A study of the metaverse, virtual reality technologies, and artificial intelligence from the perspective of professional tourist guides

Profesyonel turist rehberlerinin bakış açısından metaverse, sanal gerçeklik teknolojileri ve yapay zekâ üzerine bir çalışma

Gözde Özdemir Uçgun[1] (iD)

[1] Assistant Prof. Dr., Istanbul Aydin University, İstanbul, Türkiye, gozdeo@aydin.edu.tr

ORCID: 0000-0002-9128-2773

Abstract

The primary objective of this research is to investigate the perspectives of tourist guides, a vital component of the tourism sector, on these emerging technologies within the context of tourism activities. The study employs a qualitative research technique, where data were collected using semi-structured interview forms. Content analysis was conducted through face-to-face and telephone interviews with 18 tourist guides included in the study, utilizing the MAXQDA 24 qualitative data analysis program. Frequently repeated statements by participants in the interviews were quoted in the text. It was determined that professional tourist guides generally viewed these technologies positively and believed they primarily provided convenience in their profession. However, they stated that the spread of technological developments, such as artificial intelligence, virtual reality, the metaverse, and virtual museums, may decrease the demand for traditional guiding services, leading to employment problems. Digitalization has a direct impact on the tourism sector, and the use of metaverse, virtual reality technologies, and artificial intelligence is crucial for the professional competence, performance, and content of tourist guides' services. The fact that such studies addressing the perspective of tourist guides on these technologies are few in the literature reflects the importance and originality of the research.

Keywords: Virtual Reality Technologies, Metaverse, Artificial Intelligence, Professional Tourist Guide

Jel Codes: L83, O39, Z39

Öz

Bu araştırmanın temel amacı, turizm sektörünün vazgeçilmez bir unsuru olan turist rehberlerinin, turizm faaliyetleri çerçevesinde gelişen teknolojilere ilişkin bakış açılarını incelemektir. Çalışma, nitel araştırma tekniklerine dayalı olup, veriler yarı yapılandırılmış görüşme formları yardımıyla elde edilmiştir. Araştırmaya katılan 18 turist rehberi ile yapılan yüz yüze görüşmeler ve telefon görüşmeleri MAXQDA24 nitel veri analiz programı kullanılarak içerik analizine tabi tutulmuş, ayrıca katılımcılar tarafından mülakatlarda sıklıkla tekrarlanan ifadeler, metin içinde alıntı yöntemiyle aktarılmıştır. Profesyonel turist rehberlerinin genel olarak bu teknolojileri olumlu gördükleri ve mesleğin icrasında bunların çoğunlukla kolaylık sağladığını düşündükleri belirlenmiştir. Ancak yapay zekâ, sanal gerçeklik, metaverse ve sanal müzeler gibi teknolojik gelişmelerin yaygınlaşmasıyla, geleneksel rehberlik hizmetlerine olan talebin azalabileceğini ve istihdam sorunları yaşanabileceğini belirtmişlerdir. Dijitalleşme, turizm sektörünü doğrudan etkilemekte olup metaverse, sanal gerçeklik teknolojileri ve yapay zekânın kullanımı, profesyonel turist rehberlerinin mesleki yeterliliği, performansı ve turistlere sundukları hizmetin içeriği açısından oldukça önemlidir. Turist rehberlerinin bu teknolojilere ilişkin bakış açısını ele alan bu tür çalışmaların literatürde az sayıda olması, araştırmanın önemini ve özgünlüğünü yansıtmaktadır.

Anahtar Kelimeler: Sanal Gerçeklik Teknolojileri, Metaverse, Yapay Zekâ, Profesyonel Turist Rehberi

Jel Kodları: L83, O39, Z39

Introduction

Tourism is among the most critical sectors that follow technological developments and offer new technology-supported experiences in service delivery (Stankov and Gretzel, 2020). The development of technology has a profound impact on the tourism industry, just as it does in every other sector. Metaverse, Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) technologies create differences in the tourism sector in both supply and demand dimensions. According to Gursoy, Malodia, and Dhir (2022), travelers are increasingly opting for metaverse-based tourism experiences, services, or products. Tourists use these technologies in their travel plans and benefit from digitalization during their trips. These new-generation technologies, which they quickly adapt to, have made tourists individuals who are less satisfied and who seek innovation, comfort, and uniqueness (Goo, Huang, Yoo, and Koo, 2022). Immersion and interaction are becoming increasingly popular as traditional cultural tourism struggles to meet the needs of tourists (Guo and Wang, 2025). Assessing the advantages offered by these technologies, which are not just a trend but a force that will transform the future of the sector, and overcoming possible threats will be beneficial for the tourism and hospitality industry by reshaping the way travelers interact with attractions, destinations and accommodation businesses (Kumar, Kumar, Devi, and Bhatt 2024).

New-generation technological developments, which provide significant momentum in the service sector, include robotics, AI, and VR (Duzgun, 2022). Since new-generation technologies also reveal the skills that employees in the tourism industry will need in the future (World Economic Forum, 2016), it is also essential to address this issue specifically for tourist guides. According to the 2025 data provided simultaneously with the guide information system of the Federation of Chambers of Tourist Guides (TUREB), the total number of guides who are members of one of the 13 guide chambers in Türkiye is 13,627 (TUREB, 2025). In this context, it is evident that professional guides catering to tourists from various nationalities must adapt to contemporary needs, comprehend these technologies, and modify their services to leverage them, ensuring tourist satisfaction, enhancing their offerings, and remaining competitive.

The perspective of professional tourist guides on this issue, the current and potential areas of use of the relevant technologies, and their ideas on the advantages and disadvantages of these applications are essential to foresee the future of the industry in this new period where access to information, as well as interpersonal interaction, has increased. According to a study examining the articles on tourist guides' perspective on technology using the meta-synthesis method (Ercan, 2022), it was determined that there were few articles on the subject in the literature and that they were published in the last few years. While there are a few studies examining guides' perspectives on digitalization, there are even fewer studies that delve into their ideas, specifically on the metaverse, VR technologies, and AI. Therefore, the fact that the research fills a gap in the literature makes it a valuable contribution. By presenting the viewpoints of professional tour guides on the metaverse, VR technologies, and AI, as well as the benefits and drawbacks of these technologies for tourism guiding, this study will contribute to the existing body of literature. Additionally, specific recommendations are provided to industry stakeholders.

The study begins by attempting to clarify the key terminology adopted in the research topic. Subsequently, the method used in data collection and analysis is explained, followed by the presentation and discussion of the research findings. The paper concludes by reporting the study's limitations and identifying directions for future researchers.

