Görüşleri

### Özet

Çalışmada artırılmış gerçeklik (AG) uygulamalarının potansiyel turistlerin satın alma faaliyetleri öncesi tercihlerini ne şekilde etkilediği ortaya konulmaya çalışılmıştır. Bu amaçla 1 Şubat – 22 Şubat 2022 tarihleri arasında 30 gönüllü katılımcı ile görüşme gerçekleştirilmiştir. Elde edilen veriler MAXQDA 2022 paket programı ile analize tabi tutulmuştur. Araştırmadan elde edilen bulgulara göre örneklem grubunun artırılmış gerçeklik uygulamalarına ilişkin temel bilgileri bulunduğu ortaya çıkmıştır. AG uygulamalarının turizm alanında kullanılmasının turistik satın alma planı yapan potansiyel turistlerin düşüncelerini olumlu veya olumsuz yönde etkileyebileceği sonucuna varılmıştır

**Anahtar kelimeler:** Turizm, Artırılmış Gerçeklik (AG), Sanal Gerçeklik, Satın Alma Davranışı, Teknoloji

### Introduction

Augmented reality has turned to be one of the most popular research fields in information technologies recently. Conducted as a research in many areas, Augmented reality is a technology that has started to take its place more and more in human life (İçten and Bal, 2017: 111). In this technology, artificial images are positioned on real world images applying a digital tool (Uğur and Apaydın, 2014: 146). Augmented reality enables changing and enriching a real-world environment thanks to computer-generated data such as

audio, video, graphics and GPS (Göçmen, 2018: 176). The new and enriched real environment can be more outstanding and impressive as it is perceived in a different way (Uğur and Apaydın, 2014: 146). Using artificial intelligence, pre-designed virtual objects are placed in photographs or video images with AR technologies. The objects placed in the image interact with real objects and attract the user into a different communication environment. Furthermore, the mentioned technology, designing the living space of the user, also serves as an important communication tool used by large enterprises to reach out to their customers (Yengin and Bayrak, 2018: 65). In this regard, to reach better marketing results in products marketing, businesses can create more creative works by investing in augmented reality technologies (Cankül et al., 2018: 577). Having the possibility to be applied in many areas, AR is widely used, especially in the field of tourism.

Based on this information, the main purpose of the study is to determine how augmented reality applications in the tourism sector affect the purchasing behavior of potential tourists. In accordance with this objective, the interview method was carried out with academicians as potential tourists. Analyzing the data obtained from the interviews, the academicians' opinions about the augmented reality applications were taken into consideration. The obtained interview results were analyzed using the qualitative research software MAXQDA 2022. In the study, descriptive content analysis was used as a data analysis method.

Several studies exist on augmented reality in the literature, the feature distinguishing this research from other studies is that there is no qualitative study taking into consideration the academic staff's view on augmented reality applications. Therefore, it is believed that the results of study will contribute to the literature. Moreover, it is expected that this contribution will be more beneficial for practitioners in the tourism sector.

The research consists of three main parts. In the first part, augmented reality and the applications of augmented reality in the tourism sector are elaborated in a conceptual framework; In the second part, methods and findings are mentioned. In the third part, the interpretation of the research findings and the results are included; Finally, the research is concluded making some recommendations to shed light on future studies.

## **Conceptual Framework**

First popularized in the 1960s by Sutherland's work using head-mounted screens to display 3D graphics, augmented reality is a technology allowing combining the real world with virtual objects created by computers in a real environment simultaneously and interactively (Azuma et al., 2001: 34; Zhou, Duh, Billingham, 2008: 193). As Reitmayr and Drummond (2006: 109) puts forth, augmented reality is a promising user interface technique for mobile, wearable computing and location-based systems. Van Krevelen and Poelman (2010: 1) maintain that the augmented reality is the technology used to create a new generation and reality-based interface, and it has moved from laboratories around the world to various industries and consumer markets. Zhou et al (2008: 193) define augmented reality as a technology allowing the virtual images to overlay physical objects. According to Carmigniani et al. (2011: 341), augmented reality is a direct or indirect view of a real environment enhanced by adding virtual objects. Poushneh (2018: 170) believes that augmented reality is the harmonization of real and virtual world information to create a real world.

Emerging as a new mobile technology platform, Augmented reality is an effective and interactive technology used to provide information about the visuality of the product. Based on 3D technology providing a 360-degree view of virtual products, this concept simultaneously presents virtual 3D product information in the consumer market environment. Considered a major digital market trend in many industries, the Augmented Reality makes it easier for consumers to visually inspect products (Whang et al., 2021: 275).

