The Effects of Metaverse on the Tourism Industry

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Abstract—**This study examines the potential impacts of Metaverse, extended reality, and artificial intelligence on the tourism sector. The current use of these technologies in tourism is discussed with examples, possible risks, and criticisms are evaluated. The data was obtained through in-depth interviews with 28 experts who were reached using the snowball sampling technique. After examining the interview records with content analysis and presenting recurring expressions of the participants in a narrative form, it was concluded that these technologies support tourism marketing, increase guest satisfaction, are efficient in training tourists and employees, are advantageous for minority groups, can be more environmentally sustainable, and can create new business lines. By providing concrete examples and fact-based suggestions, the research informs tourism stakeholders on how to integrate these technologies, which are still new and full of uncertainties, into their work efficiently.**

Keywords— Metaverse tourism, artificial intelligence, XR technology, virtual tourists, Meta-recreational activities

I. INTRODUCTION

Every action in the digital world will eventually have an impact on the physical world or vice versa [2]. When the digital universe is mentioned, Metaverse and underlying technologies, which are closely related to many sectors, inevitably emerge. Tourism is recognized by The World Economic Forum as one of the most important sectors, which could benefit from the Metaverse [77].

Since every new technological development contains initial uncertainties, individuals and institutions may remain distant or delay at integrating them. The subject of Metaverse tourism is in its infancy [7, 22, 31, 52] and there is negligence in businesses acting on Metaverse [22]. Metaverse applications in tourism sector is still unexplored [89]. Metaverse is regarded as a disruptive technology in tourism industry [30]. In its report titled 'Artificial Intelligence in Action 2024', The World Travel & Tourism Council (WTTC) states that although AI adaptation has a clear sense of urgency, the travel and tourism sector is lagging most other industry sectors in implementing these technologies due to the lack of a formal strategy, a shortage of AI-skilled workers, and a reactive approach to implementing new technologies [87]. The tourism system is not able to reach the total capacity to respond the innovative shift and transition towards Metaverse which may pose an obstacle to widespread use and implementation of Metaverse [28]. Therefore, the foremost contribution of this study is the presentation of how Metaverse and underlying technologies can be beneficial on the industry with concrete examples and fact-based comments from the knowledgeable and experienced professionals in the field. Although, there are various papers on Metaverse with the great majority of them being conceptual or theoretical since 2021, this study is among the very few field research, which

provides new perspectives by confirming or rejecting the previous publications. The term Metaverse, whose reflections on the tourism sector are investigated in the research, will be considered together with the underlying technologies such as extended reality (XR) and AI, examples and explanations will cover these related technologies.

Just a few decades ago, it was unimaginable that actions such as video calls, banking transactions, or functions of navigation and calculator could be done within seconds from a handheld mobile device that can be carried in the pocket. We can compare the Metaverse and its development possibilities to the evolution of these technologies that many people currently use. Whether Metaverse gains our support or is the subject of our criticism, it seems to continue to develop and be part of our lives in the future, like an enormous power that has been awakened. As technology improves and virtual experiences eventually be more immersive, Metaverse tourism is also likely to evolve into a more popular and accessible mode of travel and exploration over time [69]. Since Metaverse, AI and XR technologies are constantly developing, the experiences and comments of users and all stakeholders about these technologies are changing day by day. Accordingly, new topics should be examined within the framework of Metaverse and tourism, and even a dimension that was researched a year or two ago should be renewed to reflect individuals' changing perspectives.

What role we play as researchers in building the future of these technologies is also crucial. Therefore, to make Metaverse useful for the tourism sector, this study explains how these technologies are currently adopted without ignoring all its shortcomings and ethical concerns, addresses the advantages and risks, so that tourism stakeholders can be prepared, and provides users' perspectives, contributing to industry forerunners as per appropriately designing and integrating their own operations. In this regard, the findings of this study are pivotal since Metaverse and its underlying technologies will interest a wide audience in the long term.

II. LITERATURE REVIEW

Metaverse is sometimes used in place of virtual reality or equated with other related concepts. Whether a platform is referred to as 'Metaverse' depends not only on its technical features, but also on its intended use [40]. Even though Metaverse does not have any consensus description, this explanation is one of the most comprehensive ones; 'A profoundly scaled and interoperable network of real-time generated 3D virtual worlds that could be experienced simultaneously and persistently by an unlimited number of users independently, visually and with continuity of data like

communications, identity, objects, history, entitlements, and payments' [6]. Metaverse is described as the concurrence of physical and digital universes, where individuals can traverse between them for purposes such as work, socializing with others, exploring their interests, education and training [9]. The Metaverse can also be explained as a world, which makes any experience accessible and possible and where people can travel wherever and whenever they desire [33]. Metaverse tourism or meta-tourism could be defined as a type of tourism, which is enriched with multi-sensory information processing during the convergence of physical and virtual environments providing a product or experience to tourists spatially [31].

Since this research is defined at the intersection of the Metaverse and underlying XR and AI technologies with tourism, it is fundamental to include the definitions of some useful terminologies such as XR, MR, digital twins, metahotel, avatar, virtual tourist, virtual communities, metaleisure, NFT's, blockchain and AI. Extended reality, abbreviated as XR, is an umbrella term representing a variety of digital reality formats in which X exhibits any form of new reality [66]. Mixed Reality (MR) is defined as an overarching construct that encompasses various examples of Augmented Reality (AR) and Virtual Reality (VR) technologies [16] (p.590). The term 'digital twin' means a precise digital representation of a single entity or a physical object. For example, depicting a hotel in a virtual world creates the digital twin of that specific hotel [40]. The concept of the Metaverse in the hotel industry appears as 'metahotels' (or metaresorts), which is defined as the digital hotels, where the guests can feel personalized experiences in a virtual environment from their homes via the avatars they create [18]. An 'avatar' is defined as 'replicas of real people or digital users in Metaverse' [48]. Virtual tourist can be explained as the digital tourists, who engage in various Metaverse environments and activities such as taking trips with digital devices, reproducing their experiences via multi-platform media, sharing photos and videos on social media to maintain Metaverse presences [31]. The term virtual tourist is seen as 'Metaverse tourist' in some research and clarified as 'Metaverse tourists can alternate between human and avatar identities, or vice versa during their travels' [46]. Groups of individuals who share some common interests or goals in online environments are described as 'virtual communities' [19]. 'Metaleisure' is explained as the leisure time people consumed in the Metaverse for meta-recreational activities such as touristic city trips, museum visits, organizing events, shaping avatars, participation to games, concerts etc. [7]. For shopping purposes, including all these meta-recreational activities, Metaverse consumers do not use money in the form of banknotes or credit cards, which are used in the real world, they use cryptocurrency or Non-Fungible Tokens, (NFT's). These are special digital tokens that Metaverse consumers use for the shopping experience on these [11]. Blockchain technology serves as an efficient and secure infrastructure and empowers Metaverse tourism [49] by providing a decentralized system via cryptocurrencies or smart contracts (i.e., NFTSs) [60]. AI is the ability of various machines, like computers, to simulate human intelligence [38]. The adoption of AI in tourism as well as many other sectors can have positive impact. According to Grand View Research, the global AI market size reached 136 billion dollars in 2022 and this rate is expected to grow by 37,3% (compound annual growth rate) from 2023 to 2030 [34].