Literature review

Research into understanding tourism innovations has gained momentum. Numerous benefits for AR and VR have begun to emerge in areas such as gamification, cultural heritage, tourism education and training, and destination marketing (Yung and Khoo-Lattimore, 2019). While focusing on the metaverse, VR technologies, and AI in the study, their applications in the tourism industry were also considered. While the metaverse is an entirely different concept, combining the real and virtual worlds, it revolutionizes the way businesses and tourists work together to create memorable experiences (Buhalis and Karatay, 2022). AI also supports the technologies that many tourists, guides, and institutions use. Virtual reality technologies encompass a range of technologies, including mixed reality (MR), extended reality (XR), augmented reality (AR), and virtual reality (VR). Because virtual reality technologies have a broad scope, they create a new environment between the human user and the virtual environment by utilizing an interaction device (such as a computer, head-mounted display, paddle, gloves, steering wheel, etc.) (Fuchs, Moreau, and Guitton, 2011). The metaverse, now essential to the tourism sector, enhances the guest experience through inclusive tourism in several ways, as noted by Jafar and Ahmad (2024). AI technologies are proving to be the foundation of practical applications and have shown

tremendous success in various fields (Xu et al., 2021). A 2018 study found that 43% of respondents had a high degree of confidence in AI-related technology in Türkiye (Clark, 2018). Consequently, it is vital to establish terminologies to enhance comprehension of these technologies, which also impact tourist guiding.

Lee et al. (2021) define VR as an artificial experience in which individuals can interact in a three-dimensional space through a virtual reality headset or helmet, perceiving an environment artificially created using images, objects, and sounds. Ro, Brem, and Rauschnabel (2018) stated that, unlike VR, AR can be considered a technology that enables the placement of virtual elements in the field of vision. MR is a broad concept that includes several applications of VR and AR technologies. (Daling, and Schlittmeier, 2024). The term XR refers to a wide range of digital reality formats where X displays any new reality (Rauschnabel, 2022).

Often mentioned together with these technologies, smart tourism—a relatively new concept—refers to a tourism environment equipped with computer communication technologies and technologies such as AR, cloud computing, and smart objects (Zhang, Sundar, and Go, 2015). Several virtual worlds are developing to allow people to expand and deepen their social relationships online. The metaverse may even make it possible to obtain information from the comfort of one's own home, dismantling barriers and democratizing access. Although there is no single, comprehensive definition of the metaverse that people can rely on, it is defined as "a seamless integration of our physical and digital existences, establishing a cohesive virtual community for work, leisure, relaxation, transactions, and social interaction" (Moy and Gadgil, 2022). AI, which supports metaverse, AR, and VR technologies and provides convenience to both guides and tourists in tourist guiding, also needs to be explained. Xu et al. (2021) define AI as the simulation of human intelligence by a system or machine, aiming to develop a machine that can think like humans and imitate human behavior, including perception, planning, reasoning, learning, and prediction.

The tourism industry has taken note of the growing popularity of virtual worlds; several nations, including the Maldives, Kazakhstan, Serbia, and Sweden, maintain virtual embassies (Wyld, 2010). Similar advancements have been made in actual tourist destinations, such as replicas of Paris's Eiffel Tower and the Arc de Triomphe de l'Étoile, as well as in Kenyan Maasai Mara settlements that avatars can explore, stroll around, and engage with (Huang, Backman, Backman, and Chang, 2016). At the intersection of the aforementioned technologies with professional tourist guiding, some technologies offer convenience in museums, historical sites, and various tour routes, benefiting both tourists and tourist guides. Many museums worldwide have transformed into virtual museums, enabling visitors to experience them remotely by accessing the required webpage online from their homes or countries (Sen, 2020). In addition to virtual museums, various technologies are used in physical museums, such as AR applications in augmented exhibitions, VR tourist-guide chatbots, three-dimensional animations, hologram applications, simulation technologies, virtual games, information kiosks, interactive learning systems, audio and video guides, audio headset services with language options, multimedia guide devices, and wayfinding technologies (Aysin Ornek and Karamustafa, 2025; Basar and Yıldırım, 2023; Harmankaya, 2010; Helmy et. al., 2024; Ozalkan, Ozkurt, and Yazıcı Ayyıldız, 2022; Walczak, Cellary and White, 2006).

Attachment, which plays a crucial role in tourism marketing, is defined as the positive and emotional ties formed through individual connections to a destination or historical site (Prayag, Mills, Lee, and Soscia, 2020). The issue of how the attachment factor will occur in virtual platforms and metaverse tourism, particularly in the context of guided tours, may attract attention. Historical events and places that professional tourist guides once used to portray through their narration can now be easily viewed using various technological methods. Four-dimensional (4D) and more advanced applications, which have evolved from two-dimensional (2D) to three-dimensional (3D) and then brought this perception even closer to reality with motion readers, sensors, or scent transmitters, will soon knock on the door of traditional tourist guides (Ersu, 2018).

In a study examining the perspective of tourist guides on developments in digital tourism, it was observed that tourist guides are not prejudiced against new technologies, and almost all of them closely follow technological advancements (Duzgun, 2022). In a similar study, tourist guides emphasized that this profession requires direct engagement with visitors, suggesting that digital applications are a helpful tool rather than a threat to the guiding industry (Kaynak, Sevinc, and Uslu, 2024). AR presents a dynamic approach to experiencing cultural heritage sites by rethinking how cultural information is stored, accessed, and monetized, according to Guo and Wang's (2025) research on AR's incorporation into digital tourist guide services on mobile platforms. According to various studies on the subject, the most significant positive effects of these technologies on tourist guiding include serving as a source of

information, making the profession easier, and acting as a promotional and marketing tool (Buhalis, Lin, and Leung, 2023; Ercan, 2022). Similarly, Rather, Zaman, Rasul, Nawaz, and Akhtar (2025) state that metaverse travel is predicted to coexist with real or physical travel and can serve as a valuable tourism marketing strategy to attract tourists to destinations. Studies emphasize that the use of these technologies in tourist guidance provides advantages in providing services in different languages, reaching a wider audience (Ergin, 2022; Ozalkan et al., 2022), providing opportunities for disabled tourists (Özdemir Uçgun, 2024), and reviving historical narratives in a more engaging and accessible way (Helmy et al., 2024; Pınarcik, 2023). In addition to boosting tourist engagement, these technologies transform digital tourism into a more user-centred, participatory, and educational experience in a rapidly evolving digital landscape (Guo and Wang, 2025; Kaynak et al., 2024). As discussed by Rana, Pillai, Sivathanu, and Malik (2024), adopting generative AI may reduce customer complaints by enhancing employee productivity and delivering high-quality customer service.

The study findings of Ghali, Rather, and Khan (2024) suggest that social presence and connection to the metaverse subsequently enhance visit and revisit intentions. Their findings indicate that perceived immersion and enjoyment in the metaverse develop visitors' cognitive processing, which in turn leads to metaverse-based satisfaction and loyalty. Creating a successful metaverse experience with a digital twin ecosystem for tourism is crucial for influencing travelers' intentions to travel physically (Deng, Wong, and Lion, 2024). The concept of "virtual roaming", defined as 'users visiting the destination on-site after experiencing a virtual tour', was first proposed in a study that found that users who experienced online guided virtual tours had an increased tendency to visit the destination on-site (Kavak, Emir, and Arslanturk, 2024).