Augmented reality is not merely the coexistence of virtual and real in the same environment, but also it is the interactive combination of virtual objects with physical reality. Thus, it requires technology that is capable of interactively combining the physical environment with virtual elements. Considering the fact that fixed interactive screens do not allow mobility, the tools used in augmented reality must be portable or wearable, that is, they need to be mobile. Smartphones or tablets, wearable devices (head-mounted displays, smart glasses), fixed interactive displays or projectors are the main tools used in this application. With virtual objects such as textual information, pictures and videos placed in the physical space, an individual can see the physical environment (Javornik, 2016: 252, 253). Besides that, augmented reality, which is not limited to the seeing, can potentially appeal to all senses, including hearing, touch and smell (Azuma et al., 2001: 34).

When the definitions related to the concept are examined in the literature, it is striking that the most important features are interaction, virtuality (the presence of virtual reality elements), a certain location, mobility (in terms of portability and wearability), and the harmonization of virtual and physical reality (Javornik, 2016: 253).

Often mistaken with virtual reality, the Augmented reality is a type of virtual reality (Azuma, 1997: 356). Both are based on digital technology. While the augmented reality places virtual objects in the real world, the virtual reality is a form of technology that allows users to navigate computer-simulated environments (Shen et al., 2022: 2). The most prominent difference between them is that virtual reality technologies take the user to a virtual world and completely separate them from the real world, whereas the augmented reality does not disconnect them from the real world (Rauschnabel, Felix, Hinsch, 2019: 44). In contrast, it allows the user to see the real world combined with virtual objects. It tries to complete reality instead of changing it completely (Azuma, 1997: 356). That is to say that augmented reality virtual elements are introduced into users' worlds; on the other hand, virtual reality tries to place users in virtual worlds (Whang et al., 2021: 276). In this context, in cases where real objects are added to virtual environments, while the environment is virtual, in augmented reality the environment is real (Azuma et al., 2001: 34).

Compared to virtual reality technology, the augmented reality technologies are more advanced display technology to simulate the real experience for the users about the product or environment. For instance, since virtual reality technologies put them in a completely artificial environment, the consumers cannot see the physical reality around them. Contrarily, the Augmented reality technology allows virtual consumers to zoom, change, rotate the product or its environment on a virtual model and view it from different angles and colors (Huang and Liao, 2015: 270, 271).

The consumers' actions in augmented reality applications can be summarized in three types: First; visualizing a physical product or product image to open informative or entertaining content, second: simulating a product on the screen as if it were in a physical environment, and finally, virtually testing a product as if the product is being tested. Through these three actions, the augmented reality tries to change the consumers' psychological state (Sun et al., 2022: 2).

Direct contact is crucial for customers when shopping taking into the fact that the customer wants to learn about the products by having a shopping experience through sensory means such as visual and auditory to help him in the decision-making process. Lack of knowledge or insufficient data about products makes purchasing decisions risky. This is where augmented reality helps fill this lack of product knowledge by creating an immersive experience. It provides a powerful shopping simulation enabling online shoppers to better evaluate products and to make more precise decisions. By presenting an interactive and three-dimensional picture of a product, the AR provides customers with engaging and enjoyable experiences. Additionally, high-quality information and positive experiences produced by augmented reality satisfy the customers and increase their willingness to purchase products from places where this technology is devised (Poushneh, 2018: 170). Providing instant interaction with virtual trial tools in digital shopping,

augmented reality enables bright and engaging consumer experiences to emerge. Therefore, augmented reality is an important tool that brings about an advantage in e-commerce (Whang et al., 2021: 276).

The initial studies on augmented reality were mainly related to combat simulations in the army or complementary training materials in education. Later, it entered various fields such as engineering, entertainment, retail, education, gaming, health and beauty industries (Whang et al., 2021: 276; Zhou, Duh, Billingham, 2008: 193). As well as, it is a technology that can be applied by all kinds of organizations and sectors aiming to reach multiple stakeholders, including consumers, employees and society in general (Rauschnabel, Felix, Hinsch, 2019: 44).

Recently seen in the field of marketing since the end of the 2000s, augmented reality applications have led to the emergence of new opportunities in fields such as consumer participation, advertising, retail and mobile marketing. Many leading brands in the furniture, eyewear, watch and beauty industries have created augmented reality applications which can be used by consumers on their (usually mobile) devices. Most of these applications provide virtual products the ability to be tried and evaluated by placing virtual products on consumers' own bodies and faces (Scholz and Duffy, 2018: 12).