A. Benefits of Metaverse and Underlying Technologies to the Tourism Industry

Understanding the benefits of Metaverse as well as XR which covers variety of digital reality environments (AR, MR and VR) and AI is very important since user experience can be maximized by the providers of Metaverse tourism applications by way of observing, emphasizing, and focusing on the positive effects while simultaneously targeting to minimize the negative outcomes [5]. In the relevant literature, the benefits of so called technologies to the tourism sector have emerged under topics such as tourism product marketing, destination marketing, tourist satisfaction and loyalty, environmental sustainability, education and training, contribution to tourism employment, time saving feature, possibility of time travel, inclusion of minority groups.

XR contributes to the desire to physically experience a destination discovered digitally, enables the experience of the accommodation facility or destination before confirming the reservation via virtual reality headsets [1, 53, 62, 72], Metaverse tourism can be cheaper, more accessible [71], and more environmentally friendly, compared to physical tourism, supporting sustainable tourism via alternative and profitable resources [2, 13, 31, 70, 76]. The combination of virtual and traditional tourism may support more sustainable means of mass tourism without the physical presence of visitors and may facilitate tangible heritage preservation [20]. Metaverse will have positive impacts on the environment due to reduced transportation and reduced carbon footprint and this idea is based on the use of metadata platforms and avatars by human resources escalating the effectiveness of recruitment, simulation training and evaluation, and enabling remote or hybrid working [86].

Various studies draw attention to positive relations between Metaverse and user behavior including visitor satisfaction and loyalty. The tourists could reach emotional satisfaction with the help of virtual tourism which helps them to recall tourism memories via reproduced VR scenes or enables them to share and disseminate culture via digitalized cultural content [86]. The experiences in virtual environments or Metaverse platforms can support positive feelings and result in visitors' happiness and loyalty [18, 42, 44]. After users experience virtual co-creation via their avatars, their satisfaction and engagement increase and this results in positive electronic word-of-mouth (eWOM) for the companies to create positive image and increase the sales of their products and services [51]. During the virtual travels, all tourists including those with disabilities or in remote areas can gather souvenirs and communicate with others [64]. Thanks to a metadata repository that can be prepared by tracking the needs and expectations, product preferences, and feedback of Metaverse consumers, the profits of industry stakeholders can be increased and an environment where consumers can quickly find interlocutors and have realistic experiences might be created [62]. A study, which is conducted on the effect of AR applications on visitors' experiences of museum visits and their willingness to pay again, suggests that AR technology positively affects visitor

experience and increases their willingness to pay again [39]. In a similar research, it is underlined that Metaverse will complement the traditional tourism and can be used as a tool by sector players for promoting hotels and reaching their potential customers, raising destination awareness, enabling destination management and branding [63]. All these findings indicate that thanks to Metaverse, users' engagement, satisfaction and the probability of positive WOM will rise resulting in an increase of tourism stakeholders' profits. Members of virtual communities share similar interests and purposes in online universes [19]. In this context, it can be said that the Metaverse virtually meets the needs of tourists who participate in tourism activities for purposes such as socializing and gaining a sense of belonging. Some motivations such as trouble avoidance, experience extension or experience substitution are found to be the unique motivations of virtual tourism, which can barely be satisfied via on-site tourism due to the high economic costs or time and energy requirements [89]. When considered within the framework of dark tourism or grief tourism, AR may provide a service that is not available in physical tourism. Somnium Space attempts to collect user data to personalize AI-powered, immortal avatars that remain digitally even after they are dead with 'Live Forever' mode [29]. Since people can live forever thanks to this feature, meta-tourists can always communicate with victims of major disasters, tragedies, and wars, or simply with their deceased family members and loved ones.

Metaverse and underlying XR, AI technologies could also be beneficial in terms of educating tourism employees, students and customers. In addition to entertainment or escapist experience, education experience found to has a positive effect on the perceived value and the intention to continue use based on the statements of users who explained that they learned something new while experiencing Metaverse, that this experience made them curious and that this experience was an educational element [45]. The education Metaverse abbreviated as 'Edu-Metaverse' is an infinite virtual space, which allows learners to create their relationships with others, to enhance their engagement, to increase creativity and build an interactive content via human–machine collaboration in an imitated extension of the real world [35] (p. 1179). Metaversity is seen as a utopian concept with the help of technologies such as AI, machine learning, photorealistic visualization, and digital twins which make Metaversity experiences closer to a possible reality [47]. An advantage of Metaverse education that is not possible in the real world is that it can connect the past, present and future with the logical time integration of the learner's virtual avatar [90]. Adoption of AI by the hospitality employees positively associated with job performance and satisfaction of the employees enhancing their creativity, innovativeness, and job learning [26].

Last of all, the most crucial advantage that can be considered in parallel with all these benefits of Metaverse and XR technologies is explained as fully immersive virtual experiences contribute to a sense of presence and creates positive attitudes, arouses intention to visit and revisit the attraction [1, 44, 82, 30].

B. Current Metaverse, XR and AI Practices Applied in the Tourism Industry

Metaverse and underlying technologies are currently adopted by many different brands in the tourism industry. The purpose of this section is to create an idea and develop an understanding of the benefits these technologies will provide by analyzing the prominent applications rather than listing all existing practices completely. To state a common benefit that covers all these sub-groups, it is stated that companies' initiatives to build and produce their services on a single digital ecosystem in the Metaverse will enable customers to use the "try before you buy" opportunity to explore the interiors of hotels, restaurants, airplanes, tourist attractions, or any tourism service without leaving the comfort of their homes [33].

