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Exploration of Virtual Tourism as an Independent Frontier Affected by COVID-19

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Polishchuk Elizaveta

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Name of Doctoral School: Doctoral School of Economic and Regional Sciences

Discipline: Regional Sciences

Head: Prof. Dr. Zoltán Bujdosó full professor, PhD, Head of
Doctoral School of Economic and Regional Sciences
MATE, Hungarian University of Agriculture and Life Sciences

Supervisor(s): Prof. Dr. Zoltán Bujdosó full professor, PhD, Head of
Doctoral School of Economic and Regional Sciences Research Professor,
Head of the Institute of Rural Development and Sustainable Economy,
MATE, Hungarian University of Agriculture and Life Sciences.

....

Approval of the Head of Doctoral School

Approval of the Supervisor(s)

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LIST OF ABBREVIATIONS

Three-Dimensional (3D)

Augmented Reality (AR)

Attention Restoration Theory (ART)

Brain-Computer Interfaces (BCI)

Behavioural Intention (BI)

Chief Executive Officer (CEO)

Confirmatory Factor Analysis (CFA)

Effort Expectancy (EE)

Electroencephalography (EEG)

Exploratory Factor Analysis (EFA)

Facilitating Conditions (FC)

Gross Domestic Product (GDP)

Grounded Theory (GT)

Habit (H)

Hedonic Motivation (HM)

Head-Motion Device (HMD)

Integrated Development Environment (IDE)

Mixed Reality (MR)

Pleasure-Arousal-Dominance (PAD)

Performance Expectancy (PE)

Partial Least Squares Structural Equation Modeling (PLS-SEM)

Price Value (PV)

People with Disabilities (PwD)

People without Disabilities (PwithoutD)

Social Influence (SI)

Stimulus-Organism-Response theory (S-O-R)

Sustainable Development Goal (SDG)

Self-Determination Theory (SDT)

Second Life (SL)

Stress Reduction Theory (SRT)

Tourism and Hospitality (T&H)

Butler's Tourism Area Life Cycle (TALC)

Technology Acceptance Model (TAM)

Technology-Organization-Environment theory (T-O-E)

Theory of Planned Behaviour (TPB)

United Nations (UN)

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Unified Theory of Acceptance and Use of Technology (UTAUT)

United Nations World Tourism Organization (UNWTO)

Value-Belief-Norm theory (V-B-N)

Virtual Environment (VE)

Virtual Reality (VR)

Virtual Reality Modeling Language (VRML)

Virtual Reality Tourism Involvement (VRTI)

Virtual Tourism (VT)

World Health Organization (WHO)

Web of Science (WoS)

World Trade Organization (WTO)

World Travel and Tourism Council (WTTC)

Extended Reality (XR)

1. INTRODUCTION

The goal of the Introduction chapter is to provide an overview of the historical and technological landscape, emphasizing the integration of personal computers and smartphones into everyday life and the emergence of virtual reality (VR) as a significant advancement. It highlights VR's potential to simulate real-world environments and enhance various experiences, particularly in the realm of tourism. The chapter sets the stage for the research by outlining the significance of VR and virtual tourism (VT) and introducing the focus on specific population segments, such as people with motor disabilities (PwD) and people without disabilities (PwithoutD).

1.1 Tourism

The inception of travel dates to the earliest existence of humanity, manifesting itself in various forms throughout history. In ancient times, nomadic lifestyles were necessitated by the pursuit of sustenance, compelling prehistoric individuals to move in search of food or to escape adverse weather conditions and possible enemies and predators (Kennedy, 2023). The establishment of settlements marked a shift away from constant wandering, leading to the emergence of travel as a means for economic endeavours. Merchants embarked on journeys to foreign lands to enhance trade prospects and seek better prices for their goods in the foreign lands (Department of Ancient Near Eastern Art, 2000).

The intertwining of travel with religious motivations became apparent as pilgrimage and missionary travel gained prominence. Pilgrims embarked on sacred journeys to revered places, while missionaries ventured abroad to propagate their beliefs. Simultaneously, the elite class, privileged in wealth and education, indulged in travel for educational pursuits, medical reasons, and leisure (Casson, 1994).

Advancements in technology, particularly the development of steam trains, cruise liners (Brooks, 2012), and civil aviation, ushered in a new era, democratizing travel for the burgeoning middle class. This shift was further catalyzed by the establishment of tourist companies, exemplified by pioneers like Thomas Cook in Europe (Singh, 2008; Kripps, 2019). These companies offered comprehensive travel packages encompassing transportation to and from the destination, accommodation, catering, transportation within the touristic destination, travel insurance, and a range of guided excursions, making travel a more accessible and widespread practice for mass tourism (Pons, et al., 2016).

The popularisation of traveling led to the creation of tourism organizations worldwide (e.g. UNWTO, World Travel and Tourism Council (WTTC), etc.), at the national level in most modern countries, and local governments and Destination Management Organizations (DMO). Their goal is to define tourism, classify different traveling by its purpose, and control the activity of the elements of the tourism sector.

Before the global COVID-19 pandemic in 2020, tourism stood as one of the most vital industries worldwide, contributing significantly to the global economy. In 2019, tourism's share of the global Gross Domestic Product (GDP) amounted to 10%, highlighting its economic importance (WTTC, 2020). The United Nations World Tourism Organization (UNWTO) reported that 1.3 billion people travelled globally in 2018, with a slight increase to 1.4 billion in 2019 (Blackall, 2019).

However, the emergence of the COVID-19 pandemic had profound repercussions, impacting not only tourists but also the millions of individuals employed within the tourism sector. UNWTO predictions estimated significant losses, including up to 1.1 billion international tourists, a staggering 1.2 trillion US dollars in export revenues, and the potential loss of 120 million jobs (Aljazeera, 2020). Governments worldwide implemented various protective measures, from mandatory COVID testing and mask mandates to complete lockdowns, exacerbating the challenges faced by the tourism industry.

Factors such as financial constraints, health concerns, and unpredictable circumstances contributed to people's reluctance to travel during the pandemic (Polishchuk, 2020). In 2022, certain governments still maintained special conditions for tourists entering their countries. In such a context, the integration of VR in the tourism industry emerges as a promising solution, offering accessibility to tourism experiences without the constraints posed by external factors or unforeseen circumstances. VR has the potential to make tourism available to everyone at any time, overcoming the limitations imposed by global crises and ensuring a more resilient and inclusive tourism sector.

The lockdowns implemented in Italy led to the rise of "digital home-based gastronomy tourism experiences" that catered to VT dining activities. These activities included remote social dining and partying, as well as online cooking classes and courses. The aim of VT in this context was to replicate gastronomic activities through video conferencing, to inspire actual visits to tourism destinations once post-pandemic travel resumes since it creates a pre-experience of a place (Garibaldi & Pozzi, 2020).

As humanity navigates the new millennium, the pervasive influence of technology on daily live has become increasingly pronounced, especially in the wake of the Fourth Industrial

Revolution (Industry 4.0) (Bai, et al., 2020). This transformative era is characterized by embedded connectivity, giving rise to a metaverse that permeates society and fundamentally alters the human experience of the world. In essence, it propounds the notion that contemporary individuals are not merely beholden to their natural senses and industrial capabilities but are instead entering an era of augmented social reality (Philbeck & Davis, 2018).

1.2 Technologies

In the year 2024, personal computers and smartphones seamlessly integrate into the fabric of everyday existence. Notably, VR has emerged as a focal point of technological advancement, evolving on a grand scale. VR is a completely synthetic, computer-simulated environment that mimics the real world and allows users to feel as though they are present in a real-world environment with no physical or geographic boundaries and barriers, where one can navigate and possibly interact with a virtual world, resulting in the real-time simulation of one or more of the user's five senses (Bruno, et al., 2010; Yusoff, et al., 2011; Desai, et al., 2014; Bogicevic, et al., 2019; Yung & Khoo-Lattimore, 2019; Loureiro, et al., 2020). Its applications span various industries, with the tourism sector being no exception. VR has been embraced as an immersion tool, offering unprecedented ways to enhance the travel experience (Alsop, 2022). The usage of a variety of interactive devices such as helmets, data gloves, or sensory feedback devices is significant to meet the needs of the scene and tasks and to control the environment (Tatzgern, et al., 2015).

Despite its use in several industries as an immersion tool (Kavanagh, et al., 2017; Damiani, et al., 2018), the integration of VR in the tourism sphere remains an occasional phenomenon, currently manifesting primarily as a tool employed for marketing, education, and strategic planning purposes (Cho, et al., 2002; Guttentag, 2010; Beck, et al., 2019; Wei, et al., 2023; McLean, et al., 2023; El Archi & Benbba, 2023).

However, despite early enthusiasm, challenges arose as false advertisements and exaggerated promises about VR's capabilities left users dissatisfied. This potential negative perception prompted the adoption of the term "virtual environment" (VE) by some authors, introducing a semantic distinction that sought to address perceived differences between VR and VE. Scholars continue to debate whether these terms are interchangeable (Schroeder, 2008) or carry nuanced distinctions (Luciani, 2007; Sherman & Craig, 2018). While they emerged almost simultaneously and essentially mean the same thing, the slight variations in origin and

usage have prompted ongoing discourse among researchers. For the sake of clarity, in current research, both VR and VE are treated as interchangeable.

Amidst these semantic debates, VR enthusiasts have persistently advanced technology and developed new equipment. Ivan Sutherland's creation of the first head motion device in 1968 marked a significant milestone (Carmigniani & Furht, 2011), and researchers at the Massachusetts Institute of Technology in 1970 pioneered the development of the first interactive map (Naimark, 1978). The 2000s witnessed a surge in VR's popularity, especially within the gaming realm. A plethora of gadgets, including head-motion devices (HMDs), joysticks, and controllers (Terando, et al., 2007), were designed to enhance the gaming experience, enabling users not only to observe but also to interact with the VEs presented to them.

However, the concept of VT, which is based on VR, is in the exploratory phases. In contrast to conventional tourism, where physical travel to destinations is essential, VT introduces a distinctive alternative. Virtual tours, within this context, present virtual tourists with unique advantages that may elude their real-world counterparts (El-Said & Aziz, 2022). These benefits encompass the ability to explore diverse locales without the constraints of physical travel, partake in remote experiences of historical events or architectural wonders, and engage with different cultures within a virtual realm. The potential of VT lies in its ability to transcend the limitations of physical travel, offering an innovative way for individuals to explore the world. As technology continues to advance, the immersive and interactive nature of VT may redefine the traditional travel experience. This not only broadens accessibility for those facing barriers to physical travel but also opens new avenues for exploration, education, and cultural exchange in a digital landscape.

Before the advent of the pandemic in 2020, tourism stood as one of the pillars of the global economy, with some countries relying heavily on its contributions (Sathiendrakumar & Tisdell, 1989; Sr & Croes, 2003; Sharma, et al., 2021). However, the emergence of COVID-19 necessitated swift and stringent measures, including the suspension of tourist activities, to safeguard citizens from the perils of the virus. The tourism industry bore the brunt of these protective measures, experiencing severe disruptions. Live streaming of tourism gained popularity during the pandemic in China (CGTN, 2020). Numerous tourism destinations, travel agencies, and individuals initiated live streaming of tourism experiences through various platforms, including TikTok, WeChat, Kwai, Weibo, Mafengwo, etc. During the early phases of the pandemic, the VT movement was organized through collaboration with a tourism advisor in Malaysia. Their VT version involves live broadcasting on travel websites,

such as Airbnb, where web users can experience a guided walking tour around various tourism site. In Italy, a nation heavily impacted by the pandemic, gastronomic tourism sites have also adopted interactive online experiences, utilizing AR and VR, to sustain connections with consumers (Garibaldi & Pozzi, 2020). The pandemic crisis has notably driven an increase in tourist engagement with VT (Sigala, 2020).

Amidst the challenging landscape of the COVID-19 pandemic, Chinese authors introduced the term "cloud tourism" to encapsulate the concept of virtual travel facilitated by modern gadgets and cutting-edge technologies (Pan & Yu, 2020). This includes the immersive realms of VR, augmented reality (AR), and 360° panoramic video, allowing individuals to embark on virtual journeys from the safety of their homes. While the moniker gained prominence during the pandemic, the notion of using VR in tourism has roots traced back to the 1990s. Current research emphasizes the application of VR in the tourism domain (Guttentag, 2010; Beck, et al., 2019; Fan, et al., 2022). This conceptual shift has ushered in a transformative era, altering the traditional tourism experience by bringing scenic wonders directly into the homes of enthusiasts. This shift towards VT has become a focal point in research, elucidating its pivotal role in the high-quality development of tourism.

Even after four years, remnants of the pandemic persist, with some countries maintaining restrictions on tourist visits. The data from October 2022 indicates a resurgence in the number of infected individuals, hinting at the possibility of a new wave. The persistence of similar data trends at the beginning of August 2023 and at the end of December 2023 underscores the enduring challenges faced by the global community in managing the impact of the ongoing COVID-19 pandemic. Despite efforts to contain the virus and alleviate its consequences, the recurrence of comparable data suggests a sustained struggle to curb the spread and implications of the virus (WHO, 2023). In this climate of uncertainty, VR emerges as a timely contender to redefine tourism, offering a viable alternative that aligns with the current global scenario.

As the world grapples with the unpredictability of the ongoing health crisis, the integration of VR as a form of tourism gains significance. It not only provides a bridge between the limitations imposed by the pandemic and the innate human desire for exploration but also establishes itself as a resilient and adaptable solution for the evolving landscape of the tourism industry. In this environment of continued uncertainty, the role of VT gains further prominence as a resilient and adaptable solution to the evolving dynamics of the tourism industry.

The surge in cloud tourism amid the COVID-19 pandemic has been a catalyst for the accelerated momentum of VT, amplified by the metaverse boom in 2021 (Fennell, 2021). This growing trend prompts important questions regarding the sustained popularity of technology and its potential impact on tourists' travel intentions. It also raises broader inquiries about the lasting influence of these virtual experiences on the overall quality of tourism. These questions not only delve into the evolution of technology but also highlight the critical role of consumer groups in driving and shaping its adoption. Some authors insist that after the COVID-19 pandemic is over VT and real tourism continue to co-exist together (Zhang, et al., 2022).

The pivotal query revolves around whether the current fascination with VT is merely a transient phenomenon or if it represents a lasting paradigm shift. Understanding the enduring appeal of technology is crucial in gauging its long-term influence on travel behaviours and preferences. While the initial surge may be attributed to the unique circumstances of the pandemic, sustained interest and continued development suggest a deeper and more lasting impact. Furthermore, assessing the impact of VT on tourists' travel intentions is essential. Does the virtual experience serve as a substitute for physical travel, or does it complement and enhance traditional tourism? Understanding how these virtual encounters resonate with different consumer segments is vital for predicting the technology's role in shaping future travel patterns.

Effectively contributing to the quality of tourism is another key consideration. Beyond being a temporary substitute during restrictions, can VT enhance the overall travel experience? Crucially, these questions underscore the dynamic interplay between technology and consumer behaviour. The trajectory of VT hinges not only on technological advancements but also on the evolving preferences and expectations of diverse consumer groups. Understanding the motivations, desires, and concerns of these groups is essential for tailoring VT experiences that resonate with a broad audience.

In navigating these inquiries, researchers and industry stakeholders play a pivotal role in shaping the future of VT. By exploring the multifaceted dimensions of this technological evolution and its implications for different consumer cohorts, a more nuanced understanding can be gained. This, in turn, will inform strategies for the continued development and integration of VT into the broader landscape of travel experiences.

1.3 Dissertation Outline

The present dissertation takes a unique approach to the study of VT, designating it as an independent and distinct form of tourism rather than an integrated component of traditional touristic experiences. Motivated by the unprecedented circumstances of the COVID-19 pandemic, which highlighted the significance of modern technologies, the dissertation delves into the exploration of VT as a standalone product with inherent appeal to potential tourists.

The impetus for this research arises from the distinctive attributes of VT, including its unparalleled uniqueness, utilization of cutting-edge technologies, and demonstrated inclusivity. The pandemic, with its widespread disruptions to conventional travel, underscored the relevance and potential of VT in providing alternative and accessible travel experiences. This inspired the author to investigate the perceptions and preferences of potential tourists regarding VT, particularly examining the willingness of individuals to engage with VT and discerning its utility for specific segments of the population based on factors such as age and health conditions.

There are three main research questions that the author tried to answer in this dissertation:

- RQ1. How is VR currently utilized in the field of tourism?
- RQ2. Can VT be considered a novel category within the tourism industry?
- RQ3. What is the level of receptivity among individuals towards VT?

The objective is to introduce and conceptualize the novel notion of VT while investigating the willingness of individuals across various age groups and health conditions to engage with this emerging form of tourism, by using focus-group interviews and questionnaires.

The current dissertation consists of nine chapters: Introduction, Literature Review, Materials and Methods, Results and Discussion, Conclusions, Recommendations, Limitations, Future Research, Summary, New Scientific Results, Bibliography, and Appendices.

2. LITERATURE REVIEW

The goal of the Literature Review chapter is to explore existing research and scholarly work related to VR and VT. It aims to provide a comprehensive understanding of the concepts, applications, and implications of VR and VT in the context of travel and tourism. The chapter synthesizes findings from previous studies, identifying key trends, theories, and methodologies. Additionally, it highlights gaps in the literature and areas where further research is needed, laying the foundation for the present study's unique approach to investigating VT's use among specific segments of the population based on their health conditions.

2.1 Virtual Reality in Tourism

2.1.1 Virtual Reality application in the tourism industry

Scholars perceive VR as a medium relying on perceptual stimulation through specific visual cues, sounds, and occasionally tactile and olfactory triggers to evoke emotional reactions. This activation contributes to a sense of presence, allowing individuals to experience real emotions within VE (Parsons & Rizzo, 2008; Price, et al., 2011; Peperkorn & Mühlberger, 2013; Diemer, et al., 2015). Emotions within VR are typically characterized by arousal (degree of intensity) and valence (degree of positivity or negativity) (Russell, 1980). Notably, there are gender differences in the experience of VE, with men generally reporting higher levels of perceived realism and a stronger sense of being in the environment compared to women (Felnhofer, et al., 2012; Montero-López, et al., 2016). The level of immersion in simulations positively correlates with the sense of presence, and a stronger sense of presence increases the likelihood of a significant correlation between presence and emotion (Baños, et al., 2012).

As a touristic experience, for the first time VR was used for in 1994 by a heritage museum providing a walk-through of Dudley Castle in England as it was in 1550 (Ramsey, 2017). Researchers advocated for the incorporation of virtual experiences on tourist websites, citing their effectiveness in advertising theme parks and natural parks compared to traditional brochures (Wan, et al., 2007). Additional studies indicated that visiting museum websites heightened interest in the museums, suggesting that virtual tours could similarly attract people to specific destinations (Thomas & Carey, 2005).

Since 1995, researchers have begun to mention the integration of VR technologies into the tourism industry, presenting diverse perspectives on its potential applications. A consensus

has emerged regarding the efficacy of VR as a marketing tool in the tourism industry (Huang, et al., 2016; Kim, et al., 2020; Chin & Musa, 2021; Frey & Briviba, 2021; Lee, 2022; Dybsand, 2022; Alegro, et al., 2023), since it can positively change the attitude of tourists towards the destination via the sense of presence (Tussyadiah, et al., 2018; De Luca, et al., 2020). VR offers tourists immersive previews of destinations' attractions and facilities (Yung & Khoo-Lattimore, 2019; Caciora, et al., 2021). This is particularly valuable as tourists often encounter uncertainties about their destination. They rely on trust in the travel agent's description, official sources, and the experiences shared by fellow travellers. The immersive nature of VR experiences contributes to providing a clearer and more vivid understanding of the destination, enhancing the overall satisfaction of tourists with their travel experiences. The lack of a testing process means that tourists only consume the product after purchasing and arriving at the destination. Through firsthand experiences in VE, tourists gain a clearer picture of their future trips, enabling tourist companies to align better with their expectations (Cheong, 1995; Hobson & Williams, 1995; Gratzer, et al., 2004; Choi, et al., 2016)

The advent of the Internet at the beginning of 2000s facilitated the creation of online tours for various destinations, attractions, or hotels, accessible through websites on devices such as laptops and phones. The hotel industry has actively embraced these technologies, utilizing virtual tours to enhance individuals' willingness to travel. Some authors found that the inclusion of panoramic photos on a hotel website had a positive impact on individuals with anxiety, making travel more accessible for them (Lee & Oh, 2007). Although lacking the free navigation characteristic of VE, these tours set the foundation for further developments (Gilbert & Powell-Perry, 2002; Cho, et al., 2002; Wan, et al., 2007) VR technologies further enhance this accessibility by offering potential tourists a preview of the real destination, facilitating better preparation and navigation for their actual visit. However, the unintended consequences, such as presenting inaccurate videos or targeting the wrong touristic clusters, can repel potential tourists. Hence, understanding the targeted audience is paramount.

In the sphere of tourism planning, VR serves as a valuable tool for visualizing environments and streamlining project development by facilitating online real-time collaboration and testing (Cheong, 1995; Sussmann & Vanhegan, 2000).

While not every organization can secure funding for VR technology (Mallinguh, et al., 2022), local governments, and DMOs leverage these features to create, test, and evaluate touristic routes and attractions. Furthermore, VR aids in problem identification and solution formulation, even predicting potential damages caused by tourists (Sussmann & Vanhegan, 2000; Bishop & Gimblett, 2000; Refsland, et al., 2000; Prideaux, 2002). This proactive

approach enables destination improvement by anticipating visitor behaviour to better cater to tourists' needs.

The enhanced planning process contributes to increased customization, as evidenced by Williams, A.P., and Hobson, J.S.P.'s proposal to implement VR for tailored tours. According to them, VR can streamline and enhance the customization process through its three key aspects: visualization, virtual immersion, and interactivity with the experience. (Williams & Hobson, 1995).

Several researchers emphasize that VR can serve as a valuable tool in the tourism planning process due to its capacity to visualize environments. Programs utilizing virtual three-dimensional (3D) maps offer more accurate and detailed representations compared to traditional 2D schemes, facilitating easier and more efficient project collaboration. This allows participants to test and discuss programs in real time online (Cheong, 1995; Sussmann & Vanhegan, 2000). Local governments and DMOs can leverage these features to create and evaluate new tourist routes, and attractions, and assess the effectiveness of existing ones.

VR can also help identify problems and propose solutions, as well as predict potential environmental damage caused by tourists at destinations (Dewailly, 1999; Bishop & Gimblett, 2000). During testing, participants engaged in virtual walks can provide feedback from the perspective of a regular tourist. Some authors suggest that people's preferences online in a VE correspond with their preferences in real life (Bishop & Gimblett, 2000). For example, VR technology was utilized to analyze crowding in a restaurant waiting area and study approach and avoidance responses (Hwang, et al., 2012). Additionally, others studied the behaviour of various tourist groups (hikers, mountain bikers, jeep tour passengers) using VR recreation, leading to insights for reorganizing touristic routes to minimize conflicts when these groups intersect within the destination (Gimblett, et al., 2001). This predictive capability helps enhance the destination, optimizing its tourism potential.

VR serves primarily as an entertaining tool within destinations, often integrated as a service in amusement parks, an attraction in museums, or an exhibit providing historical information for enhanced visitor understanding (Roussou, 2004; Pallud & Straub, 2007; Carrozzino & Bergamasco, 2010; Anderson, et al., 2010; Baktash, et al., 2016; Polimeris & Calfoglou, 2016; Napolitano, et al., 2018; Büyüksalih, et al., 2020; Mariotto & Bonali, 2021). In these instances, VR acts as a supplementary element to the traditional tourist experience rather than constituting its foundation, unlike VT.

Table 1 illustrates the advantages and disadvantages gleaned from Kulakoğlu-Dilek N. et al. (2018) research on the varied applications of VR in tourism.

Table 1: Advantages and disadvantages of the existing VR applications in tourism
Source: own editing based on (Kulakoğlu-Dilek, et al., 2018, p. 5)

Application	**Advantages**	**Disadvantages**
Marketing	Preview of the destination, attractions, infrastructure, and facilities before traveling. Possibility to explore the scene at the will of the user.	Targeting of the specific market
Planning and Management	Simple visualization. Easy testing. Fast problem revealing.	High cost
Entertainment	Embody knowledge	It is part of the traditional tourist experience

VR holds significant potential as an educational tool, especially for students in tourism-related faculties, by providing immersive experiences within VE. Practical field trips are integral to studying tourism, offering students exposure to different social and cultural contexts (Scarce, 1997; Jakubowski, 2003; Leue, et al., 2014; Zhang, 2017). However, the educational benefits of field trips must be weighed against potential environmental impact and sustainability concerns associated with physical travel to destinations. The application of VR can solve this problem by offering a virtual experience. Virtual trips can immerse students in the destination's atmosphere, allowing them to engage with the subject matter more deeply. In his research Schott (2017) demonstrated that participants in the virtual trip gained insights into the importance of climate change, as reflected in their subsequent essays (Schott, 2017). This aligns with broader efforts in education to adopt more sustainable practices and reduce the ecological impact of academic activities.

The impact of VR on the tourism domain can be elucidated through a straightforward model, as illustrated in Figure 1. In their research authors have proposed a comprehensive model that encompasses diverse antecedent factors shaping the virtual experience. These factors include quality, technology acceptance, information, and affective considerations, all interwoven with various individual factors such as age, social and demographic variables, and past experiences. The culmination of these elements collectively defines the nature of the virtual experience itself (Godovykh, et al., 2022).

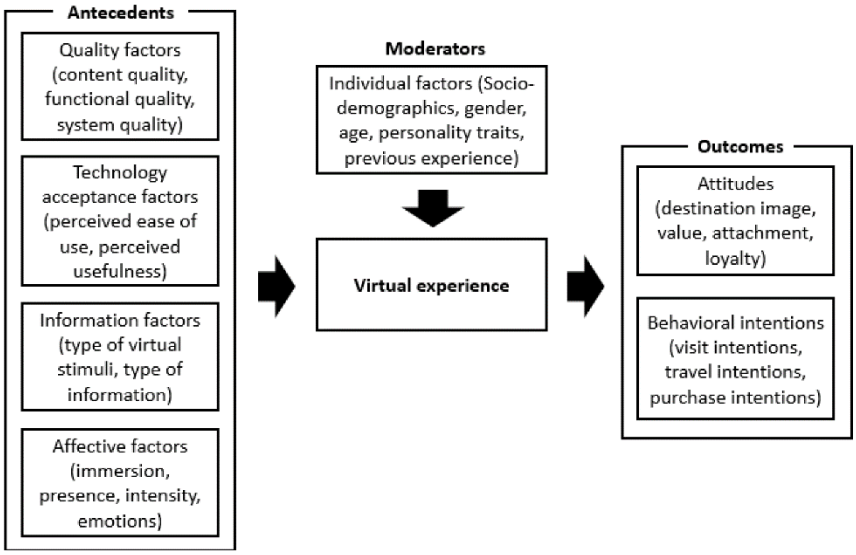

Figure 1: Virtual tourism experience
Source: (Godovykh, et al., 2022, p. 270)

Moreover, the virtual experience has a profound influence on individuals, shaping their behaviour and attitudes toward the tourism destination. This influence is dynamic and capable of inducing both positive and negative changes in how people perceive and engage with the destination. The model offers a holistic framework for understanding the complex interplay between antecedent factors, virtual experiences, and subsequent shifts in behavioural and attitudinal dimensions within the tourism sphere. This conceptualization serves as a valuable guide for researchers and practitioners seeking to comprehend and harness the transformative potential of VR in shaping tourist perceptions and behaviours.

Scholars propose classification of VR based on the degree of immersiveness, which include three types (Isdale, et al., 2002; Sultan, 2022):

1. Non-immersive VR provides virtual experience facilitated through a computer, and allows users engage in activities within the software, however, the environment itself does not directly interact with the users, they stay aware of and keep control of their physical surroundings. This form of VR extends beyond traditional desktop computers and has become accessible on laptops and video games consols. Therefore, displays, keyboards, mice and controllers are used during non-immersive virtual experience. The application of non-immersive VR is the widest comparing to other types of VR because of its low cost and easy access (Rao & Krantz, 2020).
2. Semi-immersive VR represents a convergence of non-immersive and fully immersive types of VR, offering users a blend of interactive engagement within VE. In this hybrid form all virtual activities are directed toward the user, providing a personalized

experience, yet physical movements are limited to visual interactions. It can manifest as a 3D space or virtual setting where users navigate independently, utilizing either a computer screen or a VR box/headset. Wearing a VR box/headset results in a complete immersion within the VE, excluding visibility of the real world creating a heightened sense of realism (Ahn, et al., 2014). Notably, semi-immersive VR stands out as a cost-effective and widely adopted form of VR. One of its prominent applications is in virtual tours, a popular choice for businesses across various sectors. These virtual tours can be device-based or web-based, offering an interactive and engaging experience.

3. Fully immersive VR promises a realistic and impactful experience within VE, providing users with a profound sense of presence and a feeling that events are unfolding genuinely. This sophisticated form of VR involves specialized equipment such as helmets, gloves, and body connectors equipped with sensors. These components are intricately connected to a powerful computer, allowing for the detection and projection of users' movements, reactions, and even subtle gestures within the virtual world. The immersive nature of this technology creates the sensation of physically existing within the VE. While the potential for fully immersive VR is vast, its widespread adoption is currently limited due to its high cost and the intricate nature of the equipment involved. Nonetheless, as technology advances and applications diversify, there is optimism that fully immersive VR will continue to evolve, contributing to advancements in various fields and potentially improving lives in unforeseen ways (Heizenrader, 2019; Beck, et al., 2019).

Figure 2 illustrates the annual and cumulative sales projections of VR headsets from 2019 to 2024, indicating a consistent growth in interest and adoption driven by marketing efforts, technological advancement, easier access totechnology, and lower prices.

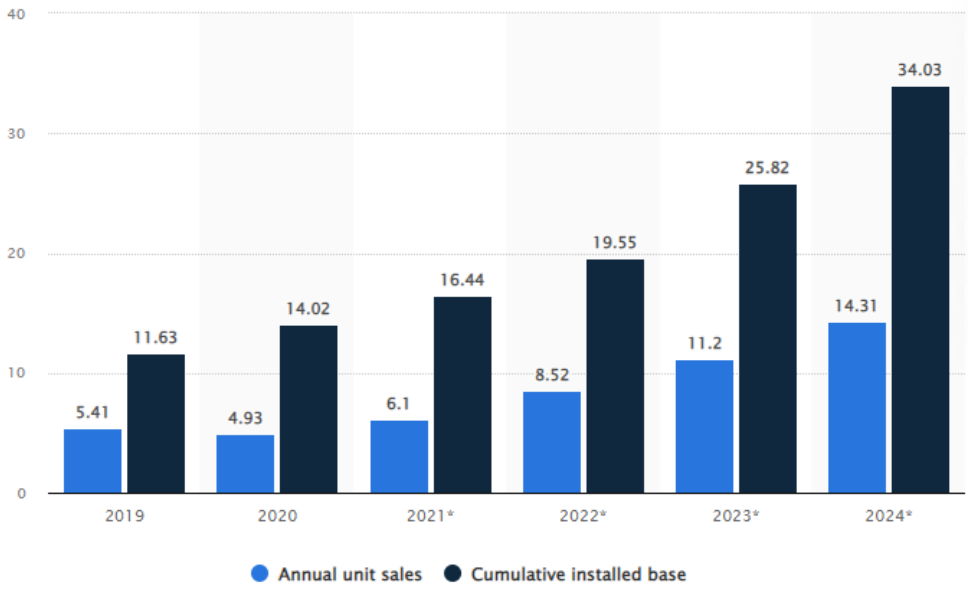

Figure 2: VR headset unit sales worldwide from 2019 to 2024 (in million units)
Source: (Alsop, 2022)

The factors highlighted in the survey are relevant when considering the purchase of a VR headset for personal use. However, it's important to note that VT doesn't inherently demand personal ownership of the device. Instead, it can be experienced within designated VT spaces where the rental of the gadget is integrated into the virtual tour's cost as one of its components.