Another area where augmented reality is widely used is the tourism sector. Augmented reality applications are used in many museums, accommodation, food and beverage businesses in the tourism sector (Özgüneş and Bozok, 2017: 154). The first augmented reality hotel developed by Holiday Inn is considered as one of the best practical examples. Using this application, the guests used their smartphones to experience conditions close to the same environment with the Olympic and Paralympic athletes in virtual world (Yovcheva and Buhalis, 2013: 8; Demirezen, 2019: 7). With the Omni Live application, Omni Hotels & Resorts, which allow users to review their advertisements through AR, they offer users privileged experiences, including interviews with Omni chefs (Kabadayı, 2020:471-472).

Owing to the augmented reality applications integrated into the menus of some food and beverage businesses, customers have the opportunity to examine the food they want to order and share it in their social media (Özbek and Ünüsan, 2022:111). Inamo Restaurant in London is a business standing out by successfully combining food and beverage services with AR technologies. Thanks to the augmented reality technologies, the guests can choose themes for their tables as they wish, choose and order their food from the menus reflected on the table and see the preparation process live from the kitchen (Yovcheva and Buhalis, 2013: 6). With augmented reality applications, food and beverage businesses can provide their guests with a different experience, gaining the advantages of reducing costs, positive image, sustainable competitive edge and increasing the number of customers at the same time (Cankül et al., 2018: 585).

In museums, augmented reality technologies are used as an exhibition method allowing visitors to perceive the works as if they exist in the real environment and to interact in various ways such as examining and comparing the works (Şalk and Köroğlu, 2020:316). Smithsonian National Museum of Natural History (USA), London Natural History Museum, (Sucaklı ve Güzel, 2020:73), Topkapı Palace Museum, Anatolian Civilizations Museum, Sakıp Sabancı Museum, Hatay Archeology Museum, Zeugma Mosaic Museum are examples where augmented reality applications are used (Kulakoğlu Dilek, 2020: 90-91).

The technologies used in augmented reality applications offer the visitors the opportunity to visualize the original first states of the structures in the cultural heritage areas (Şalk and Köroğlu, 2020:316). The ARCEOGUIDE (Augmented Reality-based Cultural Heritage On-site GUIDE) Project developed by Vlahakis et al. (2002) in order to close the gap between recreation, education and scientific research, is an example of AR applications used in this field, the prototype of which was implemented in the ancient city of Olympia.

In addition, augmented reality applications are constantly developed in different areas in the tourism sector. For instance, using Mardin AR technology, the tourists coming to Mardin are provided with information about the city and touristic facilities (Demirezen, 2019:8). Another area where AR technology is used in the tourism sector is tourism-oriented websites; the studies conducted in the area suggest that websites with interaction level and rich multimedia content are more successful in convincing consumers (Özgüneş and Bozok, 2017: 154). AR technology is also used in airlines and provides convenience to passengers. American Airlines developed the AR prototype. Thanks to this application, passengers arriving at the airport are provided with opportunities such as finding their departure gates and taking advantage of food and beverage services guided the camera images on their smartphones (Berk and Özilhan Özbey, 2020: 289).

## **Methodology and Finding**

In the study, the subject periphery was determined with purposeful sampling for the data. The academicians who are thought to have basic knowledge about AR and see the subject within their special interest areas constitute the research samples. Considering the fact that the participants are assumed to have basic knowledge about AR, descriptive content analysis method was used in this study. Content analysis is gathering similar data within the framework of certain concepts and themes, as well as organizing and interpreting the data in an understandable format (Creswell, 2013).

32 volunteer participants supported the research. The data taken from two participants stating that they did not know about AR were not processed in the MAXQDA 2022 program, and the interview texts of these two participants were excluded from the analysis. The interviews lasted an average of 15 minutes. After 6 questions consisting of demographic data, 9 structured interview questions were directed to the participants. The interview concluded with the question “Is there anything else you would like to point out?” to convey their subjective opinions.

During the coding and evaluation phase of the interview, the interview forms in the content analysis studies in the literature were examined and a study-specific form was created (Sertalp, 2016; Guttentag, 2010; Han, Jung, & Gibson, 2013). The data obtained with the relevant form were analyzed using the qualitative research software MAXQDA 2022.

To ensure the internal validity of the research, the data form was examined by three academicians versed in the field and the form was given its final shape making various changes according to the feedback. Also, to ensure external validity, the researcher conducting the study using qualitative research methods should inform the research participants about all phases of the research (Yıldırım & Şimşek, 2016). To do so, detailed elaborations were made for the participants at all stages of the research.