1) Transportation industry

When we look at the aviation industry, it is seen that both airline companies and their customers benefit from these technologies. Adopting AI to optimize airline operations, Lufthansa Group has become more customer-oriented and saved approximately 8,700 tons of CO_2 in 2022 allocating the aircraft and routes precisely with the help of AI. After considering the crew availability and locations, weather forecast, passenger demand and aircraft maintenance status, AI suggests scenarios, which are accepted by operation controllers with the rate of 90% [23]. The Japan-based First Airlines Company, which started virtual flights from Tokyo, has 100% occupancy to many destinations such as Hawaii, New York, Rome, and Paris [33]. Singapore's award-winning Changi Airport extends from the physical world to ChangiVerse - the virtual world by collaborating with Roblox platform [12]. Southwest Airlines announced an in-flight moving map application to its customers flying to all Southwest destinations allowing passengers to benefit from AR and watch some short videos [46]. Similarly, Emirates launched the first airline VR application in Oculus Store. With the help of an interactive 3D seat map, passengers can figure out what their seat will be like and book their selected seat from that VR environment [67]. Launched by Turkish Airlines, a simulator 'Hezarfen Flight Experience' located at İstanbul Airport allows passengers to experience the flight between Galata Tower and Maiden's Tower of Hezarfen A. Çelebi, who played an important role in history, by wearing VR glasses, see many other historical structures of Istanbul and at the same time feel the wind and flight movements [78]. VR could help tourists to be inspired to travel remote destinations after their VR experiences encourage them by enlightening the issues such as the duration of the journey, the features and comfort of the type of transportation etc.

2) Accommodation industry

With the help of virtual platforms, hoteliers are now able to provide their customers a 'try before you buy' experience, which raises the direct booking rates and hotel revenues. Many hotels and resorts could deliver their customers virtual itineraries about the historical places, landmarks or museums nearby as well as more personalized itineraries based on visitors' needs and likings [83]. As the world's first hospitality group operating a hotel in the virtual world, the Millennium Hotels and Resorts created 'The M Social Decentraland' in

2022, where guests are guided with an avatar in Metaverse. Similarly, hotel groups like EV Hotel Corporation and CitizenM are starting to develop virtual hotels in Sandbox to engage hotel guests with similar interests [73]. A hospitality brand, Leven, is launching a Metaverse hotel wherein tourists from all over the world could interact in a fun virtual hotel atmosphere [46]. In addition to developing and operating digital hotels across different Metaverses, a platform called 'Metaverse Hospitality' also provides consulting services to stakeholders interested in onboarding their hotel in Web3 [56].

3)   Sight-seeing and entertainment

The high-tech accessories like Google Glass or Oculus Rift provides tourists multi-sensorial experiences in virtual tourist destinations in which human senses such as smell, vision, and taste are stimulated [58]. With the help of this technological advancement, virtual tourist destinations could provide better entertainment options such as virtual museums, festivals, concerts, conferences, F&B alternatives in Metaverse environment, virtual zoos and theme parks. Virtual travel allows the experience of hard-to-reach, remote or protected places, for example, places such as Argentina's most famous mountain landmark-Monte Fitzroy and the glacier lake can be experienced with the Patagonia virtual reality experience on Oculus Rift [22]. Thanks to the Oculus remote control, tourists who reach the turquoise blue glacial lake- Laguna Sucia, which is reached with a difficult hike at the foot of the mountain, can take off like a winged bird, fly around the lake, visit the lakeside waterfalls and snowy plains under the mountain peaks, and learn about the geology and history of the region through various narratives [54]. The customers can also be physically present at the destination and access virtual resources through Metaverse to enhance destination interpretation. Using XR gadgets, the visitors can experience volcano eruptions or ancient ceremonies in archaeological temples [66]. Many museums, cultural heritage sites, and tourist attractions, which were distant from the virtual environment before the pandemic, have later launched virtual tours. The Vatican Museums, the New York Botanical Garden, and the Eiffel Tower are among these attractions which have initiated virtual tours [25]. The Chinese domestically produced Metaverse 'XiRang' can welcome up to 100,000 participants for a variety of cultural activities with historical Chinese components including the ancient Shaolin Temple, Three Body Museum, and Baidu's Creator City region [50]. At the point where Metaverse has reached today, visitors are able to interactively explore the marine life and ocean science topics via virtual exhibitions [4], the Giza pyramids have been opened to visitors in a virtual environment with the Harvard University Giza Project [21], Thomas Cook travel agency has organized virtual reality trips that offer a series of virtual reality holidays on the Samsung Gear VR [84].

Meta-museum is developed to connect artists and collectors through Metaverse in an immersive way taking submissions from visual artists to participate on collaborative NFT collections [55]. In addition to museums, visitors could experience zoos with the help of these technologies. The world's first hologram zoo by Axiom Hollographics opened in Australia providing Arctic journeys to prehistoric times with dinosaurs and undersea animals, African safaris or travels to lesser-known zoo animals. This AR type zoo, which is thought to be more ethical because it does not lock animals in cages in real life, is planned to be opened in other locations such as Texas, Japan, and Europe in the future [8]. Another important development that contributes to the sightseeing activities of tourists is the AR-supported navigation in the Google Maps application which can be used both indoors and outdoors to show augmented directions to tourists [10].

4)   Food and beverage industry

At the meeting point of the food and beverage industry and Metaverse, XR and AI technologies, it has gone far beyond the use of robots that only serve orders in restaurants. For example, Le petit Chef has been using AR to provide an immersive dining experience for more than two years. Currently, they provide five-course meals with VR theater to guests where they could follow an animated chef through a multisensory tasting menu, listen to a story of the history, ingredients and cooking techniques used to make these dishes [79]. It is reported that a lounge called MetaTerrace with a view of the Dubai skyline and the Burj Khalifa was opened by ColossalBit Company [68]. Accessible through AR and VR, people will be able to meet others with similar interests, engage in NFT and cryptocurrency discussions, trade and book most cryptocurrencies and blue-chip NFTs while having drinks.

Many international companies, which are preferred by tourists during their trips abroad because they are familiar with them, have initiatives in this regard. KFC and McDonalds launched NFTs, Starbucks has released an NFT-based loyalty program where users can collect digital stamps and exchange them for free coffee. Papa Johns Pizza chain announced a collection of 19,840 NFTs of bags that customers can get for free after scanning the QR code seen on a flyer or pizza delivery confirmation email [88].

5)   Use of Metaverse, XR and AI technologies for educational purposes

Metaverse and underlying technologies inform users on many topics of their choice. Meta-museums educate people culturally, as well as directly educate tourism employees, tourism students and tourists. Metaverse could be well utilized in education for developing skills for industry professionals while digital twins could support the implementation of ideas and concepts of the physical world in Metaverse-education to create a more realistic, innovative, user friendly and virtual-physical blended education design [57]. Providing learnings solutions in the Metaverse, a global company called VRHTI delivers face to face and virtual training for the hospitality industry. There are various alternatives all in the Metaverse such as a virtual hotel, an accessible hotel room for disabled tourists, a training restaurant where you can visit, choose your avatar and learn via real life workplace situations [85]. Similarly, a virtual training game called 'Hotel Simulation' is designed for tourism managers, management trainees and hospitality students to train the participants by dividing them into teams to assign various tasks of running 500 room hotels in a competitive VR marketplace. Every management team in the game must manage hotel operations, capital investment decisions, marketing and distribution, pricing correctly and, as a result, perform well in terms of market share, total revenues,

occupancy levels, RevPAR, ADR, and net profits [32]. ClassVR provides AR/VR portals, which enable teachers to direct student attention and to easily send content including travel, tourism and history topics for various levels [14]. SSDA (The South of Scotland Destination Alliance), provides a multi-disciplinary educational content from history, science, English and art to storytelling, sport, music, and design. Collaborating with an award-winning inspire learning team, they design lessons and activities for students aged 3 to 18, combining local stories and technology in Metaverse, and also give local young people the opportunity to work with popular tech company New Frontier [74].