An additional aspect of VT involves the use of avatars, allowing individuals to represent themselves in VE. Users have the flexibility to choose the appearance of their avatars, facilitating communication with other users and participation in various activities, including VT experiences within the VE. An early example of such internet-based environments is Second Life (SL), where users can explore different destinations created, constructed, and promoted by individuals and organizations. Notably, tourism organizations have recognized SL as an effective tool for marketing destinations, exemplified by Tourism Ireland Island, Philippines Department of Tourism, and establishments like Starwood, Hyatt, STA, and Crowne Plaza's The Place To Meet, leveraging its popularity (Ives & Piccoli, 2007; Hay, 2008; Lee & Wicks, 2010; Huang, et al., 2012). Over the time, various VE featuring avatars have emerged, including OpenSim, Croquet Consortium, ActiveWorlds, Project Wonderland, reflecting the growing prevalence of this technology in contemporary multiuser VEs (Salmon, 2009; Warburton, 2009).

2.2 Virtual Tourism

In the realm of tourism, innovation is essential for enhancing competitiveness, increasing the utilization of tourism services, and achieving economic success. Innovation in tourism involves introducing new services to the market that meet specific temporal needs, possess high consumer demand, and positively impact tourists' satisfaction levels and their overall standard of living. Prolonged immobility and social distancing can lead to psychological distress. Consequently, tourists may turn to VT products to alleviate psychological distress and overcome boredom (Yang, et al., 2021; Wong, et al., 2022). Innovations in the tourism industry encompass various changes in the organizationally managed sector, including legal aspects, the introduction of new types of tourist activities, and, crucially, the development of new tourism products using modern technologies (Sochenkova, et al., 2018).

The topic of VT became of interest to authors approximately thirty years ago, and their understanding of it varies. Some posit that a non-digital virtual experience, involving activities such as reading about a place, thinking about it, and mentally picturing oneself there, can constitute VT (Bittarello, 2008; Menke, 2013; Mura, et al., 2016). Others suggest that ancient literary texts and myths, like Homer's Odyssey, represent virtual worlds absent in non-virtual life (Wertheim, 1999; Ward, 2000). Some authors proposed that the music and dance performances of immigrants serve as a reminder of traditions for them and as a form of VT for residents (DeWitt, 1999) and immigrants' children (Kilichenko & Vovchok, 2019). Other recommended using ethnographic exhibits as tools to immerse people in a presented era, defining it as VT (Hirsch, 2003) and supported this perspective, defining VT as "tourism experienced in the museum, the panorama, and the theatre, which provides all the ostensible value of travel with little inconvenience or expense" (Chase-Levenson, 2012).

The diverse understanding of VT among authors may stem from their areas of expertise, often concentrated on culture and history. However, even among authors more closely related to the tourism industry, the definition of VT varies. Some assert that VT encompasses any digital activity related to tourism, including searching for destination images, reviewing Google Maps, and navigating through it, watching videos online in a 360-degree perspective, or using VR equipment. Conversely, some authors hold the opposite opinion, prompting the need to first define tourism itself.

The global tourism organization UNWTO defines tourism as "a subset of travel." Travel refers to the activity of travellers, where a traveller is someone who moves between different geographic locations for any purpose and any duration (United Nations, 2010). With 160

members, 6 associate members, and 2 observers, it is reasonable to assume that most, if not all, share this definition of "tourism." In contrast, Russia, not being a member of UNWTO, defines tourism through its Federal Agency of Tourism, stating that tourism involves temporary departures for various purposes without engaging in income-generating activities in the country of temporary stay (Federal Law of Russian Federation N132-F3, 2018).

As a result, some authors argue that virtual travel cannot be considered VT by the definition of tourism itself, as it implies physical movement from one's place of residence to a touristic destination. However, VT enables individuals to mentally travel far away while staying in their city. According to Urry (2000), various communications, such as letters, postcards, telegrams, telephones, faxes, print media, film, and TV, can substitute for physical transportation (Urry, 2000). Additionally, Hassani, A. & Bastenegar, M. (2020) summarized sixteen different definitions of tourism. Their features are listed in Table 2. Most of them emphasize "going out of the ordinary" as a key aspect of tourism, while "temporary and short-term relocation" appears only in four, and "temporary stay at the location" is mentioned three times, suggesting that movement is not as significant during traveling as previously thought.

Table 2: Keywords used to define tourism
Source: (Hassani & Bastenegar, 2020).

Source	Temporary and short-term relocation	Going out of the ordinary	Human interaction between host and guest	Temporary stay at the destination	Participate in the lives of locals	Avoid the material world for a deeper understanding of life
Tourism Scientific Experts, 1981		✓				
Tourism Society of England, 1976	✓	✓				
Rhine, 1991			✓			
Goldner & Ritchie, 2006			✓			
Burkart & Medlik, 1981	✓	✓	✓	✓		
UNWTO		✓				
Smith, 1998		✓				

Jafari, 2002		✓				
Mattison & Wall, 1982	✓	✓				
World Tourism Organization, Ottawa Canada, 1991		✓				
Murphy, 1985				✓		
World Conference on Rural Tourism					✓	
Gai, 2003						✓
Morgan & Richie, 2010				✓		
Tirag, 1999	✓	✓				
World Trade Organization (WTO), 2006		✓				

The absence of a unified conceptual framework in the tourism field, coupled with the lack of a pure science of "tourism," hinders effective exploration and understanding of emerging concepts. This limitation also impedes active participation in processes fostering the development of intellectual VT as a means of venturing into the realm of acquiring new thoughts and ideas, thereby providing extensive opportunities for the younger generation (Trifonov, et al., 2019).

UNWTO refrains from furnishing a specific definition of VT, much like the absence of a universal definition for VR. Nonetheless, several scholars characterize VT as a process that immerses individuals in a VE replicating touristic destinations (Guttentag, 2010; Mirk & Hlavacs, 2014; Schott, 2017; Zhang, et al., 2022). Existing research aligns with this summarized definition, but the author emphasizes the necessity of employing modern gadgets to achieve full immersion into the VE. This entails utilizing specially recorded video clips, appropriate systems, and diverse gadgets that engage all five senses of the human body, complementing the use of VR for a more comprehensive experience.

Hassani A. and Bastenegar M. (2020) also summarized electronic tourism definitions and models. Their features are presented in Table 3. While VT was not explicitly mentioned within the chosen selection, it is worth noting that the sources used in this table are dated up to 2012, a period when VT was not yet recognized as a distinct type of tourism. Additionally,

these sources predominantly come from countries that did not focus on VT in their tourism-related research at the time.

Table 3: Key concepts in definitions and models of electronic tourism
Source: (Hassani & Bastenegar, 2020)

Sources	Reservation[1] and Destination Management Systems[2]	Online access to cultural resources	Direct communication between suppliers and tourists	E-commerce[3]	Digitalizing value chain processes	Get real-time, personalized information	Routing and guidance systems	Artificial Intelligence[4], Data Mining, Web Mining, Semantic Web[5]	Virtual Reality System, Virtual Tours
International Organization for the Electronic Tourism Industry (IOETI)	✓	✓	✓						
Buhalis, 2003				✓	✓				
UNCTAD[6]				✓					
Model of Ministry of Industry, Mining, Trade 2011						✓	✓	✓	
UNWTO, 2006				✓	✓				
The Qalandar Model, 2012	✓	✓	✓						

[1] Including airlines, accommodation, car rental, attractions, and entertainment tickets.
[2] DMS: Destination Management System: Includes attractions, activities, accesses and transportation, infrastructure and…
[3] Marketing and Electronic Advertising, Electronic Money, Electronic Accounting, Electronic Human Resource Management, Electronic Shopping, Electronic Visa, Electronic R&D and Electronic Products for all sectors of the tourism industry including tourism, travel, transportation, hospitality.
[4] Artificial Intelligence Algorithms.
[5] The Semantic Web is a network of web-based intelligent information on a global scale so that it can be easily processed by machines. The Semantic Web enables computer applications to access heterogeneous information from a variety of sources.
[6] United Nations Conference on Trade and Development.

Scholars have proposed a classification of VT comprising four types (García-Crespo, et al., 2016; Myung, et al., 2020):

1. Desktop VT: In desktop VT, tourists engage with VE through computer monitors or mobile terminal devices. These landscapes primarily utilize 360-degree 3D real-world technology, allowing operation in a 360-degree direction and viewing on any terminal (Choi, et al., 2015).
2. Cabin-style VT: In cabin-style VT, tourists are situated in a specialized cabin equipped with a screen to observe the virtual world from different angles by rotating the cabin. Users can participate in interactive activities without the need for additional special devices, offering a burden-free experience (Huang, et al., 2020).
3. Immersive VT: Immersive VT requires tourists to use HMD or wrap-around monitors for an enriched virtual travel experience (Burdea, et al., 1996; Mattila, et al., 2020). This setup provides a more realistic and intense scene suitable for VT as a unique experience.
4. Naked-eye 3D VT: Naked-eye 3D VT employs AI, eye tracking, and 3D rendering to track tourists' eyeballs through an integrated camera. The system calculates AI-based movements and dynamically presents realistic landscapes, aiming to provide tourists with an immersive naked-eye 3D viewing experience (Wrzesien, et al., 2013).

Numerous authors have expressed interest in VT, indicating its growing popularity. To establish VT as a distinct type of tourism, official recognition by UNWTO is suggested, necessitating a re-evaluation of the tourism definition. The advent of technology blurs the distinction between online and offline experiences (Floridi, 2007). Some scholars propose viewing VR in tourism as a substitute for traditional touristic experiences (Jung, et al., 2016). Others advocate for introducing a general tourism model with integration into the Smart City platform, considering the shift from physical tourism to VT and the necessity of transitioning the country's economy to the digital realm (Trifonov, et al., 2019; Karosi & Bujdosó, 2019). Noteworthy developments occur within virtual worlds; for instance, SL hosts virtual embassies and hospitality organizations. Various VT sites replicate landmarks like the Eiffel Tower and Maasai Mara villages, allowing avatars to explore and interact (Hsu, 2012; Huang, et al., 2016). Even tourism education is promoted in SL, exemplified by The Hong Kong Polytechnic University’s School of Hotel and Tourism Management establishing a virtual campus on the platform (Penfold, 2009). Despite financial investments, the significant role of

virtual worlds in the tourism industry lacks comprehensive academic exploration (Mura, et al., 2016).

2.2.1 Virtual Tourism as a type of tourism

UNESCO is a specialized agency of UN established with the goal of promoting collaboration among nations in the fields of education, science, culture, and communication. Through its diverse programs and initiatives, UNESCO strives to build a more just, inclusive, and peaceful world by fostering collaboration among nations in the fields of education, science, culture, and communication (UNESCO, 2024).

In September 2015, during the 70th session of the United Nations General Assembly, Heads of State and Government, along with senior UN officials and representatives of civil society, convened to adopt seventeen Sustainable Development Goals (SDGs) (UNESCO, 2015). This set of objectives constitutes a comprehensive program for sustainable, universal, and ambitious development. Importantly, the SDGs are designed as a program crafted with the active participation of UNESCO, emphasizing a commitment that is "of the people, by the people, and for the people." Figure 3 illustrates the 17 SDGs (UNESCO, 2021).

Figure 3: SDGs by UNESCO
Source: (UNESCO, 2021)

VT, or the use of VR technologies for tourism experiences, can potentially contribute to six of these SDGs:

- Quality Education (Goal 4): VT can enhance educational experiences by providing virtual tours of historical sites, cultural landmarks, and natural wonders. It provides an

opportunity to apply theoretical skills within an immersive environment and explore the world without the necessity of physical travel, thereby facilitating the attainment of higher quality education for a broader demographic.

- Reduced Inequality (Goal 10): VT can bridge the gap for individuals who may face barriers to physical travel due to health (e.g. people with disabilities, chronic illnesses, etc.), financial constraints, or other limitations, thus promoting inclusivity in accessing cultural and historical experiences irrespective of their unique circumstances (Ford, 2001; Stendal, 2012; Siriaraya, et al., 2014; Tecău, et al., 2019).
- Sustainable Cities and Communities (Goal 11): By reducing the need for physical travel, VT can contribute to sustainable urban development by alleviating the negative impact associated with mass tourism, such as: overcrowding, resource depletion, loss of authentic practices, commercialization of traditions, overdevelopment of infrastructure, gentrification, cultural clashes, seasonal employment, leakage of profit, waste generation, carbon emission.
- Life Below Water (Goal 14) and Life on Land (Goal 15): VT can raise awareness about marine and terrestrial ecosystems, fostering a sense of responsibility and contributing to conservation efforts.
- Partnerships for the Goals (Goal 17): Collaboration between technology companies, tourism stakeholders, governments, and local communities in promoting VT can be a form of partnership to achieve various SDGs.

While VT cannot fully replace the benefits of physical travel, it can complement traditional tourism and help address certain challenges outlined in the SDGs.

VR creates the possibility for new types of destinations to appear. It could be a historical site that cannot be restored in real life, so it was recreated in a VE. Some authors presented virtual projects suitable for VT, for example a 3D virtual copy of Pisa's Piazza dei Miracoli that was available online for free access (Carrozzino, et al., 2005), and recreation of an ancient Greek palace to avoid threat and danger in a cultural heritage place (Styliadis, et al., 2009).

At the same time, VT will help to preserve some historical and cultural heritage sites to save them for future generations. As a result, some of them are already closed to tourists or will be in the near future. It is mostly acceptable for popular mass-tourist destinations and UNESCO World Heritage sites. For example, the Cave of Altamira in Spain was closed for visiting because people damaged the ancient paintings by breathing on them. In 2001, a replica cave

and a museum were built for tourists (Bright Side, n/d). It seems that creating a VR tour would be easier and cheaper.

In 2019, "Uluru" – a famous Australian natural attraction – was closed to tourists because of their disrespectful behaviour in a local aboriginal's sacred place by defecating, urinating, leaving trash, chipping small pieces of rock as souvenirs, and carving different images that destroy the original ancient ones (Coffey, H., 2017).

Access to Kazakhstan's Kobeytuz Lake was not limited on time. This lake occasionally acquires a pink color because of the special type of algae in it. When people found out about this unusual place, many tourists arrived to see it. They left a lot of trash and picked up salt from the lake, which led to changing the ecosystem and destroying the algae, making the lake lose its uniqueness and attractiveness (Kumenov, A., 2020; Reddit, 2020).

Tourists may do it accidentally, not being aware of the consequences, but sometimes they are willing to break rules just to achieve another goal on their "bucket list" without caring for the cost of their actions. The "Valley of Temples" in Bagan, Myanmar, suffered from such actions. Some temples were damaged or destroyed (Miss Filatelista, nd).

On the other hand, tourists would be able to visit chosen destinations in different periods of time; travel through the solar system or galaxies; or spend time in a completely fictional destination that exists only in a virtual world (e.g., fantasy places from books, movies, myths, or legends).

For example, the company "Oculus" offers a virtual historical tour around Rome; one of them is visiting the Pantheon. Using headsets and controllers, tourists can freely move around the complex that was reconstructed to present it the way it looked in ancient times (Lazzari, Z., 2019; Meta Quest, 2019).

In other cases, the place might not be available for tourists because of the danger that it carries for travellers. Nadidi National Park in Bolivia is one such place. Unsupervised tourist visits are not recommended here because of the dangerous animals, insects, and plants (Maheshwari, E., nd). However, using VR technologies, it is much safer to do so.

VT can manifest in various forms, including:

- replicating existing places, whether it is available for most people, such as Petra in Jordan, or something that is closed for visiting because of the negative effect of a large number of people there, such as the Emperor's Tomb in China (Jung & Dieck, 2017; Baik, 2021), or the danger to tourists themselves, because of the war in Palestine;

- reconstructing historical sites that were not preserved until our days allowing tourists travel through time and space (e.g. Pompeii, the Library of Alexandria, etc.) (Arnold, 2005; Stanco, et al., 2011; Friedman, et al., 2014; Vichitvejpaisal, et al., 2019; Toivonen, 2022);
- fictional destinations (e.g. Hogwarts from the series of book about Harry Potter, Gotham City from a comic book series about Batman) (Styliaras, et al., 2011; Beck, et al., 2019).

Nevertheless, certain authors may contend that the locale showcased in VT should have a real-world existence and not be fictional; otherwise, it transforms into a virtual fantasy transferred into VR (Podzharaya & Sochenkova, 2018). On the other side, this adaptability enables VT to play a role in conserving authentic attractions, elevating the tourist experience, and introducing novel and unconventional destinations.

In contrast to traditional tourism, VT offers a unique experience by eliminating lengthy preparations, transportation logistics, and health-related concerns. Virtual tourists can instantly immerse themselves in desired attractions, bypassing issues like acclimatization, language barriers, visa processes, weather concerns, transportation logistics, and safety, providing a streamlined and guaranteed experience (Hobson & Williams, 1995; Dewailly, 1999; Tavakoli & Mura, 2015; Akhtar, et al., 2021).

Similar to any new type of tourism, VT will undergo a life cycle, commencing with its initial introduction to the market, progressing through stages of growth and maturity, and ultimately concluding with either a decline or potential life cycle extension as it is illustrated by Figure 4 (Levitt, 1965).

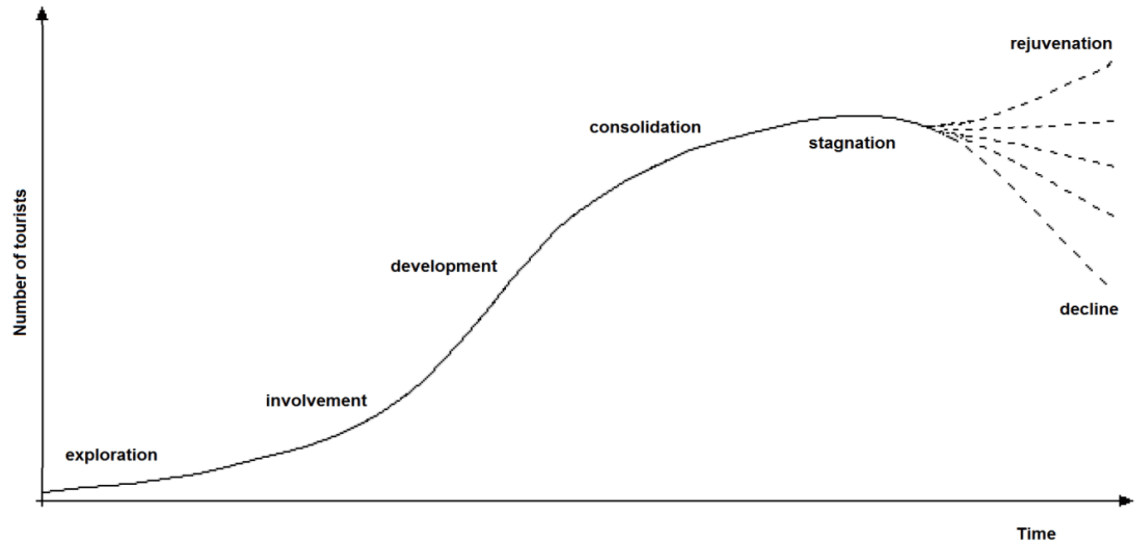

Figure 4: Butler's tourism area life cycle (TALC) model
Source: (Levitt, 1965)

TALC is a theoretical framework that elucidates the evolutionary stages of tourist destinations, offering insights into their development over time. Proposed by Richard W. Butler in 1980, this model has gained widespread adoption in the field of tourism planning and development (Butler, 1980). The TALC model delineates various stages in the development of tourist destinations, each characterized by distinct levels of infrastructure, visitor numbers, and impacts. These stages are as follows:

1. Exploration: The initial stage marked by minimal infrastructure, limited visitor numbers, and a remote, undiscovered environment attracting adventurous travellers.
2. Involvement: Positive word-of-mouth leads to increased interest, higher visitor numbers, and the emergence of basic tourism infrastructure.
3. Development: Significant growth in visitor numbers, establishment of formal tourism infrastructure, and increased accessibility through improved transportation links.
4. Consolidation: High development levels with continued increases in visitor numbers, making tourism a crucial economic sector, but also leading to challenges such as overcrowding and environmental issues.
5. Stagnation: The destination reaches its peak, showing signs of saturation, declining visitor growth, potential outdated infrastructure, and decreased visitor satisfaction.
6. A critical juncture where the destination faces a choice between decline and rejuvenation.

    a) Decline: Inadequate planning is poised to result in diminished interest and the eventual demise of the product.

    b) Rejuvenation: Proactive planning can revitalize the destination and potentially initiate a new cycle of growth.

Like any other form of tourism, VT must possess characteristics that appeal to potential tourists and ensure success, including attractiveness, affordability (Hummelbrunner & Miglbauer, 1994), and accessibility (Mazanec, et al., 2007). There is a suggestion among some authors that as VT continues to gain popularity, people may increasingly favour it over traditional tourism (Shoaib, et al., 2022).

Amid the COVID-19 pandemic, virtual traveling garnered interest; however, for VT to emerge, concerted efforts from the tourism industry, including specialized agencies, local government regulations, marketing, and research, are essential. As of now, VT appears to be in its development stage, with a limited consumer base mainly consisting of "innovators," a restricted number of available destinations, and minimal government or industry control. For

VT to progress into the "growth" and "maturity" stages, wider acceptance, marketing for mass tourists, and increased public familiarity with virtual technologies are prerequisites.

While some authors debate the need to classify VT as a distinct type of tourism, others advocate for singling out specific categories within VT, such as Space VT, utilizing applications like Google Moon, Google Mars, Starmap, SkyView, and Celestia. Space agencies such as NASA and ESA, along with companies like Google and SpaceX, are seen as contributing to this specialized form of VT (Damjanov & Crouch, 2018). Furthermore, there are suggestions to create a digital platform that integrates various services and attractions typical of real destinations, collects and utilizes data, and opens a novel space for VT (Jelincic, et al., 2019).

With the rapid advancement of VT in recent years, the revenue generated from VT-related products has experienced significant growth. The development of VT should not be mere imitation; rather, it requires clear scientific planning and formulation, including a comprehensive integration strategy involving the independent operation of provincial tourism bureaus and the promotion of the overall image of national tourism bureaus. Figure 5 illustrates the economic impact of VT-related products. Between 2017 and 2020, the number of virtual tourists is projected to increase from 100,000 to 2 million, the revenue from virtual products is expected to rise from 50 million to 1 billion, and the growth rate is anticipated to surge from 2.5% to 40% (Talafubieke, et al., 2021).

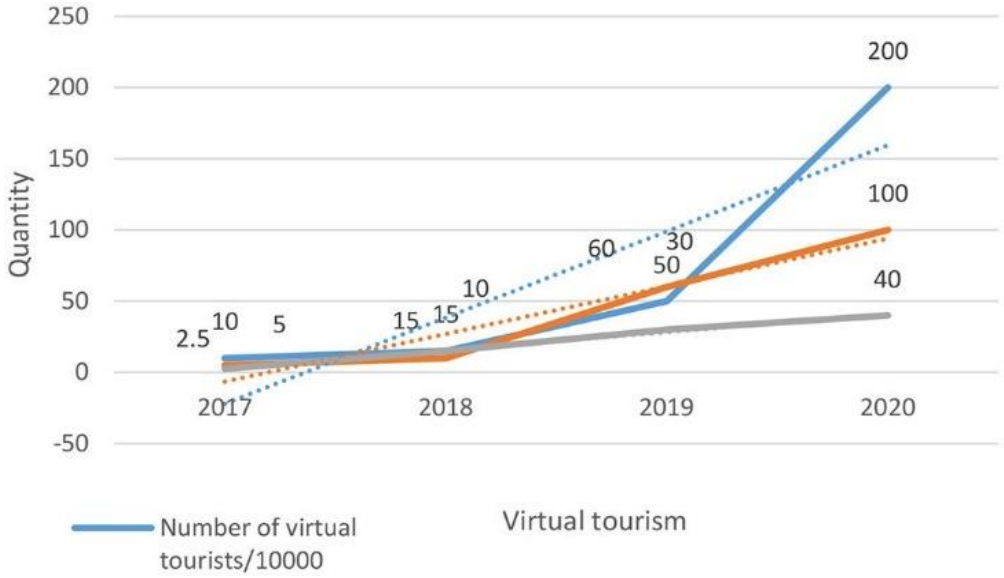

Figure 5: Parameter selection for different applications
Source: (Talafubieke, et al., 2021, p. 8)

It is crucial to emphasize that the present study does not position VT as a substitute for actual travel (Guttentag, 2020; Lu, et al., 2022). Instead, it serves as a valuable alternative for individuals who may be unable or unwilling to engage in real-life travel. Given this perspective, advocating for the recognition of VT as a distinct type of tourism appears to be a reasonable proposition (Dybsand, 2022; Wei, et al., 2023).

In terms of practical applications, foreign companies have been at the forefront of developing VT systems. Notably, Altair4 Art Studio of Italy developed the renowned software in 2005, "Ancient Virtual Travel Encyclopedia" and "Ancient Egypt Virtual Travel Encyclopedia." These applications utilize virtual display technology to showcase the urban planning, architecture, and art treasures of ancient Rome and ancient Egypt (Altair4 Multimedia, 2005). Sweden has also embraced VT through the development of the website "Virtual Sweden" (https://virtualsweden.se/). This platform, created by Linden Research, offers virtual tours of different level immersiveness and allows users to explore Swedish courts, churches, museums, and the natural environment for free (Sweden, 2024).

The “Digital Dunhuang” system, a collaborative effort by the Institute of Computer Science of the Chinese Academy of Sciences, Wuhan University, and Zhejiang University, uses VR to showcase the rich culture of the Dunhuang Grottoes. This system integrates cultural relics protection, education, scientific research, and cultural tourism, earning national key support (Digital Dunhuang, 2015).

2.3 Advantages and Disadvantages of Virtual Tourism

2.3.1 Advantages of Virtual Tourism

Physical travel may elicit negative user experiences as tourists are already forming impressions associated with factors like transportation, agency interactions, and weather before reaching their vacation destination. In contrast, virtual tours remain unaffected by these external factors, providing a unique environment where such influences do not impact tourist impressions (Cao, et al., 2021). Additionally, virtual tours can evoke positive emotions (Wagler & Hanus, 2018). This suggests that technological advancements empower individuals to choose experiences based on their preferences – whether they seek exclusively informative virtual tours or a combination of informative content with the psycho-emotional aspects of real tours.

The rationale behind singling out VT as a distinct type of tourism stems from several factors. Primarily, it addresses inclusivity in touristic activities, catering to individuals unable to

travel due to personal constraints (interpersonal factors) as well as external factors that can be found in Table 4.

Table 4: Factors limiting traveling
Source: own work

Internal factors	**External factors**
Health issues	Epidemics
Time limitations	Natural disasters
Financial constrains	Political instability
Language barrier	Danger in the region
	Group affiliation
	Complicated visa procedure

Interpersonal factors encompass specific traits that hinder individuals from engaging in conventional modes of travel. Conversely, external factors delineate the constraints preventing people from traveling, which are beyond their control.

Elderly and people with disabilities (PwD) take center stage in discussions concerning health-related challenges as barriers to travel (Tavakoli & Mura, 2015; Maran, et al., 2022). Tourism has been qualitatively reported by older adults as an activity contributing to their quality of life (Gabriel & Bowling, 2004; Sirgy, et al., 2011). Unfortunately, engagement in traditional forms of tourism may pose challenges for older adults, given factors such as financial limitations, poor health, or disability (Nimrod, 2008; Cathy & Kang, 2009; Kazeminia, et al., 2015).

There are four main types of barriers for PwD in tourism (Freeman & Selmi, 2010):

1. Physical Barriers. It refers to obstacles related to the physical environment that may hinder the mobility or accessibility of PwD. This could include challenges in navigating spaces, transportation issues, or lack of facilities designed to accommodate diverse needs.

2. Attitudinal Barriers. It involves prejudiced attitudes, stereotypes, or discriminatory behaviours towards PwD. Attitudinal barriers can arise from misconceptions about the capabilities and needs of people with disabilities, leading to social exclusion.

3. Financial Barriers. It relates to economic challenges that PwD may face in participating in tourism activities. This could include the cost of accessible transportation, accommodation, or specialized services that cater to their needs.

4. Communicational Barriers. It encompasses difficulties in communication, such as the lack of information in accessible formats or the absence of effective communication tools for

individuals with specific impairments. This barrier can limit access to information about tourist destinations and services.

Leisure travel barriers for PwD categorized into three dimensions (Smith, 1987):

1. Intrinsic Barriers. It refers to barriers inherent to the PwD. These may include health conditions, mobility limitations, or sensory impairments that impact their ability to engage in leisure travel activities.

2. Environmental Barriers. It relates to obstacles present in the physical environment or infrastructure. These could be architectural barriers, lack of accessible transportation, or inadequately equipped facilities that impede the participation of individuals with disabilities in leisure travel.

3. Interactive Barriers. It involves challenges arising from interactions with others, including service providers, fellow tourists, or the public. Discrimination, lack of understanding, or unhelpful interactions can contribute to interactive barriers for PwD.

Challenges related to mobility constraints, difficulties in enduring prolonged transportation, issues with sustained focus, and quick fatigue collectively pose significant barriers preventing tourists from fully enjoying their travel experiences (Darcy, 2002; Yau, et al., 2004; Jang & Ham, 2009; McKercher & Darcy, 2018). For PwD it is crucial to comprehend how they engage with specific tourism products, considering diverse forms of disabilities (Tecău, et al., 2019; Singh, et al., 2021; Iftikhar, et al., 2023). Research on the motivations of PwD in the realm of leisure and tourism indicates that the motivations for leisure activities vary depending on the type of disability (Adam, et al., 2017).

VT emerges as a viable alternative for real visits, particularly catering to individuals facing mobility challenges or those for whom conventional transportation is either impractical or cumbersome. Illustrating the tourism sector's responsiveness to this issue, the Netherlands-based theme park "Efteling" introduced a VR version of the "dreamflight" attraction explicitly designed for PwDs. Due to safety concerns, PwDs were restricted from physically accessing the site. Instead, they were provided with HMD, headphones, and microphones, facilitating their virtual presence within the forest, and fostering a shared experience with their group (Efteling, 2017).