Along with these benefits, some studies highlight the educational significance of digitalization in general tourism education or its applications, specifically in tourism guidance. Kuluk (2019) emphasized that digital tools enrich museums' academic programs, support research and conservation efforts, and deepen interactions with communities. Demir (2024) underlined that Chatbots, VR models, and algorithms that utilize machine learning are examples of AI-driven solutions that could be integrated into educational platforms to produce dynamic and realistic learning experiences. Well-equipped tourist guides have been found to contribute to the sustainability and competitiveness of tourist destinations. Busulwa, Pickering, and Pathiranage (2024) stated that educational models supported by VR environments, the metaverse, and AI are suitable for addressing the main problems, such as the high cost of tourist guiding practice trips, financial constraints in practice and the lack of professional expertise among lecturers. Suppose the use of these technologies in tourism is not directed at tourist guides but rather at the AI algorithms themselves. In that case, a study analyzing the perspectives of ChatGBT 3.5, Google Bard, Jenni, and Bearly AI algorithms on tourism education is important. According to the study's results, the standard answer among these four algorithms is that technological components, such as digitalization, technology, and data analytics, are essential in tourism education (Guner and Cılgınoglu, 2024).

Various researchers in the literature have underlined the critical adverse effects of the mentioned technologies on the tourist guiding profession. Iscen and Isık (2020) reported that although most tourist guides utilize mobile applications, there are instances where they have difficulties in using them. Insufficient technology, resulting in tour interruptions, adaptation challenges, and a growing inclination towards unguided tours (Ercan, 2022; Ozalkan et al., 2022), all pose a threat to the future of the profession. Some tourist guides view digitalization as a communication gap and consider it a significant obstacle to effective communication (de la Harpe and Sevenhuysen, 2020; Ozalkan et al., 2022). Similarly, tourist guides highlight the drawbacks of artificial intelligence-powered robot guides, including their inability to empathise, their failure to assist in dire circumstances, and their limited ability to engage (Duzgun, 2022). It is also anticipated that these technologies may create employment problems for human guides in the future (Duzgun, 2022; Vatan and Dogan, 2021; Yıldız, 2019).

On the other hand, as the metaverse and related technologies continue to develop, compatibility issues between metaverses developed by different companies or between the metaverse and the real world may arise (Wang et al., 2023). Personal information, such as habits, practices, and communication styles of a large number of users, could be gathered and misused by those with unauthorized access to the information (Ozdemir Ucgun and Sahin, 2023; Wang et al., 2023). The collected data of users raises serious privacy concerns and the possibility of legal problems due to improper data processing (Monaco and Sacchi, 2023). Exposure of users to violent or distressing content in realistic virtual environments may have adverse effects (Kumar et al., 2024). Among the drawbacks of employing AR, VR, and metaverse technology in tourist guiding, one must not overlook the potential health issues that may

arise. Addiction, cyber illness, social isolation, anxiety, and disengagement from reality are all possible outcomes of using these technologies (Ozdemir Ucgun, 2024; Yung and Khoo-Lattimore, 2019).

Although these technologies have inherent drawbacks, it is difficult to overlook the advantages of using them. Despite their varied applications, these technologies are all used to improve the traveler experience (de la Harpe and Sevenhuysen, 2020). To establish a governance framework that fosters accountability, openness, and justice, it can be challenging to develop uniform protocols and standards applicable to all users of these technologies (Wang et al., 2023). Applications of generative AI must be handled responsibly and ethically due to concerns about bias, justice, openness, security, and the contributions humans make (Cengiz Tirpan, 2024). Furthermore, Stahl and Eke (2024) suggested that researchers will continue to study morally sound technological innovations. Researchers, in general, should initiate investigations to assist tourism professionals and marketers in understanding the essential elements required to create immersive and engaging experiences for their clients in 3D virtual environments (Ahn, Jin, and Seo, 2024; Bilgihan et al., 2024).

Methodology

This research attempts to explore a lesser-known and newly investigated subject. For this reason, an exploratory and qualitative research design was adopted, and semi-structured interview forms were used. This method enables the collection of data from crucial participants with personal experiences, beliefs, and perceptions on the study topic (De Jonckheere and Vaughn, 2019). Inspired by similar study questions of Eser, Çakıcı, Babat, and Kızılırmak (2019) and Duzgun (2022), six interview questions that align with the current research were developed by the author. Questions regarding the guides' perspective on digital tourism and new technologies for these two studies in the literature were updated to reflect the current research, specifically the metaverse, VR technologies, and AI. These updates were subjected to expert opinions in the pilot research. The feedback from a pilot study conducted with two academicians, who are experts on the subject, and the research questions were finalized by considering their suggestions. The second question was divided into two parts, with expert advice, so that answers would be sought in two different ways: a. for the tourist guides and b. for the tourists. In addition, an open-ended final question was included, with expert advice, allowing participants to share their general opinions and suggestions on the subject.

The following are the research questions that the study aims to address following six demographic questions.

- To what extent do tourist guides personally benefit from developing technologies in their professional lives?

- What are the possible effects (advantages or problems/failures/challenges) of the advances in metaverse, virtual reality technologies, and artificial intelligence (AI) on tourism guidance?

State your answers for the tourist guides and the tourists separately.

How will the developments in the metaverse, virtual reality technologies, and AI affect tour guiding, including its advantages, failures, and challenges?

- What effects will the technologies mentioned above have on employment in the field of professional tourist guiding?

What are the advantages and disadvantages of using these technologies in the education of students for tourist guides?

- Do you have additional comments, evaluations, or concrete suggestions about the research subject based on your experiences or expertise?

The reason for choosing the snowball sample, a purposeful sampling method, in the study is to reach other tourist guides with in-depth knowledge who are believed to be able to provide answers to the questions based on the suggestions of the interviewed participants (Altunısık et al., 2010). Within the scope of the research, 12 Zoom meetings, four face-to-face interviews, and two telephone interviews were conducted with 18 active tourist guides who are members of one of the guide chambers in Türkiye. Interviews, which lasted an average of 43 minutes, took place between March 2025 and April 2025. Since it is recommended that the sample size be at least 15 in qualitative studies, it was decided that interviewing 18 tourist guides would be sufficient (Mason, 2010). The completion of interviews with 18 participants was also necessitated by the attainment of data saturation, as evidenced by the consistency of responses and recurring information provided.