In order to ensure the coding reliability, all interview data were coded by the researchers and 10 interview forms randomly selected by two independent academics having prior experience in the qualitative research methods. Prior to loading the data, the codes made by independent academics and researchers were compared. According to the consensus/(consensus+disagreement)\*100 formula proposed by Miles and Huberman (1994), the consensus among the coders was calculated as 100%.

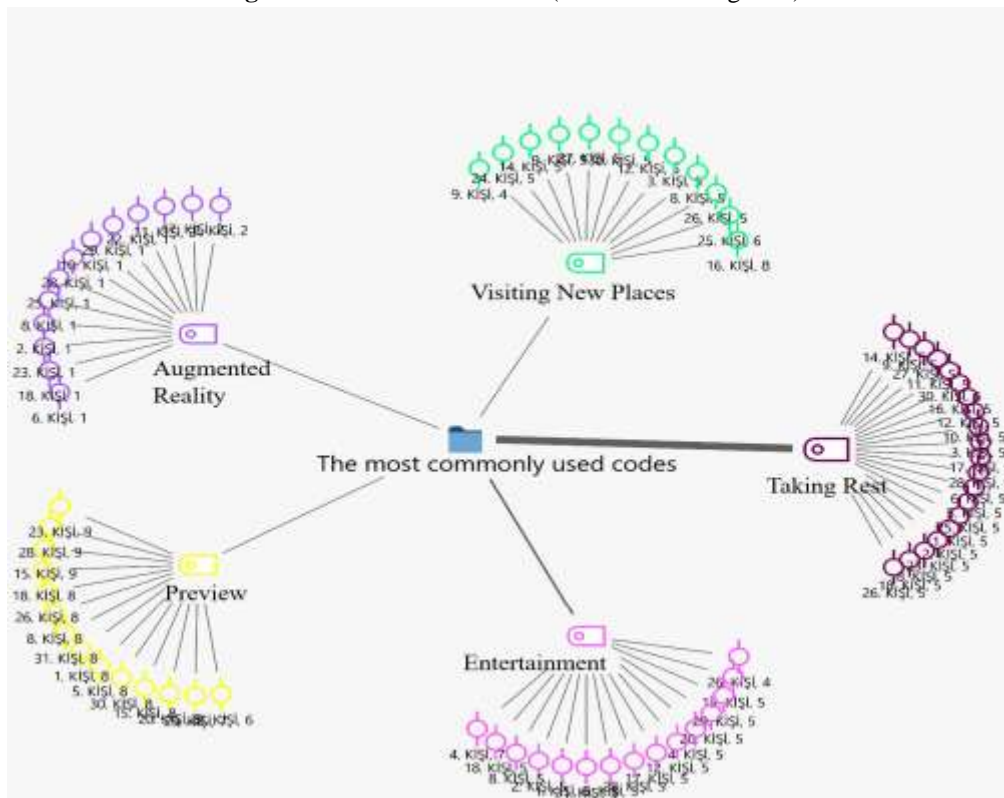
Demographic characteristics of the academicians participating in the research are shown in Table 1.

**Table 1:** Percentage Distribution of Participants' Demographic Characteristics

Gender	Female		Male		Age	27-33	34-40	41-47	48 and over
	20		10			14	8	6	2
	%66.70		%33.30			%46.67	%26.67	%20.	%6.66
Education Level	MA Students	MA Graduates	Phd Candidates	Phd	Field of Experties	Social And Human Sciences	Technical And Scientific Disiplines	Medical Sciences	Proficiency in Art
	1	2	15	12		18	6	3	3
	%3.33	%6.67	%50.	40%		%60.	%20.	%10.	10%
Monthly Income	10.000 TL and below	10.001-20.000 TL	20.001-30.000 TL	30.001 TL and over	Touristic Activities	NONE	1.-3	4.-10	11 and over
	7	18	2	3		3	21	3	3
	%23.33	%60.	%6.67	10%		%10.	%70.	%10.	%10.

As it can be collected from the table, the majority of the participants in the research (66.7%) are female. As for the educational status, the majority of them are doctoral students (50%), while the least group is Master's degree students (3.33%). 60% of the participants stated that their monthly income is 10.001-20.000 TL on average. While 70% of the participants have 1-3 touristic activities per year, 10% of them do not engage in any touristic activities.

**Figure 1:** AR Tourism Model (Visualized Categories)



In accordance with the findings obtained in the study, 34 open codes were created at the beginning. As the next step of analysis, the relations among these codes were determined and these codes were named in 5 categories. Frequency, tables, graphics, code maps and intensity tables were used to visualize. Figure 1 depicts the details of the model of the categories visualized. The connection lines width among the findings obtained from all interviews and the categories, as well as the size of the category icons indicate the frequency.