C. Criticisms about Metaverse and Underlying Technologies

Besides all these mentioned advantages, Metaverse and underlying technologies also receives negative criticism from psychological and sociological disciplines. Virtual reality may negatively affect the perception of reality in societies and the consumers' sense of belonging due to the shifts between two lives [61]. Management of sensitive data that will spread through the Metaverse [59]. Like this view, attention is drawn to the potential risks of privacy control, misuse of personal data, challenges in necessary law formulation for Metaverse, addiction to virtual activities and health related problems result from the use of these technologies [2].

Some researchers [17, 80, 81] object to the studies listing the positive effects of such virtual platforms on the environment and claim that these universes consume more energy due to the use of high-tech. The project called 'sustainverse' carried out at Middle East Technical University (METU) is based on the hypothesis that the Metaverse will require high energy in the future. However, after TRUBA (Turkish National e-Science e-Infrastructure) analyzed data about the daily energy consumption of cloud systems and data centers (supercomputers, storage, and networking devices), the results show that there will be less energy consumption in the future [27].

III. METHODOLOGY

This study was carried out to examine the effects of Metaverse on the tourism industry and providing suggestions on adopting Metaverse for the benefit of the tourism sector. Research questions were created based on the literature review. Depending on the research type and main research question, between 10 and 50 participants are regarded as being sufficient in qualitative study designs by some researchers [15]. Data needs to be collected through in-depth interviews with people who have experience on the research subject and whose numbers vary from 5 to 25 individuals for phenomenological studies, which aim to derive a universal explanation from the personal experiences of participants regarding a concept [65]. Similarly, as the purpose of this research is to obtain a detailed understanding of the experiences, perceptions and comments of the participants who are knowledgeable on the subject, a qualitative method is adopted. Initially, 50 participants were targeted to be reached based on the statements underlined by references [15, 60] and then, the research was completed with 28 participants, considering that theoretical data saturation was reached. While searching for answers to issues to be discovered, data was collected from those professionals who

agreed to participate in the research by in-depth interview method, which can provide the researcher with an in-depth and versatile perspective on the tendencies, social activities and assumptions of the interviewed individuals [43]. The semi-structured interview forms are formed since they enable establishing relationships between concepts and themes and allowing rich data to be collected [3]. The two initial interviews were conducted with the experts on the study topic (I1 and I13), to shape the research based on their suggestions and comments. Sample was selected with snowball sampling relying on the referrals from initially sampled participants. The main inclusion criterion for participants was that they were recommended by the initially selected experts in the snowball method. Additionally, in the selection of participants, attention was paid to include those who either have Metaverse, XR or AI experience, or those who are the founders, entrepreneurs or employees of the companies operating on the field of related technologies. As can be seen in Table 1, the participants also consist of those who have academic studies on the subject or who personally use these technologies in education, or who are working in tourism industry and have knowledge on so-called technologies at the same time.

TABLE 1. CHARACTERISTICS OF THE INTERVIEWEES AND RELEVANCE TO THE STUDY

Identifier	Characteristics of the Interviewees and Relevance to the Study
I1	Academician / has publications on Metaverse & Tourism
I2	Founder of a Blockchain & Metaverse Academy / Digital Currency Trainer
I3	Academician / has publications on Metaverse & Tourism
I4	Independent AR developer / teaches machine learning in high school degree
I5	Academician / has publications & projects on AI and smart tourism
I6	Academician / has publications on Metaverse & Tourism
I7	Academician / teaches courses in Metaverse platform university degree
I8	Owner of an IT Company & AI Entrepreneurship
I9	General Manager of an F&B Business located in a university campus
I10	Academician / lectures in VR environment since 2020
I11	Finance Director of an international chain hotel which launched NFT's for customers
I12	Owner & Chef of a popular restaurant in US
I13	CEO of an XR Company / Executive Board Member of Open AR Cloud Association & Metaverse Standards Forum
I14	Procurement & Contract Manager of an international chain hotel
I15	Movie Producer & master student / employed in the field of art adopting technology
I16	Owner of a software company serving AR-VR–XR content
I17	Founder of an XR Entrepreneurship
I18	Researcher on Smart Cities & Digital Twins / Strategic partner of a high-tech company in London
I19	Space Architect & Engineer / Project architect of Think Orbital (a Space Tourism Project-Delaware)
I20	Tourism & Financial Investment Consultant / Services include Blockchain, XR & AI technologies
I21	Designer & Instructor of VR spaces in a US university
I22	Banker & Stock market investor / Blockchain follower
I23	R&D Natural Language Processing Engineer / AI Expert
I24	Founder of a software company that combines Metaverse & XR with Gamification & Blockchain technologies
I25	F&B Director of an international chain hotel which adopts NFT's / involved in project creation
I26	Academician / Department Chair in Business and IT / Actively uses AI
I27	Sales & Marketing Specialist of a well-known airline company which adopts AI for its operations
I28	Academician / Metaverse and virtual destinations project consultant / focuses on sustainable tourism

The interview forms were delivered to the interviewees in a planned and systematic manner during face-to-face meetings, and when necessary, interviews were conducted by phone or recorded Zoom meetings from November 2023 to January 2024. All information used in the analysis step was derived from interview data. To examine the data, content analysis, an evaluative frequency analysis method which summarized the information gathered from interviews in relation to replicability, was conducted by the author manually. The specific characteristics of the messages as well as the repeat number of statements were identified. The study findings were presented via ethnographic summary technique, which is an exploratory and qualitative method that allows the meanings of individuals' / organizations' behaviors and thoughts to be conveyed in a narrative form [36]. After the interviews were transcribed, the most important parts of the participants' statements, emerging comments, and repeated sentences were quoted in parentheses with a nomenclature of interviewees I1–I28. Table 1 summarizes the characteristics of the interviewees.

IV. FINDINGS AND DISCUSSION

This research was conducted with interviews lasting an average of 48 minutes with 28 experts, who were knowledgeable about the subject and agreed to participate out of 50 individuals. 27 of the participants, except one, were men. The age average of the participants, of whom 93 percent were found to have experienced relevant technologies, is 37. As seen in Table 1, participants come from very different backgrounds and their work locations vary geographically; the majority of 12 interviewees work in America, 10 experts work in Türkiye and 2 of them work in England. Additionally, one person each from Estonia, France, Greece, and Sweden participated, which is important in terms of providing ideas free from geographical bias in the research.