VT mitigates these challenges by offering a VR travel service, enabling people to explore destinations worldwide without leaving the confines of their home (Stainfield, et al., 2000; Ranasinghe, et al., 2020; Srinivasa Rao & Krantz, 2020; Lu, et al., 2022). Thus, individuals whose life situations align with one or more of these factors could be potential users of VT (Huh & Singh, 2007; Wagler & Hanus, 2018; Ilkhanizadeh, et al., 2020; Fennell, 2021).

The adoption of VR in tourism aligns with the principles of sustainable development, a viewpoint substantiated by several scholars (Dewailly, 1999; Soomro, et al., 1999; Bishop & Gimblett, 2000; Rácz & Zilizi, 2019; Monteiro, et al., 2021; Talwar, et al., 2022). VT emerges as a potential solution in destinations where local natural sightseeing poses a risk to the biodiversity of fragile ecosystems (Simón, et al., 2004; Parry, 2007; Widaningrum, et al., 2020; Shang, et al., 2023). The notion of tourist social responsibility is intertwined with the idea of tourists acknowledging their role in environmental preservation and remaining vigilant about the ecological impact of their activities during vacations (Fennell, 2008; Weeden, 2011; Miller, et al., 2015). Sustainable practices may manifest as a rejection of environmentally harmful travel methods or the deliberate use of local resources. Some individuals may even opt not to travel at all (David, et al., 2020).

However, the utilization of VT can contribute to the preservation of destinations and historic sites without giving up on traveling (Cole & Razak, 2009; Williams & Shaw, 2009; Mittel, 2012; Wen & Leung, 2021), mitigating the negative impact associated with mass tourism and overtourism (Bishop & Gimblett, 2000; Refsland, et al., 2000; Addison, 2000; Paquet & Viktor, 2005; Arnold, 2005; Zubiaga, et al., 2019; Ilkhanizadeh, et al., 2020; Bec, et al., 2021).

Mass tourism, rooted in the activities of the travel agency “Thomas Cook” in the 19th century, involves bundling different components of the tourist product and reducing the overall cost. In the contemporary context, mass tourism often revolves around all-inclusive, budget-friendly tours to popular destinations, especially during peak seasons. Overtourism, a term introduced in 2018, describes situations where the influx of tourists surpasses the capacity thresholds in physical, ecological, social, economic, psychological, and/or political aspects (Peeters, et al., 2018). This phenomenon leads to changes that can negatively impact the attractiveness and sustainability of destinations.

Overtourism affects local communities, straining infrastructure, disrupting daily life, and causing dissatisfaction among residents. The pressure to accommodate large numbers of tourists often results in changes to the historical character of areas, building new hotels and restaurants that may compromise the authentic local experience. The economic impact is also felt, as small local businesses struggle to compete with international chains. Residents may be forced to move away due to increased living costs, and the influx of tourists can lead to noise, congestion, and safety concerns. Anti-tourist sentiment and protests may arise, further tarnishing the image of the destination (Bye Bye Barcelona, 2014; Coldwell, 2017) that could lead to dissatisfaction among tourists with the destination (Bimonte & Punzo, 2016). In

response to overtourism, there has been a shift towards recommending alternative, less-crowded destinations by frequent travellers and travel bloggers.

VR presents a solution by offering realistic experiences without the need for physical presence, reducing the strain on sensitive environments that cannot cope with overwhelming demand. Researchers, advocate for the adoption of virtual tours to attract fewer physical visitors and minimize environmental damage. VT, in this context, aligns with the principles of sustainable tourism and provides a viable alternative to traditional travel, particularly in delicate or crowded destinations (Cheong, 1995; Hobson & Williams, 1995; Drost, 1996; Dewailly, 1999; Soomro, et al., 1999; Addison, 2000; Refsland, et al., 2000; Paquet & Viktor, 2005; Li, et al., 2008; McKinsey&Company, 2017).

The cost of VR equipment varies based on factors such as functionality, quality, brand, and type. Prices range from as low as $9 for a basic cardboard construction, resembling Google Cardboard, designed to hold a smartphone and use it as a screen (Cardboard, n.d.). On the higher end, high-tech HMDs with controllers by Meta can exceed $1000 (Meta, 2024). While these prices may be relatively high for individual consumers, VT agencies that invest in top-quality equipment can provide a distinctive and immersive service at a fraction of the cost of traditional travel (Zhang, et al., 2022).

Furthermore, the perpetual usability of created virtual footage provides a significant advantage to VT. Unlike physical destinations that may face wear and tear (Ryu, 2013), virtual representations can be used indefinitely (Paquet & Viktor, 2005; Cignoni & Scopigno, 2008).

At the same time, VT reduces the carbon footprint compared to traditional tourism (Schott, 2017; Griffin & Muldoon, 2020), positioning VT as one of the most sustainable tourism options (Sr & Croes, 2003). Hence, individuals who prioritize sustainable travel practices may constitute a potential user base for VT. In addressing this challenge, Schott, C. (2017) explored the integration of VR into the educational process. In his research, Schott created a VR version of Fiji with specific tasks designed to educate participants about climate change on the islands. This "virtual field trip" aimed to simulate a wide range of aspects and complexities of the real world using audio and visuals, offering an alternative to physical field trips. The study compared the ecological impact of a virtual field trip for 96 participants with a real field trip involving the same number of people. The results showed that the virtual trip caused nearly 50 times less damage to the environment. This substantial reduction in environmental impact is attributed to the fact that virtual field trips involve minimal physical travel and primarily rely on electricity consumption during computer usage. The potential for

virtual field trips to be shared across multiple groups, including those from different universities or countries, further enhances their sustainability (Schott, 2017). By leveraging VR technology for educational purposes, institutions can offer students valuable experiences while minimizing the environmental footprint associated with traditional field trips.

Safety emerges as another compelling reason to opt for VT over traditional tourism. The data on causes of US non-natural deaths abroad from 2012 to 2019 provides insights into the various risks faced by US citizens when traveling internationally. Figure 6 illustrates a breakdown of the yearly average causes of non-natural deaths (beTravelwise, 2021). The most common one appeared to be vehicle-related (27%), followed by homicide (19%), drowning (13%) and other accidents (14%).

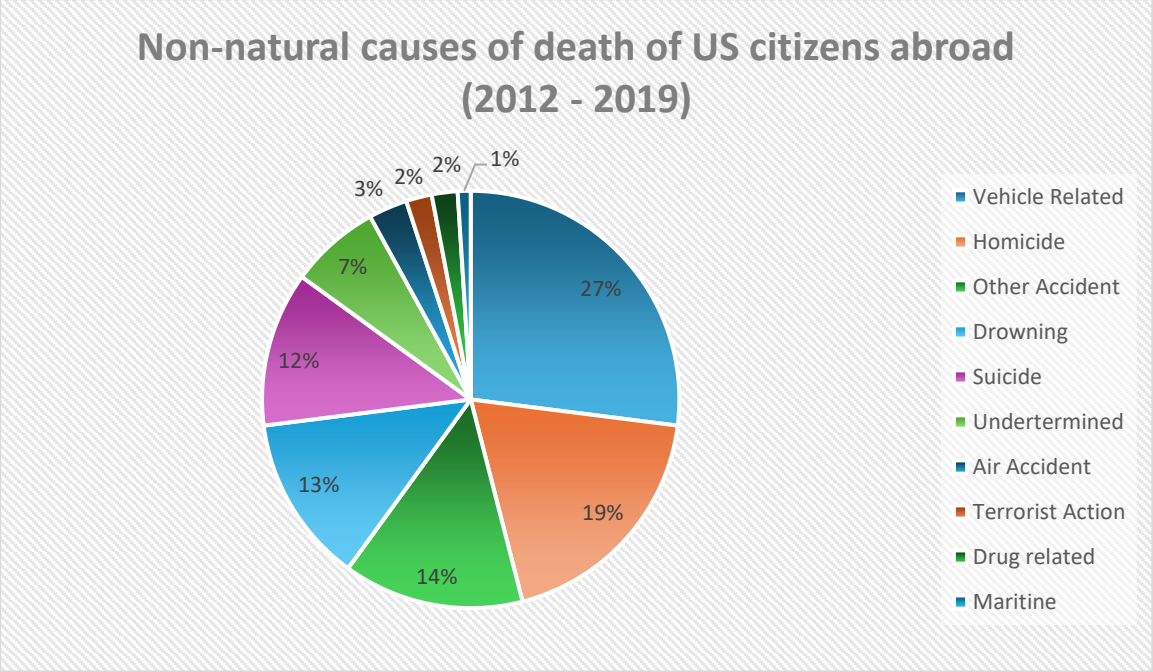

Figure 6: Non-natural causes of death of US citizens abroad (2012 – 2019)
Source: own editing based on (beTravelwise, 2021)

At least half of such threads, including transport related accidents, nature related accidents and unpredicted attacks, cannot happen during VT. The World Health Organization (WHO) also provides valuable information on various health-related topics, including travel-related advice and safety measures. It's commendable that they address potential environmental risks during travel and offer guidance on preventing violence against travellers (WHO, 2020). VT provide touristic experience without such threats (Podzharaya & Sochenkova, 2018; Xiao, et al., 2018; Rao & Krantz, 2020; Jung, et al., 2020; Bec, et al., 2021). At the same time, it

eliminates language barriers, acclimatization process, and the need for the time-consuming and expensive visa acquisition.

VT breaks away from the constraints of a typical touristic season, offering an immersive experience accessible throughout the entire year. Unlike traditional tourism, where certain destinations exhibit their prime attractions only during specific seasons, VT provides users with the flexibility to embark on virtual tours at any time. For instance, virtual tourists can explore a simulated Tokyo and marvel at cherry blossoms – an event limited to the end of March and the beginning of April in reality. Similarly, they can venture into a virtual Iceland to witness the enchanting northern lights, an occurrence typically visible during the autumn and winter seasons. This absence of temporal limitations adds a unique dimension to the VT experience, allowing users to engage with destinations and phenomena irrespective of the time constraints imposed by physical seasons.

Additionally, VT provides access to destinations and sites where a certain group of people may be restricted due to reasons such as government regulations (e.g. “Doomsday” Vault, Norway (Duggan, 2024)), safety concerns (e.g. Snake Island, Brazil (Thomas, 2017)), preservation efforts (e.g. Tomb of Qin Shi Huang, China (Williams, 2016)), religious considerations (e.g. Mount Athos, Greece (UNESCO, n.d.)), and more (Sochenkova, et al., 2018).

In conclusion, the delineation of VT as a distinctive type of tourism is justified by various factors, predominantly addressing inclusivity in touristic activities. The interplay of personal factors along with external factors limit traditional traveling but are effectively eliminated by VT. This positions individuals whose life situations align with these limiting factors as potential users of VT. In essence, the singling out of VT is justified by its multifaceted advantages that cater to diverse constraints, making it an inclusive, sustainable, and safety-oriented alternative to traditional tourism.

2.3.2 Disadvantages of Virtual Tourism

The foundational VR technologies of VT encounter skepticism from both scholars and potential users. The following concerns arise while using VR:

- complexity of the technology;
- motion sickness, which can manifest after prolonged exposure to VE or due to poor-quality equipment, presents symptoms such as headaches, nausea, dizziness, and eye fatigue (Charissis, et al., 2008; Slavin, 2019; Karpunina, et al., 2021). This condition has the potential to impact users' focus, engagement, and interaction within the VE, thereby

adversely affecting the overall user experience (Witmer & Singer, 1998; Nichols, et al., 2000; Sacau, et al., 2008). However, advancements in system design and improvements in gadget quality can mitigate this issue (Guttentag, 2010; VRS, 2017). For instance, some authors have developed and tested a technique that enhances performance and immersion levels while minimizing simulator sickness, with minor effects on users' perceived immersion level (Monteiro, et al., 2020). Although initially designed for gaming, this technique could be adapted for VT applications if necessary.

- data security concerns, as VR may be connected to the internet when using a VE, posing the risk of potential personal data theft (Denwagan, 2013);
- cyber-addiction that can be acquired while using VR gadgets;
- legal aspect in situations where one person harms another while immersed in VE. The ambiguity lies in determining responsibility for the actions of individuals engaged in VR. (VRS, 2017; Thalmeiner, et al., 2021);
- luck of authenticity (Orru, et al., 2019).

Cheng, R. (1995) expressed apprehensions regarding the potential decline in demand for traditional tours due to the emergence of VR. This decline could have economic repercussions for countries heavily reliant on tourism revenue (Cheong, 1995). However, his concerns are not supported by the retrieved statistics from 1990 until 2000. Figure 7 illustrates the number of international tourists before VR started being used in tourism and after. It was increasing before and continued increasing steadily in every part of the world.

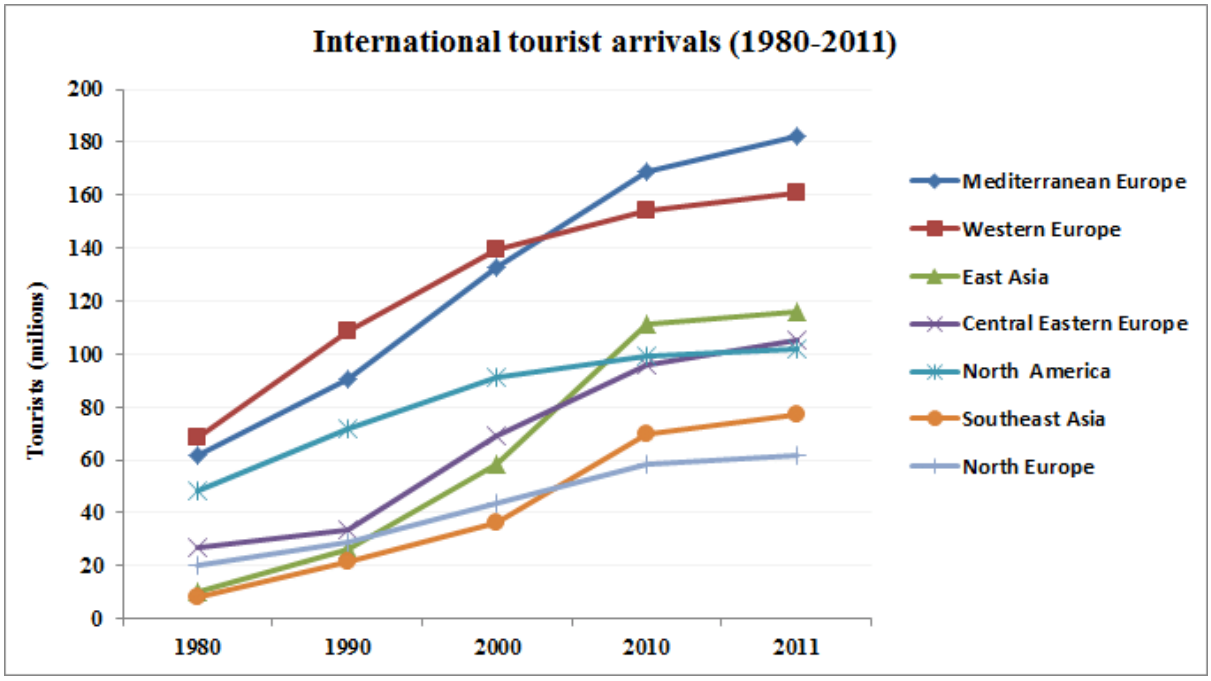

Figure 7: International tourist arrivals (1980-2011)
Source: (Marotta, 2015)

This can mean that Cheong, R. in 1995 was pessimistic towards future impact of VT. At the same time, there are strategies to monetize VT effectively. These approaches may not only generate necessary income but also avoid adverse impacts on the local environment and resources.

Virtual tours utilizing drones as a tool of non-immersive VT have a wide range of applications, particularly in the areas of safeguarding, conserving, and elevating tangible heritage. Moreover, they serve as valuable tools for catering to specific demographics, including the elderly, children, and individuals with disabilities, who may face challenges accessing otherwise inaccessible monuments (Skondras, et al., 2018). However, they may pose environmental threats by disturbing local flora and fauna or causing harm to delicate ecosystems. Additionally, concerns about privacy and security emerge, as drone networks could be vulnerable to hacking for spying, military, or terrorist purposes (Rao & Krantz, 2020). However, these challenges are less pronounced in semi- and fully immersive VT.

Environmentally conscious users also express concerns regarding the use of plastic in manufacturing VR glasses, controllers, and other accessories. A potential solution to address this issue is the adoption of eco-friendly materials like wood, leather, or cardboard to produce VR devices (Jaehnig, 2018).

Issues of authenticity in VT have undergone thorough examination, with research investigating how individual characteristics shape the perception of reality (Littrell, et al., 1993; Sensales & Greenfield, 1995; Waitt, 2000; Budruk, et al., 2008). Existing literature on VT posits that diminished authenticity, marked by a lack of spontaneity and novelty, poses barriers to evoking the emotional responses associated with real destinations (Funk, et al., 2009; Orru, et al., 2019; Kim, et al., 2020). However, proponents argue that VT possesses its own authenticity, characterized by self-value and distinctive attributes that set it apart from real travel experiences (Hobson & Williams, 1995; Cho & Fesenmaier, 2000; Govers, et al., 2000; Guttentag, 2010). A notable concern revolves around the potential contradiction between the widespread use of digital technologies in VT and the fundamental nature of purposeful engagement in leisure, raising apprehensions about a potential decline in psychological well-being (Harmon & Duffy, 2021).

The impact of VT on host communities, particularly in terms of potential economic benefits for locals, is under close examination. Strategies for monetization must be explored to sustain

economic advantages, which could otherwise wane with the increasing prevalence of VT (Griffin & Muldoon, 2020). Local governments can regulate these aspects through agreements with VT providers, ensuring a continuous income stream for host countries. Shoaib M.S. et al. (2022) propose content distribution systems, integrating blockchain technology to facilitate decentralized access, authentication, authorization, accountability, and payment facilities, that is illustrated by Figure 8. This approach aims to ensure security and trust in VT transactions, addressing concerns related to the economic impact of VT on host communities.

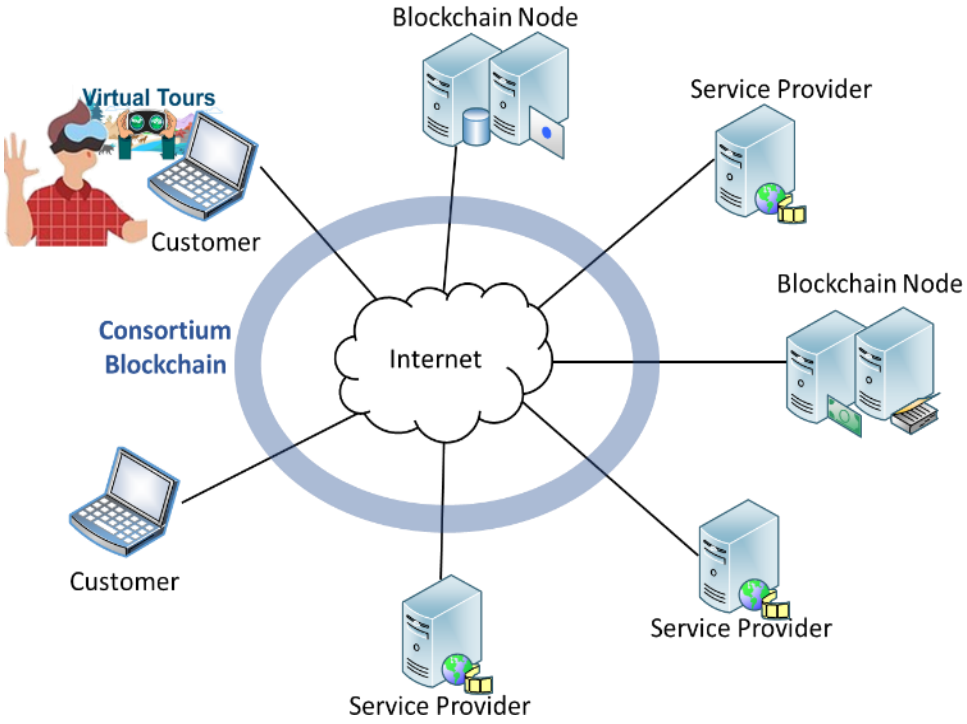

Figure 8: The blockchain-based Content Distribution System using a Consortium of Blockchain Nodes, Registered Service Providers, and Customers
Source: (Shoaib, et al., 2022, p. 232)

They also provide a modular diagram of the proposed blockchain-based permission and usage control system illustrated by Figure 9.

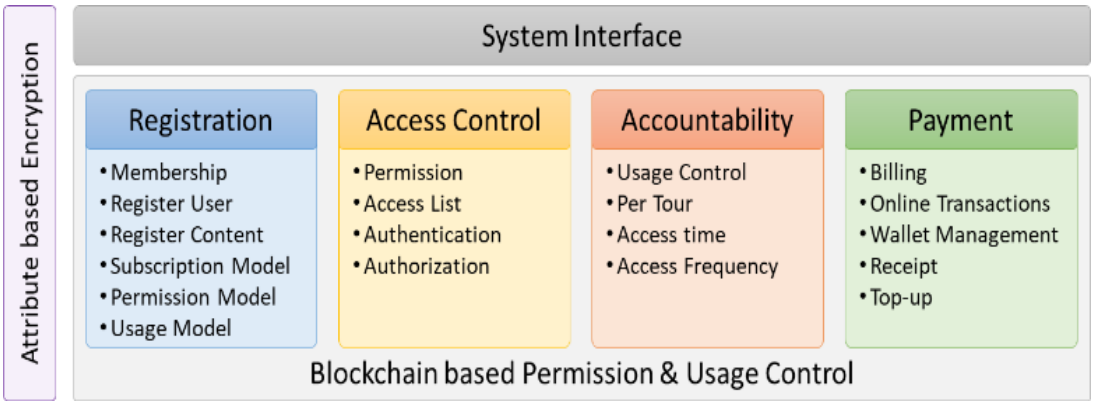

Figure 9: Modular Diagram of the Proposed Blockchain-based Permission and Usage Control System
Source: (Shoaib, et al., 2022, p. 233)

The digitalization of tourism is expected to bring about significant changes in employment. While the tourism industry traditionally revolves around services, involving interactions between service providers and guests, the advent of digitalization may lead to the emergence of new business models. This transformation encompasses not only the potential disappearance of conventional travel agencies but also the emergence of VT agencies. In certain areas, there is already evidence of robots replacing humans in service provision within the tourism sector (Fuste-Forne & Ivanov, 2021; Rahman, et al., 2022).

Some authors posit that the emotions and feelings derived from 'real' visits cannot be entirely replicated by virtual experiences (Losada, et al., 2020). Concerns are also raised by heritage destination managers who fear that virtual experiences may dilute the objective authenticity of destinations, leading to a reluctance to adopt VT approaches due to perceived unreliability and distortion of information (Dueholm & Smed, 2014). Highlighting the significance of using VT responsibly for entertainment while avoiding societal harm, there is a clear emphasis on the necessity of creating guidelines and codes of practice. This collaborative initiative includes interaction with local government, DMOs, and residents to ensure a balanced and responsible incorporation of VT (Rao & Krantz, 2020).

2.4 Technological aspect of VT

VR is a technology that creates an immersive 3D simulated environment, providing users with the sensation of being present in a real-world setting, whether it replicates existing places and events or introduces entirely new ones (Guttentag, 2010). According to Gutierrez, M. et al. (2008), VR involves two essential aspects:

1. Physical Immersion entails immersing participants in VE, stimulating one or more of their senses: sight, hearing, taste, smell, and touch. The goal is to deliver a multisensory experience that closely resembles real-world interactions.

2. Physical Presence refers to the ability to make users behave in VE as they would in the real world, achieving a seamless integration and fostering a sense of realism and engagement (Gutierrez, et al., 2008).

Coined by Jaron Lanier in 1987 (Virtual Reality Society, 2017), the roots of VR can be traced back to filmmaker Morton Heilig's pioneering work in 1957 with "Sensorama." Heilig's creation was a booth designed to envelop individuals in the illusion of an alternate reality, complete with associated sounds, smells, and tactile sensations like wind and vibrations (Heilig, 1984; Dormehl, 2017). Initially embraced for entertainment purposes, Sensorama gained popularity, yet the commercial viability of VR eluded business minds at the time, leading to a temporary slowdown in its development (Laurel, 2013).

Picture 1: Morton Heilig's "Sensorama"
Source: (HistoryofInformation.com, 2024)

Yoon, S.Y. et al. (2008) emphasized the pivotal role of the Internet in propelling the development of VR, particularly following the emergence of interactive 3D graphics with the Virtual Reality Modeling Language (VRML) in 1994 (Yoon, et al., 2008). This development facilitated the widespread adoption of web-based VR for interactive simulations. Subsequently, various companies ventured into the development of technologies and gadgets, leading to the creation of gaming devices such as "Lawnmower Man," "Nintendo Virtual Boy," and "Sega VR headset" (Mennecke, et al., 2007).

In 1993, Sega, a video game company, unveiled a prototype of a headset designed as an accessory for their Genesis console. Despite its smaller size compared to previous models, Sega opted not to release it for sale. The official explanation cited concerns that the realistic experience provided by the headset could potentially cause physical harm to users due to the motions involved in gaming (Guttentag, 2010; VRS, 2017).

In the 21st century, the advent of new gadgets such as HMDs, joysticks, and controllers (Mennecke, et al., 2007) enabled users not only to observe VE, but also to interact with it. VE went beyond offering a 3D image viewed from different angles; they replicated normal human vision by providing a separate view for each eye, creating a stereoscopic vision effect, and enhancing the immersive experience (Vince, 2004).

During the 2010s, VR technologies gained immense popularity, particularly among gamers. Various companies, including "Owlchemy Labs," "Luden.io," "Force Field," and others, released different headset variations (Gupta, 2020). However, the groundbreaking prototype specifically designed for gaming, named "Oculus Rift," was created by Palmer Luckey in 2010 (Luckey, 2012). Notably, several game industry specialists, such as Bleszinski C. (design director of "Epic Games"), Helgason D. (Chief Executive Officer (CEO) and co-founder of "Unity"), and McCauley J. (founder of “Risk of Rain 3”, lead engineer of "Guitar Hero"), responded positively after trying it (Meta, 2022). The Oculus Rift represented an innovative gadget that significantly improved upon the capabilities of previous headsets. For instance, it increased the field of view from 40 degrees to 110 degrees, and integrated speakers enhanced the immersive VR experience (Meta, 2022). To interact with VR during gaming, users typically employ a game controller. However, "Oculus" introduced a uniquely shaped "touch controller" that is wireless and, with its comfortable button placement, allows users to play more naturally (Parrish, 2016).

Picture 2: Oculus Meta Quest 2
Source: Source: (Meta, 2022).

Picture 1 and Picture 2 vividly illustrate the evolution of VR devices from the 20th to the 21st century. The devices have undergone significant transformations, becoming smaller, portable, and more user-friendly over time.

The advent of contemporary technologies has marked a new phase in digitization, facilitated by the seamless integration of 3D scanning and modelling techniques. This integration enables interactive three-dimensional animation and dynamic simulation, showcasing advancements in accuracy, quality, and the ability to faithfully recreate a wide range of objects (Choi, et al., 2015; Botella, et al., 2017; Loureiro, et al., 2020). However, the effectiveness of digitizing cultural and architectural sites to create a compelling VR experience is intricately linked to practical considerations such as time constraints, budget allocations, and the availability of skilled personnel.

As VT does not allow physical contact, a precise and realistic image is essential to provide relevant information and help the user form a mental image (Iachini, et al., 2019). The virtualization process, exemplified by the recreation of historical artifacts, spans a spectrum from swift tasks completed within a few hours to more intricate endeavours contingent on the complexity of the objects and other contextual limitations. The resulting virtual experiences can range from the simplicity of placing users in a 3D environment to interact with a single historic object – an artifact observed from every conceivable angle – to the complexity of crafting densely populated scenes replete with various interactive elements.

In the realm of VR, particularly when viewed through HMD, a departure from traditional camera limitations becomes evident. Unlike conventional photography where scenes are captured by real cameras, what unfolds on the HMD is meticulously crafted by skilled 3D artists. This affords the unique advantage of surpassing the minimum distance perceptible by

human eyes or a conventional camera. However, the digitization process is not universally automatable. There are instances where manual intervention is imperative, necessitating the virtual reconstruction of specific parts or entire objects. This meticulous approach strives to maintain a faithful resemblance to the real-world counterpart (Esmaeili, et al., 2017).

Figure 10 illustrates a simplified schematic representation of how VR operates, showcasing its components and the connections between them.

Figure 10: Components of VR
Source: (ScienceSoft, n.d.)

VR systems necessitate an input device for interpreting user actions, which can include joysticks, gloves, bodysuits with sensors, or voice recognition software. The system captures information through various trackers placed on the bodysuit or around the user, utilizing optical, ultrasound, infrared, or electromagnetic sensors, commonly known as non-contact devices. Subsequently, the software processes this information, allowing the VE to respond by altering the viewing angle or facilitating interaction with objects (Foxlin & Stanney, 2002; Burdea & Coiffet, 2003; Vince, 2004; Gutierrez, et al., 2008).

The VR software serves as a crucial link connecting the user and the cloud, handling input data processing, feedback generation, physics simulation, and data loading. Various gadgets and their components are essential for the successful operation of a VR program, including:

- content feeds: data creating the digital world, located in the hardware of a computer, console, or phone;
- controls: equipment such as headsets and devices mimicking real items like guns or swords;
- displays: screens built into the headset delivering visual information to the user;
- lenses: aiding in creating a 3D picture on single screens, like smartphone screens;
- VR's field of view: the angle and width it can project, with an optimal range of 100-110 degrees for satisfying use;
- frame rate: defining the quality of video, with a minimum of 60 fps for realistic virtual simulations;

- tracking sensors: tracing movements of the user's head, hands, and body to adjust content accordingly, often located on the headset (Sokhanych, 2021).

Additionally, certain elements enhance the immersion process, particularly crucial for industries like tourism, where realism is paramount:

- AI-controlled virtual characters introducing virtual guides, assistants, patients, etc.;
- motion-and eye-tracking sensor input processing used for rehabilitation VR and motion/gaze-controlled interfaces;
- voice recognition allows voice-based control and conversations with virtual characters;
- haptics device input processing and feedback generation facilitates realistic tactile experiences (ScienceSoft, n.d.).

Recognizing the imperative for an enriched VT experience, the incorporation of additional gadgets plays a pivotal role. Early discussions in the field proposed the integration of three senses – sight, hearing, and taste – to emulate an authentic experience (Mura & Lovelock, 2009; Loureiro, et al., 2020). However, as the discourse evolved, scholars advocated for an expanded sensory spectrum, encompassing smell and touch (Mura, et al., 2016). The adoption of a multi-sensorial approach, facilitated by specialized gadgets, emerges as a crucial element in VT. The collective objective of these gadgets is to engage diverse senses, fostering an immersive VE that imparts the sensation of being present in a real-world location (Slater & Usoh, 1993; Witmer & Singer, 1998; Banos, et al., 2005; Cummings & Bailenson, 2016). Simultaneously, the choice of equipment plays a crucial role in achieving the most immersive experience. Some authors in a laboratory experiment, demonstrated the superiority of HMD over PC and mobile phones. The HMD not only provided a more immersive experience but also resulted in higher sensory encouragement, increased engagement, and greater social intentions toward the destination (Flavián, et al., 2019).