In the first stage, the meanings associated with concept of "augmented reality" in academic staffs' mind were tried to be determined. According to the data obtained, the "augmented reality concept" evokes 6 different expressions. Accordingly, the concept of augmented reality is coded at the highest level (23.5%) with "simulated" and "computer" codes, followed by the "technology" and "virtual" (20.6%), "AR glasses" (8.8%) and "artificial intelligence" (2.9%), respectively. In Table 2, frequency and percentage distributions of the expressions evoked by Augmented Reality are given.

**Table 2:** Expressions Associated with the Concept of Augmented Reality

Expressions Associated with the Concept of Augmented Reality	Sections	%
Simulation	8	23,53
Computer	8	23,53
Technology	7	20,59
Virtual	7	20,59
AR Glasses	3	8,82
Artificial intelligence	1	2,94
Total	34	100,00

After the concept of augmented reality, the academicians participating in the research were asked what they associated the augmented reality applications and tourism activities. According to the data obtained, it was observed that the highest coding was “seeing new places” (41.9%). However, “dreams coming true” (29.03%) were expressed as “hard to reach places” (29.03%). In Table 3, frequency and percentage distributions of the expressions evoked by Augmented Reality and Tourism Activities are given.

**Table 3:** Expressions associated with Augmented Reality and Tourism Activities

Expressions associated with Augmented Reality and Tourism Activities	Frequency	%
Seeing new places	13	41,94
Dreams coming true	9	29,03
Hard to reach places	9	29,03
Total	31	100,00

The academicians participating in the research were asked about their thoughts on the concepts of "holiday and tourism". Table 4 shows the data for the categories of "resting" and "entertainment", which are the main theme and consist of the sub-codes of "socialization, relaxation, entertainment, entertainment, peace".

**Table 4:** Frequency and Percentage Values of Resting and Entertainment Categories

	Frequency	%
Taking Rest	24	63,15
Entertainment	14	36,85
Total	38	100,00

Participants were asked about the advantages and disadvantages of using augmented reality applications in tourism-related activities. Evaluated under the "foresight" category, the Positive opinions were coded as "comparison" and the negative opinions were coded as "Missing the Excitement".

**Table 5:** Shows The Data For The “Foresight” Category.

Foresight	Documents	%
Comparison	30	96,77
Missing the Excitement	1	3,23
Total	31	100,00

The code cloud, which is a visual representation of the frequency of use of the codes, is shown in Figure 2.





**Figure 2:** Code Cloud

## Evaluation of Findings and Conclusion

According to the findings obtained from the research data; it is observed that the participants have basic knowledge about AR. The concepts of “holiday and tourism” are associated with the concepts of “entertainment, rest, peace”.

AR applications usage in tourism is generally considered as positive and exciting regarding the fact that it will provide a foresight to potential tourists before participating in touristic activities. 4 participants evaluated this situation negatively. Negativity is defined as; “A mechanism bringing the distant things closer, but it cannot replace real experience (person 22).” “I don't enjoy it (2nd Person)” “A new version of daydreaming. They have expressed it in the form of high potential to take people away from reality (25th Person) "the excitement may get away (14th Person)". With this foresight, the participants reported that it is possible to experience positive or negative changes in their holiday preferences. “yes, it may cause me to plan more vacations during the year (Person 24). “Yes, having an opinion changes my preference (Person 30) because I have experienced it before. “It can change depending on whether my experience with AR is good or bad (Person 26).

Participants' opinions about the tourism where AR applications can be used were taken into consideration. 9 participants mentioned that cultural trips can be organized with augmented reality. According to one participant, “Augmented reality applications can be used in museums and sky observations (23rd Person)”.

As touristic products are not the ones to be experienced at the purchasing stage like industrial products, it is not possible for people to understand whether these products will meet their expectations at this stage. It is possible to hold on the trip planned with AR technology, the hotel to be accommodated, the areas where food and beverage activities will be carried out, and the regression activity areas before the purchasing activities. This may enable potential tourists to be persuaded to exhibit purchasing behavior.

It is believed that the companies aiming to gain competitive advantage should put the priority on AR applications in their plans and programs. In this context, studies on the subject in which quantitative or mixed methods are applied in the future can be carried out. In addition, different results can be obtained with similar studies conducted on different sample groups. In addition, it is thought that important contributions will be made to the literature with researches to be conducted in different sectors in order to determine the differences between the sectors.

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