First, the answers given by the participants about how the developments in Metaverse, XR and AI technologies will affect the marketing of touristic products and destinations were analyzed. It was determined that 93%, a significant majority of the participants thought that these technologies would support the marketing of touristic products and destinations. These professionals generally base their opinions on the fact that since tourists will experience the touristic products they want to buy or the destinations they want to visit through these technologies in advance, their curiosity will be awakened and participation in physical tourism activities will increase. This finding is parallel to the previous studies of [1, 53, 63, 72], also coincides with the author's initial predictions. Half of the interviewees (16 people) indicated that Metaverse will be a complement to traditional tourism. 20 interviewees who think that these technologies will positively affect tourism marketing also assume that these technologies will increase tourist satisfaction. In this context, relevant technologies will positively affect tourists' revisit or repurchase behavior. When it comes to its impact on guest loyalty, 10 participants mentioned that there is a positive relationship, while 6 interviewees emphasized that the effects of Metaverse to tourist satisfaction and loyalty will vary depending on the age and personality of the users. An interviewee (I3) states that;

"just as tourists prefer to go online and decide by looking at the 2D pictures or 360-degree videos of a hotel on Tripadvisor before going somewhere, the Metaverse allows us to become familiar with touristic products and services through our 5 senses. Thanks to the tourists' correct expectations, the difference between the services they receive, and their expectations will be minimized, which will positively affect tourist satisfaction".

Confirming past researchers [51], CEO of an XR company (I13) adds;

"when a tourism stakeholder (hotel, airline, restaurant, etc.) adopts such technologies, it creates a positive impression on tourists since the company is confident and can offer their services and products to guests in the virtual environment. It also provides competitive advantage for companies and can increase tourist satisfaction in this respect".

The finance director of an international chain hotel (I11) gives an example *"we give the guests staying at the hotel a photo of themselves with an NFT as a welcome gift instead of wine, fruit plate, etc. Leaving a note with a QR code to guest's room, we both surprise the guest, increase his/her satisfaction and make them more loyal to our brand with this practice".* The statement that Metaverse and underlying technologies can offer more personalized, tailor-made experiences is a recurring comment of 61% of the respondents.

An AI expert (I23) suggests that "*AI can offer personalized travel recommendations by analyzing data such as tourists' interests, preferences and past travel experiences. This can help industry players develop more effective marketing strategies and offer tailored holiday packages to potential customers".*

Interviewees were asked about how developments in Metaverse, and underlying technologies would affect and benefit existing tourism businesses, and their detailed answers based on various concrete examples were gathered. A participant (I19) had this to say *"AI provides tourists with great convenience in foreign languages as a translation tool. Tourists traveling to different countries can get support in the language they want while communicating with the staff at the hotel reception, on the plane, or trying to read the descriptions of historical artifacts in museums".* An academician (I26) asserts that;

"transportation companies have the potential to develop an AI-driven virtual assistant to simplify the booking process and provide informative responses to customers' specific queries. AI can assist in optimizing routes, offering insights into weather and road conditions, making tailored recommendations, analyzing data, supporting in forecasting, and predicting outcomes. Therefore, it ultimately leads to cost reduction, time savings, enhanced guest satisfaction, and improved profitability through efficient cost management".

Statements underlining the timesaving of these technologies in tourism were repeated by 13 more participants.

Some paramount answers to the question about how these technologies become beneficial to transportation companies, accommodation facilities, sightseeing and entertainment businesses and destinations are as follows;

"various countries facilitate the use of these technologies in museums. Historical artifacts can be revived with their missing parts and ancient stories. Even without VR glasses, historical buildings can be visualized in the virtual environment, inhabitants of that period can be depicted, and touristic areas and activities can be simulated (I2)".

71% of the participants emphasized that "meta-museums are very convenient and educational for the tourists". 12 interviewees stated that these technologies will positively impact cultural tourism by enabling time travel and understanding the history of destinations. An academician suggests that 'through the Metaverse, concerts, museums, festivals, fairs and any meta-recreational activities can be simulated, increasing their accessibility to a global audience. XR platforms can simplify the process of buying tickets and attending virtual events'.

Regarding F&B industry an owner of a popular US restaurant (I12) argues;

"in F&B industry there is a trend of return to historical techniques and flavors, and Metaverse could be used for educational purposes on old-time cooking techniques and ancient recipes by traveling through history. For example, we may have the chance to see, visualize and learn many details, from the palace cuisine of the Ottoman Empire to the technique of cooking Sumerian dishes in golden pots".

Founder of an XR company, which is currently designing restaurant menus with AR emphasizes that 'tourists will only need to scan the QR code on their phone and then they will be able to see the menu items, the ingredients, portion size, price and the interior atmosphere of the restaurant (I17)'. Some comments about the reflections of relevant technologies on airline companies are as follows; 'these technologies can be used as AR way finding at large airports (I13)'. Another participant (I20) claims that; *"transportation companies will be able to offer experiences such as playing games or continuing their journey by learning the history and culture of the places seen while looking out the window via VR glasses to prevent passengers from getting bored".* Sales and marketing director of a popular airline company (I28) asserts that "*our company adopts AI and benefits greatly. When processing flight data, predicting occupancy rates, reporting, and calculating load factor, AI speeds up the work by providing more accurate and clear predictions".*

46% of the participants who are expected to evaluate Metaverse and related technologies in terms of their impact on tourism employment assume that these technologies will create new job opportunities in the tourism industry. 32% of the interviewees expressed an abstaining opinion on the subject drawing attention to both positive and negative details about employment, and 3 participants mentioned that it would negatively affect employment causing the extinction of some businesses in tourism. However, it was understood that none of the participants perceived the Metaverse and related

technologies as a threat to their profession in the short term. An interviewee (I1) expresses *"the demand for the sector will also increase as Metaverse will be a complement to tourism and used as a marketing tool. As a result, an extra workforce will be needed to meet the increasing demand, creating new job opportunities in tourism".* With a different perspective I6 suggests that;

"Metaverse causes gradual replacement of physical hotel staff with avatar operators. Using Metaverse does not cause job lines to disappear but changes the employees' titles. There may be a need for fewer receptionists but more content developers, block chain experts, digital marketers, cybersecurity experts or meta-tour guides in Metaverse. Office-based work will probably evolve into an online and home-based working environment".