In the realm of VT, immersive VR aspires to create a compelling environment for users, engaging all five senses within the VE for a natural and interactive experience. It employs various output and input devices to facilitate interaction by the principles of movement, prioritizing the quality of the virtual simulation. However, this type of equipment presents significant challenges due to its high requirements, experimental nature, and limited feasibility for widespread adoption until advancements are made in terms of cost-effectiveness and portability of related equipment (Talafubieke, et al., 2021).

For an effective VT experience, it should have the capability to fully immerse tourists in a VE by stimulating all human senses. The goal extends beyond catering to audiovisual senses

alone; it ultimately aims to provide a complete sensory immersion that seamlessly integrates interaction, immersion, and artistic conception (Kaptelinin & Nardi, 2006; Jung, et al., 2016; Calogiuri, et al., 2018):

- Vision. Vision is a paramount sense in VR, constituting over 80% of human message reception (Rosenblum, 2011). Various HMDs, ranging from simple Google Cardboard to advanced glasses with voice recognition and headphones, cater to different user preferences and technical requirements (Google Cardboard, n.d.; Greenwald, 2022). Technical challenges may arise from lens quality, display resolution, frame rate, and individual variations in users' vision characteristics, such as side vision, near-sightedness, farsightedness, or colour blindness, impacting the immersive experience and, consequently, VT.
- Hearing. Sound design is crucial in VT for recreating authentic auditory experiences, whether it be the sounds of a bustling city or the tranquillity of a natural landscape. Soundtracks should encompass main sounds and background noises for a natural feel. However, challenges emerge in creating universally realistic sounds due to variations in external environments, reverberation, and unique anatomical perceptions of sound by individual users (Burdea & Coiffet, 2003; Vince, 2004; Gutierrez, et al., 2008).
- Smell. Olfactory elements in virtual tours aim to include appropriate smells corresponding to the visited location, enhancing the immersive experience. Early attempts like "Smell-O-Vision" faced challenges in timing and intensity management. Olfactory displays in the 2000s utilized scents in specific areas but had limitations, including the need to remove scents before introducing others. VR's olfactory capabilities serve two purposes: recreating authentic scents for immersive experiences and eliminating unpleasant odors within destinations (Gutierrez, et al., 2008; Turi, 2014).
- Taste. Taste sensations in VR were explored with the "Food Simulator" in the early 2000s, injecting liquids to simulate tastes. While taste is crucial in gastro-tourism, VR currently has limitations in competing effectively in this domain (Iwata, et al., 2004).
- Touch. Tactile sensations in VR have evolved from early vibrations in the "Sensorama" to sensors in clothing simulating object weight. 3D cinema effects like blowing fans and water splashes enhance tactile perception. Invasive VR technologies now offer a broader palette of tactile sensations, allowing users to feel different textures during VT, expanding the range of experiences (Vince, 2004; Gutierrez, et al., 2008).

In the realm of immersive VT, the temperature experienced during the virtual encounter emerges as a crucial aspect, recognizing the significance of temperature as a pivotal tourism resource (Clements-Croome, 2013). Studies underscore that environmental temperature plays a vital role in influencing tourists' thermal comfort (Schellen, et al., 2013). There is a notable contrast in the perceived thermal comfort of the human body between an active state, such as exercise, and a sedentary state, like quiet sitting (Ji, et al., 2015). It is essential to highlight that when the heat generated by the human body equals the heat dissipated, the body achieves a thermally comfortable state. Consequently, scholars delve into understanding tourist perceptions and behaviours through microclimate simulations specific to tourist attractions (Galagoda, et al., 2018).

Examining the forefront of VT systems globally, three prevalent modes of virtual tourist attractions have been identified: two-dimensional virtual scenic spots, three-dimensional virtual scenic spots, and panoramic virtual tourist scenic spots (360°/720°). Among these, the implementation of 3D virtual scenic spots is acknowledged as the most challenging. Despite its technical complexity, this mode holds the most extensive application prospects, encompassing various technologies such as 3D modeling, rendering, design aesthetics, interactive features, and big data analysis. The study of virtual scenic spots is presented through a detailed flowchart, as illustrated in Figure 11 (Liu, 2019).

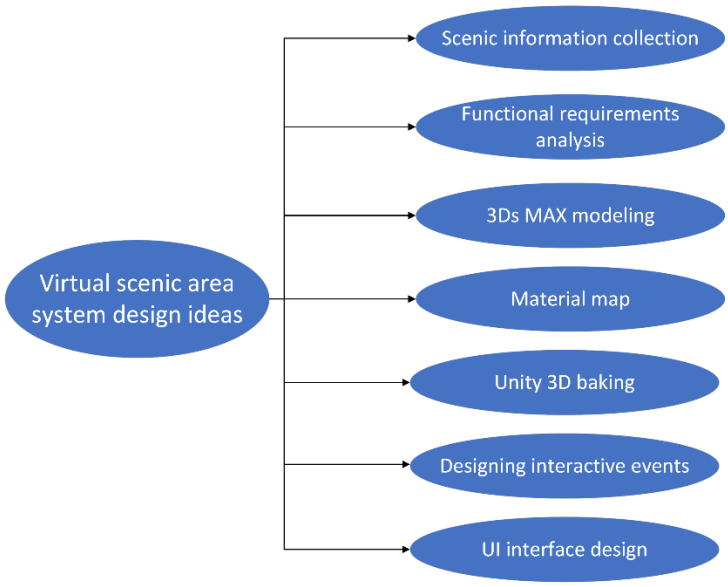

Figure 11: Flow chart of virtual scenic area system design
Source: (Liu, 2019, p. 410)

However, there is no unanimous agreement among authors regarding whether technological advancements have reached a point where VT can seamlessly integrate all available gadgets

for a comprehensive experience. The current technological landscape falls short of providing users with full sensory stimulation in VE, leading to the perception that VT is 'less authentic' compared to physical mobility. The inability to 'feel,' 'smell,' and 'taste' within the virtual experience contributes to this perceived authenticity gap (Mura, et al., 2016).

The quality of the VT experience is intricately tied to the adept use of modern technologies that enable the recreation of scenery in an animated and interactive manner (Wong, et al., 2022). As VT relies on technological improvisation, the product's quality plays a pivotal role in capturing the essence of the destination.

The evolution of VR is swiftly progressing towards greater integration with the human body, aiming to eliminate the need for headsets and controllers. The emerging trend emphasizes a more sensory-oriented VR experience, facilitated by groundbreaking innovations like Brain-Computer Interfaces (BCI). This transformative technology enables VR devices to interpret brain responses using Electroencephalography (EEG) technology, allowing applications to adapt, or be controlled by brain wave activities.

In the envisioned future, VR experiences will not only be immersive but also interactive and imaginative, influencing senses that were less affected by traditional VR, such as smell and touch (Li, et al., 2017). The implementation of BCIs can be realized through both invasive and non-invasive technologies. For instance, non-invasive approaches include experiments, where students navigated a virtual street using their brain signals (Pfurtscheller, et al., 2006). Invasive methods involve the implantation of sensors into the human brain to enhance tourists' immersion in VE, coupled with wearable sensors on clothing to intensify sensation and perception (Udovicic, et al., 2016).

While these advanced measures promise a more enriched VR experience, ethical concerns arise (Glannon, 2016). Addressing these considerations can be achieved through the implementation of participant agreements, ensuring informed consent and ethical use of such technologies. Start-ups like Neurable have already introduced examples of agreements in the market, paving the way for responsible integration of cutting-edge technologies into the realm of VR (Gera, 2018). Also, recent discussions surrounding advanced technologies have been amplified with Neuralink's milestone of implanting its first microchip in the human brain (Guarno, 2024). Initially designed to enhance cognitive abilities and tackle neurological conditions, the implications of such technology extend beyond current applications. There is a prospect for broader utilization, potentially impacting the field of VT as these technological advancements progress.

2.4 RStudio analysis of Virtual Tourism literature from Web of Science

VT has become a burgeoning area of interest, reflecting the dynamic interplay between technological advancements and the evolving preferences of modern travellers. To gain deeper insights into the research landscape, this dissertation leverages R Studio, a powerful open-source statistical computing environment, and specifically, the bibliometrix package and biblioshiny application for bibliometric analysis.

In the pursuit of an exhaustive understanding of VT to contextualize and compare with my research, a systematic retrieval process was employed to extract 185 pertinent articles from the Web of Science (WoS) database. The critical selection of the keyword "Virtual Tourism" in at least one of the features: title, abstract, keywords, text, was instrumental in ensuring the retrieval of articles that align closely with the thematic focus of my dissertation. This deliberate approach aimed at maximizing the relevance of the gathered literature for a comprehensive comparative analysis with my primary research findings.

RStudio is an integrated development environment (IDE) for the R programming language, providing a user-friendly interface and a range of tools to enhance the R programming experience. It is widely used by statisticians, data scientists, researchers, and analysts for data analysis, statistical modelling, and the development of data-driven applications (RStudio Team, 2020). The usefulness of RStudio for bibliometric analysis, particularly with the bibliometrix package, lies in its capabilities to handle and manipulate bibliographic data effectively.

RStudio serves as a comprehensive platform equipped with a diverse array of tools, including Shiny apps. These applications prove instrumental for crafting interactive dashboards and dynamic tools, providing users with an immersive experience to explore bibliometric data in real-time. Step-by-step process of RStudio Analysis is presented in Appendix 2.

The *biblioshiny()* function was employed for supplementary data analysis and figure generation. Figure 12 illustrates the comprehensive analysis of all acquired data. However, there is a conspicuous absence of information in the last two lines: "DOI" and "Keywords Plus." This indicates that we possess accurate data for subsequent analysis except those previously mentioned.

Metadata	Description	Missing Counts	Missing %	Status
AU	Author	0	0.00	Excellent
DT	Document Type	0	0.00	Excellent
SO	Journal	0	0.00	Excellent
LA	Language	0	0.00	Excellent
PY	Publication Year	0	0.00	Excellent
WC	Science Categories	0	0.00	Excellent
TI	Title	0	0.00	Excellent
TC	Total Citation	0	0.00	Excellent
C1	Affiliation	1	0.54	Good
RP	Corresponding Author	1	0.54	Good
CR	Cited References	2	1.08	Good
AB	Abstract	6	3.24	Good
DE	Keywords	16	8.65	Good
DI	DOI	22	11.89	Acceptable
ID	Keywords Plus	53	28.65	Poor

Figure 12: Missing Data Detected within the Database
Source: own work

Preliminary findings unveiled the temporal evolution of VT research, emphasizing peaks in scholarly activity as revealed by *biblioAnalysis()* function. The bibliometric analysis indicated the publication of 185 articles between 1999 and the inception of 2024 with annual growth of 2.81%. Table 5 depicts the surge in interest that commenced in 2017, coinciding with the development and widespread adoption of VR technologies. Before that papers were mostly not relevant to the current topic. The onset of the COVID-19 pandemic generated a renewed wave of interest, leading to a notable uptick in publications since 2021.

Table 5: Annual scientific production of articles in the database
Source: own work

Year	Number of Articles	Year	Number of Articles	Year	Number of Articles
1999	1	2013	5	2019	13
2003	1	2014	2	2020	8
2008	1	2015	2	2021	28
2009	1	2016	2	2022	40
2011	1	2017	10	2023	53
2012	1	2018	14	2024	2

Predominantly, the corpus consists of articles and proceeding papers, encompassing book chapters, reviews, editorial materials, and book reviews, as delineated in Table 6.

Table 6: Document types presented in the database
Source: own work

Document type	Number of publications
Article	106
Article, book chapter	3
Article, early access	29
Book review	1
Editorial material	3
Proceedings paper	37
Review	6

The scrutinized articles found publication in 134 distinct journals. Table 7 displays the Top-10 pertinent sources, with seven directly associated with the tourism industry, two having indirect relevance, and the last one being linked to psychology.

Table 7: Top-10 most relevant sources presented in the database
Source: own work

№	Source	Number of Articles
1	Current Issues in Tourism	10
2	Sustainability	9
3	Information Technology & Tourism	4
4	Journal of Hospitality & Tourism Research	4
5	Journal of Hospitality and Tourism Management	4
6	Asia Pacific Journal of Tourism Research	3
7	Cogent Social Science	3
8	Journal of Travel Research	3
9	Tourism Management	3
10	Frontiers in Psychology	2

The co-authorship network shed light on collaborative dynamics. Among the 185 documents, merely 28 were penned by a lone author, while the remaining 157 resulted from the collaboration of two or more authors. As per bibliometric analysis, on average, there are approximately 3 authors per paper, and around 28% involve international cooperation among authors from different countries. Table 8 showcases the Top-10 countries, with China notably taking the lead in publishing the highest number of articles on VT, followed by USA and Portugal.

Table 8: Table 3. Top corresponding Author's Countries presented in the database
Source: own work

№	Country	Number of publications
1	China	56
2	USA	17
3	Portugal	10
4	Australia	7
5	Italy	7
6	Korea	6
7	Romania	6
8	India	5
9	Malaysia	5
10	France	4

Table 9 presents the Top-10 most productive authors according to the number of published research addressing the VT related issues. There is no significant difference, since the topic of VT is relatively new.

Table 9: Most Productive Authors presented in the database
Source: own work

№	Author	Number of publications
1	Bessa M.	5
2	Melo M.	5
3	Clavel C.	3
4	Huang X.T.	3
5	Jorge F.	3
6	Li Y.	3
7	Losada N.	3
8	Potdevin D.	3
9	Sabouret N.	3
10	Teixeira M.S.	3

Table 10 illustrates the disparities between author keywords and article keywords-plus in the keyword analysis. Notably, more general keywords like "tourism" and "satisfaction" are prevalent in both categories. However, terms directly associated with VT, such as "virtual tourism," "augmented reality," and "digital tourism," along with those linked to the COVID-19 pandemic, are more frequent in newer articles. Surprisingly, "Virtual Reality" holds the second position in both author keywords and article keywords-plus lists. These variations highlight the evolving nature of VT research, influenced by the novelty of the subject, the diverse sources consulted, and the specific aspects of VT under investigation.

Table 10: Most relevant author keywords and article keywords-plus presented in the database
Source: own work

№	Author Keywords	Number of articles	№	Article keywords-plus	Number of articles
1	Virtual tourism	82	1	Reality	25
2	Virtual reality	30	2	Travel	25
3	Covid-19	29	3	Experience	23
4	Tourism	12	4	Model	23
5	Augmented reality	11	5	Impact	19
6	Cultural heritage	7	6	Destination	15
7	Airbnb	4	7	Tourism	13
8	Covid-19 pandemic	4	8	Satisfaction	12
9	Digital tourism	4	9	Technology	12
10	Satisfaction	4	10	Virtual reality	11

However, due to the considerable number of missing Keywords Plus, as it is mentioned in Figure 1, the analysis could have a higher chance of yielding inaccurate results.

The citation analysis provided valuable insights into the most impactful contributions. The *cbind()* function was employed to compile the list, and Table 11 presents the Top 20 most cited articles. This table summarizes the key information about the selected articles, including authors, publication year, title of the article, journal details and the number of citations. Unsurprisingly, most of the articles center around VR and its applications in tourism, with only two exceptions from the bottom of the table (lines 17 and 20) that deviate from this theme.

Table 11: Top-20 most cited articles presented in the database
Source: own work

№	**Author**	**Year**	**Title**	**Journal**	**Volume**	**Number of citations**
1	Guttentag D.A.	2010	Virtual reality: Applications and implications for tourism	Tourism Management	31	47
2	Tussyadiah I.P. et al.	2018	Virtual reality, presence, and attitude change: Empirical evidence from tourism	Tourism Management	66	41
3	Bogicevic V. et al.	2019	Virtual reality presence as a preamble of tourism experience: The role of mental imagery	Tourism Management	74	30
4	Kim M.J. et al.	2020	Exploring Consumer	Journal of	59	28

			Behavior in Virtual Reality Tourism Using an Extended Stimulus-Organism-Response Model	Travel Research		
5	Beck J. et al.	2019	Virtual reality in tourism: a state-of-the-art review	Tourism Review	74	25
6	El-Said O. & Aziz H.	2022	Virtual Tours a Means to an End: An Analysis of Virtual Tours' Role in Tourism Recovery Post COVID-19	Journal of Travel Research	61	25
7	Huang Y.C. et al.	2013	Exploring user acceptance of 3D virtual worlds in travel and tourism marketing	Tourism Management	36	24
8	Loureiro S.M.C. et al.	2020	20 years of research on virtual reality and augmented reality in tourism context: A text-mining approach	Tourism Management	77	24
9	Huang Y.C. et al.	2016	Exploring the Implications of Virtual Reality Technology in Tourism Marketing: An Integrated Research Framework	International Journal of Tourism Research	18	23
10	Lu J.Y. et al.	2022	The potential of virtual tourism in the recovery of tourism industry during the COVID-19 pandemic	Current Issues in Tourism	25	23
11	Kim M.J. & Michael Hall C.	2019	A Hedonic Motivation model in virtual reality tourism: Comparing visitors and non-visitors	International Journal of Information Management	46	22
12	Yung R. & Khoo-Lattimore C.	2019	New realities: a systematic literature review on virtual reality and augmented reality in tourism research	Current Issues in Tourism	22	21
13	Williams P. & Perry Hobson J.S.	1995	Virtual reality and tourism: fact or fantasy?	Tourism Management	16	20
14	Zhang S.N. et al.	2022	Would you enjoy virtual travel? The characteristics and causes of virtual tourists' sentiment under the influence of the COVID-	Tourism Management	88	20

			19 pandemic			
15	Cheong R.	1995	The virtual threat to travel and tourism	Tourism Management	16	19
16	Mura P. et al.	2017	'Authentic but not too much': exploring perceptions of authenticity of virtual tourism	Information Technology & Tourism	17	18
17	Fornell C. & Larcker D.F.	1981	Evaluating Structural Equation Models with Unobservable Variables and Measurement Error	Journal of Marketing Research	18	17
18	Perry Hobson J.S. & Williams P.	1995	Virtual reality: A new horizon for the tourism industry	Journal of Vacation Marketing	1	17
19	Wei W. et al.	2019	Effects of virtual reality on theme park visitors' experience and behaviors: A presence perspective	Tourism Management	71	17
20	Hair J.F.	2006	Multivariate Data Analysis	N/A	6	16

2.4.1 Meta-analysis of Virtual Tourism Literature from Web of Science

The RStudio analysis revealed a diverse range of VR applications in tourism. However, the current research aimed to specifically focus on VT as a distinct form of tourism. To achieve this, a systematic review of 185 articles embracing VT was conducted by the author.

In the initial phase, a thorough two-month examination of the selected articles was undertaken, addressing the objectives of each study, the methodologies employed, and the conclusions drawn by the authors. Figure 13 visually represents the systematic process of source selection and exclusion from the database to curate the sample for systematic review.

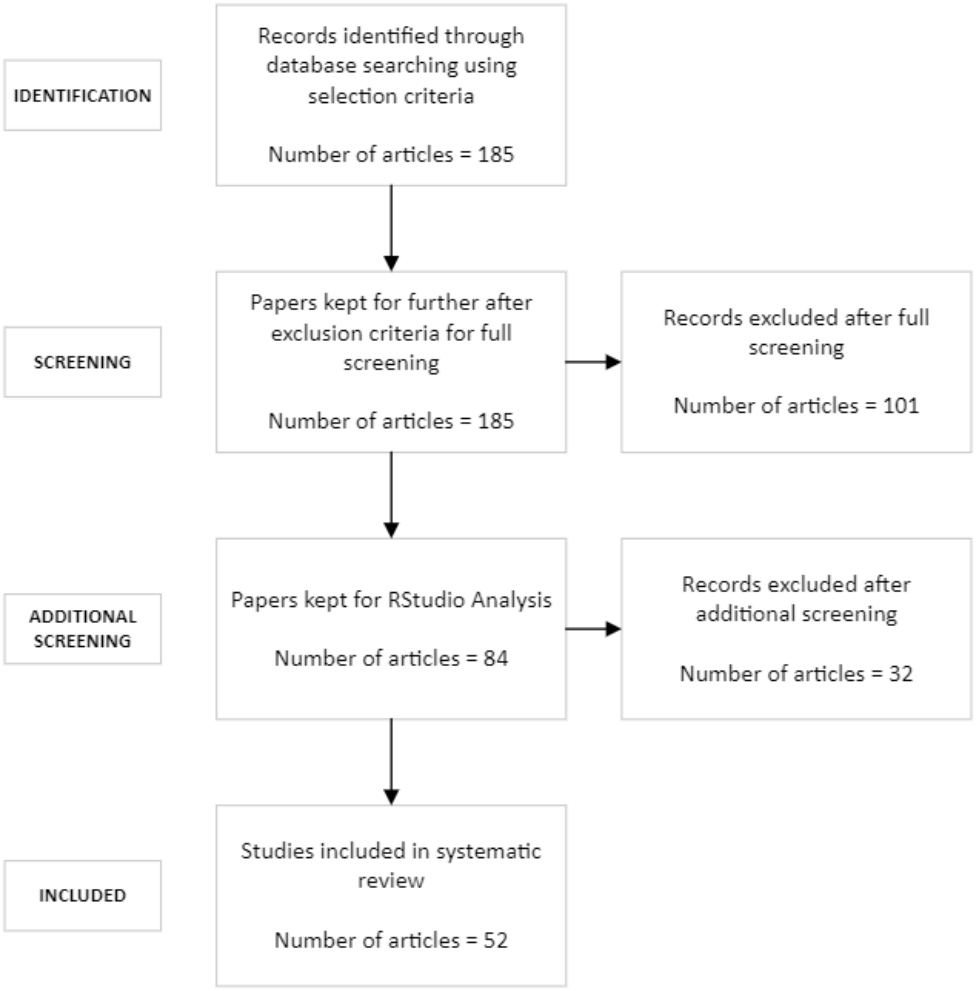

Figure 13: Selection and exclusion of sources from the database
Source: own work

I. Step One: clearing the sample.

Subsequently, a refinement process was implemented to exclude articles that did not align with the primary focus. Table 12 presents the reasons and corresponding numbers of articles removed during this stage.

Table 12: Excluded Articles from Systematic Review: Reasons for Exclusion
Source: own work

Reason	Number of Articles	Total
Unavailable Source	29	101
Not related	32	
Technological Aspect	25	
Different meaning	5	
AR application	10	

Unavailability of the source manifested in two forms: non-English language without an available English version (1 article) or articles not accessible in open access (28 articles).

Some papers had the key phrase "Virtual Tourism" in their metadata but did not primarily focus on VT or VR applications in tourism. No relevant information about VT was found in 32 articles, including 1 article, which despite including the key phrase "Virtual Tourism Community," did not pertain to the subject.

Furthermore, 25 articles delved into the technical aspects of VR and its probable use in VT, covering topics such as computer programs for 3D dimensional image reconstruction (11 articles), new systems for enhanced VR experiences (12 articles), special gadgets for VR immersion, including those for tourism purposes (1 article), and other unique technical aspects (1 article) were also removed from the further analysis.

5 articles that embraced a definition of VT different from the one mentioned in the current research were also excluded from further analysis.

In addition, 10 articles within the sample focused on AR applications in tourism, a scope not aligned with the current research objectives. Consequently, these articles were excluded from further analysis.

In total, 101 articles were excluded from further analysis during the refinement process.

II. **Step two: Categorizing the articles.**

After carefully reading and analyzing 84 articles from the WoS database, it was found that not all of them utilized a specific methodological tool, employed a model, or conducted primary data research. Conversely, some of the papers included multiple methodological approaches. Hence, the next step is to categorize those articles. Categorizing articles in a systematic review is a crucial step to organize and synthesize information effectively. It was decided to create and follow five different criteria:

- Methodology. To categorize articles based on the research methodology employed.
    1. Design of the data collection:
        a) Surveys are research methods involving the collection of data from a sample of individuals through standardized questionnaires. They are used to gather information about opinions, behaviours, attitudes, or characteristics of a population. Surveys often generate quantitative data, making it suitable for statistical analysis. Surveys are efficient for large-scale studies involving diverse participant groups (Babbie, 1990). This method was used in 29 articles.
        b) Interviews are particularly valuable for exploring complex phenomena, gaining in-depth understanding, and uncovering participant perspectives that may not be

captured through other methods. The success of an interview-based study often depends on the skill of the researcher in creating a comfortable environment and effectively eliciting rich data from participants (Kvale & Brinkmann, 2009). This method was used in 16 articles.

c) Case studies involve an in-depth examination of a specific individual, group, event, or phenomenon. Researchers use various data sources, including interviews, observations, and documents, to gain a comprehensive understanding of the case. Case studies provide a detailed and holistic exploration of a particular case, allowing for rich insights. Researchers consider the context, nuances, and complexities of the case under investigation (Yin, 2018). This method was used in 5 articles.

d) Experimental designs involve manipulating one or more independent variables to observe their effect on a dependent variable. Researchers use controlled conditions to establish cause-and-effect relationships. Participants are randomly assigned to different experimental conditions, enhancing internal validity. Experimental designs allow researchers to make causal inferences about the impact of variables (Campbell & Stanley, 2015). This methos was used in 17 articles.

e) Content analysis is a systematic method for analyzing the content of textual, visual, or audio materials. It involves identifying patterns, themes, or characteristics within the content. It provides an objective approach to studying media, texts, or communication materials. It can include both qualitative analysis for understanding context and quantitative analysis for identifying patterns (Krippendorff, 2018). This method was used in 29 articles.

2. Method of data analysis:

a) Technology Acceptance Model (TAM) is a theoretical framework that assesses individuals' acceptance and adoption of new technologies. It includes “perceived usefulness” (the extent to which a person believes that using a particular technology would enhance their performance); “perceived ease of use” (the degree to which an individual believes that using the technology would be free of effort); “behavioural intention to use” (the individual's willingness and plan to use the technology in the future); “actual system usage” (the real usage behaviour after the individual has had the opportunity to use the technology) (Davis, et al., 1989). It was used in 3 articles.

b) Self-Determination Theory (SDT) is a psychological framework that focuses on the inherent human needs for autonomy, competence, and relatedness as determinants of motivation and behaviour. It includes “autonomy” (the need to experience actions as self-endorsed and emanating from one's own volition); “competence” (the need to feel effective in one's interactions with the environment and to experience a sense of mastery), “relatedness” (the need to connect with others, to be involved in a social context, and to experience a sense of belonging); “intrinsic motivation” (engaging in an activity for its inherent enjoyment and satisfaction rather than for external rewards); “extrinsic motivation” (engaging in an activity for external rewards or to avoid punishment) (Ryan & Deci, 2000). It was used in 1 article.

c) Sentiment Analysis is the use of natural language processing, text analysis, and computational linguistics to identify and extract subjective information from source materials. It is often applied to analyze opinions, reviews, and social media content to understand sentiment trends (Pang & Lee, 2008). It was used in 12 articles.

d) Stimulus-Organism-Response (S-O-R) Theory explains the relationship between external stimuli, internal organismic factors, and the resulting behavioural responses. It is widely used in consumer behaviour studies to understand how external stimuli impact individuals and lead to specific responses (Mehrabian & Russell, 1974). It was used in 6 articles.

e) Partial Least Squares Structural Equation Modeling (PLS-SEM) is a statistical method used for analyzing structural relationships between latent variables in a model. It is commonly used in social sciences and business research to analyze complex relationships and structural models (Hair, et al., 2016). It was used in 4 articles.

f) Pleasure-Arousal-Dominance (PAD) Theory is a psychological model used to describe and measure emotional states based on three key dimensions: Pleasure, Arousal, and Dominance. It is often employed in consumer research to understand emotional responses to products and advertisements (Mehrabian & Russell, 1974). It was used in 1 article.

g) Theory of Planned Behaviour (TPB) is a psychological theory predicting intentional behaviour by considering individual attitudes, subjective norms, and perceived behavioural control. It is widely used in health psychology, marketing,

and social sciences to predict and explain behaviour (Ajzen, 1991). It was used in 3 articles.

h) Behavioural Intention (BI) Theory focuses on the formation of behavioural intentions as a predictor of actual behaviour. It is applied in fields like marketing and technology adoption to understand individuals' intentions to engage in specific behaviours (Fishbein & Ajzen, 1975). It was used in 2 articles.

i) Attention Restoration Theory (ART) and Stress Reduction Theory (SRT) were used in the same article. ART focuses on the restorative benefits of nature on cognitive functioning. It posits that spending time in natural environments, characterized by features like greenery and water, can replenish mental resources and improve attention capacity (Kaplan & Kaplan, 1989). SRT explores the psychological and physiological benefits of exposure to nature in reducing stress. It suggests that natural environments have a positive impact on individuals, leading to decreased stress levels and improved well-being (Ulrich, 1983). Both ART and SRT highlight the importance of nature in promoting mental and physical well-being, offering valuable insights for designing environments that support human health and resilience, which is the reason they were used simultaneously in 1 article.

j) Involvement Theory suggests that individuals are more likely to engage with and process information about products or issues they find personally relevant or important. It is applied in marketing to understand consumer engagement and decision-making processes (Zaichkowsky, 1985). It was used in 1 article.

k) Flow Theory describes the mental state of being fully immersed and focused on an activity, often characterized by a sense of enjoyment and optimal experience. It is commonly used in studies related to user experience, gaming, and leisure activities (Csikszentmihalyi, 1990). It was used in 1 article.

l) Grounded Theory (GT) is a qualitative research methodology aimed at developing theories based on the systematic analysis of data. It is widely used in social sciences to generate theories from data without preconceived hypotheses (Glaser & Strauss, 2017). It was used in 1 article.

m) Technology-Organization-Environment (T-O-E) Theory examines the interplay between technological, organizational, and environmental factors in the adoption of innovations by organizations. It is applied in the field of innovation and

technology adoption in organizational contexts (Tornatzky & Fleischer, 1990). It was used in 1 article.

n) Confirmatory Factor Analysis (CFA) is a statistical method used to verify the factor structure of a set of observed variables. It is commonly used in psychometrics and social sciences to validate measurement models and assess the reliability and validity of constructs (Bollen & Stine, 1990). It was used in 2 articles.

o) Exploratory Factor Analysis (EFA) is a statistical technique used in the field of multivariate statistics to identify underlying factors that explain patterns of correlations within a set of observed variables. It is often employed when researchers want to explore the underlying structure of a set of variables or when developing measurement scales. The goal is to uncover the latent factors that contribute to the observed correlations among variables (Gorsuch, 1983). Together with CFA it was used in 1 article.

p) Value-Belief-Norm (VBN) theory is a theoretical framework used in environmental psychology to explain individuals' pro-environmental behaviour. It emphasizes the interconnectedness of values, beliefs, and norms in shaping individual attitudes and actions toward the environment (Stern, 2000). It was used in 1 article.

q) The Unified Theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework in the field of information systems and technology acceptance (Venkatesh, et al., 2003). It was later extended to UTAUT2, incorporating additional factors to enhance its explanatory power, including Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Price Value (PV), Habit (HT). UTAUT2 aims to provide a more comprehensive understanding of the factors influencing individuals' acceptance and use of technology in various contexts (Venkatesh, et al., 2012). It was used in 1 article.