Data analysis

The responses gathered from professional tourist guides via structured interviews were transcribed and underwent content analysis. Interview transcripts from various participants were compiled into a single Word file and then transferred to MAXQDA 24. MAXQDA is a program designed to conduct hybrid and qualitative data analysis (Marjaei, Yazdi, and Chandrashekara, 2019). Then, coding was carried out systematically. Codes, categories, and themes should be checked to determine the level of representation of the data set that is analyzed by the results obtained as a result of data analysis (Poggenpoel and Myburgh, 2003). Since the researcher can't create a coding system that is free from individual effects, different coders must code the same dataset. The similarity rate resulting from this process determines the reliability of the qualitative research (Fidan and Ozturk, 2015). The reliability of the study was measured by examining the agreement between coders. In qualitative research, a consensus of at least 80% between coders is expected (Miles and Huberman, 1994; Patton, 2002). In this study, based on participant 6 (P6), which was chosen randomly, the consensus between coders was analyzed by two different coders: the study author and one of the academics whose expert opinion was sought in the pilot study. The Intercoder Agreement Test is a feature provided by the MAXQDA program, which calculates it automatically. For this purpose, the P6 document, which was coded separately by two coders, was imported into MAXQDA, and the program calculated the percentage of agreement between the two coders' documents. The values in Table 1 reflect the results of the analysis. Based on the coders' P6 document codes, eight codes were found to be common, and two codes were found to be different, indicating an 80% match.

Table 1: Intercoder Agreement

Document name	Related	Not Related	Percentage
P6	8	2	80,00
<Total>	8	2	80,00

Based on the collected data, main themes, subthemes, and word clouds were created. The objective of visually presenting data in the word cloud analysis is not to enhance aesthetics but to facilitate rapid access to information for readers (Fronza, 2013). Yıldırım and Simsek (2013) state that providing direct quotes to reflect the ideas of the participants effectively contributes to increasing the reliability of the study. In this context, in addition to the themes and word clouds, direct quotes were extracted from the participants' responses to present the study findings. Permission was obtained from Istanbul Aydın University Social and Human Sciences Ethics Committee to conduct the study regarding data collection, tools, and methods, with the meeting decision dated 21/02/2025 and numbered 2025/2.

Results

The average length of the interviews conducted within the scope of the research was determined to be 43 minutes. Table 2 displays the demographic data collected from the participants, using acronyms ranging from P1 to P18. While not presented in the table, a qualifying requirement stipulates that all participants in the study must be licensed guides who are now actively working and members of a guide chamber affiliated with TUREB. It is observed that most participants are male guides, with fifty per cent holding a bachelor's degree and the other half possessing a postgraduate education, such as a master's degree or doctorate. The participants are mostly guides affiliated with the Istanbul Tourist Guides Chamber, aged between 28 and 62. The participants' professional experience ranges from 2 years to 40 years, and there is no discernible variation in their marital status.

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Table 2: Demographics of the Participants

Participant	Gender	Education	Age	Marital status	Experience	Chamber membership
P1	Male	Master's degree	43	Married	16	Ankara Tourist Guides Chamber
P2	Male	Master's degree	38	Single	16	Muğla Tourist Guides Chamber
P3	Female	Master's degree	40	Single	7	İstanbul Tourist Guides Chamber
P4	Male	Undergraduate degree	32	Single	5	İstanbul Tourist Guides Chamber
P5	Female	Masters degree	44	Single	20	İstanbul Tourist Guides Chamber
P6	Male	Undergraduate degree	32	Single	5	İstanbul Tourist Guides Chamber
P7	Male	Undergraduate degree	31	Single	2	Şanlıurfa Tourist Guides Chamber
P8	Male	Undergraduate degree	37	Married	8	İstanbul Tourist Guides Chamber
P9	Male	Undergraduate degree	28	Single	8	İstanbul Tourist Guides Chamber
P10	Male	Undergraduate degree	44	Single	15	İstanbul Tourist Guides Chamber
P11	Female	Masters degree	28	Married	7	İstanbul Tourist Guides Chamber
P12	Male	PHD	37	Married	12	İstanbul Tourist Guides Chamber
P13	Male	Undergraduate degree	44	Married	16	İstanbul Tourist Guides Chamber
P14	Male	PHD	41	Married	18	İzmir Tourist Guides Chamber
P15	Male	Undergraduate degree	36	Single	4	Antalya Tourist Guides Chamber
P16	Male	Masters degree	46	Single	26	Nevşehir Tourist Guides Chamber
P17	Male	Masters degree	34	Single	6	Antalya Tourist Guides Chamber
P18	Male	Undergraduate degree	62	Married	40	İstanbul Tourist Guides Chamber

Source: Created by the author

Tourist guides' perspective and adaptation to the metaverse, VR, and AI technologies

Within the scope of the research, the participating guides were first asked whether they were personally benefiting from developing technologies in their professional lives. All of the participants stated that they particularly benefited from AI technology, and most believed that these technologies were beneficial for professional quality. The themes for each research question are presented via *Hierarchical Code-Subcode Models,* which were preferred because both frequency numbers and theme structure can be easily seen.
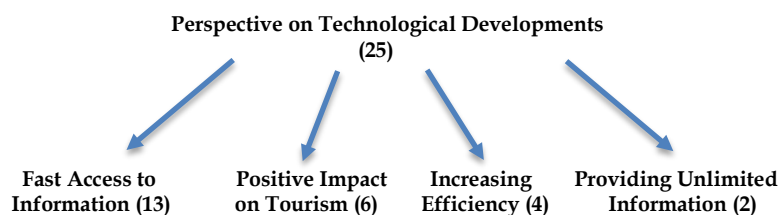
Figure 1: Perspective on Technological Developments, Hierarchical Code-Subcode Model

The most frequently stated benefit by the participants was the "fast access to information" provided by these technologies, as shown in Figure 1. P12's explanation is essential in the context of the subject. "*I make use of these technologies as much as possible in my work as a tourist guide. Instead of relying just on photographs, I attempt to use 3D programs or virtual museum apps to examine new sites and learn about every aspect*". A participant (P13) who mentioned the positive effects of these technologies on the profession adds the following; "*The mentioned technologies complement the explanations of the guides and provide benefits by creating a motivation to explore.*" Regarding the increasing efficiency provided by these technologies in tourist guiding, P1 draws attention to the following: "*Historical events can be brought to life with VR. For example, the missing part of a depiction (mosaic, fresco, etc.) can be completed, as in the Dessesis scene in Hagia Sophia.*"

According to P8, these technologies will provide unlimited information; *"During the guidance training, thanks to technology, students can visit museums that are too far and expensive to go and gain information, and they can visit not only museums in our country but also all over the world, providing limitless information about the artefacts."* These remarkable participant comments make it clear that the majority of tourist guides adopt these technologies due to the advantages they offer, such as faster information availability and increased efficiency. This finding aligns with previous research results by Duzgun (2022) and Iscen and Isık (2020).

Some participants emphasized the support of these technologies for destination marketing. *"Just as tourists are attracted to certain destinations by the images they see on television, in magazines, or YouTube videos, they will also be attracted to real tourism destinations by what they experience in VR, AR, and metaverse environments."* (P4). According to the analysis results fed by the comments made by the research participants, it is seen that the positive effects of these technologies emerge in areas such as supporting education, accelerating access to information, understanding cultural heritage, and destination marketing, and in this context, the findings support the study of Yung and Khoo-Lattimore, (2019).