I13, who made a similar comment about flexibility in working conditions, explains as follows, *"meta-guides will increase and, a guide who will explain Peru will be able to guide remotely even if he/she is in Germany after Metaverse becomes common in medium term".* An F&B director (I25) points out that *"after the adoption of AI, although certain manual positions would be depleted by time there would still be a need for a human touch to adjust and monitor the set-up phase in Metaverse or AI".*

Another issue explored during the interviews was how the use of Metaverse, XR and AI in tourism activities would affect disabled, elderly and low-income tourists. 75% of the interviewees consider that these technologies will positively affect the participation of disabled and elderly to tourism activities without having to relocate, which support the current studies [64, 71]. The majority of the interviewees think that these technologies will also be a good alternative for low-income groups. The remaining participants consist of those who think that these technologies and related equipment are costly. An interviewee clarifies;

"with these technologies, people with mobility issues can access virtual tours and experiences from home, making tourism more inclusive. Audio descriptions of virtual environments can be incorporated into XR, enabling visually impaired individuals to understand and enjoy them. AI-driven closed captioning can help those with hearing impairments understand virtual events. For low-income individuals, Metaverse and XR offer cost-effective ways to explore destinations remotely. By using AI, cost-conscious travelers can make informed choices about budget-friendly options while elderly tourists with medical conditions can receive healthcare support and recommendations remotely during their travels (I26)".

An IT company founder (I8) mentioned that there are minorities outside these three groups that will benefit from the use of these technologies in tourism *"it could also serve as an alternative for solo travelers that might hesitate to visit some countries or for women who have the same concern about visiting some countries due to gender-related considerations or for those with fear of flying".* Another participant (I7) states that *"Metaverse is a solution for tourists who cannot visit some countries because they cannot obtain a visa, or for those who cannot go to countries that they consider risky such as*

Mexico". Similarly, 14 participants stated that the Metaverse reduces the risk perceived by the tourists. It is expected that these ideas will bring a new perspective to the literature.

Considering the financial requirements of these technologies an owner of a software company (I16) claims that *"by just paying $10 for a virtual gala, a financially challenged person can meet other wealthy class attendees at an elite show, feels better by entering noble environments that he cannot participate in real life. Thus, these technologies could prevent social class discrimination"*. A digital currency trainer (I2) suggests that

"these technologies can be costly, like Apple's latest glasses, which has reached 3500 dollars. However, as usage becomes widespread, costs will decrease and tourists will turn this initial investment into profit over time; if a tourist wants, he can take a bird's eye view of London one day without transportation cost, can visit a museum half an hour later without paying again, move to another destination or participate in a touristic event on the same day".

Three participants also advised that central authorities, municipalities, provincial cultural tourism directorates can initially provide VR services with some trial rooms and offer a free Metaverse experience to these minority groups to familiarize them with it.

Interviewees were also asked to evaluate the use of these technologies in tourism in terms of environmental sustainability. The attempt was made to understand whether it is more sustainable to carry out touristic activities in a virtual environment in terms of water waste, food waste, pollution, energy consumption etc. The majority, of 61% of the participants think that these technologies are more sustainable, and ideas in this regard are compatible with the literature [2], [13, 31, 70, 76]. For example, I21 states that *"Metaverse tourism can reduce the energy consumption and carbon footprint caused by transportation and accommodation because tourism takes place in a virtual environment, unlike physical travel. Food waste, air, water and noise pollution are reduced in virtual tourist activities"*. Drawing attention to a different point, I8 argues that;

"in physical tourism activities, many means of transportation, passenger planes, land transportation vehicles, rail systems, etc. are used and worn out. Even reassembling a Boeing would still require energy, and this would again increase carbon emissions. Tourists also cause wear and tear of vehicles, facilities, buildings etc. used by local people, depletion of local food, pollution of oceans and seas, etc. If we evaluate these holistically, Metaverse tourism is definitely more sustainable".

Consistent with literature [20], a blockchain academy founder (I2) considers *"by not physically visiting museums, palaces, etc., the historical artifacts will not be damaged. Touristic products with historical and archaeological importance can be left to future generations much more efficiently without being spoiled. Metaverse provides an advantage for historical places that have carrying capacity problems, such as Hagia Sophia today"*. 8 additional participants expressed a common opinion about the benefit of these technologies regarding carrying capacity. In addition, 5 interviewees agreed that Metaverse will support sustainable tourism thanks to its function of educating tourists and hoteliers about being environmentally sensitive. 8 participants who were hesitant about whether Metaverse tourism is sustainable or not generally stated that they were undecided because the infrastructure required by this technology, data mining, blockchain technology, servers, coolers, etc., also requires serious energy consumption. Some have emphasized that although this technology is not environmentally friendly in the short term, it will become sustainable in the long term via greener energies as its use becomes widespread and as technology develops. There are 3 participants who believe that Metaverse tourism is not environmentally sustainable, and they express their opinions as follows *"VR and AR will support the marketing of touristic products and they are promoted to be experienced in real life. As a result, Metaverse cannot prevent but may increase the negative effects of tourism activities (I4)"*. From another perspective, I26 argues that;

"virtual environments consume electricity, and based on the energy sources they use, this can negatively impact the environment. Virtual tourism can make destinations accessible to individuals with disabilities that limit their participation in physical tourism, increasing accessibility and related environmental damage. Moreover, if not managed responsibly, electronic devices used in Metaverse tourism can contribute to electronic waste".

5 participants, including those who find the use of these technologies in tourism beneficial in terms of environmental sustainability, argue that they are not economically, socially and culturally sustainable. An academician (I5) explains *"by 2030, the number of physical tourists will decrease, which will be positive for environmental sustainability but negative for social and economic sustainability. Displacement of small tradesmen and local people may trigger social problems and increase crime rates in society"*. Similarly, I26 suggests *"people do not have equal access to the internet, or the technology required for Metaverse, which results in further inequalities. Physical tourism supports local economies and generates revenue through various occupations, which virtual tourism may not be able to replicate"*.

Finally, participants were asked to evaluate the use of Metaverse and underlying technologies in tourism with its positive and negative aspects, without subject restrictions, and the answers given to this open-ended question enabled different perspectives to be enlightened. 68% of the interviewees believe that the use of Metaverse and related technologies in tourism education will be beneficial. A researcher on smart cities and digital twins (I18) adds *"Metaverse can be utilized for conducting virtual crisis simulations and preparedness training for tourism industry stakeholders to handle emergencies effectively"*. A participant (I16), who manages the virtual education content of 17 universities in Türkiye, states *"I can claim that the most important contribution of these technologies to education is digital twins. Metaversities are becoming more attractive today than brick-and-mortar schools"*. Another interviewee (I24) asserts that;

"thanks to these technologies, tourists will not perceive tourism as limited to this planet. In the long run, there will be initiatives to increase guest satisfaction and to broaden their horizons. I had the chance to see Mars in person with VR glasses at NASA Space Center and to experience the visuals they created by taking 360 degree or animatic renderings. A project is planned to be implemented in 2030, with the aim of creating a Nasa Space Hotel for tourists, so that travelers can see a hotel in space and have the chance to experience gravity-free tourism".