- Technological Aspect. To categorize articles based on the specific virtual technologies discussed within the article. This category can be divided into four groups:

1. Non-immersive VR appeared to be the most popular equipment used in 19 articles and understood by authors as a VT, that includes:

a) using drones or web and normal cameras for a LIVE streamed video to the users TV, PC, or a laptop, calling it “Live streaming videos”, “webcam

tourism", "drone tourism" (Colorado, et al., 2017; Kan, et al., 2018). They don't allow people to communicate with the VE, making it only possible to enjoy the picture and sounds (13 articles);

b) online videos that include local guide in front or behind the camera belong to this category, since users only can watch the video, listen to the sounds, even communicate with the host, and receive feedback from them, but they cannot directly affect the environment. This type was launched by Airbnb during the COVID-19 pandemic as a substitute of the real experience, however, only with the use of laptop, PC, or phone (7 articles);

c) prerecorded videos in 2D, 3D or 360-degree point of view, that can be demonstrated at any time with the use of non-immersive gadgets, as an example, so called "remote tourism", which goal is a recreation of a school trip for those, who could not join physically (11 articles).

d) avatars exist on internet platforms where people can create their own character (avatar) and explore the virtual destination by navigating it around (4 articles);

2. semi-immersive VR represents a use of HMD that has a higher level of immersion, but affecting limited number of senses: vision and hearing (17 articles);
3. fully immersive VR is a multisensory experience that affects more than two senses (1 article);
4. real touristic experience was used in some articles as a comparison to virtual experience (2 articles)

- Application Areas. To categorize articles based on the application areas of VT:
    1. The most popular application of VT, according to the collected data, is an application as a marketing tool. Authors point out that immersing people into VE of their future destination helps them better understand it, have a brighter image of it and have an ability to picture the area, be familiar with it, what reduces stress and anxiety (30 articles).
    2. Educational purpose is also a popular application of VT:
        a) as a part of an education process at school or university (4 articles);
        b) as a part of museum experience (6 articles);
    3. VT can be used as an entertainment tool within the destination (1 article);
    4. VT can be considered as a type of tourism on its own (5).

- Focus group. To categorize articles based on the specific characteristics of the participants in the research:
    1. By age:
        a) The opinion of elder people about VT became a focal point of 5 articles. It is explained by researchers' interest in making tourism easier for them (5 articles);
        b) Some authors are focusing on younger generation opinion about VT, assuming that the younger the generation the better they are going to adopt new technologies (2 articles).
    2. By gender:
        a) Focus of the study are men (1 article);
        b) Focus of the study are women (3 articles).
    3. According to profession:
        a) The opinion of specialists in tourism about VT is studied in 4 articles;
        b) 1 article focused on professionals in sport.
    4. According to health conditions:
        a) People with disabilities as potential users of VT were featured only in 1 article.

III. Step three: summarizing table

Current systematic review delves into the burgeoning field of VT, seeking to comprehend its multifaceted dimensions and implications. Spanning a wide spectrum of studies, the research synthesizes insights from diverse investigations to present a comprehensive overview of VT's current state and future potential. Appendix 3 presents the detailed summary of 52 scientific articles, book chapters and conference papers retrieved from WoS in December 2023.

1. VT experience and factors influencing user engagement.

VT experiences go beyond mere visual content, significantly impacting users' perceptions. The authenticity of these experiences, coupled with the enjoyment derived, plays a pivotal role in user engagement. The accessibility of VT further enhances its appeal. Key determinants shaping user engagement include the ability of VT to evoke mental imagery, the overall attitude of users towards these experiences, the level of telepresence they feel, and the flow experience during interaction.

2. Influence of technology and demographics on VT engagement.

Digital skills, though recognized, do not serve as major determinants in VT adoption. EE and prior experience exhibit limited influence on users' willingness to engage with VT. However, demographics, particularly age and internet access, play a more substantial role. VT products tend to attract a younger audience, and the availability of continuous internet access and basic technological skills contribute significantly to increased engagement.

3. COVID-19 and crisis management through VT.

The emergence of VT as a valuable tool during crises, particularly exemplified by the COVID-19 pandemic, highlights its potential in crisis management for the tourism and hospitality (T&H) industries. Beyond serving as an alternative for travel planning, VT becomes a means of coping with travel restrictions. The flexibility and accessibility it offers become crucial elements in adapting to unforeseen circumstances.

4. VT as a substitute for physical tourism.

Authentic experiences within VT positively influence the perception of it as a substitute for physical tourism. However, it's essential to note that VT is not seen as a direct replacement. Users still prefer the tangible and sensorial aspects of actual travel. The findings suggest a nuanced coexistence, where VT complements but doesn't entirely replace traditional tourism.

5. Impact of VR on tourism experience and future intentions.

VR emerges as a transformative element in enhancing the tourism experience. Participants report a heightened sense of presence and immersion, contributing significantly to positive attitudes. The impact extends to future travel intentions, with users expressing an increased desire to visit the actual destinations depicted in their VR experiences.

6. Community building and social experiences in VT.

VT transcends individual experiences and contributes to community building. The shared VE facilitates social interactions and influences behavioural intentions. The sense of connection and reminiscence fostered through VT enhances its appeal, positioning it as more than just an individualized activity.

7. Environmental considerations and advantages of VT.

Recognizing VT for its minimal environmental impact underscores its appeal in the era of eco-conscious consumers. The advantages of global accessibility, flexibility, and the elimination of physical constraints make VT an attractive option for users concerned about their environmental footprint. The study highlights VT's potential role in sustainable tourism.

8. User satisfaction and quality measures in VT.

User satisfaction in VT experiences is intricately linked to the quality of content, system functionality, and interaction. Positive experiences and intentions to engage further are significantly influenced by the seamless integration of these quality measures. Enjoyment and system quality emerge as critical components, emphasizing the need for a holistic and engaging VT platform.

9. Challenges and concerns in VT adoption.

Addressing existing fears and concerns, such as technophobia, lack of trust, and security considerations, is crucial for overcoming barriers to VT adoption. Understanding and mitigating these concerns will play a vital role in fostering user trust and willingness to engage with VT, ultimately influencing widespread adoption.

10. Role of VT in group experiences and older adults' engagement.

Group experiences in VT present unique challenges, particularly related to the effective communication of participants. Addressing these challenges is essential to ensure a seamless and enjoyable group VT experience. Moreover, the study underscores the potential benefits of VT for older adults, emphasizing higher temporal involvement and realistic immersion. This recognition positions VT as a tool for enhancing the quality of life in aged care settings.

In conclusion, the detailed examination of VT experience, adoption factors, and its role during crises provides a comprehensive understanding of its potential and challenges. These insights offer valuable guidance for future developments in VT, emphasizing the need to address concerns, enhance quality measures, and leverage VT as a complementary tool in the travel and tourism industry.

2.5 People's Receptiveness to Virtual Tourism

In 1995, Cheong R. expressed concerns about a potential decline in the demand for real tours due to the increasing use of VR in tourism (Cheong, 1995). However, subsequent survey results from the early 2000s indicated that people were not inclined to embrace VT as a substitute for actual travel. This reluctance was attributed to perceived disadvantages of VT. Research by Sussmann S. and Vanhegan H. supported the notion that individuals generally favoured reality over VR during the early 21st century (Sussmann & Vanhegan, 2000). It's worth noting that the capabilities of VR during that period were constrained by technological limitations.

The reluctance to embrace VT as a substitute for real travel is evident in the survey results from the early 2000s (Sussmann & Vanhegan, 2000; Prideaux, 2002). Reasons cited include

the perceived lack of spontaneity, the absence of opportunities to relax, and the inability to purchase souvenirs. Research by Paquet, E., and Viktor, H.L. (2005) reinforces this sentiment, suggesting a preference for reality over VR (Paquet & Viktor, 2005). It's crucial to note that these studies were conducted during a period when VR technologies were constrained by limited technological development.

On the contrary, as early as 2002, in the research on dark tourism at the Auschwitz Museum was noted that participants might not perceive a significant difference between physically walking in a real concentration camp and visiting it online (Miles, 2002). In 2013, Han H. et al. conducted a study to gauge people's willingness to utilize virtual technologies, specifically for golf simulators in the Republic of Korea. The findings revealed that eight years ago, individuals recognized the environmental impact associated with creating a real golf course (Han, et al., 2013). Consequently, they exhibited a preference for a digital experience, highlighting a shift in attitudes toward virtual alternatives driven by environmental considerations.

Some authors assert that VT is poised to exert a significant influence on the existing tourism system. It not only addresses the limitations of transferring real tourist attractions but also mitigates the constraints that real tourism imposes on the leisure and income of tourists. However, the current state of VR tourism products provides tourists with only superficial and superficial tourism experiences (Talafubieke, et al., 2021).

Age and gender are frequently identified as key individual characteristics influencing users' perception of VE, particularly in terms of their sense of presence (Heeter, 1992; Lombard & Ditton, 1997; IJsselsteijn, et al., 2000; Sacau, et al., 2008). The classification of generations is a common framework used to understand and analyze societal shifts based on shared experiences, cultural influences, and technological developments. Here are descriptions of four generations often studied (Howe & Strauss, 1992; Howe & Strauss, 1997; Howe & Strauss, 2003):

1. Baby Boomers are born mid-1940s to mid-1960s. They experienced a significant post-World War II increase in birth rates. Witnessed cultural, social, and technological shifts, including the rise of television, the civil rights movement, the Vietnam War, and the advent of personal computers. Associated with values such as hard work, traditional family structures, and community.

2. Generation X are born roughly 1965 - 1980. They grew up during a period of economic uncertainty and technological change. Often called the "Latchkey Generation" due to increased instances of both parents working outside the home. Embraced independence and

entrepreneurship. Experienced the advent of personal computers and the internet during their formative years.

3. Generation Y (Millennials) are born roughly 1981 - 1996. They came of age with rapid technological advancements, including the internet and mobile devices. Known for a strong sense of civic duty and social consciousness. Experienced economic challenges, such as the Great Recession, and embraced digital communication and social media as integral parts of daily life.

4. Generation Z are born roughly 1997 - 2012. They are the youngest generation studied in behavioural economic studies. Grew up in a fully digital age, with smartphones, social media, and instant access to information. Characterized by a global perspective and a high level of comfort with diversity. Displays a preference for visual and short-form content. Experiences the world amid significant social and environmental issues.

5. Generation Alpha refers to the cohort of individuals born from 2010 onwards. Often described as the most technologically immersed generation, they are growing up in a world where digital technology is seamlessly integrated into daily life. This generation is anticipated to be highly diverse, globally connected, and raised in an era of rapid technological advancements, shaping their worldview and interactions with society. However, the oldest representative of this generation currently is 14 years old. And this is the reason why they were not considered for this research since they are too young to be able to purchase such services and cannot be a target segment for VT yet.

It's important to note that while this classification is based on U.S. sources, the distribution of generations may vary in different countries due to differences in political, economic, social, and cultural backgrounds.

Earlier studies have shown mixed results regarding the impact of age on virtual experience. Some studies found no significant gender-related differences in users' perception of the VE in the context of various tasks (Heydarian, et al., 2015), perception of spatial presence (Day, 2015), exposure time for sense of presence (Melo, et al., 2018), navigation performance in VE (Ross, et al., 2006), and rotational and translational movements (Sancaktar & Demirkan, 2008). Other presented the results of a study on VT, indicating that the findings are more positively received among women, individuals with lower education levels, and those aged between 50 and 70 (Marasco & Balbi, 2019). In their comparative analysis of VR perceptions across different generations, Siddiqui et al (2022) observed a heightened enthusiasm among younger generations for engaging with VR technology. This finding underscores the distinct preferences and attitudes toward VR adoption that exist among various age groups, shedding

light on the generational dynamics influencing the reception of this immersive technology. (Siddiqui, et al., 2022). Gen Z is often characterized as digital natives, individuals defined by their familiarity with social networks, mobility, and engagement with multiple realities (Francis & Hoefel, 2018). Those born in the 2010s are even more deeply immersed in digital technology and its transformative impact on reality. Such differences in results can be explained by the differences in study design, peculiarities of the respondents, an error, or an effect of some unidentified feature.

The study conducted by the All-Russian Society of Disabled People in the Leningrad region (it is based in Saint Peterburg – the capital of Leningrad Region) focused on the perception of VR among PwD. Specifically, the survey aimed to explore how new technologies, including various types of VE, could be adapted for different categories of PwD. The findings revealed a notable interest among participants in utilizing VR for activities related to sports and tourism. Despite the interest expressed by the respondents, the study identified a significant barrier to the adoption of VR technologies for PwD in the form of limited availability of suitable offerings. Participants noted that the lack of accessible options in the realm of VR experiences for sports and tourism purposes hindered their ability to engage with such technologies effectively.

Additionally, Wong I. A. et al. (2023) conducted a study on social media posts related to the Airbnb initiative and identified four major themes of online VT – hedonism, attention restoration, social relatedness, and self-exaltation (Wong, et al., 2023). Other studies concluded that an individual could engage in a VR experience of a heritage site for educational purposes and find satisfaction with the experience. However, the same individual might participate in the same VR experience for leisure purposes and experience dissatisfaction. In this scenario, users' opinions of the VR environment, including both hedonic and utilitarian benefits, can impact their overall satisfaction and willingness to use such systems again (Davis, 1989; Akdim, et al., 2022). These findings shed light on the diverse motivations and experiences associated with online VT through social media channels.

Consumer behaviour towards VT can follow a pattern like the adoption of any novel product or service. As highlighted by Pankruhin, A. (2005), the speed and manner of consumer reactions vary across different groups in response to the introduction of a new product or information in the market:

1. "Innovators" constitute the first group, comprising consumers who eagerly embrace and try the new product, representing approximately 2-5% of the total consumer base.

2. "Adopts" form the second group, contributing to making the product fashionable and renowned. This group encompasses around 10-15% of all final consumers.
3. "Progressives" represent the third group, driving mass sales during the initial stages of product development. They account for 25-35% of the overall consumer base.
4. "Skeptics" comprise the fourth group, entering the market at the maturity stage and contributing to demand. This group constitutes approximately 35-45% of all final consumers.
5. "Conservatives" form the fifth and final group, exhibiting demand when the product attains a more "traditional" status. They represent around 12-18% of the total consumer base. (Pankruhin, 2005)

Norwegian author Hilde Nikoline Hambro Dybsand conducted an analysis of 422 travel companies from North America and Europe that provided virtual traveling experiences amid the COVID-19 pandemic. Figure 14 illustrates that the United Kingdom exhibited the highest number of activities, followed by the USA and Italy. Furthermore, 96% of all reviews garnered the highest rating. The author emphasized that despite the popularity of VT during the COVID-19 pandemic, the market for VT subsequently experienced a contraction (Dybsand, 2022).

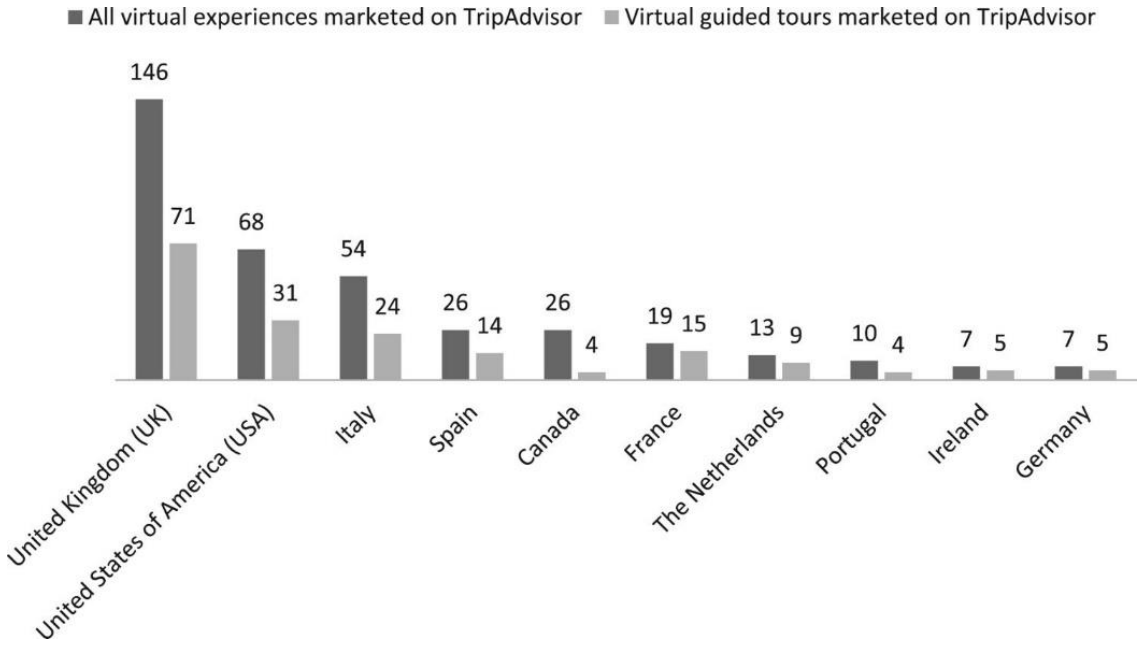

Figure 14: The 10 countries with the most virtual experiences
Source: (Dybsand, 2022, p. 50)

For a significant duration, authors resisted categorizing VT as a distinct form of tourism. This reluctance stemmed from the traditional perspective that tourism entails physical travel from one's residence to another destination and back. However, the evolving modern world, coupled with the proliferation of new gadgets, has propelled society towards digitalization over the past few decades. This ongoing global process increasingly influences various aspects of life and routines. From our standpoint, aligning people's mindset with contemporary realities rather than clinging to outdated definitions is crucial.

Currently, accurate statistics on the number of individuals using VR for tourism are elusive. This lack of precision is attributed to the absence of a concrete definition for this activity and the absence of stringent requirements for the necessary VR gadget set for VT. The distinction between the immersive capabilities of VR headsets alone versus a room equipped with gadgets that can engage multiple senses is noteworthy. Even in this relatively unrestricted landscape, obtaining statistics relies solely on user self-reports, introducing an element of trust in their accounts.

These varied perspectives underscore the divergent opinions people hold regarding the merits and drawbacks of VT. While some individuals are willing to embrace and utilize it, others remain skeptical, either lacking belief in its efficacy or encountering perceived disadvantages when compared to traditional tourism experiences.

3. MATERIALS AND METHODS

The goal of the Materials and Methods chapter is to outline the approach taken to conduct the research study. It provides a detailed description of the research methodology, including the procedures followed, tools and instruments used, and the overall design of the study. This chapter aims to ensure the transparency and reproducibility of the research process by clearly explaining how data was collected, analyzed, and interpreted. Additionally, it discusses any ethical considerations and limitations of the study, offering insights into the reliability and validity of the findings. Overall, the Materials and Methods chapter serves as a roadmap for conducting the research and serves as a guide for other researchers interested in similar investigations.

3.1 Research Objectives

Objective 1: Unveiling VR Applications in Tourism.

The primary goal of this objective is to illuminate the diverse applications of VR within the tourism industry. Through an exhaustive literature review and analysis, current research aims to discern the multifaceted ways in which VR technologies are currently integrated into various facets of tourism.

- RQ1. How is VR currently utilized in the field of tourism?
- RQ1.1 What are the existing applications of VR in the tourism industry?
- RQ1.2 How do businesses and tourists leverage VR technologies for enhanced tourism experiences?

- H1. VR is employed in diverse ways across the tourism industry.
- H1.1 Various applications demonstrate the versatility of VR in enhancing tourism experiences.

Objective 2: Exploring the Concept of VT.

This objective involves a meticulous exploration of the emergence of VT as a distinct paradigm within the broader spectrum of tourism. By scrutinizing existing VR applications, current research seeks to identify foundational elements contributing to the conceptualization of VT.

- RQ2. Can VT be considered a novel category within the tourism industry?
- RQ2.1 What defines VT as a unique form of tourism?
- RQ2.2 How does VT differ from traditional tourism experiences?

- H2. VR serves as the foundation for VT.
- H2.1 Non-immersive VR technologies form the basis for the emergence of VT.
- H2.2 Semi-immersive VR technologies form the basis for the emergence of VT.
- H2.3 Fully immersive VR technologies form the basis for the emergence of VT.

Objective 3: Assessing Tourist Receptivity to VT.

This objective revolves around investigating the receptivity of different segments of tourists towards VT. Particular emphasis is placed on understanding whether individuals with motor disabilities exhibit a distinctive inclination towards embracing VT experiences.

- RQ3. What is the level of receptivity among individuals towards VT?
- RQ3.1 What factors influence people's willingness to embrace VT?
- RQ3.2 Are there demographic variations in the acceptance of VT?

- H3. Receptivity towards VT varies among different types of tourists.
- H3.1 Younger generation ("Generation Z") exhibit higher receptivity towards VT, considering wide range of new technology usage within the generation.
- H3.2 Middle generations ("Generation Y") exhibit higher receptivity towards VT, considering its potential to address accessibility challenges.
- H3.3 Older generation ("Generation X") exhibit higher receptivity towards VT, considering its potential to address accessibility challenges.
- H3.4 Individuals with motor disabilities exhibit higher receptivity towards VT, considering its potential to address accessibility challenges.

Figure 15 serves as a concise summary of the overarching objectives, specific research questions, and testable hypotheses formulated to guide the current research.

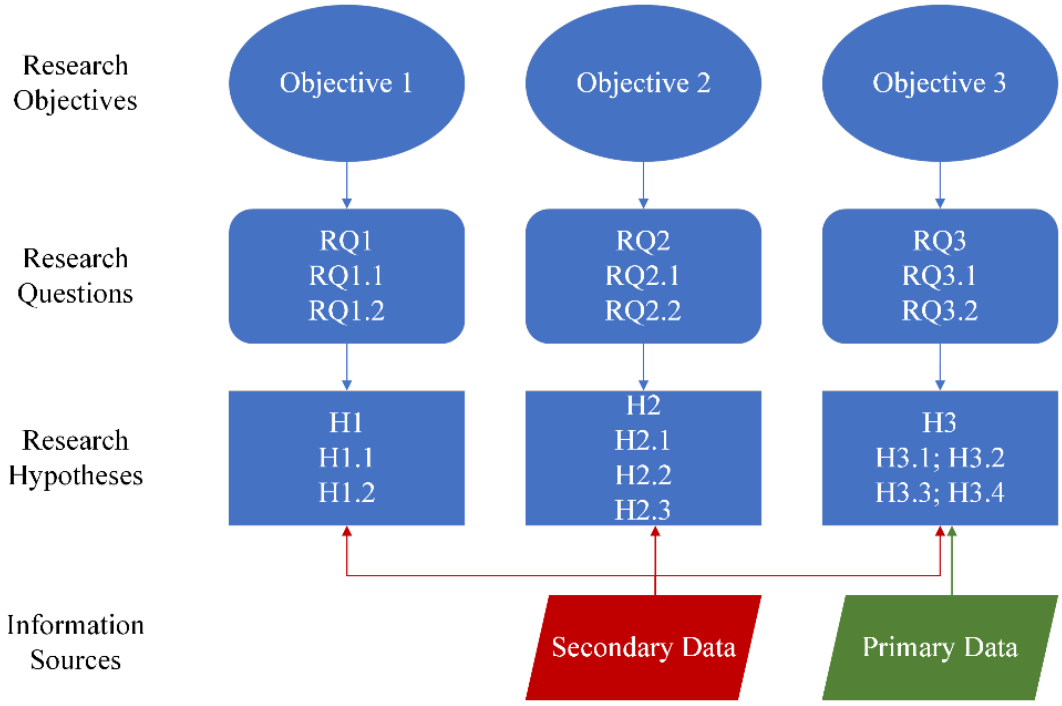

Figure 15: Research Summary
Source: own work

3.1.1 Research gap and contribution

Tourism industry has witnessed the integration of VR technologies, yet there remains a discernible gap in understanding the full spectrum of possibilities and implications associated with the emergence of VT. Existing literature offers insights into the applications of VR in tourism, acknowledging its potential to enhance user experiences. However, the gap arises in the comprehensive exploration of whether VT can be recognized as a distinct category within the broader tourism paradigm.

This dissertation aims to bridge this gap by systematically investigating the multifaceted relationship between VR and tourism, proposing that VR could serve as the foundational technology for the evolution of VT. While some studies have touched upon the use of VR in specific tourism applications, there is a lack of in-depth analysis regarding its potential to redefine the very nature of tourism experiences.

The proposed hypotheses lay the groundwork for exploring the diversity of VR applications in tourism, elucidating the transformative potential of VR in shaping VT. Furthermore, the examination of receptivity towards VT among different segments of tourists, including those with motor disabilities, adds an inclusive dimension to the research.

The confirmation of these hypotheses would contribute to filling the research gap by providing a nuanced understanding of how VR is currently employed in tourism, the conceptualization of VT as a distinctive form of tourism, and the factors influencing individual receptivity towards this innovative paradigm. This research endeavours to advance the theoretical foundations of tourism studies and offer practical insights for industry stakeholders seeking to capitalize on the evolving virtual experiences in tourism.

3.2 Data Collection

3.2.1 Secondary Data

In this dissertation, secondary data for analysis were sourced from reputable scientific platforms, namely "Web of Science," "Scopus," and "Google Scholar," in addition to scholarly journals, books, and electronic resources. The dataset also included information gathered from official websites of companies specializing in VR products or services, relevant blogs, and video interviews. In the comprehensive literature review conducted for this dissertation, a total of 357 sources were employed. More than half of these sources comprised scientific journal articles, with additional contributions from categories such as "Web site," "Book," and "Conference Proceedings." The detailed distribution of sources from the current research is visually presented in Figure 16.

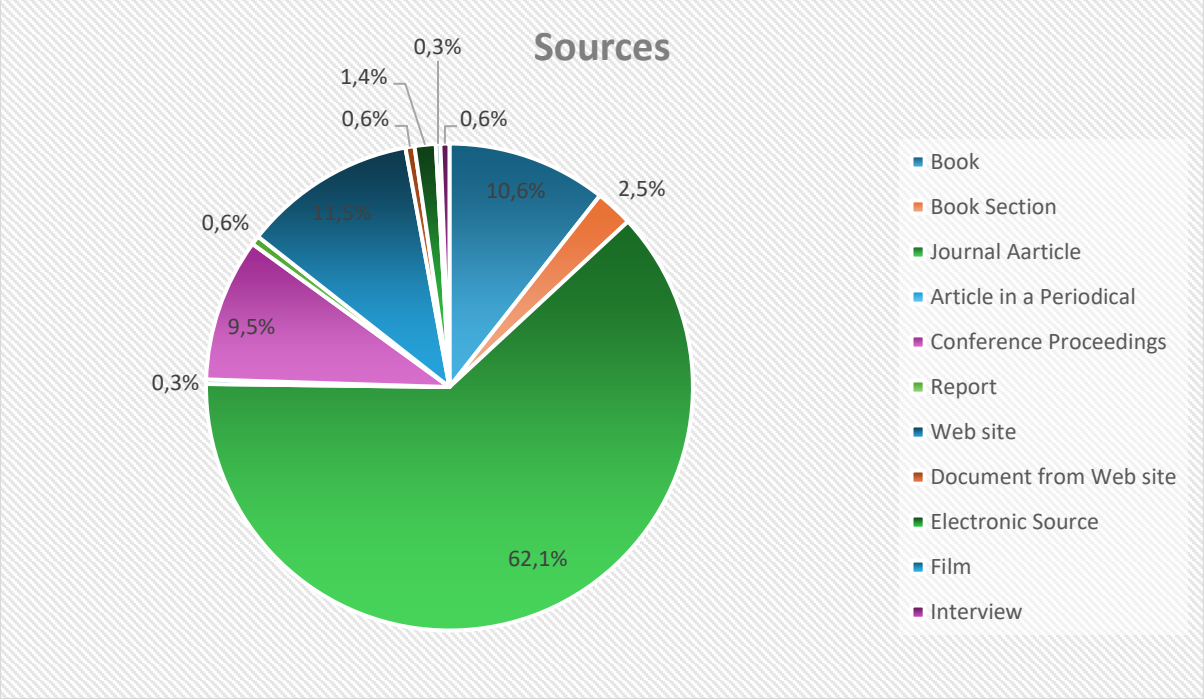

Figure 16: Source distribution used in dissertation
Source: own work

To conduct a comprehensive analysis of the VT literature retrieved from the WoS, a systematic method was employed. This method was chosen to ensure a thorough and organized examination of the available literature, providing a robust foundation for the subsequent chapters of the dissertation.

3.2.2 Primary Data

In the primary data analysis, a mixed method was employed, encompassing both qualitative and quantitative research approaches. Qualitative research was conducted through a focus-group interview and open-ended questions in the questionnaire, offering insights into participants' perceptions of VT, its advantages, and disadvantages.

I. Focus-group Interview

A focus-group interview was chosen for its effectiveness in eliciting genuine opinions, fostering open discussions, and generating new ideas. The focus group allowed for a nuanced exploration of participants' views on VT without the constraints of multiple-choice questions. In the primary data research phase, focus group interviews served as a valuable method to glean insights into the perceptions of potential tourists who were not professionally aligned with tourism and were unfamiliar with current virtual trends in this industry.

The focus-group interview was structured as an open discussion, initiated by the interviewer providing a clear definition of VT ("Virtual Tourism is a process of immersing people in the virtual environment by using various gadgets (VR helmet, gloves, smell and test sensors, etc.") to ensure participants had a common understanding relevant to the research. Each group, comprising five individuals, engaged in discussions for approximately an hour. Throughout the session, the interviewer periodically introduced prepared topics to guide the conversation, including:

1. Identify potential users of VT.
2. Explore the advantages associated with VT.
3. Discuss the drawbacks or limitations of VT.
4. Brainstorming strategies for enhancing the popularity of VT.

In total, 20 people participated in the focus-group interview. They were divided into four groups by five people each. All of the participants belonged to the 20s–30s age group and were intentionally selected from Gen Y and Gen Z, as their technological literacy and openness to progress were deemed critical for understanding their perspectives on VT, and were referred to as "digital native" (Palfrey & Gasser, 2010), compared to older generations.

The focus group interviews took place in April 2024, took about an hour, and became a base for formulating survey questions.

II. Survey

Quantitative research was conducted through an online questionnaire that was created based on the results of the focus-group interview. To ensure accessibility and minimize errors, the questionnaire featured a user-friendly interface, simple language, and explanations of specific terminology. Google Forms was chosen as the survey platform for its ease of use, accessibility across devices, and intuitive design. The program facilitated data collection and analysis, allowing for the download of responses in various formats.