The effects of technological developments on tourism guidance

Secondly, a broad understanding of the benefits, drawbacks, problems, and challenges associated with digitalisation, the metaverse, VR, and AI technologies was sought from the tourist guides.
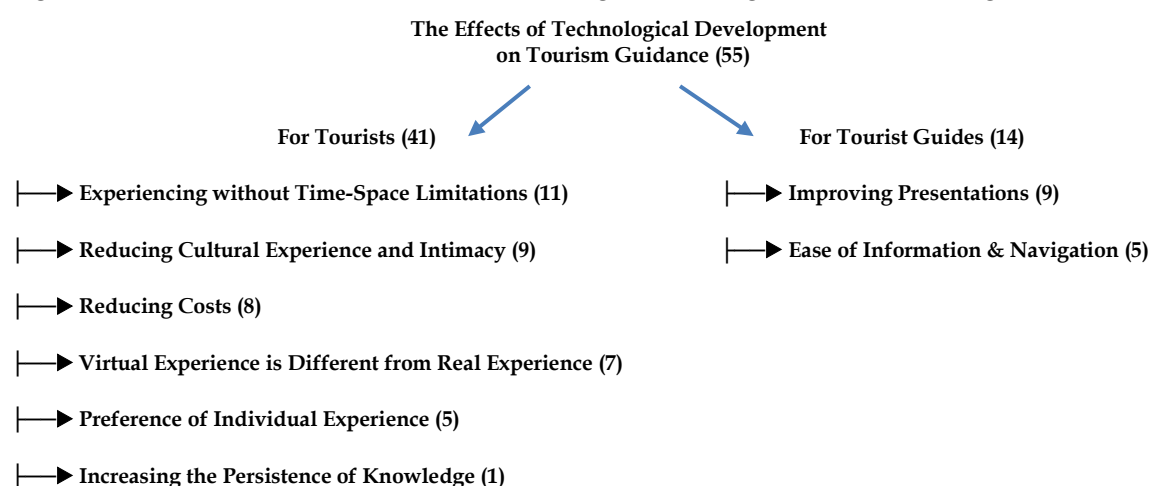
The Effects of Technological Development on Tourism Guidance (55)

For Tourists (41)

├──▶	Experiencing without Time-Space Limitations (11)
├──▶	Reducing Cultural Experience and Intimacy (9)
├──▶	Reducing Costs (8)
├──▶	Virtual Experience is Different from Real Experience (7)
├──▶	Preference of Individual Experience (5)
├──▶	Increasing the Persistence of Knowledge (1)

For Tourist Guides (14)

├──▶	Improving Presentations (9)
├──▶	Ease of Information & Navigation (5)

Figure 2: The Effects of Technological Developments on Tourism Guidance, Hierarchical Code-Subcode Model

While the vast majority of the research participants stated the possible positive effects of developments in the metaverse, AR, and AI technologies for tourist guides, it is found that AI will be beneficial, especially in utilizing digital information sources such as academic databases, e-books, maps, videos, etc., which improve guides' presentations. Additionally, AI could be advantageous for tourist guides while designing the narrative plan for tour preparations. One of the female tourist guides (P5) expressed that *"AI helps us throughout the journey. Using smartphones, we employ AI to decide the travel schedule and itinerary."* Similarly, another participant (P1) indicates, *"Technologies such as AR and metaverse can make guide presentations more interactive and eye-catching."* Moreover, guides benefit from these technologies in terms of finding customers directly without going through a travel agency.

From the tourists' standpoint, the most emphasized issue was that these technologies enable them to see the destinations and museums they want to visit without time and space limitations. According to the respondents, virtual museums, virtual exhibitions, AR zoos, and similar platforms cannot replace real or physical ones. Still, they can provide tourists with preliminary information or allow people with limited time to experience destinations or tourist attractions in a brief period. Another critical issue for tourists is that these technologies reduce costs in tourist activities. According to a participant (P11), *"Employing these technologies for touristic entertainment lowers trip expenses, particularly for activities that need extra payment in guided tours."* The following comment from a participant (P4), which supports previous research (Ergin, 2022; Ozalkan et al., 2022), details the ability of these technologies to provide services in different languages: *"Increasingly advanced AI voice models can convey the same information that a guide gives to a tourist in the language, style, and speed that the visitor prefers."*

Participants emphasized that numerous platforms can connect tourists and service providers directly, particularly due to the enhanced automation systems, Internet of Things (IoT), and AI matching algorithms. It has been stated that shortly, personalized tour packages will be produced and offered

instantly by these systems instead of standard tour packages for tourists. Added by P10, "*Traveling for tourists will become much more customized and easier thanks to these technologies.*" Participant 14 emphasized the benefits of these technologies for disabled tourists: "A*ctivities such as virtual tours, museums, concerts, etc., will provide an alternative where disabled tourists or elderly individuals with health problems who cannot participate in physical tours can socialize without leaving their homes.*" It was also stated that these technologies would be very advantageous in terms of making it easier to comprehend the stories, legends, and historical appearance of the visited regions and ancient artefacts by visualizing them in the eyes of tourists and consequently increasing the persistence of knowledge. Relatedly, P14 puts forward the following view, "*It can be thought that AR applications will soon create Virtual Guides. Examples such as the Lycian Civilizations Museum and the Ephesus Experience Museum, which provide visual support that enriches tours, are technologies that will increase tourist satisfaction.*" With a similar explanation, P5 indicates, "*VR and AR technologies are used in museums to revitalize historical sites. Tourists can learn what historical remains looked like in their own time with the help of virtual museums.*" Comments in this vein support the previous research by Guo and Wang 2025; Helmy et al., 2024; Pınarcik, 2023.

In addition to these positive comments, some participants expressed the disadvantages brought about by so-called technologies, such as the deterioration of cultural experiences and a reduction in intimacy. To clarify, respondents stated that VR museums, virtual zoos, tourism-related metaverse platforms, and digital environment exhibitions could not satisfy the main reasons behind tourists' motivation to travel. A tourist guide (P2) states, "*The main motivation behind people travelling is to escape from the place where they work or live permanently, to recreate and define themselves in a completely different place. The concept of experience, which is also a main pillar of the travel experience, encompasses various dimensions, including entertainment, aesthetics, escape, education, and interaction with people. When we look at metaverse, AR, and VR technologies, we see that they meet these needs very little and rarely satisfy the travel motivation.*" Some tourist guides predict that tourists who experience metaverse content or activities in virtual environments a few times will later lose interest and turn to traditional guided tours. A participant (P12) denotes, "*Tourists will be interested in getting what they want to experience at travel destinations in a personalized way with the help of these technologies, and they do. However, no artificial visual or content created in the digital environment will be able to erase the feeling and desire of people to be there physically.*"

Many participants asserted that the virtual experience is very different from the real experience, given the limitations of these technologies. Participant 15 indicates that "*It is important to touch and smell a touristic place to feel its lived-in nature. No matter how much a tourist watches the orange groves next to the Aspendos theatre in the metaverse, it has no meaning unless they go and smell them in person. Again, listening to an artist we love very much in a virtual environment is very different from seeing and hearing him in a real concert.*" The preference for individual experiences over virtual experiences is also one of the most emphasized themes, as seen in Figure 2. The following assertion is made by (P6): "Thanks to the mentioned technologies, tourists will be able to access information more economically, but the information they receive will not be as permanent as the narration made by a human guide with gestures and facial expressions. No computer has yet been developed sufficiently to measure a person's interest in the information they are listening to. Therefore, even if the tourist gets bored while listening, the computer will continue to explain in detail as programmed. A tourist guide can quickly understand the interest of the tourists in the subject and make the trip more exciting for them."