Two participants (I10 and I17) stated that Metaverse will create egalitarian tourism in the following ways: *"'people can be encouraged to overcome their shyness and fragility without being exposed to physical prejudice, thanks to their avatars. People who are treated equally with other virtual tourists without any bias regarding their nationality, religion, gender, appearance, height, weight etc. could be helpful to overcome some communication problems".*

Some opinions of those who evaluate the Metaverse regarding its disadvantages and risks are as follows; *"Metaverse and underlying technologies may cause robotization of human tourists (I5)". "Tourists who are excessively exposed to these technologies may become lazy (I1) and Metaverse may lead to digital addiction, especially in the younger generation (I23)".* The risk of addiction is mentioned by 9 more participants. A space architect (I19) claims that;

"in Metaverse tourism, we are limited to what content producers and marketers offer us, but if we participate in traditional tourism as tourists ourselves, we are the ones who decide. We can be surprised by what the outside world offers us. Additionally, the Metaverse can trigger dissatisfaction. When people take off their VR glasses and return to interact with the real world, they may not like reality".

Consistent with the previous studies [2], 8 interviewees mentioned the fact that *"These technologies have some risks like cybercrime",* and 5 of them point to the threat of cyberbullying. 43% of the participants stated that these technologies would cause various health problems due to technological devices like headsets, VR glasses or wearable suits and inactivity. These include cyber sickness, sleep disorders, anxiety, obesity, eye problems, dizziness, headache, nausea, etc. Another participant emphasizes the issue of ethical violations;

"all those popular brands like Google, Facebook, Microsoft are collecting biological data via wearable suits, VR glasses, headsets etc. and the data may also be traded by these companies. They will be able to know where we focus on via eye trackers. After following our brain activity, they can know when we are happy, afraid, sad etc. with the help of all those biometric data (I6)".

The Metaverse has received various criticisms regarding its artificiality.

"human is a being who has emotions and improves himself by traveling and observing the outside world. I think Metaverse technology is an application that limits tourists' human activities and pushes them into a fake world by tearing their feet off the ground and their mind from real life (I15)".

Having similar opinions I26 asserts *"there is also a risk that virtual experiences will lack the authenticity and cultural richness of real-world tourism, putting cultural heritage tourism at risk".*

Considering the arguments that touristic activities in the Metaverse are far from the perception of reality and therefore will not satisfy or entertain the tourists sufficiently, various technological developments, projects and initiatives are being carried out continually to narrow the gap between meta-tourism and traditional tourism. For example, Mark Zuckerberg's Meta is working on a vibrating glove that could detect sensations to make people feel more immersed in virtual reality [24]. HaptX Company has been working on haptic gloves, which provide realistic touch sensations in virtual reality by using hundreds of microfluidic actuators across the fingers and palms for better tactile feedback [37]. A Sony-backed company, H2L, has developed a product with an armband to detect the flexing of human muscles, allowing it to replicate the body movements of the user's avatar in the Metaverse and feel people's body presence and weight. This technology uses electrical stimulation to manipulate arm muscles and mimic sensations such as catching a ball or feeling a bird pecking the skin [75]. Thanks to these initiatives, tourists may find the Metaverse environment more satisfying and participation in meta-recreational activities or virtual sports may increase.

Like many researchers conducting this type of empirical studies, the researcher expected to reach concrete answers and did not foresee that the participants' answers would vary depending on the characteristics of the Metaverse users in question or on the short-medium-long-term future of the Metaverse. However, it has been realized that on a subject such as Metaverse tourism, which is based on extremely current and rapidly developing technologies, it is reasonable and may be more useful to present the possibilities based on justifications rather than making very definitive judgments.

As can be seen from the interviewee opinions, attention is drawn to both the benefits and risks of Metaverse tourism. How tourists use these technologies is similar to what an author writes with his pen since what can be scrawled with this pen depends entirely on the will of the writer. Metaverse tourism may benefit the tourism stakeholders or vice versa depending on the use cases. Fig. 1 was organized by the author by blending existing literature and study findings in a holistic manner.

This figure explains that the users of Metaverse tourism consist of virtual tourists and that the context of experience they will have while participating in virtual communities with their avatars can be the virtual world, the real world, or both. At the same time, various technological tools that Metaverse tourists will use to make virtual payments or to enhance their experience while participating in meta-recreational activities such as virtual concerts, Meta-museum visits, virtual games or virtual shopping are listed in this figure. While the accommodation form of Metaverse-tourism appears as MetaHotels or MetaResorts, the use of this technology in

education is realized thanks to new formations such as Edu-Metaverse or Metaversity. The use of Metaverse in education as well as the Meta-recreational activities in which Metaverse tourists participate, increases the tendency of tourists to physically visit the destination or purchase the real tourism product. Confirming the previous research [45], education experience via Metaverse positively affects the perceived value and intention to continue use. While training tourism employees through these technologies probably increases