The survey encompassed 20 questions strategically categorized into three main sections:

1. Touristic Behaviour: understanding participants' travel patterns before and after the COVID-19 pandemic.
2. Awareness and Experience: exploring participants' awareness and experience with VR in tourism, along with their opinions on VT.
3. Demographic Data: Collecting information on age group, nationality, income level, and status to assess potential influences on participants' perspectives.

The questionnaire was disseminated via the Internet to maximize outreach and engage a broader participant base, aligning to obtain a representative and diverse sample. The data collection took place in April 2023 and December 2023. The utilization of an online platform facilitated ease of access for respondents, allowing them to complete the survey at their convenience. This methodological choice also facilitated the integration of data obtained from participants with varying degrees of familiarity with VT, thereby enriching the overall dataset.

The strategic design of the survey questions sought to elicit nuanced responses, providing valuable insights into the intricate interplay between participants' travel habits, their perceptions of VR technology, and demographic factors that might influence their viewpoints. The comprehensive nature of the questionnaire aimed to capture a holistic understanding of individuals' attitudes toward VT, laying the foundation for a nuanced analysis within the broader context of the dissertation.

The study was conducted bilingually, utilizing both English and Russian languages, to maximize the dataset. This approach facilitated broader participation and ensured that individuals comfortable with either language could contribute their insights. Conducting the study in two languages catered to a more diverse participant base, enabling a comprehensive analysis of responses from individuals with varying linguistic preferences. Additionally, the

political restrictions that Russia currently faces affect traveling possibilities for Russian citizens. This can become a potential market segment for VT.

One survey was employed to gather data from individuals both with and without motor disabilities, with the primary divergence occurring in Section 2. This section specifically focused on respondents' awareness of VR and VT, their firsthand experiences with these technologies, and their opinions regarding the utility of VT as a distinct form of tourism.

In the attempt to gather enough respondents with motor disabilities for analysis, the distribution of the questionnaire within common social media groups proved ineffective. To address this challenge, a targeted approach was adopted, focusing on social media platforms dedicated to PwD. Simultaneously, outreach efforts were extended to organizations specifically catering to PwD. The strategy involved reaching out to relevant organizations through email and contact forms available on their websites, leveraging their established platforms for individuals with motor disabilities. A Google search conducted on December 6, 2023, at 3 p.m. CET, with the query “community for people with motor disabilities,” resulted in checking 90 different links globally. Nineteen emails were sent, and contact forms were filled in for 26 organizations. A subsequent search on December 12, 2023, at 7 a.m. CET, using the Russian query “сообщества для людей с ограниченными возможностями” (translated as "community for people with motor disabilities"), involved checking 80 different links. 28 emails were sent to organizations in post-Soviet countries, and 83 emails were sent to official government organizations across different subjects of the Russian Federation.

However, the obtained feedback was notably low, with several organizations either not responding to emails or facing issues such as outdated or incorrect email addresses. Some responses included requests for additional research details or suggestions to redirect the inquiry to a more suitable organization within their network.

In total, three organizations declined participation, while three organizations agreed to share the questionnaire within their respective platforms. The outcomes of this outreach effort are summarized in Table 13.

Table 13: Feedback from emails
Source: own work

Type of feedback	International	Russian
No feedback	30	102
Error message	4	2
Confirmation message	3	1

Agree to help	1	2
Not agree to help	2	1
Miscellaneous message	5	3

The process of engaging with social media platforms for data collection involved registration, seeking approval to post in relevant groups, and crafting the posts. Distinct steps were taken for Russian-speaking and International English-speaking media. Despite variations in the number of groups and their responsiveness, an integrated analysis was undertaken due to the inability to compare responses between the two linguistic groups. Key insights were derived from three highly effective social media platforms: "Facebook," "Odnoklassniki," and "Vkontakte." Table 14 provides a detailed overview of the outcomes.

Table 14: Feedback from social media platforms
Source: own work

Platform	**International (total/approved)**	**Russian (total/approved)**	**Number of impressions on the post**	**Was not approved or was deleted**
«Vkontakte[7]»	-	37/11	31	26
«Facebook[8]»	32/18	4/2	38	16
«Odnoklassniki[9]»	-	27/15	7	12
«X[10]»	1	1	18	-
«Telegram[11]»	-	2/1	1	1
«LinkedIn[12]»	1	-	32	-
Forums for PwD	2/1	1/1	20	1

On "Facebook," although only half of the communities accepted the questionnaire post, those that did boasted a combined follower count exceeding 37,000. However, the posts generated limited engagement, with only 38 impressions.

[7] Vkontakte is a Russian online social media and networking service, often compared to Facebook. It allows users to create profiles, connect with friends, share multimedia content, and join communities.
[8] Facebook is a widely used global social networking platform. Users can create personal profiles, connect with friends and family, share text and multimedia content, and engage with others through comments and likes.
[9] Odnoklassniki is a Russian social network that focuses on connecting classmates and old friends. It provides features for sharing photos, updates, and communication with classmates.
[10] X is a microblogging and social networking platform that allows users to share short messages. Users can express thoughts, opinions, or share links and multimedia content within a character limit.
[11] Telegram is a cloud-based instant messaging app that prioritizes privacy and security. Users can send messages, multimedia files, and create groups or channels.
[12] LinkedIn is a professional networking platform. It is used for building professional connections, sharing work-related updates, and networking within industries.

On "Odnoklassniki," nearly half of the communities removed the questionnaire post, and one even banned the profile. The remaining approved groups had a collective follower count exceeding 21,000, but the posts received only 7 impressions.

"Vkontakte" featured numerous communities for PwD, but a third of them either removed the post, did not approve it, or ignored administrator messages. The approved groups had a total follower count of 13,500, and the posts garnered 31 impressions.

Other utilized social media platforms did not yield significant results for the current research. The posts were disseminated in December 2023, and the results were aggregated in February 2024, providing a two-month window for survey participation.

While online surveys offered cost-efficient and global reach, potential drawbacks included a lack of control over the sample, limited population diversity, and uncertainties regarding participant engagement. The snowballing sample principle was leveraged to encourage participants to share the survey with their networks.

ANOVA Analysis.

To determine whether there is a significant variation in the means of the groups being compared or if the differences observed could have occurred by chance. ANOVA allows to assess the impact of categorical independent variables (factors) on a continuous dependent variable, identifying which factors, if any, have a significant effect on the outcome variable.

This analysis was used for two aspects: different generations familiarity with VR and VT. Respondents were classified into distinct age groups and generations based on the options provided in the survey. These options included age ranges such as less than 18, 18-24, 25-33, 36-50, and more than 50. Specifically, individuals selecting less than 18 and 18-24 were categorized as Gen Z, those within the 25-33 range were identified as Gen Y, while respondents falling within the 36-50 and more than 50 categories were designated as Gen X. Statistical analysis was conducted by using ANOVA analysis via DATAtab (DATAtab Team, 2024). First step was to test the normal distribution. Table 15 shows the results of four different statistical tests used to assess whether your data follows a normal distribution. A high p-value (greater than 0.05) suggests that the data does not significantly deviate from normality. All four tests indicate that your data do deviate significantly from the normal distribution. This means that you should proceed with statistical methods that do not assume normality of the data.

Table 15:Normality Distribution Tests of the sample
Source: own work

Normality distribution tests	Familiarity with VR		Familiarity with VT	
	Statistics	p	Statistics	p
Kolmogorov-Smirnov	0.33	<.001	0.26	<.001
Kolmogorov-Smirnov (Lilliefors Corr.)	0.33	<.001	0.26	<.001
Shapiro-Wilk	0.79	<.001	0.79	<.001
Anderson-Darling	37.29	<.001	33.37	<.001

As a next step, data was analysed by using following calculations:

- Frequency indicates the number of respondents in each age group who provided data on their familiarity with VR.
- Mean indicates the average familiarity score for each age group.
- Std. Deviation measures the dispersion or variability of the familiarity scores within each age group.
- Variance represents the spread of data points around the mean.
- 95% Confidence Interval for Mean provides a range within which the true population mean of familiarity with VR is estimated to lie with 95% confidence.

This analysis lays the groundwork for further investigation into the factors influencing VR and VT adoption among different generations, contributing to a deeper understanding of technology acceptance and usage patterns.

4. RESULTS AND DISCUSSION

The goal of the Results and Discussion chapter is to present and interpret the findings of the research study. This chapter begins by presenting the raw data collected during the study in the form of tables, charts, and graphs. Following the presentation of the results, the discussion section interprets the findings. The author analyze the data, identify patterns or trends, and compare the results with existing literature. This chapter aims to provide insights, explanations, and implications of the findings, addressing any unexpected outcomes or discrepancies. It also discusses the significance of the results, their theoretical and practical implications, and potential avenues for future research. Overall, the Results and Discussion chapter is crucial for understanding the meaning and relevance of the study's findings within the broader academic and practical contexts. Consequently, this study endeavors to address the research questions, and this section delineates the study's design, methodology, and offers an analysis of the gathered data.

4.1 Focus-group Interview

The focus group interview commenced with a succinct introduction to the concept of VT, providing participants with a foundational understanding. The ensuing discussion was both dynamic and multifaceted, with each participant presenting distinctive viewpoints and considerations related to the potential adoption of VT.

4.1.1 Group 1

Man 1 (22 y.o., Morocco, student) emerged as an active contributor to the conversation, proposing numerous positive scenarios for the VT application. From envisioning a reduction in the reliance on traditional zoos to the immersive experience of historical events, he displayed a keen interest in the transformative possibilities of VT. Additionally, he delved into the realm of interpersonal relationships, suggesting VT as a tool for long-distance couples to virtually travel together. Notably, he raised important concerns regarding cybersecurity and the actual level of relaxation that users might experience during virtual travel, offering valuable insights that contribute to the ongoing discourse on VT.

Man 2 (21 y.o., Jordan, student), leveraging his experience with VR, expressed reservations about potential medical contraindications and the legal intricacies surrounding the functioning of VT. His apprehensions extended to the readiness of individuals for a transformative change, emphasizing the need for an effective marketing campaign to propel the popularity of VT.

Man 3 (26 y.o., Jordan, employee) played a pivotal role as a mediator within the group, acknowledging the validity of opinions presented by both Man 1 and Man 2. He underscored the notion that VT may cater to different individuals and stages of development, asserting that it need not be a constant choice but a tool for specific, perhaps urgent, experiences.

Woman 1 (22 y.o., Russia, student), while maintaining a more reserved stance, contributed thoughts on safety within VT simulations. She highlighted the absence of physical threats within VE while expressing reservations about potential sanitization in the representation of destinations.

Woman 2 (25 y.o., Russia, student) delved into the sustainability aspect of VT, emphasizing its potential to reduce the carbon footprint associated with traditional travel. Her insights extended to the inclusivity of VT, providing opportunities for individuals with health or financial constraints to engage in travel experiences. She emphasized the ability of VT to cover a diverse array of attractions in a single virtual trip.

Despite the varying perspectives presented within the group, a common thread emerged: all participants expressed a willingness to experiment with VT before forming definitive opinions. This collective openness to exploring the potential benefits and drawbacks of VT showcased a dynamic and receptive attitude within the focus group. The nuanced and multifaceted nature of the discussion provided a rich tapestry of insights, contributing to a comprehensive understanding of public attitudes toward VT within different demographic segments.

4.1.2 Group 2

Man 1 (30 y.o., Korea, employee, business owner) sees VT as suitable for those who want to visit many places in a short time. He pointed out the convenience of exploring places without time constraints or physical limitations are the advantages of VT. However, he assumes that not being able to feel the real environment is a disadvantage. He recommended targeting seniors as a potential audience for VT.

Woman 1 (31 y.o., Hungary, employee) believes that VT is suitable for anyone who lacks the resources or ability to travel physically. Being able to customize experiences and avoid unpleasant aspects of travel are the advantages of VT, but she feels like virtual experience will lack authenticity in experiencing local cultural aspects. She recommends marketing VT as a cost-effective and convenient alternative for traditional traveling.

Woman 2 (23 y.o., Slovakia, student/employee) recognizes the potential of VT for PwD and, at the same time, as a cost-saving and time-saving option. She agrees with Woman 1 in her

disbelieve that VT can provide an authentic cultural experience. She suggests integrating VT into educational settings.

Woman 3 (22 y.o., Hungary, student/employee) views VT as accessible to anyone, but particularly beneficial for PwD. Her concerns were focused on the accessibility of VR, because of its high price, and the possible negative impact on the economy of local communities at the real destinations.

Woman 4 (22 y.o., Hungary, student) also emphasizes the inclusivity of VT for PwD, just like Woman 2 and Woman 3. She doubts that the multisensory experience is possible to digitalize. She recommended to increase awareness of people about VT and boost their interest for a successful implimitation of VT.

Overall, while there is recognition of the potential benefits of VT, such as accessibility and cost-effectiveness, there are also concerns about its limitations in providing authentic experiences and its impact on traditional tourism economies.

4.1.3 Group 3

Woman 1 (27 y.o., Hungary, employee) believes that VT is accessible to anyone with the necessary technology, regardless of demographics. She pointed out that VT is accessible, affordable, and can be customized for individuals' interests. At the same time, she doubted that the virtual experience could be similar to real sensory perceptions. She recommended raising awareness of people about the VT.

Woman 2 (23 y.o., Jordan, student) agreed with Woman 1 and considered anyone with internet access as a potential user of VT. She viewed VT as a cost-free travel experience. Just like Woman 1, she doubts the technological ability of VT to provide a multisensory experience.

Woman 3 (27 y.o., Jordan, employee) suggested that PwD can be a target market for VT. She mentioned that VT is a means to escape daily routines and disconnect from reality. She also agreed with previous interviwees in VT not being able to recreate multisensory experience.

Woman 4 (31 y.o., Jordan, employee) suggested that VT is suitable for individuals unable to travel because of the various reasons (financial, health conditions, etc.). Her main concern about VT was its possible negative impact on local communities economics. She recommended targeting a specific segment that can be satisfied with the VT provided experience.

Woman 5 (21 y.o., Kazakhstan, unemployed) identified PwD, budget-conscious individuals, and the elderly as potential users of VT. She expressed that affordability, time-saving, and

stress-free exploration are the advantages of VT compared to traditional traveling. The disadvantage is the lack of social interactions during VT. She recommended to focus on educational initiatives to promote VT.

Overall, while there's a recognition of the benefits of VT in terms of accessibility and cost-saving, there are also concerns about its limitations in replicating real travel experiences and its potential impact on traditional tourism economies. Effective marketing, affordability, and creative implementation strategies emerge as common themes in making VT more popular and widely accepted.

4.1.4 Group 4

Woman 1 (27 y.o., Russia, student) identified PwD and people with financial constraints as potential users of VT. She did not mention any advantages of VT but highlighted the lack of interaction with local culture and the absence of physical experiences as a disadvantage. She suggested making VT more immersive with features like sound effects, AI-based conversations, and providing local food recipes to make it more immersive.

Woman 2 (27 y.o., Russia, employee) agreed with Woman 1 on the potential users of VT and added that it also can be used during events and for kids as an entertaining tool. She acknowledged the advantage of VT in providing access to destinations that are not available during traditional traveling. However, she pointed out the inability of VT to evoke the same emotions as real travel experiences. She suggested raising people awareness of VT via Internet promotion and integrating it into educational system.

Woman 3 (25 y.o., Indonesia, employee) suggested that anybody who wants to use VT can be a target group. She acknowledged the accessibility, affordability, convenience, safety, and educational value of VT. However, she mentioned that lack of authenticity, limited sensory immersion, technological barriers, and social isolation are disadvantages of VT. Collaboration with the government and DMOs can lead to a successful implementation of VT without negative effect on the destination.

Woman 4 (25 y.o., Laos, employee) agreed that anyone can use VT, but especially those who cannot travel because of the different limitations. She emphasizes the ability of VT offer near realistic experience, however, cost, accessibility issues, and complexity of use of such technology, especially for the elderly can be a disadvantage. She suggested providing free trials of VT experience to raise people's awareness.

Man 1 (27 y.o., Russia, employee) agreed that anyone can use VT, but focused on PwD. He agreed with Woman 2 and acknowledged that VT can provide access to destinations that are

not available for traditional traveling. The number of additional gadgets needed for successful implementation of VT made it less accessible and affordable. According to him, raising the awareness of VT is a key to its success.

Overall, the participants recognized the potential of VT to cater to diverse user groups but also acknowledged the need for improvements in its accessibility, affordability, and immersive qualities to maximize its benefits.

4.2 Questionnaire

4.2.1 Demographic Analysis

The survey, conducted in both April and December of 2023, garnered a total of 356 responses.

A demographic breakdown revealed a predominant representation of female participants, with the majority falling within the age groups of 25-35 (37.9%) and 18-24 (34.8%). Nearly 60% of respondents identified as students, possibly influenced by the author's student status and the survey's initial dissemination among the author's social circle. Monthly income among participants varied, with the majority falling within the range of 500€ to 1000€. Most of the respondents do not have motor disability, and less than 10% of the respondents have it. A comprehensive analysis of demographics data is presented in Table 16, offering detailed insights into the diverse characteristics of the survey participants.

Table 16: Demographic Analysis
Source: own work

Category	**Criteria**	**Total = 356**	
		n	**%**
Gender	Male	109	30.6
	Female	243	68.3
	Prefer not to say	4	1.1
Age-group	Less than 18	3	0.8
	18 – 24	124	34.8
	25 – 35	135	37.9
	36 – 50	68	19.1
	More than 50	26	7.4
Marital status	I am single	162	45.5
	I have a partner	114	32
	I am married	80	22.5
Children	Yes	81	22.8
	No	275	77.2

Status	Student	208	58.4
	Part-time job	63	17.7
	Full-time job	93	26.1
	Unemployed	17	4.8
	Pensioner	17	4.8
	Other	20	5.6
Monthly income	Less than 500€	95	26.7
	500€ - 1000€	113	31.8
	1000€ - 2000€	61	17.1
	2000€ - 3000€	22	6.2
	More than 3000€	20	5.6
	Prefer not to say	45	12.6

To enhance the inclusivity of the survey and amass a broader range of responses, the questionnaire was translated into Russian, allowing for distribution in Russia and among Russian-speaking communities in post-Soviet countries. The author's proficiency in Russian facilitated this translation process.

Survey participants hailed from 64 countries, with significant representation from Russia (15.7%), Hungary (13.5%), and the UK (12.9%). The availability of the questionnaire in Russian contributed to the higher response rate from Russian speakers. The international distribution strategy, particularly within Hungarian communities, was supported by the author's residency in Hungary. Figure 17 provides a visual representation of the global distribution of survey participants, with darker shades indicating higher response concentrations. Notably, eight respondents opted not to disclose their location.

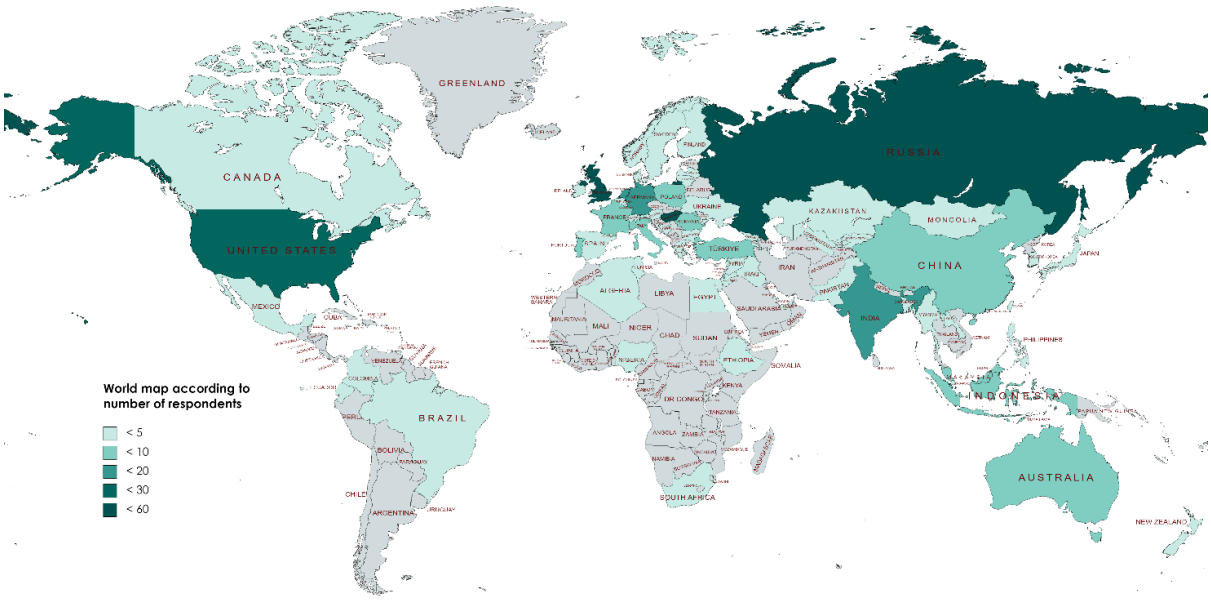

Figure 17: World map according to number of respondents
Source: own work

4.2.2 Travelling habits analysis

The analysis of data from Section 1 sheds light on the pre-COVID-19 travel patterns of the respondents. This side-by-side comparison highlights the disparities in travel frequencies between respondents without disabilities and those with motor disabilities. Individuals with motor disabilities tend to travel less frequently, with a higher percentage (37%) indicating traveling less than once a year compared to respondents without disabilities (17.3%). The biggest amount of these indicated traveling 2-3 times a year (38.3%). Conversely, a smaller percentage of individuals with motor disabilities (3.7%) reported traveling more than three times a year compared to those without disabilities (17%). This information underscores the impact of motor disabilities on travel behaviour. More detailed information is represented in Table 17.

Table 17: Comparative analysis of pre-COVID-19 traveling habits among participants with and without motor disabilities
Source: own work

Category	**People without motor disability (Total=329)**		**People with motor disability (Total=27)**		**Total = 356**	
	n	**%**	**N**	**%**	**n**	**%**
Less than once a year	57	37.3	10	37	67	18.8

Once a year	90	27.4	9	33.4	99	27.8
2-3 times a year	126	38.3	7	25.9	133	37.4
More than 3 times a year	56	17	1	3.7	57	16

The analysis of respondent preferences regarding the type of travel reveals divergent patterns based on disability status. Participants without disabilities displayed a preference for international travel, with 69.6% indicating a propensity for journeys abroad, while only 30.4% favoured domestic travel. Conversely, respondents with disabilities exhibited a strong inclination towards domestic travel, with 70.4% expressing a preference for local destinations, while 29.6% favoured international travel. A potential explanation for this disparity lies in the variations observed in the monthly income of the two groups, as detailed in Table 1. The economic considerations tied to income differences may contribute to the distinct travel preferences, where individuals with disabilities, potentially facing financial constraints, show a higher preference for cost-effective domestic travel options. At the same time, Individuals with disabilities might encounter challenges related to transportation. International travel often involves various modes of transportation, including flights, which may pose accessibility issues for people with disabilities. Finally, people with disabilities may have specific health considerations that make domestic travel more manageable. Access to familiar healthcare facilities and a more controlled environment might be prioritized over navigating unfamiliar healthcare systems during international travel. Opting for domestic travel could be a more accessible and convenient choice for PwD.

Respondents could choose only one option that helped to identify the most important purpose of traveling. The list was created according to UN, which includes leisure, visiting friends and relatives, education, health, religion, and business, with an additional blank field where people could mention their own reason (UN, 2010).

Table 18 depicts the primary purposes of travel for individuals both with and without disabilities, revealing distinct patterns in their preferences. Among people without disabilities “leisure” is the most prevalent purpose, chosen by 74.2% of respondents, and “visiting friends and relatives” was elected by 18.2% of respondents. “Education” was identified by 3.7% of respondents. Among PwD “leisure” remains a significant purpose, selected by 55.6% of respondents, “health and medical care” was highlighted by 14.8% of respondents.

Table 18: Comparison of Travel Purposes Between Individuals With and Without Disabilities
Source: own work

Category	People without motor disability (Total=329)		People with motor disability (Total=27)		Total = 356	
	n	%	n	%	n	%
Leisure	244	74.2	15	55.6	259	72.7
Visiting friends and relatives	60	18.2	1	3.7	61	17.1
Education	12	3.7	-	-	12	3.4
Health and medical care	6	1.8	4	14.8	10	2.8
Religion	2	0.6	-	-	2	0.6
Business	1	0.3	1	3.7	2	0.6
Other	4	1.2	6	22.2	10	2.8

It is evident that leisure is a predominant travel purpose for both groups, although it holds greater importance for individuals without disabilities. Health and medical care emerge as a more significant factor for individuals with disabilities, underscoring the importance of healthcare considerations in travel decisions for this demographic. Additionally, business-related travel appears more frequently among individuals with disabilities than those without. This nuanced understanding of travel purposes is crucial for tailoring VT experiences to diverse needs and preferences, acknowledging that certain motivations may not be fully addressed by virtual alternatives.

The dissertation discusses the suitability of VT for creating virtual tours in specific locations, particularly in areas like the city center of Budapest that tourists can explore within a few hours. The focus is on the potential of VT for educational cultural tourism due to its ease of production. To gauge people's interest in such tours, an additional question was incorporated to ascertain whether respondents would be inclined to participate in a city tour during their regular travels. The results indicate the general interest level, with most respondents (53.4%) expressing interest in a short city tour, prioritizing it if they have sufficient time, while a smaller percentage consider it a top priority (34.6%). The least number of respondents showed no interest at all (12%).

The dissertation explores how VT provides a condensed version of the travel experience, focusing on sightseeing and eliminating the need for transportation, accommodation, and catering. This shift results in a gradual reduction in the length of the trip. Analysis of the respondents' typical travel durations indicates that the majority prefer trips lasting up to one

week, with the smallest percentage opting for trips exceeding two weeks. Figure 18 details these findings.

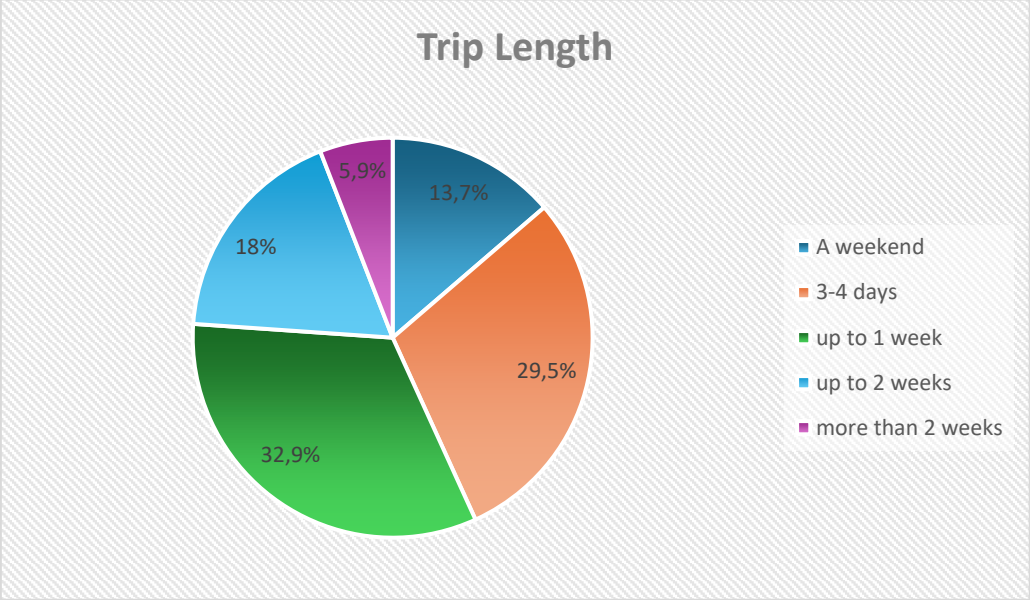

Figure 18: Respondents' trip length
Source: own work

An essential characteristic to consider is the amount of money individuals are willing to spend on their typical trip per person, given that VT offers a potentially more cost-effective alternative. The analysis of the gathered data indicates that most respondents typically spend between 100€-300€ and 300€-600€. Conversely, the fewest respondents allocate more than 1000€ per person for their trips. Detailed results can be found in Figure 19.

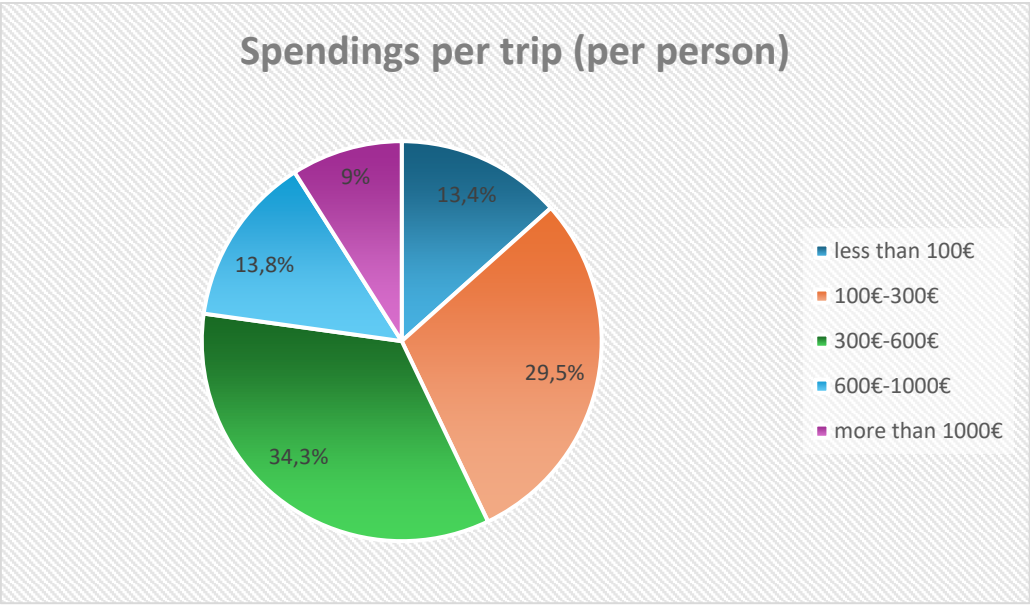

Figure 19: Respondents' spendings per person during the trip
Source: own work

The preferred type of travel organization is crucial in understanding people's openness to utilizing VT, as different organizational approaches may impact their choices. From the outset, VT can be implemented through specialized VT agencies offering various sensors and high-quality gadgets. According to the results, respondents primarily favour planning their trips independently (77.5%). While numerous resources facilitate the booking of essential elements for traditional tours, certain constraints like language barriers, complicated visa procedures, and a lack of experience can pose challenges for some travellers. 19.1% of respondents use both: organized and independent way of traveling, and the least amount (3.4%) prefer to organize their trip by using services of travel agencies.