Some participants cite earlier research by Ozdemir Ucgun (2024) and Yung and Khoo-Lattimore (2019), cautioning that the use of these technologies may result in several health problems and addiction for travelers "*While VR, AR or metaverse can provide unforgettable experiences for some of our customers, it can also cause health problems. The occurrence of health problems such as dizziness, headache, migraine, nausea, and epilepsy raises questions about the benefits/harms of these technologies (P9).*" "*Although it may be too soon to declare this, technologies like AI, AR, VR, and the metaverse can cause us to get addicted to virtual worlds and disengage from real-world experiences, just as social media has made us dependent on it now (P1).*" These findings address the research question regarding the positive and negative effects of these technologies on the tourist guiding profession.

The effects of the use of metaverse, VR, and AI technologies on employment in the professional tourist guiding profession

Participants were also asked to evaluate the use of Metaverse / AR / VR / AI technologies in terms of their effects on the employment of professional tourist guides. As shown in Figure 3, most tourist guides noted a decrease in the need for professional guides due to the increasing adoption of these technologies. Another recurring theme is the difficulty faced by both tourist guides and tourists in adopting these technologies. The findings in this vein are consistent with the relevant literature (Duzgun, 2022; Vatan and Dogan, 2021; Yıldız, 2019), which argues that the technologies mentioned

above will create employment problems for tourist guides. To give an opinion of a participant (P2) in this direction, "*AR applications, in particular, will reduce the dependency of individual tourists on guided tours. In this respect, we may witness a decrease in standard city tours sold very cheaply in the market and a rise in special, optional small group tours.*" Another participant (P4) adds the following: "*If guides who do not adopt these technologies continue to give Wikipedia-style narrations on tours, they will have difficulty in employment in the future.*"
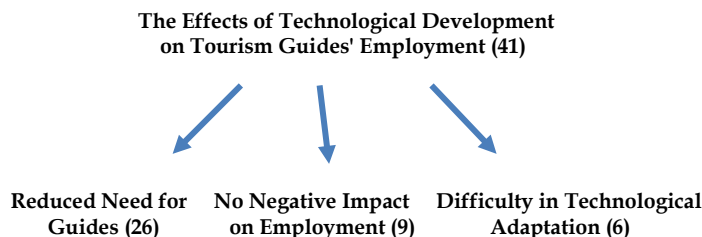
**The Effects of Technological Development
on Tourism Guides' Employment (41)**

**Reduced Need for
Guides (26)**   **No Negative Impact
on Employment (9)**   **Difficulty in Technological
Adaptation (6)**

Figure 3: The Effects of Technological Developments on Tourism Guidance Employment Hierarchical Code-Subcode Model

Some participants argue that these technological developments have no negative impact on the employment of tourist guides. These respondents believe that guides who are superior in using these technologies can provide a competitive advantage by making themselves more equipped and knowledgeable. Accordingly, a participant (P1) indicates that "*Guides can create new business opportunities by organizing niche tours on virtual platforms (P1).*" Furthermore, several participants emphasized that guides who diversify their tales and offer more comprehensive information through these technologies will enhance tourist satisfaction. Another tourist guide (P7) expresses, "*These technologies, especially with the digitalization of many books/resources, have provided incredible convenience to guides. In terms of employment, tourist guides who utilize emerging technologies will undoubtedly have a competitive advantage. The experience of tourists depends on the uniqueness and expertise of tourist guides, and I think that these emerging technologies will lead to the emergence of new tourism trends.*" One participant (P5) noted that "*Rather than decreasing recruitment opportunities, new technologies will increase the number of options for guides to generate income. Additionally, these technologies are successful in selling additional museum tours, tickets, etc., which boosts the tour program's earnings.*"

However, it was stated that in the long term, there may be a risk to the future of the profession if the new generation of tourists, born into these technologies, benefits from virtual tours, concerts, and museums, which they perceive as more practical and time-saving, rather than classic guided tours. Tourists may no longer need translation support from professional guides, thanks to AI technologies that offer multiple language options. While professional tourist guides, one of the service providers in the destination, continue to exist, it is estimated that guides who cannot break free from their traditional agency-guide dependency will gradually lose their presence and influence in the sector.

P12 indicates, "*The guides who insist on doing old-fashioned guiding will have to be eliminated in time because the young generation has adopted these technologies more than the middle-aged tourists. Those who cannot keep up with these technologies and their target audience will face great difficulty in terms of employment.*" These findings have clarified the effects of the mentioned technologies on employment in the tourist guiding profession.

The effects of the use of metaverse, VR, and AI technologies on the tourist guiding education

The most emphasized issue that the research participants agreed on regarding the impact of metaverse, VR, and AI technologies on education was that they accelerate the learning process and strengthen skills. In addition, participants who predicted that these technologies would create various advantages in education mentioned the benefits of providing first-hand experience. Regarding the topic, participant P8 offers the following: "*These technologies allow tourists guiding students to experience virtual museums or historical sites in the metaverse that are too far away and costly to visit physically. They can study the historical artefacts and various destinations through their computers because metaverse platforms or VR environments allow them to travel not only in their own countries but also all over the world.*" Similarly, P14 asserts, "*These technologies will be particularly beneficial for language acquisition. In addition, VR tours can be made for experiencing cultural heritage, and historical structures can be displayed in 3D platforms, in archaeology or art history classes.*"
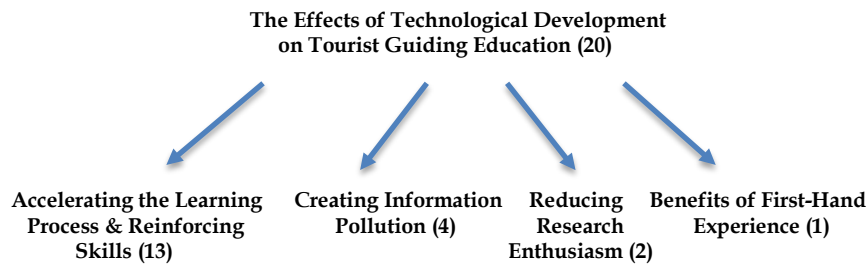
The Effects of Technological Development on Tourist Guiding Education (20)