service quality and reduces possible errors, educating tourists with the "try before you buy" concept actually serves to arouse curiosity and prepare them for the physical tourism experience. The virtual tourist, who has the chance to experience his dream holiday in advance with VR simulations or who can learn the details of the product or service he will buy thanks to AI and discover new alternatives, will later turn into a physical tourist. Finally, the benefits of Metaverse tourism and some controversial topics are listed on the right side of the Fig. 1.
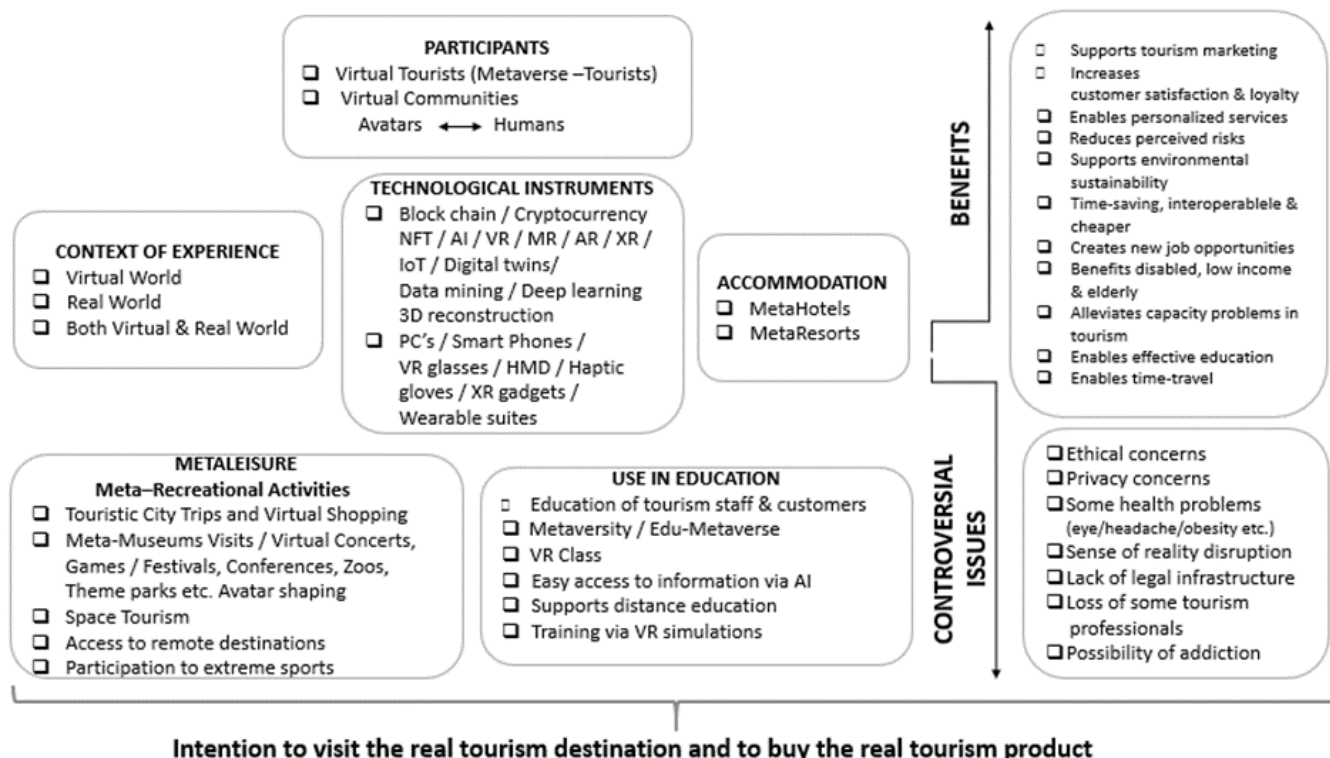

FIG.1. CONCEPTUAL MODEL OF METAVERSE AND TOURISM

TABLE 2. THE MAIN STUDY FINDINGS

The effects of Metaverse, XR & AI technologies on tourism marketing	These technologies support the marketing of touristic products & destinations (93%)	These technologies will be a complement to traditional tourism (50%)	They will increase tourist satisfaction (72%)	They will increase tourist loyalty (36%)	The effects of them on satisfaction & loyalty depends on the users' age & personality (22%)	These technologies can offer more personalized experiences (61%)
The effects of Metaverse, XR & AI technologies on existing tourism businesses	These technologies are time saving (50%)	AI provides various conveniences to businesses & their customers (cost management, as a translation or way finding tool etc.) (78%)	Meta-museums are very convenient & educational for the tourists (71%)		These technologies will positively impact cultural tourism by enabling time travel & understanding the history of destinations (43%)	
The effects of Metaverse, XR & AI technologies on tourism employment	These technologies will create new job opportunities in tourism industry (46%)	They will both have positive & negative effects on tourism employment (32%)		They will negatively affect employment, causing the extinction of some businesses in tourism industry (11%)		
The effects of Metaverse, XR & AI technologies on disabled, elderly and low-income tourists	These technologies will positively affect the participation of disabled & elderly to tourism activities (75%)	These technologies will positively affect the participation of low-income tourists to tourism activities (68%) These technologies & related equipment are costly (32%)		These technologies would benefit other minorities (solo travelers, women etc.) They reduce the risk perceived by the tourists (50%)		
The effects of Metaverse, XR & AI technologies on environmental sustainability	These technologies are more environmentally sustainable (61%)	These technologies offer an alternative to the carrying capacity problem (29%)	They help educating tourism stakeholders about environmental sustainability (18%)	They both have positive & negative effects on environmental sustainability (28%)	These technologies are not environmentally sustainable (11%)	
The pros & cons of Metaverse, XR & AI technologies	They will be beneficial in tourism education (68%)	These technologies would cause various health problems (cyber sickness, sleep disorders, anxiety, obesity etc.) (43%)	These technologies may cause a risk of addiction (36%)	These technologies creates the threat of cybercrime (29%) & the threat of cyberbullying (18%)	Technologies are not economically, socially & culturally sustainable (18%)	

This study may gain more importance in the coming years since it is carried out with the help of the opinions of human participants, whose thoughts have not yet been distorted. To clarify, AI is criticized for its usage to convince large groups since it becomes superior to humans at persuasion with the help of 'Alpha Persuade' effect [41]. In the future, AI will be able to manipulate the perception and opinions of both tourism stakeholders and ordinary citizens through the content they are exposed to and the social media accounts they follow. As a result, such studies may not be carried out by free-thinking authors with the inclusion of human participants having original ideas. Literature may become the product of a single superior mind, AI. For this reason, it can be concluded that the results of this study, which addresses a relatively up-to-date issue by blending individuals' perspectives with the current literature, are perhaps among the latest studies, which reflect the original will of the human participants.

The main findings of the research are summarized in Table 2.

V. CONCLUSION

The study tries to reveal how Metaverse, XR and AI technologies can be adopted by tourism stakeholders effectively and presents the associated risks and criticisms so that precautions can be taken. Previous studies have suggested conceptual framework on Metaverse and tourism intersection. This research makes theoretical contributions to the literature firstly by validating the past research on some topics from the perspective of industry stakeholders and secondly enhancing the conceptual model with the inclusion of study results in a holistic manner.

The most far-reaching practical reference of the study is its feature of being a guide for the sector stakeholders. The current meta-tourism practices presented in this research can be a source of inspiration for all industry players who are considering incorporating these technologies into their operations, offers meta-tourists the chance to be prepared by knowing the benefits and risks in advance, and opinions quoted from the participants could be informative about how Metaverse can be used in tourism education.

The difficulty of making appointments to conduct long-lasting in-depth interviews with knowledgeable experts who had busy schedules prevented a larger sample size and was a limitation encountered in the research process. Future researchers may work with a larger sample size with a more balanced gender ratio of the participants and could investigate what possible motivations or hesitations meta-tourists would have. In addition, instead of challenges faced by the tourists such as the crowd of tourism destinations, finding suitable flight tickets, or booking the last room in a hotel, what kind of problems may arise in Metaverse tourism can be determined to be followed by precautionary recommendations.

AUTHORS` CONTRIBUTIONS

The author declares that she prepared the entire study and carried out all processes herself.

CONFLICT OF INTEREST

The author declares that there is no conflicting interests.

DATA AVAILABILITY

The data supporting the findings of this study are available upon request from the author.

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