4.2.3 Familiarity with VR and VT

The analysis of Section 2 in the questionnaire aimed to uncover participants' familiarity with VR, its application in tourism, and their opinions about VT. Table 19 illustrates the answers on question "Are you familiar with VR?" As a result, 20% of the participants were not familiar with it. Among those familiar with VR, only 17% reported its occasional or frequent usage. Most of respondents, both with and without disabilities, are aware of VR and its applications in tourism but do not actively use it themselves. The results indicate no significant differences between the two groups.

Table 19: Comparison of VR usage patterns between individuals with and without motor disabilities
Source: own work

Category	**People without motor disability (Total=329)**		**People with motor disability (Total=27)**		**Total = 356**	
	n	%	n	%	n	%
"Yes, I use it often"	8	2.4	1	3.7	9	2.5
"Yes, I use it occasionally"	47	14.3	5	18.5	52	14.6
"Yes, but I don't use it"	212	64.4	12	44.4	224	62.9
"No, I haven't used it"	62	18.9	9	33.3	71	20

Analysis also unveiled variations associated with the age groups of the respondents. Figure 5 highlights an interesting trend where older participants tend to use VR more frequently, both often and occasionally. Paradoxically, the same older demographic demonstrates a lower

overall awareness of VR, suggesting that Gen X has the highest number of respondents who are unaware of VR. Despite this lack of general awareness, Gen X also boasts the highest number of respondents who actively engage with VR technology.

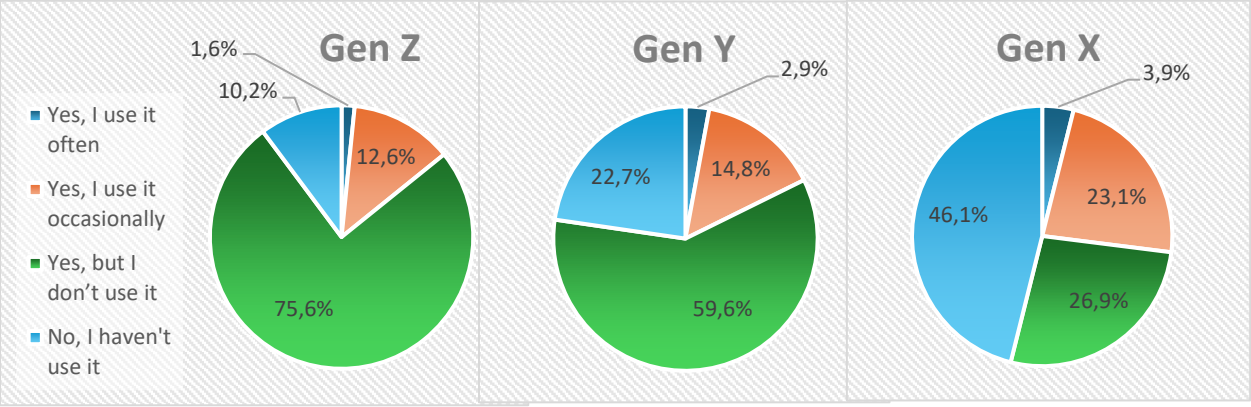

Figure 20: Comparison of different age-groups' awareness of VR
Source: own work

The results of the ANOVA analysis support the statement above and provide descriptive statistics for the familiarity with VR across these groups. They are represented in the Table 20 and described as following:

- Mean. Gen X has the highest mean familiarity score of 3.05, followed by Gen Y with a mean of 3.02, and Gen Z with a mean of 2.94.
- Std. Deviation. Gen X has the highest standard deviation of 0.83, indicating greater variability in familiarity scores among respondents in that group.
- Variance. Gen X also has the highest variance, suggesting wider variability in familiarity scores compared to the other age groups

Table 20: ANOVA analysis of different generations familiarity with VR
Source: own work

		Frequency	Mean	Std. Deviation	Variance	95% Confidence interval for mean
Familiarity with VR	Gen X	94	3.05	0.83	0.7	2.88 - 3.22
	Gen Y	135	3.02	0.65	0.42	2.91 - 3.13
	Gen Z	127	2.94	0.54	0.29	2.85 - 3.04

The data in Table 21 illustrates responses to the question "Have you ever seen how VR is used in tourism (for marketing, management, as an attraction, etc.)?" Among the participants, 37% reported that they had never heard of VR being used in tourism, while only 13% indicated that they had tried it themselves. Most respondents demonstrated awareness of VT

but had not personally engaged with the technology. The results of both: respondents with and without disabilities are similar, however, there is a much higher percentage of PwD who tried VT themselves, meaning they are already more interested in VT thanks to it inclusivity. This awareness bodes well for the implementation of VT, as familiarity often precedes adoption. The bigger percentage of PwithoutD never heard of VR being used in tourism.

Table 21: Comparison of familiarity and experience with VR used in tourism between people with and without motor disabilities
Source: own work

Category	**People without motor disability (Total=329)**		**People with motor disability (Total=27)**		**Total = 356**	
	n	**%**	**n**	**%**	**n**	**%**
"Yes, I tried it myself"	41	12.5	8	29.6	49	13.8
"Yes, but I haven't tried it"	164	49.8	11	40.8	175	49.1
"No, never heard of it"	124	37.7	8	29.6	132	37.1

Discrepancies in the age-group analysis exhibited consistent outcomes across all three generations. An intriguing observation is that a larger percentage of Generation Z is aware of VR applications in tourism, while a greater number of individuals who have actually used it belong to Generation X. The detailed results are illustrated in Figure 21.

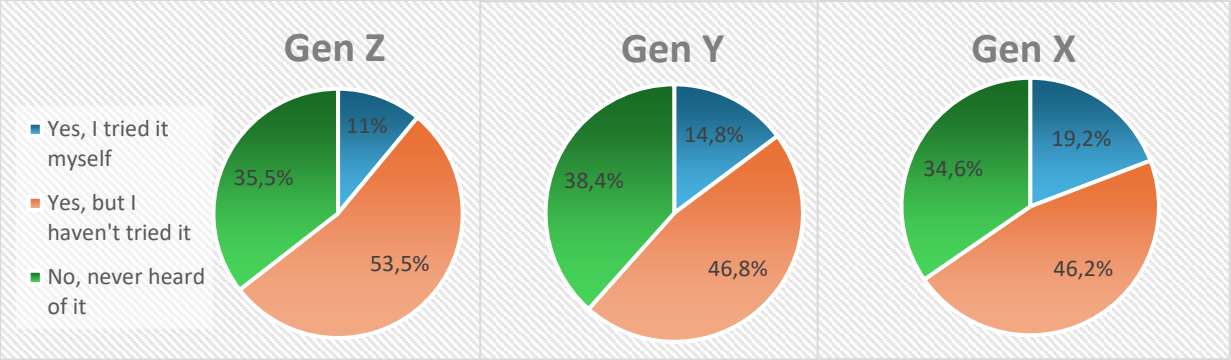

Figure 21: Comparison of different age-groups' awareness of VR used in tourism
Source: own work

The results of the ANOVA analysis support the statement above and provide descriptive statistics for the familiarity with VR across these groups. They are represented in the Table 22 and described as following

- Mean. Gen Y has the highest mean familiarity score (2.3), followed by Gen Z (2.24) and Gen X (2.14).

- Std. Deviation. Gen X exhibits the highest standard deviation (0.73), indicating greater variability in familiarity scores compared to Gen Y (0.67) and Gen Z (0.64).
- Variance. Gen X has the highest variance (0.53), indicating the widest spread of familiarity scores, followed by Gen Y (0.45) and Gen Z (0.41)

Table 22: ANOVA analysis of different generations familiarity with VT
Source: own work

		Frequency	Mean	Std. Deviation	Variance	95% Confidence interval for mean
Familiarity with VT	Gen X	94	2.14	0.73	0.53	1.99 - 2.29
	Gen Y	135	2.3	0.67	0.45	2.18 - 2.41
	Gen Z	127	2.24	0.64	0.41	2.13 - 2.36

The evaluation of potential users' awareness and attitudes towards VT in comparison to traditional tourism was conducted using a six-point Likert scale. This scale lacks a neutral option, what makes respondents choose the more suitable option for them, and Table 23 presents the participants' responses, with the number of votes for each option. The most popular option in each row is highlighted in yellow, while the least popular one is underlined. To facilitate a clearer comparison between the two groups, their results are juxtaposed and color-coded differently: yellow highlight demonstrates the highest score, and the lowest score is underlined.

Table 23: Likert scale results comparison between people with and without disability
Source: own work

	Category	strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree
VT is cheaper	PwithoutD[13]	18	22	44	63	121	61
	PwD	3	3	4	3	8	6
VT is easier to plan and arrange	PwithoutD	11	13	37	78	128	62
	PwD	2	4	4	4	8	5
VT allows people to travel to places that are difficult to reach	PwithoutD	11	14	25	50	125	104
	PwD	2	3	5	1	8	8
VT allows people to travel to places that do not exist	PwithoutD	20	16	23	43	112	115
	PwD	2	3	5	2	8	7
VT is safer	PwithoutD	15	20	36	72	111	75
	PwD	3	3	3	3	9	6

[13] People without disability

VT is more sustainable	PwithoutD	23	25	45	74	106	56
	PwD	3	3	3	4	8	6
VT is more inclusive	PwithoutD	29	37	52	55	94	62
	PwD	2	4	3	4	7	7
There are no technologies that can recreate real experience	PwithoutD	18	23	31	37	56	164
	PwD	3	4	5	3	6	6

To analyze the received data and gain deeper insights into respondents' perceptions, key statistical measures were employed. The mean, median, and mode were calculated for each statement to assess the central tendency of the responses, while standard deviation was computed to gauge the variability in participants' viewpoints. The following formulas were utilized in this analysis:

- Mean provides an average value, offering an overview of the central tendency in respondents' opinions.
    - Mean = (sum of all responses)/(total number of respondents) (Field, 2013).
- Median identifies the central position, especially valuable for understanding the distribution of responses.
    - Median is the middle value of the responses when the data are arranged in order from lowest to highest (Allen & Yen, 1979).
- Mode highlights the most common viewpoint expressed by participants.
    - Mode represents the most common response (Agresti & Finlay, 2012).
- Standard deviation (St. Dev.) indicates the degree of variability or dispersion in respondents' opinions around the mean.
    - St. Dev. = sqrt((sum of (response-mean)^2)/(total number of respondents - 1) (Tabachnick & Fidell, 2012).

Detailed results of the Likert Scale analysis after the calculations are presented in Table 24 and described below.

Table 24: Likert Scale data analysis
Source: own work

	Category	Mean	Median	Mode	St. Dev.
VT is cheaper	PwithoutD	49.0	44.0	61.0	29.5
	PwD	4.3	3.5	6.0	1.4
VT is easier to plan and arrange	PwithoutD	56.2	62.0	44.0	27.4
	PwD	4.3	4.5	5.0	1.6
VT allows people to travel to places that are difficult to reach	PwithoutD	60.2	62.0	125.0	28.7
	PwD	4.8	5.0	8.0	2.5

VT allows people to travel to places that do not exist	PwithoutD	68.7	75.0	112.0	32.1
	PwD	4.7	5.0	7.0	2.3
VT is safer	PwithoutD	58.7	72.0	75.0	28.3
	PwD	5.0	6.0	6.0	2.1
VT is more sustainable	PwithoutD	51.7	45.0	56.0	22.1
	PwD	5.7	6.0	6.0	3.3
VT is more inclusive	PwithoutD	42.4	37.0	52.0	15.4
	PwD	5.1	4.0	7.0	1.8
There are no technologies that can recreate real experience	PwithoutD	46.6	37.0	164.0	39.7
	PwD	5.4	4.0	6.0	1.6

1. "VT is cheaper".

For PwithoutD, the data suggests a relatively positive perception, with an average mean of 49.0, a median of 44.0, and a mode of 61.0. The standard deviation of 29.5 indicates a considerable spread in responses, signifying diverse opinions within this group.

Conversely, PwD demonstrated a lower average mean of 4.3, a median of 3.5, and a mode of 6.0, suggesting a less favourable perception of VT being a cost-effective option. The standard deviation of 1.4 implies a more concentrated distribution of responses among individuals with disabilities.

The comparison between the two groups reveals a substantial difference in means, medians, and modes, indicating a clear contrast in perceptions. People without disabilities, on average, exhibit a more positive view regarding the cost-effectiveness of VT.

2. "VT is easier to plan and arrange".

For PwithoutD, the data reveals a generally positive perception, with an average mean of 56.2, a median of 62.0, and a mode of 44.0. The standard deviation of 27.4 suggests a significant range in responses, indicating diverse opinions within this group.

In contrast, PwD showed a slightly lower average mean of 4.3, a median of 4.5, and a mode of 5.0, suggesting a less favourable perception of VT being easier to plan and arrange. The standard deviation of 1.6 implies a more concentrated distribution of responses among individuals with disabilities.

The comparison between the two groups reveals a substantial difference in means, medians, and modes, indicating a clear contrast in perceptions. People without disabilities, on average, exhibit a more positive view regarding the ease of planning and arranging VT.

3. "VT allows people to travel to places that are difficult to reach".

For PwithoutD, the data suggests a generally positive perception, with an average mean of 60.2, a median of 62.0, and a mode of 125.0. The standard deviation of 28.7 indicates a wide range of responses, reflecting diverse opinions within this group.

Conversely, PwD displayed a slightly lower average mean of 4.8, a median of 5.0, and a mode of 8.0, indicating a less favourable perception of VT's ability to facilitate travel to difficult-to-reach places. The standard deviation of 2.5 suggests a more concentrated distribution of responses among individuals with disabilities.

Comparing the two groups reveals a notable difference in means, medians, and modes, highlighting a distinct contrast in perceptions. People without disabilities, on average, hold a more positive view regarding the capability of VT to enable travel to challenging destinations.

4. "VT allows people to travel to places that do not exist".

For PwithoutD, the data suggests a predominantly positive perception, with an average mean of 68.7, a median of 75.0, and a mode of 112.0. The standard deviation of 32.1 indicates a wide range of responses, reflecting diverse opinions within this group.

Conversely, PwD displayed a slightly lower average mean of 4.7, a median of 5.0, and a mode of 7.0, indicating a less favourable perception of VT's ability to facilitate travel to non-existent places. The standard deviation of 2.3 suggests a more concentrated distribution of responses among individuals with disabilities.

Comparing the two groups reveals a notable difference in means, medians, and modes, highlighting a distinct contrast in perceptions. People without disabilities, on average, hold a more positive view regarding the capability of VT to enable travel to imaginary or non-existent places.

5. "VT is safer".

For PwithoutD, the data suggests a generally positive perception, with an average mean of 58.7, a median of 72.0, and a mode of 75.0. The standard deviation of 28.3 indicates a wide range of responses, reflecting diverse opinions within this group.

Conversely, PwD displayed a similar positive perception with an average mean of 5.0, a median of 6.0, and a mode of 6.0, indicating an overall favourable view of VT as a safer alternative. The standard deviation of 2.1 suggests a more concentrated distribution of responses among individuals with disabilities.

Comparing the two groups reveals a notable difference in means, medians, and modes, highlighting a distinct contrast in perceptions. People without disabilities, on average, hold a more positive view regarding the safety of VT.

6. “VT is more sustainable”.

For PwithoutD, the data indicates a generally positive perception of VT's sustainability, with an average mean of 51.7, a median of 45.0, and a mode of 56.0. The standard deviation of 22.1 suggests a considerable range of responses within this group, reflecting diverse opinions on the sustainability of VT.

On the other hand, PwD also displayed a positive perception, with an average mean of 5.7, a median of 6.0, and a mode of 6.0, indicating an overall favourable view of VT as a sustainable option. The standard deviation of 3.3 suggests a more concentrated distribution of responses among individuals with disabilities.

Comparing the two groups reveals some differences in means, medians, and modes, signifying varying perceptions of sustainability in VT. People without disabilities, on average, hold a slightly more positive view regarding the sustainability of VT.

7. “VT is more inclusive”.

For PwithoutD, the data suggests a generally positive perception of VT's inclusivity, with an average mean of 42.4, a median of 37.0, and a mode of 52.0. The standard deviation of 15.4 indicates a moderate level of variability in responses within this group, reflecting diverse opinions on the inclusivity of VT.

Similarly, PwD displayed a positive perception, with an average mean of 5.1, a median of 4.0, and a mode of 7.0, indicating an overall favourable view of VT as a more inclusive option. The standard deviation of 1.8 suggests a more concentrated distribution of responses among individuals with disabilities.

Comparing the two groups reveals some differences in means, medians, and modes, signifying varying perceptions of inclusivity in VT. People without disabilities, on average, hold a slightly more positive view regarding the inclusivity of VT.

8. “There are no technologies that can recreate real experience”.

For PwithoutD, the data suggests a diverse range of opinions, with an average mean of 46.6, a median of 37.0, and a mode of 164.0. The higher standard deviation of 39.7 indicates a considerable level of variability in responses within this group, reflecting contrasting views on the capability of technologies to recreate real experiences.

PwD, on the other hand, displayed a more concentrated distribution of responses, with an average mean of 5.4, a median of 4.0, and a mode of 6.0. The lower standard deviation of 1.6 suggests a more consistent view among individuals with disabilities, indicating that they generally agree that technologies can recreate real experiences.

Comparing the two groups reveals substantial differences in means, medians, and modes, signifying contrasting beliefs about the potential of technologies to replicate real experiences. People without disabilities, on average, hold a more skeptical view regarding the limitations of current technologies in recreating real experiences.

In essence, the overall sentiments gleaned from the responses are positive. Participants predominantly recognize the benefits offered by VT, with positive affirmations across various dimensions. However, a notable point of hesitation emerges concerning the technological capabilities of current systems. Participants harbor skepticism regarding the ability of existing technologies, within their knowledge scope, to authentically replicate genuine travel experiences. This underscores a key aspect for consideration and further exploration in the development and refinement of VT technologies.

In the following open-ended question, respondents were allowed to provide qualitative insights into their opinions on VT. Out of the 329 respondents without disabilities, 96 provided comments. After filtering out 9 meaningless comments, a total of 87 comments were deemed suitable for future analysis. PwD left 9 comments, all of which were included in the analysis. The comments were predominantly in English, with 12 written in Russian. Obtained results can be divided into three categories:

Supportive:

- Some respondents endorsed VT, emphasizing its utility for individuals with health issues, including PwD and the elderly, who may face challenges with traditional travel (e.g. “I think it's a good way of tourism for people who aren't able to reach certain places themselves” and “Wonderful for old people”).
- Highlighted cases where VT serves as a valuable alternative for exploring unusual or inaccessible destinations (e.g. “I would opt for the virtual tourism if the real life option is completely out of reach due to health or income issues (example: space travel)” and “VR can extend the discovering, e.g. show the ancient condition in case of ruins”).

Critical:

- Those against VT explicitly stated that, personally, virtual experiences cannot replace real-world encounters (e.g. “For me it won’t work. No smell, no taste, no local weather, no spontaneity” and “It has some advantages but I am not sure that it is for me”).
- Some respondents acknowledged the potential in VT but expressed reservations, citing the perceived insufficiency in current technological development (e.g. “Really cool, but nothing beats in person experience. Only so much technology can do at the moment” and

"… if you want to really travel you won't get the full experience through a VR set. VR is a developing part of tech, it's not decent enough now …").

The cautiousness towards VT, particularly among those without disabilities, may be attributed to its novelty and a low familiarity among respondents. This aligns with consumer behaviour theory, where a small percentage of consumers are willing to try a new product immediately (Pankruhin, 2005).

The comparison between individuals with and without disabilities adds depth to the exploration of attitudes toward VT, revealing unique considerations and reservations within these distinct groups.

Similarities:

- Both groups exhibited mixed opinions on VT, with a range of attitudes from skepticism to appreciation.
- Concerns were raised in both groups about VT's ability to replace authentic travel experiences.

Differences:

- Concerns expressed by individuals without disabilities often revolved around sensory limitations.
- People with disabilities identified VT as a potential alternative for specific needs, emphasizing its utility for health-related or accessibility challenges.

Such qualitative feedback enriches the dissertation's analysis, providing real-world perspectives on VT. It emphasizes the need for a nuanced understanding of individual preferences, acknowledging that perceptions of VT are shaped by personal experiences and technological readiness. Received feedback from forums and comments from under the posts on social media supports these results.

Table 25 provides statistical insights into respondents' willingness to engage with VT if given the opportunity. Over half of the respondents express an openness to trying VT, with only 20% indicating a reluctance to try it at all. Notably, the data reveals variations in responses between individuals with and without disabilities. PwD exhibit a higher willingness to actively use VT (44.4%), while those without disabilities seem more inclined to consider trying it without a firm commitment (57.4%). This discrepancy may be attributed to the greater familiarity of PwD with VR applications in tourism, positioning them as potential adopters of VT.

Table 25: Comparison of respondents' willingness to use VT
Source: own work

Category	People without motor disability (Total=329)		People with motor disability (Total=27)		Total = 356	
	n	%	n	%	n	%
Yes	71	21.5	12	44.4	83	23.3
Try once	189	57.4	10	37	199	55.9
No	69	21	5	18.5	74	20.8

Additionally, the results indicate that most of respondents perceive VT as potentially useful for PwD (85.2%).

At present, despite the considerable attention given to VR and its accessibility, it is evident that the mass consumer is not fully prepared to embrace this form of tourism as a complete substitute for real-life experiences. Nevertheless, a notable portion of respondents acknowledge the potential advantages and enhancements that this technology could bring to specific segments of tourists and the broader tourism industry.

4.3 Discussion

In this section, some aspects of the conducted research will be compared to existing studies to emphasize their similarities, and differences and compare the results.

4.3.1 Systematic Review Comparison

During the analysis of articles from WoS, four articles were identified that conduct a systematic review of the literature with a similar topic, specifically addressing the application of virtual technologies in the tourism industry. It's important to note that these articles, although sharing a common theme, differ from the systematic review presented in the current research. The distinctions may include variations in the scope of the review, the selection criteria, or the specific focus within the broader realm of virtual technologies in tourism. The features of each research including current research are presented in Table 26.

Table 26: The comparison existing articles with systematic reviews
Source: own work

Source	Sample size	Type of papers	Database	Keywords
(Yung & Khoo-	46	VR- and AR- related articles in tourism	Scopus, EBSCO, Elsevier,	augmented realit*, virtual realit*, virtual world*,

Lattimore, 2019)		journals	Proquest, Emerald	virtual environ*
(Akhtar, et al., 2021)	60	Digital technologies and tourism	Scopus and WoS	digital tourism, digital technologies, virtual travel, virtual reality and tourism, augmented reality and tourism
(Fan, et al., 2022)	65	The validity of AR/VR presence in different experimental contexts and different demographic contexts	WoS, EBSCO, Science Direct	(augmented reality, virtual reality) AND (tourism, tourism environment, virtual tourism, attractions, destination marketing, hospitality)
(Calisto & Sarkar, 2024)	54	VR application in tourism and hospitality	WoS	1. augmented reality, virtual reality, virtual touris*, mixed reality; 2. touris*, hospitality, hotel*, destination marketing.
Current Research	54	Virtual Tourism	WoS	virtual tourism

Research of Yung and Khoo-Lattimore (2019) that involves 46 articles related to VR and AR in the field of tourism. The review focuses on articles published in tourism journals and includes five databases. The search criteria for relevant articles involve specific keywords that include variations to cover different aspects of VR and AR in titles, keywords, and abstracts.

The study of Akhtar et al. (2021) focuses on digital technologies in the context of tourism, particularly exploring aspects related to virtual travel, VR, AR, and digital tourism. Articles were retrieved from two main sources using specified keywords to identify relevant papers for their study or review.

The systematic review of Fan et al. (2022) focuses on assessing the validity of AR and VR presence in various experimental and demographic contexts within the field of tourism. The researchers conducted searches in three databases using specific keywords related to AR, VR, and various aspects of tourism.

Calisto and Sarkar (2024) conducted a systematic review to map and analyze existing research on VR applications in (T&H). Two sets of search terms were employed, covering VR-related terms and T&H-related terms, including emerging concepts like "mixed reality"

(MR). The search focused on titles, abstracts, and keywords, without applying a specific timeframe.

In contrast to the studies discussed, my research uniquely concentrates on a more specific application within the broader field of VR – VT. While the other studies encompassed AR, MR, and XR applications, my research deliberately focused solely on VR as the pivotal component for achieving fully immersive VT experiences. This targeted focus is reflected in the choice of a specific keyword, "virtual tourism," employed in the literature search, ensuring a more precise and relevant selection of articles.

Despite the shared emphasis on the quality of articles over quantity, with each study prioritizing peer-reviewed articles from reputable databases, the distinction lies in the specificity of application and the corresponding choice of keywords. This deliberate narrowing of focus contributes to the uniqueness of my research within the collective landscape of VR and AR studies in the field of tourism.

Additionally, only my research used RStudio for literature analysis, other articles used other programs (such as SPSS) or did not use them at all.

4.3.2 Primary Data Analysis Comparison

The current dissertation employs a survey methodology to gather primary data on the application of VR in tourism and VT. This approach aligns with the practices of other researchers who have utilized surveys for similar purposes since the 2000s. Table 27 presents a comparative analysis of various aspects across these studies, focusing on articles that solely employed survey methodologies without providing a demonstration of the VT experiences themselves. Table 27 contains nine suitable articles and current research as well.

Table 27: Comparison of articles with similar approach to mine
Source: own work

The study	Sample	Sample size	Aware of VT	VT Technology	Likert Scale	Advantages of VT	Disadvantages of VT
(Sussman & Vanhegan, 2000)	General public and professionals in tourism; UK	50	16%	N/A	7-point	Experience the destination before booking	Not actually experiencing the real thing
(Korinth, et al., 2019)	General public; Poland and	250	66.3 %	Google Street App	N/A	N/A	N/A

	foreigners						
(Roman, et al., 2022)	General public; Poland	564	82%	VR 3d environment	N/A	The use of VR is important at the time of the COVID-19 pandemic	Tourism with VR cannot substitute for traveling in the real world
(Shoaib, et al., 2022)	General public	534	69.1 %	N/A	N/A	Safety and security	Lack of change of environment
(Mavrin, et al., 2022)	General public; Croatia	228	N/A	VR/AR/XR use in tourism	5-point	VR/AR/XR and video games can contribute to virtual revival of lost historical sights.	N/A
(Li, et al., 2022)	General public with and without VT experience; China	239	100%	N/A	5-point	Easy to use	There is still a theoretical path of the enjoyment of tourists in VT that has not been achieved in the industry
(Geng, et al., 2023)	Elderly (65+); South Korea.	412	N/A	Semi-immersive VR	N/A	VR/AR attributes in senior tourism contribute to valuable experiences, positively affecting emotional benefits, enjoyment, and reuse intention	N/A
(Zeqiri, 2023)	General public; Kosovo	674	N/A	N/A	N/A	Authentic experience, enjoyment, and flow	N/A

						experience are crucial for enhanced VT experience	
(Bilynets, et al., 2023)	General public	656	N/A	Semi-immersive VR	7-point	N/A	VT is not seen as a substitute for actual travel
Current Research	General public and PwD	356	62.9 %	Fully-immersive VR	6-point	VT allows people to travel to places that are difficult to reach	There are no technologies that can recreate real experience

In a study conducted by Sussmann and Vanhegan (2000), a questionnaire was administered to both the general public and professionals in tourism in Great Britain. It is noteworthy that my research excluded professionals, focusing solely on comparing results with the general public's responses from their study. Despite methodological differences, the core arguments remained consistent. Both studies emphasized themes such as the opportunity to explore inaccessible places, inclusivity, and the ability to travel to non-existent locations. One striking similarity was the identification of a common negative effect – the absence of the actual experience of real travel – which was highlighted by respondents in both studies. This enduring consistency in results, spanning two decades, suggests that VT has yet to establish its efficacy among mass consumers.

In their article, Korinth et al. (2019) conducted a study comparing VT awareness among Polish individuals and foreigners. The study aimed to consolidate and summarize their results for comparison with other research. Notably, the authors emphasized the use of the Google Street app as a primary tool for their investigation. It is essential to highlight that in their approach, VT was positioned more as a marketing tool rather than being treated as a distinct and independent form of tourism.

In their article, Roman et al. (2022) gathered the survey respondents focusing on VT awareness among Polish people. The findings indicate a high level of awareness among the respondents. The primary factor influencing the choice of virtual travel is the opportunity to explore inaccessible places. Notably, almost 90% of respondents firmly believe that VR tourism cannot serve as a substitute for real-world travel experiences. The study identifies

new technologies, security, and changes prompted by the COVID-19 pandemic as key factors influencing the development of VR in tourism. Interestingly, comfort and accessibility for disabled individuals are not considered significant factors. Additionally, a substantial majority, approximately 70% of respondents, express the importance of using VR during the COVID-19 pandemic.

In their article, Shoaib et al. (2022) provided a comprehensive analysis of respondents' awareness of VT across different generations, encompassing Gen Z, Millennials, Gen X, and Baby Boomers. Like my research, this study revealed a low percentage of individuals who had personally experienced VT. At the same time, it highlighted a significant portion of respondents who expressed a willingness to try VT in the future. This also aligns with the trend observed in my research, indicating a potential interest and openness among diverse age groups to explore VT.

In their article, Marvin et al. (2022) examined travel habits before the COVID-19 pandemic, a similar approach was used in my research. The study identified similar proportions in traveling motives, with leisure and visiting family and friends ranking at the forefront. While there is no specific information about respondents' awareness of VT, the article revealed that 60% of participants believed that VR, AR, and XR could contribute to the touristic presentation. This aligns with the broader theme in my research, indicating a recognition of the potential impact of immersive technologies on the tourism sector.

In the article of Li et al. (2022) participants were exclusively selected based on their awareness of VT and were then compared in terms of experience and non-experience with VT. The research acknowledges the limited popularity of VT at its current stage of development, as indicated by differences in sample counts between potential and actual tourists. TAM was employed for analysis, emphasizing the significance of the expected ease of use as a key determinant. The study identifies significant predictors and emphasizes the need for effective advertising to enhance the popularity of VT. Practical design considerations for VT products are discussed, focusing on simplicity, efficiency, and increased user engagement. This aligns with your research's exploration of VT and the factors influencing its acceptance and usage.

The research of Geng et al. (2023) explores VR and AR attributes in the context of senior tourism. It emphasizes that these attributes contribute to valuable experiences, leading to positive effects on emotional benefits, enjoyment, and reuse intention among elderly individuals. This aligns with my research, which also delves into the application of VT in the

tourism sector, providing insights into the experiences and intentions of the senior demographic.

The research of Zeqiri (2023) underscores the importance of authentic experience, enjoyment, and flow experience in enhancing the VT experience. The study highlights the critical role of VT quality, as experiences perceived as inauthentic or unenjoyable may impact user engagement negatively. Specifically, authenticity, particularly in terms of local interactions and culinary experiences, is identified as a key factor influencing the perception of VT as a substitute for physical tourism. The study also reveals that the level of digital skills does not significantly influence the intensity of VT use. The accessibility and simplicity of VT products and services are suggested as factors that may diminish the impact of digital skills on usage intensity. These findings align with my dissertation's exploration of factors influencing the VT experience, particularly emphasizing the role of authenticity and user engagement.