Accelerating the Learning Process & Reinforcing Skills (13)

Creating Information Pollution (4)

Reducing Research Enthusiasm (2)

Benefits of First-Hand Experience (1)

Figure 4: The Effects of Technological Developments on Tourism Guidance Education, Hierarchical Code-Subcode Model

Contrary to previous researchers (Kuluk, 2019; Demir, 2024; Busulwa et al., 2024), who emphasized various advantages at the intersection of guiding education, the metaverse, VR, and AI, the study participants also held negative views. The possibility that these technologies can create information pollution and reduce research enthusiasm is evident in Figure 4, which highlights the repeated themes. Accordingly, P6 states, "*Although the use of these technologies in guidance education seems advantageous because it will make it easier for students to understand stories, legends, and historical events through simulations, I see these technologies, especially AI, as a disadvantage because they will diminish students' responsibility and reduce their enthusiasm for learning.*" On the topic, participant P8 highlights the following: "*While technology simplifies our lives, going on a guided tour is a unique intellectual experience. Although AI gathers, filters, and provides us with information from a variety of online sources, the internet is rife with information pollution. However, a guide researches to find accurate information from specific, trustworthy sources, chooses which sources to use, filters the information, blends it, and chooses an expression style based on the guests' level of interest while paying attention to facial expressions and intonations.*"

The recommendations of the participants regarding the use of the metaverse, VR, and AI technologies

In the in-depth interviews, participants were asked to provide additional comments, evaluations, or concrete suggestions about the research topic based on their experiences or areas of expertise. Most participants drew attention to the necessity of adapting metaverse, VR, and AI technologies for both tourists and professional guides.
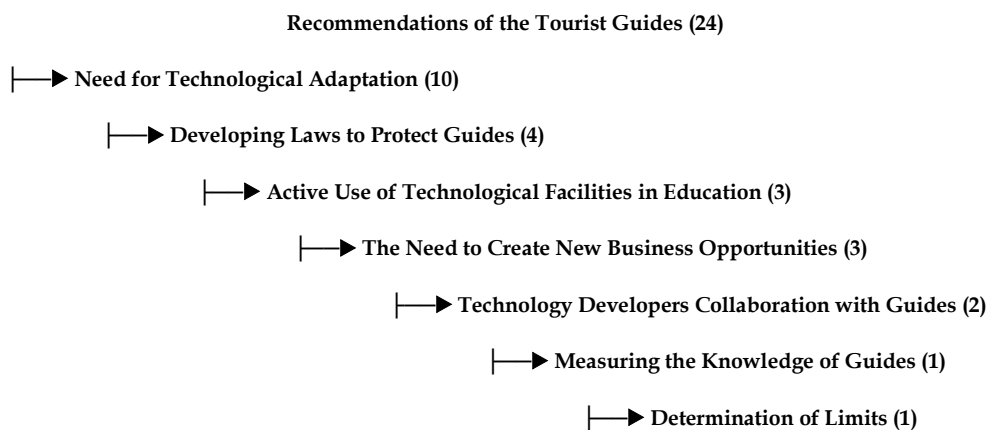
Recommendations of the Tourist Guides (24)

├──▶ **Need for Technological Adaptation (10)**

   ├──▶ **Developing Laws to Protect Guides (4)**

      ├──▶ **Active Use of Technological Facilities in Education (3)**

         ├──▶ **The Need to Create New Business Opportunities (3)**

            ├──▶ **Technology Developers Collaboration with Guides (2)**

               ├──▶ **Measuring the Knowledge of Guides (1)**

                  ├──▶ **Determination of Limits (1)**

Figure 5: Recommendations of the Tourist Guides, Hierarchical Code-Subcode Model

It was also stated that the developers of these technologies should collaborate with guides. The participants emphasized the necessity for everyone, from student guide candidates to seasoned guides, to adapt to these technologies. They attributed this need to the fact that the relevant technologies complement traditional guided tours. They believe that measuring the technological knowledge of guides and equipping them with these technologies will also contribute to the country's promotion. The following comment of P2 is noteworthy: "*Compared to matching algorithms and AI technologies, the metaverse and VR are relatively new and immature technologies. It is even possible to say that the metaverse is a premature baby. Because we are not yet prepared to adjust to such a development, given our current technological capabilities and internet usage patterns. VR technology remains complex, tiring for users, and not yet suitable for general use. Future collaboration between technology developers and guides is necessary to facilitate such technologies as a marketing tool.*" Another respondent (P3) argues, "*I believe that virtual museums and various VR applications, which have examples of use in nearby geographies such as Italy and Greece, will be very beneficial for the promotion of Türkiye. I believe that tourists who first learn about our destinations remotely through these technologies will then visit our country in person and explore these museums and historical sites with guided*

tours. As a result, the amount of foreign currency entering our country will increase." The findings of this research align with previous studies that highlight the benefits of relevant technologies as a marketing tool for country promotion, indicating that these technologies will coexist with physical tourism activities (Buhalis et al., 2023; Ercan, 2022; Rather et al., 2025).

The need to create new job opportunities is another striking theme seen in Figure 5. Some of the research participants noted that guides who adopt these technologies can create additional job opportunities in addition to the business connections offered by the travel agencies they are affiliated with. P11 indicates, *"As professional guides, our process of following technological developments in detail is a long journey from our use to persuading and encouraging tourists to use them. If guides are open to innovation and digitisation, they are advantageous; however, if they cannot adapt, for example, if they are not involved as human guides who develop virtual guides or provide information behind some metaverse platforms, it is possible to experience employment problems."*

It was emphasized that the active use of metaverse, VR, and AI technologies in tourism education is necessary to generate new employment opportunities and prevent future employment issues. The advantages of using technology in education extend beyond giving guides a competitive advantage; they also include enhancing the sector's stakeholders' capacity, improving service quality, and ultimately increasing visitor satisfaction. According to some participants, travelers will be more inclined to return to the nations they visit if they get a customized, realistic, and contemporary experience there, thanks to these technologies. It has been observed that these views do not contradict the studies by Ghali et al. (2024), Jafar and Ahmad (2024), and Deng et al. (2024).

Although the tourist guides interviewed mentioned the benefits of these technologies, such as their advantages in tourism promotion, education, and increased accessibility, they also raised various ethical issues and concerns about the future of these technologies in their statements. For example, P1 indicated, *"My perspective on the sectoral adaptation of these technologies is positive, but there is another side to the coin regarding ethical, social, and economic dimensions."* Another participant (P7) clarified the issue of limits: *"I think that in the future, maybe 10-15 years from now, the popularity of VR tours will increase. Since both tourists may start to disconnect from reality and guides may become unemployed, it is necessary to introduce rules such as participant limits for such virtual platforms, to establish laws, and to ensure supervision."*

Although some participants acknowledged the advantages of integrating new technologies into guiding education, they also pointed out that the necessary equipment is expensive. The disparity in access to and adoption of technology between developed and developing nations was highlighted, and it was anticipated that this would lead to unequal opportunities in tourism guiding education and training. A participant (P12) explains another critical problem that may arise in the use of these technologies in education as follows: *"Students have the chance to access an endless information network with only an internet connection and a computer/smartphone. Virtual museums and virtual trips are all mind-opening tools that will prepare students for the future before they even start their careers. However, this excessive number of options that students have poses a problem in finding the right alternative and can tire the user looking for the right content. Technologies sometimes cause information pollution and can lead to negative results with ineffective guidance and planning in tourist guidance."*

Code cloud summarizing professional tourist guides' perspectives on the use of metaverse, VR, and AI technologies in the tourist guide profession

The participant views analyzed in Hierarchical Code-Subcode Models, based on various subjects, are likewise comprehensively represented in the code cloud generated by the MAXQDA program analysis (Figure 6). The distribution of participant expressions according to intensity is shown in this code cloud. Codes with larger font sizes indicate expressions used more intensely, while expressions with smaller font sizes suggest that the codes are used less intensely.

Figure 6: The Code Cloud

Conclusion and discussion

Most tourist guides stated that they benefit from AI to enrich their narratives in preparation for tours, reinforce their knowledge of historical and cultural issues, and serve as a wayfinding tool. It was emphasized that AI and VR technologies will be very efficient, especially in educating prospective students and active guides. In line with the benefits provided by these technologies in education by Busulwa et al. (2024), Research participants anticipated that metaverse, VR, and AI could create equal opportunities in education and make guidance education—which is inherently expensive and challenging—more inclusive, comfortable, and memorable for both scholars and students. Although it is stated that metaverse technology is not yet well-developed and its adoption is weak among tourists and guides, it is understood that it holds potential for the future. It was mentioned that all these related technologies will facilitate access to information, personalize travel activities, enable travel without time and space limitations, and provide advantages for disabled and elderly travelers. It was emphasized that simulations, hologram technology, and 3D revitalization technologies, which will help guides and tourists visualize some buildings, historical artefacts, and archaeological sites, will be especially productive in subjects related to history and archaeology. Courses on AI, VR technologies, and content creation should be added to the curriculum of relevant faculties. It is recommended that technological innovations support guides rather than replace them and be used as a complement to traditional tourism.

Similar to the pros and cons evaluation highlighted by de la Harpe and Sevenhuysen (2020) in their study, the participants in this study share a common opinion that the benefits of the relevant technologies should not be ignored despite the potential negative consequences they may cause. The ethical rules regarding the use of these technologies should be determined, and the role of tourist guides should be secured. Cooperation should be ensured between technology developers, guides, academics, and public administrators. Parallel to the suggestions of Ahn and Bilgihan et al. (2024), scholars should conduct studies to help marketers and tourism stakeholders understand the fundamental elements of creating interactive experiences for tourists in 3D virtual environments. Managers in the tourism sector and various external stakeholders such as decision makers in travel agencies and tour operators must learn and be equipped on how to adapt to the metaverse, VR technologies and AI in all stages of their activities, such as preparation, research and development, and marketing, to ensure customer satisfaction and increase their profitability accordingly. Businesses that can attract tourists to virtual environments will also benefit from the competitive advantage of meeting tourists in real destinations within the framework of virtual rooming, as stated by Kavak et al. (2024).

Wang et al. (2023)'s warning about compatibility problems between metaverses developed by different companies or between the metaverse and the physical world, particularly with the development of metaverse, AI, and VR technologies, is also crucial. The idea of a future in which a single authority manages metaverse and VR technologies, as well as AI, seems incredibly utopian. However, to create a holistic tourism environment for users and prevent information pollution, the World Tourism Organization could develop global criteria and ethical standards. Relevant bodies, such as the Ministry of Culture and Tourism of each country, could conduct inspections on issues including the control of metaverses, the conformity of virtual content to reality, and ethical violations.

In light of the study's findings, which assess the topic of the metaverse, virtual technologies, and AI from the viewpoint of professional tourist guides, some theoretical and practical contributions are presented. In addition to these, the analysis of the collected data has laid the groundwork for several recommendations.

Theoretical implications

This study contributes to the existing body of literature. It presents a significant theoretical addition by offering the perspectives, recommendations, and critiques of tourist guides on the digital transition, particularly about the metaverse, AI, and virtual technologies. As previously mentioned, AI, metaverse, and VR technologies have the potential to save time, help educate both tourist guides and visitors, allow for more individualized experiences, aid in the revitalization of historical sites, organizations, and myths, and enhance the allure of stories. However, the guides who were interviewed believe that these technologies might lead to operational failures, communication problems, reality distortion, various health issues, and ethical violations. While the majority of guides are adopting these technologies, some believe that their use may create recruitment problems for the profession's future.

Practical implications

The study demonstrates the integration of technical advancements into tourist guiding, informed by the perspectives of active tourist guides. The extent to which both visitors and tour guides utilize these technologies is shown by this qualitative study, which is based on the perspectives of individuals who are now employed as professional tour guides. The research also evaluates the current situation by identifying deficiencies and potential problems, highlighting use cases of these technologies that can be leveraged for advantages, and warning sector stakeholders about possible risks.

Tourist guides need to follow the latest technological advancements closely and possess at least as much technological expertise as their tour participants. Before and during the narration, guides should support their knowledge with AI. They should also take advantage of mobile devices, AR, and VR applications and possess a thorough grasp of how to utilize virtual museums, the metaverse, and hologram technology. Thus, guides who are competent in digital literacy will make physical tours much more attractive and practical for participants, eliminating the threat of tourists abandoning guided tours and opting for digital alternatives with the help of their talent and knowledge.

In addition, since the new generation is seen to be much more prone to these technologies, the curriculum for tourist guide candidates should be updated to include new technologies. In this way, students from any part of the world can gain a deeper understanding of the historical and natural beauties of other countries, UNESCO heritage sites, and the culture and habits of past ages, and relate these subjects more effectively thanks to digitalization. It is of great importance for the future of the professional tourist guiding profession that licensed tourist guides, tourism guidance students and lecturers, and guide associations should effectively integrate AR, VR, AI, and metaverse technologies into their activities, planning processes, and strategies.

Limitations and suggestions for future studies

While the use of relevant technologies in tourism is evaluated from the perspective of tourist guides within the scope of this research, the fact that only licensed guides operating in Türkiye were reached is a limitation that prevents generalizations for a profession performed worldwide. It is recommended that future researchers conduct their studies similarly. In addition, conducting research specifically on tourists' and tour guides' acceptance of the metaverse, VR technologies, and AI using the Technology Acceptance Model (TAM) will contribute to the literature. The research was conducted using in-depth interviews, employing a qualitative research method. The study can be designed quantitatively, and data can be collected from a larger number of tourist guides on the subject. Similarly, the relevance of technologies in training tourist guides and other tourism personnel in the sector can be analyzed in the future, and the employees' perspectives can be evaluated during this process.

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