The study of Bilynets et al. (2023) uniquely compares people's willingness to use VT for payment and for free. Participants were randomly assigned to either a paid or free VT experience condition. Among those offered a paid VT experience, 33% agreed to pay and participate, while 83% of those offered a free experience chose to participate. The research found that EE and previous experience with technology did not have the expected effect on the user's intention to use VT. This study provides insights into the economic aspect of VT adoption and how the cost factor influences user willingness, contributing valuable information to your dissertation's exploration of factors influencing VT acceptance.

The studies mentioned utilized questionnaires as their primary data collection method. However, they adopted a different definition of VT, incorporating non-immersive or semi-immersive VR and positioning it as a useful marketing and planning tool. In contrast, my research focuses on presenting VT as a distinct and independent category of tourism, specifically by utilizing fully immersive VR experiences. This approach enhances the novelty and uniqueness of your study, as it delves into the potential of VT as a separate and immersive form of tourism. Additionally, my utilization of a 6-point Likert Scale, which excludes a neutral option, ensures that respondents express a more decisive stance, providing a clearer insight into their preferences and perceptions regarding VT. At the same time, by incorporating the perspectives of PwD, my research contributes to a more inclusive understanding of VT. Previous studies did not focus on VT’s inclusivity. This emphasis on inclusivity aligns with broader societal goals of promoting accessibility and equal opportunities for all individuals, including those with motor disabilities. Consequently, my

study adds valuable insights to the literature by exploring the potential benefits and challenges of VT for this specific demographic, addressing a notable gap in existing research.

5. CONCLUSIONS, RECOMMENDATIONS, LIMITATIONS AND FUTURE DIRECTIONS, SUMMARY

This chapter serves to draw overall conclusions from the study, offer practical recommendations based on these conclusions, discuss the limitations of the research, and propose directions for future research.

1. Conclusions summarize the key findings of the study, emphasizing how they address the research objectives or questions. It highlights the main insights gained from the research and their implications for the field of study.

2. Recommendations are based on the conclusions drawn, and this section provides practical suggestions or recommendations for stakeholders, policymakers, or practitioners. These recommendations aim to inform decision-making or guide actions that can address the issues or capitalize on the opportunities identified in the study.

3. Limitations is a part where the author acknowledge and discuss the limitations of the study, including any constraints, biases, or shortcomings that have affected the validity or generalizability of the findings. This section promotes transparency and helps readers interpret the results within the context of the study's limitations.

4. Future Directions outlines potential avenues for future research that build upon the current study. It identifies unanswered questions, areas for further investigation, or methodological improvements that could enhance understanding in the field. By suggesting future directions, researchers contribute to the ongoing advancement of knowledge in the subject area.

Overall, this chapter synthesizes the main outcomes of the study, provides actionable insights, acknowledges its limitations, and offers guidance for future research endeavors.

5.1 Conclusions

The integration of VR into the tourism industry has marked a transformative shift in contemporary society, leading to the emergence of VT. This dissertation explores the multifaceted impact of VR on tourism, addressing key objectives and research questions through a comprehensive mixed-method approach. The findings illuminate the diverse applications of VR in tourism, showcasing its versatility as a planning tool, marketing strategy, and immersive attraction (H1).

The second objective delves into the concept of VT, identifying technological prerequisites for its classification as a unique form of tourism. Non-immersive and semi-immersive VR fall short of providing the authentic travel experience sought by tourists, highlighting the pivotal

role of fully immersive VR in shaping VT (H2.1, H2.2, H2.3). VT emerges as a sustainable, inclusive, and safe alternative, redefining conventional notions of travel.

Objective three investigates the behavior of different respondent groups toward VR in tourism. While individuals with disabilities exhibit higher receptivity to VT (H3.4), the age-group analysis yields nuanced results, emphasizing the need for a more sophisticated research design (H3.1, H3.2, H3.3). The hypotheses are supported or partly supported based on the study's comprehensive analysis.

In summary, the research contributes valuable insights into the potential of VT as a distinct tourism paradigm. Despite challenges and varying receptivity among demographic groups, VT holds promise for revolutionizing the tourism industry. The study concludes by emphasizing the importance of regulatory acceptance and collaboration with global tourism organizations to ensure the responsible integration of VT into mainstream tourism practices.

Table 28 summarizes the hypothses of the dissertation.

Table 28: Result according to hypotheses of the research
Source: own work

Hypotheses	Sub hypotheses	Content	Result
H1	H1.1	Various applications demonstrate the versatility of VR in enhancing tourism experiences	Supported
H2	H2.1	Non-immersive VR technologies form the basis for the emergence of VT	Not supported
	H2.2	Semi-immersive VR technologies form the basis for the emergence of VT	Not supported
	H2.3	Fully immersive VR technologies form the basis for the emergence of VT	Supported
H3	H3.1	Younger generation (“Generation Z”) exhibit higher receptivity towards VT, considering wide range of new technology usage within the generation	Partly supported
	H3.2	Middle generations (“Generation Y”) exhibit higher receptivity towards VT, considering its potential to address accessibility challenges	Partly supported
	H3.3	Older generation (“Generation X”)	Partly supported

		exhibit higher receptivity towards VT, considering its potential to address accessibility challenges	
	H3.4	Individuals with motor disabilities exhibit higher receptivity towards VT, considering its potential to address accessibility challenges	Supported

The COVID-19 pandemic ushered in an era of unprecedented challenges for the global tourism industry, with traditional travel experiencing severe constraints. In this context, VT emerged as a potential alternative, capturing the attention of researchers eager to explore innovative solutions amidst the crisis. This period of restricted travel provided a unique opportunity for the development and popularization of VT. Despite the enthusiasm within the academic realm, the reception of VT among tourists and tourism-related enterprises presented a nuanced picture. The industry, grappling with survival concerns during the crisis, had limited bandwidth for innovation. As a result, VT struggled to gain significant attention, facing potential neglect amid the prioritization of immediate survival strategies. The perspectives of tourism industry professionals played a pivotal role in shaping the trajectory of VT. Varied reactions were observed, reflecting a spectrum of viewpoints. While some professionals recognized the potential of VT and embraced its integration as a viable solution, others perceived it as a threat, potentially disrupting traditional tourism practices, and rejected its implementation. This dichotomy in reactions highlights the delicate balance between innovation and the preservation of established industry norms. Survival imperatives during the crisis may have overshadowed the exploration of novel avenues such as VT. As the industry stabilizes post-pandemic, there is an opportunity for a reassessment of VT's potential and its integration into broader tourism strategies.

To conclude, VT possesses the capacity to revolutionize the tourism industry, as elucidated by our study, which provides valuable insights into its merits and limitations. The findings suggest that VT can offer a distinctive and accessible alternative to physical tourism, particularly for individuals encountering physical or financial constraints.

5.2 Recommendations

This section elucidates the practical steps taken to implement our research findings, particularly focusing on the creation of VT as a distinct form of tourism. The details outlined herein serve as a guide for future endeavours in establishing VT as a viable and independent facet within the tourism industry.

A systematic approach to data collection was fundamental to unravelling valuable insights and gauging the impact of VR on the tourism industry, specifically delving into people's perceptions of VT. Employing a mixed-method strategy, the research incorporated both qualitative and quantitative techniques.

A focus group interview was conducted to delve deeper into participants' qualitative perceptions of VT as a distinct form of tourism. This interactive session facilitated open discussions, allowing participants to express nuanced opinions and experiences related to VT. The qualitative data gathered enriched our understanding of the intricacies surrounding VT.

Quantitative data collection was executed through an online questionnaire, meticulously designed to extract specific insights into respondents' opinions on VT, taking into consideration their health condition. This structured approach ensured a systematic analysis of participants' perspectives, enabling statistical inferences on the broader acceptance and potential challenges of VT within the tourism landscape.

In the context of my research, ethical considerations centered on the voluntary nature of survey participation and the absence of personal information collection. By design, the study prioritized the protection of participants' rights, privacy, and confidentiality, adhering to ethical standards.

The research findings underscored discernible variations in the perspectives of distinct tourist segments based on age and health conditions. These insights can be instrumental for local governments, DMOs, and businesses for offering valuable input for the development and promotion of virtual attractions. This approach aims to preserve existing attractions, provide access to destinations unable to accommodate physical visitors, and create entirely new and distinctive virtual offerings.

Theoretically, leveraging current technologies allows for the creation of a fully immersive environment simulating real travel experiences by engaging all five senses: visual input through glasses or 360-degree view screens, auditory stimuli via headphones or speakers, olfactory and gustatory sensations using sensors, and tactile feedback through gloves, all within climate-controlled rooms. This holistic approach promises a unique travel encounter, eliminating the necessity for physical travel while mitigating potential negative factors associated with real experiences.

Considering technological advancements, global travel organizations are urged to reevaluate the conventional definition of "tourism" in alignment with suggestions from the scientific community. Recognizing VT as a distinct form necessitates regulatory considerations, paving

the way for elevated standards in virtual experiences without adversely impacting the local community's economic dynamics.

5.3 Limitations and Future Research

My research encountered certain limitations that should be acknowledged to provide a comprehensive understanding of the study's context and potential constraints.

- Political Situations.

The political climate in the world, particularly, in Russia and Palestine introduced additional challenges to my study. Emotional constraints stemming from ongoing conflicts in these regions affected the researcher's working schedule and ability to focus on the study, what increased the time needed to conclude the dissertation.

- Geographic Restrictions.

The constrained access to Russia due to geopolitical factors significantly impacted the execution of more intricate investigations and collaboration with local stakeholders. The sanctions imposed against Russia presented challenges in terms of travel, limiting the researcher's ability to conduct on-the-ground studies.

- Email Domain.

The sanctions imposed had a notable impact on source accessibility. When in Russia, foreign sources were unreachable, and similarly, while in Hungary, Russian sources remained inaccessible. This led to the unavailability of certain sources, necessitating the use of additional tools such as VPNs. Moreover, assistance from third parties, including friends, relatives, and other researchers, became crucial in obtaining the required information.

- Participant Cooperation.

Despite our efforts to ensure a diverse participant pool, some individuals exhibited a reluctance to fill out the survey, which impacted the overall response rate. This reluctance may stem from various factors, including time constraints, disinterest, or privacy concerns.
The identified factors have introduced constraints that influenced both the depth and breadth of this study. It is crucial to acknowledge these limitations for a nuanced interpretation of the research outcomes. For future studies, it is recommended to consider these constraints when building upon this work, aiming for a more comprehensive and inclusive exploration of VT in diverse contexts.

- Lack of relevant data.

Due to the absence of pertinent data, it is impossible to analyze the impact of VT on actual tourism destinations, economical situation and local communities as it does not exist in a form current research proposes. Simultaneously, there's a scarcity of comprehensive statistical data available globally or on a country-specific level regarding individuals with motor disabilities. This limitation makes it challenging to accurately predict the size of the potential virtual tourism segment comprised of this demographic.

The present research relies on a systematic review based on sources obtained from the WoS. Future research endeavours should explore the possibility of retrieving information from other platforms, such as Scopus, to ensure a more comprehensive literature review.

The sample size of PwD in the current research is relatively small. It is suggested that future research aims to collect a larger number of respondents to obtain more accurate and representative results, particularly in the context of PwD and their engagement with VT.

The primary data collection tool in the current research was a survey. For future research, it is advisable to consider incorporating interviews and experiments in addition to surveys. This multi-method approach can provide more detailed and nuanced results, contributing to a deeper understanding of the research topic.

Future research endeavours could further examine the potential impact of VT on the tourism industry and reveal the best-suited technological equipment. Additionally, to better understand whether VT can be successful using not only VR gadgets but extra sensors as well, my goal is to conduct a series of experiments that will include different groups of tourists with variable traveling experiences. This will help to evaluate the influence of VT compared to real traveling.

5.4 Summary

The dissertation titled "Exploration of Virtual Tourism as an Independent Frontier Affected by COVID-19" employs a mixed-method approach encompassing focus-group interviews, surveys, and a systematic literature review. The primary objective is to investigate potential tourists' inclination toward VT and the influencing factors, including age and health conditions.

The research findings indicate that participants acknowledge the advantages of VT, expressing a willingness to engage in virtual experiences. However, concerns about the technological preparedness of the industry to deliver authentic and realistic encounters are prevalent. The identified benefits, including sustainability, affordability, and inclusivity,

significantly enhance the attractiveness of tourist destinations, fostering community involvement.

The study suggests that these favorable aspects could pave the way for the establishment of a new tourism paradigm – VT. However, widespread acceptance by governments and global tourism organizations is crucial for the formulation of regulations governing this emerging sector.

In conclusion, the study not only addresses its research questions but also opens avenues for future research on the evolving landscape of VT, its societal implications, and the continuous refinement of virtual experiences to meet the evolving expectations of diverse tourist segments. The research contributes substantially to the understanding of integrating VT into tourism practices, particularly for PwD. The dissertation concludes by addressing limitations, discussing implications, and proposing avenues for future research, all centered around the concept of crafting a unique virtual experience using modern technologies.

6. NEW SCIENTIFIC RESULTS

The chapter on new scientific results presents several key contributions to the field of community-based tourism, particularly in the realm of VT and its implications for inclusivity, accessibility, and sustainability.

Firstly, a systematic review of existing literature reveals a gap in understanding the willingness of PwD to engage with VT. This study addresses this gap by uncovering unique results that reveal their awareness of VR usage in tourism and willingness to use VT, emphasizing its potential as an inclusive and accessible form of tourism.

Furthermore, utilizing RStudio analysis of the database from WoS, that highlights current trends in the scientific society towards VT.

Moreover, the scientific outcomes derived from this research make a substantive contribution to the realm of community-based tourism by underscoring the importance and practicality of inclusivity, accessibility, and sustainability through the development of a virtual form of tourism utilizing advanced VR technologies. The study establishes that these elements play pivotal roles in influencing people's inclination to embrace VT, thereby enhancing the overall travel experience, positively impacting the destination, and contributing to the improvement of local community living conditions, along with fostering effective risk mitigation management during emergencies.

In addition, by categorizing potential tourists across different generations and health conditions and focusing on the utilization of fully immersive VR technologies, this research constructs a comprehensive framework for the conceptualization and implementation of VT as an independent type of tourism. The findings illuminate that the integration of VR in tourism not only aids DMOs and local governments in planning and marketing but also facilitates the creation of authentic attractions, thereby fostering tourism that is more inclusive, accessible, and sustainable for both tourists and local communities.

Lastly, the research outcomes underscore the imperative of collaborative efforts among global tourism organizations, local governments, DMOs, and the business sector to establish an operational framework for VT. This collaborative approach is essential for presenting realistic tourism experiences within VE without adversely impacting the economic well-being of the destination.

BIBLIOGRAPHY

Adam, I., Kumi-Kyereme, A. & Boakye, K. A., 2017. Leisure motivation of people with physical and visual disabilities in Ghana. *Leisure Studies,* 36(3), pp. 315-328.

Addison, A., 2000. Emerging trends in virtual heritage. *IEEE Multimedia,* pp. 22-25.

Agresti, A. & Finlay, B., 2012. *Statistical Methods for the Social Sciences.* 4th ed. s.l.:Prentice Hall.

Ahn, S. J., Bailenson, J. & Park, D., 2014. Short- and long-term effects of embodied experiences in immersive virtual environments on environmental locus of control and behavior. *Computers in Human Behavior,* Volume 39, pp. 235-245.

Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50(2), p. 179–211.

Akdim, K., Casaló, L. V. & Flavián, C., 2022. The role of utilitarian and hedonic aspects in the continuance intention to use social mobile apps. *Journal of Retailing and Consumer Services,* Volume 66.

Akhtar, N. et al., 2021. Post-COVID 19 Tourism: Will Digital Tourism Replace Mass Tourism?. *Sustainability,* 13(10).

Alegro, T., Turnsek, M., Spindler, T. & Petek, V., 2023. Introducing Amazon Explore: a digital giant's exploration of the virtual tourism experiences. *Journal of Tourism Future.*

Aljazeera, 2020. *UN: Global tourism loses $320bn amid coronavirus pandemic.* [Online]
Available at: https://www.aljazeera.com/economy/2020/8/25/un-global-tourism-loses-320bn-amid-coronavirus-pandemic
[Accessed 30 October 2020].

Allen, M. J. & Yen, W. M., 1979. *Introduction to Measurment Theory.* Monterey: Brooks/Cole Publishing.

Alsop, T., 2022. *Virtual reality (VR) headset unit sales worldwide from 2019 to 2024.* [Online]
Available at: https://www.statista.com/statistics/677096/vr-headsets-worldwide/
[Accessed 12 09 2023].

Altair4 Multimedia, 2005. *Altair4 Productions.* [Online]
Available at: https://altair4multimedia.it/altair4-productions/
[Accessed 7 February 2024].

Anderson, E. et al., 2010. Developing serious games for cultural heritage: a state-of-the-art review. *Virtual Reality,* Volume 14, pp. 255-275.

Arnold, D., 2005. Virtual tourism: A niche in cultural heritage. In: M. Novelli, ed. *Niche Tourism. Contemporary issues, trends and cases.* s.l.:Elsevier Ltd, pp. 223-231.

Babbie, E., 1990. *Survey Research Methods.* 2 ed. s.l.:Cengage Learning.

Bai, C., Dallasega, P., Orzes, G. & Sarkis, J., 2020. Industry 4.0 technologies assessment: A sustainability perspective. *International Journal of Production Economics,* November.Volume 229.

Baik, A., 2021. The Use of Interactive Virtual BIM to Boost Virtual Tourism in Heritage Sites, Historic Jeddah. *ISPRS International Journal of Geo-Information,* 10(9).

Baktash, A., Nair, V., Subramonian, H. & Ragavan, N., 2016. *Conceptualising a framework to study behavioural intention of tourists of distinct cultures towards wearable Augmented Reality (AR) application.* Bandung, s.n.

Banos, R. M. et al., 2005. Immersion and Emotion: Their Impact on the Sense of Presence. *Cyberpsychology & behavior: the impact of the Internet, multimedia and virtual reality on behavior and society,* 7(6), pp. 734-741.

Baños, R. M. et al., 2012. Positive mood induction procedures for virtual environments designed for elderly people. *Interacting with Computers,* 24(3), pp. 131-138.

Bec, A., Moyle, B., Schaffer, V. & Timms, K., 2021. Virtual reality and mixed reality for second chance tourism. *Tourism Management,* Volume 83.

Beck, J., Rainoldi, M. & Egger, R., 2019. Virtual Reality in Tourism: A State-of-the-Art Review. *Tourism Review,* Volume 74, p. 586–612.

beTravelwise, 2021. *10 Interesting Travel Safety Statistics.* [Online]
Available at: https://betravelwise.com/10-interesting-travel-safety-statistics/
[Accessed 7 January 2024].

Bilinska, K., Pabian, B., Pabian, A. & Reformat, B., 2023. Development Trends and Potential in the Field of Virtual Tourism after the COVID-19 Pandemic: Generation Z Example. *Sustainability,* 15(3).

Bilynets, I., Trkman, P. & Cvelbar, L. K., 2023. Virtual tourism experiences: adoption factors, participation and readiness to pay. *Current Issues in Tourism.*

Bimonte, S. & Punzo, L. F., 2016. Tourist development and host–guest interaction: An economic exchange theory. *Annals of Tourism Research,* Volume 58, pp. 128-139.

Bishop, I. & Gimblett, H., 2000. Management of Recreational Areas: GIS, Autonomous Agents, and Virtual Reality. *Environment and Planning B: Planning and Design,* 27(3), pp. 423-435.

Bittarello, M. B., 2008. Another time, another space: virtual worlds, myths and imagination. *Journal of Virtual Worlds Research,* 1(1), pp. 1-18.

Blackall, M., 2019. *Global tourism hits record highs – but who goes where on holiday?.* [Online]
Available at: https://www.theguardian.com/news/2019/jul/01/global-tourism-hits-record-highs-but-who-goes-where-on-holiday
[Accessed 30 October 2020].

Blaer, M., 2023. Interactive webcam travel: supporting wildlife tourism and conservation during COVID-19 lockdowns. *Information Technology & Tourism,* 25(1), pp. 47-69.

Bogicevic, V. et al., 2019. Virtual reality presence as a preamble of tourism experience: The role of mental imagery. *Tourism Management,* Volume 74, pp. 55-64.

Bogliolo, A. et al., 2021. Massive Remote School Trips: A Case Study. *IEEE ACCESS,* Volume 9, pp. 165239-165251.

Bollen, K. A. & Stine, R. A., 1990. Direct and indirect effects: Classical and bootstrap estimates of variability. *Sociological Methodology,* Volume 20, pp. 115-140.

Botella, C. et al., 2017. Recent progress in virtual reality exposure therapy for phobias: a systematic review. *Current Psychiatry Reports,* 19(42).

Brooks, K., 2012. *CRUISE NEWS JUNE 2012,* s.l.: BTNews.

Bruno, F. et al., 2010. From 3D reconstruction to virtual reality: A complete methodology for digital archaeological exhibition. *Journal of Cultural Heritage,* 11(1), pp. 42-49.

Budruk, M., White, D., Wodrich, J. & Van Riper, C., 2008. Connecting Visitors to People and Place: Visitors' Perceptions of Authenticity at Canyon de Chelly National Monument. *Journal of Heritage Tourism,* 3(3), pp. 185-202.

Burdea, G. & Coiffet, P., 2003. *Virtual reality technology.* 2nd ed. Hoboken: Wiley Interscience.

Burdea, G., Richard, P. & Coiffet, P., 1996. Multimodal virtual reality: input output devices, system integration, and human factors. *International Journal of Human–Computer Interaction ,* 8(1), pp. 5-24.

Butler, R., 1980. The Concept of a Tourist Area Cycle of Evolution: Implications for Management of Re-sources. *Canadian Geographer/Le Géographe canadien,* Volume 24, pp. 5-12.

Büyüksalih, G. et al., 2020. Preserving the Knowledge of the Past Through Virtual Visits: From 3D Laser Scanning to Virtual Reality Visualisation at the Istanbul Çatalca İnceğiz Caves. *Journal of Photogrammetry, Remote Sensing and Geoinformation Science ,* Volume 88, p. 133–146.

Bye Bye Barcelona. 2014. [Film] Directed by E. Chibas. Spain: COAC audiovisual program.

Caciora, T. et al., 2021. The Use of Virtual Reality to Promote Sustainable Tourism: A Case Study of Wooden Churches Historical Monuments from Romania. *Remote Sensing. 13. 1758.,* 13(9).

Calisto, M. d. L. & Sarkar, S., 2024. A systematic review of virtual reality in tourism and hospitality: The known and the paths to follow. *International Journal of Hospitality Management,* Volume 116.

Calogiuri, G. et al., 2018. Experiencing nature through immersive virtual environments: environmental perceptions, physical engagement, and affective responses during a simulated nature walk. *Frontiers of Psychology,* Volume 8.

Campbell, D. T. & Stanley, J. C., 2015. *Experimental and Quasi-Experimental Designs for Research.* s.l.:Ravenio Books.

Cao, X., Qu, Z., Liu, Y. & Hu, J., 2021. How the destination short video affects the customers' attitude: The role of narrative transportation. *Journal of Retailing and Consumer Servises,* Volume 62.

Cardboard, n.d. *Get your Cardboard.* [Online]
Available at: https://arvr.google.com/cardboard/get-cardboard/
[Accessed 7 February 2024].

Carmigniani, J. & Furht, B., 2011. Augmented Reality: An Overview. In: *Handbook of Augmented Reality.* Florida: s.n., pp. 3-46.

Carrozzino, M. & Bergamasco, M., 2010. Beyond virtual museums: Experiencing immersive virtual reality in real museums. *Journal of Cultural Heritage,* 11(4), pp. 452-458.

Carrozzino, M. et al., 2005. *Lowering the development time of multimodal interactive application: the real-life experience of the XVR project.* New York, Publication History.

Casson, L., 1994. *Travel in the Ancient World.* Baltimore: Johns Hopkins University Press.

Cathy, H. C. H. & Kang, S. K., 2009. Chinese Urban Mature Travellers' Motivation and Constraints by Decision Auyonomy. *Journal of Travel & Tourism Marketing,* 26(7), pp. 703-721.

CGTN, 2020. *"Cloud" tourism becomes fad amid COVID-19 outbreak.* [Online]
Available at: https://news.cgtn.com/news/2020-03-21/-Cloud-tourism-becomes-fad-amid-COVID-19-outbreak-P2kwXA1dC0/index.html
[Accessed 7 February 2024].

Charissis, V. et al., 2008. *An enquiry into VR interface design for medical training: VR augmented anatomy tutorials for breast cancer.* s.l., SPIE.

Chase-Levenson, A., 2012. Annihilating Time and Space: Eclecticism and Virtual Tourism at the Sydenham Crystal Palace. *Nineteenth-Century Contexts - an Interdisciplinary Journal,* 34(5), pp. 461-475.

Cheng, L.-K. & Huang, H.-L., 2022. Virtual tourism atmospheres: The effects of pleasure, arousal, and dominance on the acceptance of virtual tourism. *Journal of Hospitality and Tourism Management,* Volume 53, pp. 143-152.

Cheong, R., 1995. The virtual threat to travel and tourism. *Tourism Management,* 16(6), pp. 417-422.

Chin, W. L. & Musa, S. F. P. D., 2021. Agrotourism resilience against Covid-19: Impacts and management strategies. *Cogent Social Sciences,* 7(1).

Choi, J., Ok, C. & Choi, S., 2016. Outcomes of destination marketing organization website navigation: The role of telepresence. *Journal of Travel & Tourism Marketing,* pp. 46-62.

Choi, S., Jung, K. & Noh, S. D., 2015. Virtual reality applications in manufacturing industries: Past research, present findings, and future directions. *Concurrent Engineering,* 23(1), pp. 40-63.

Cho, Y. H. & Fesenmaier, D. R., 2000. *A conceptual framework for evaluating effects of a virtual tour.* Vienna, Springer.

Cho, Y., Wang, Y. & Fesenmaier, D., 2002. Searching for Experiences. *Journal of Travel & Tourism Marketing,* pp. 1-17.

Cignoni, P. & Scopigno, R., 2008. Sampled 3D models for CH applications: A viable and enabling new medium or just a technological exercise?. *Journal on Computing and Cultural Heritage,* 1(1), pp. 1-23.

Clements-Croome, D., 2013. Sustainable Healthy Intelligent Buildings for People. In: D. Clements-Croome, ed. *Intelligent Buildings.* London: ICE Publishing, pp. 1-24.

Coldham, G. & Cook, D. M., 2017. *VR Usability from Elderly Cohorts: Preparatory Challenges in Overcoming Technology Rejection.* Colombo, IEEE.

Coldwell, W., 2017. First Venice and Barcelona: now anti-tourism marches spread across Europe. *Demos in San Sebastián and crackdowns in Rome and Dubrovnik as locals vent frustration at city-breakers and cruise ships*, 10 August.

Cole, S. & Razak, V., 2009. Tourism as future. *Futures,* 41(6), pp. 335-345.

Colorado, J. et al., 2017. *Low-altitude autonomous drone navigation for landmine detection purposes.* Miami, Institute of Electrical and Electronics Engineers Inc., pp. 540-546.

Csikszentmihalyi, M., 1990. *Flow: The psychology of optimal experience.* s.l.:Harper & Row.

Cummings, J. J. & Bailenson, J. N., 2016. How Immersive Is Enough? A Meta-Analysis of the Effect of Immersive Technology on User Presence. *Media Psychology,* 19(2), pp. 272-309.

Damiani, L. et al., 2018. Augmented and Virtual Reality Applica-tions in Industrial Systems R.: A Qualitative Review towards the Industry 4.0 Era.. *IFAC-PapersOnLine,* 51(11), p. 624–630.

Damjanov, K. & Crouch, D., 2018. Extra-planetary mobilities and the media prospects of virtual space tourism. *Mobilities,* 13(1), pp. 1-13.

Darcy, S., 2002. Marginalised participation: Physical disability, high support needs and tourism. *Journal of Hospitality and Tourism Management,* 9(1), pp. 61-73.

DATAtab Team, 2024. *DATAtab: Online Statistics Calculator.* [Online]
Available at: https://datatab.net
[Accessed 12 April 2024].

David, L. D., Csapó, J., Nagy, Á. & Törőcsik, M., 2020. Can We Understand Non-Tourism as a Form of Sustainable Tourism? The Role of Lifestyle and Motivations behind Non-Traveling Based on the Hungarian Example. *Sustainability,* 12(18).

Davis, F. D., 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly,* 13(3), pp. 319-340.

Davis, F. D., Bagozzi, R. P. & Warshaw, P. R., 1989. User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Managements Science,* 35(8), pp. 982-1003.

Day, T. W., 2015. The oculus rift as a portal for presence: The effects of technology advancement and sex differences in the horror video game genre. *Computer Science.*

De Luca, G., Dastgerdi, A., Francini, C. & Liberatore, G., 2020. Sustainable Cultural Heritage Planning and Management of Overtourism in Art Cities: Lessons from Atlas World Heritage. *Sustainability,* Volume 12.

Denwagan, V., 2013. Barriers and stimulants of augmented reality adoption. *Springer.*

Department of Ancient Near Eastern Art, 2000. *Trade Routes between Europe and Asia during Antiquity,* New York: Heilbrunn Timeline of Art History.

Desai, P., Desai, P., Ajmera, K. & Mehta, K., 2014. A Review Paper on Oculus RiftA Virtual Reality Headset. *IJETT Journal,* 13(4), pp. 175-179.

Dewailly, J., 1999. Sustainable tourist space: From reality to virtual reality?. *Tourism Geographies,* 1(1), pp. 41-55.

DeWitt, M. F., 1999. Heritage, tradition, and travel: Louisiana French culture placed on a California dance floor. *World of Music,* 41(3), pp. 57-83.

Diemer, J. et al., 2015. The impact of perception and presence on emotional reactions: a review of research in virtual reality. *Frontiers in Psychology,* 6(26), pp. 1-9.

Digital Dunhuang, 2015. *Here you can enter the Dunhuang Grottoes.* [Online]
Available at: https://www.e-dunhuang.com/index.htm
[Accessed 7 February 2024].

Dormehl, L., 2017. *8 virtual reality milestones that took it from sci-fi to your living room.* [Online]
Available at: https://www.digitaltrends.com/cool-tech/history-of-virtual-reality/
[Accessed 10 November 2021].

Drianda, R. P., Kesuma, M. & Lestari, N. A. R., 2022. The Future of Post-COVID-19 Urban Tourism: Understanding the Experiences of Indonesian Consumers of Hallyu with South Korean Virtual Tourism. *International Journal of Technology,* 12(5), pp. 989-999.

Drost, A., 1996. Developing sustainable tourism for World Heritage sites. *Annals of Tourism Research,* pp. 479-492.

Dueholm, J. & Smed, K. M., 2014. Heritage authenticities – a case study of authenticity perceptions at a Danish heritage site. *Journal of Heritage Tourism,* 9(4), p. 285–298.

Duggan, J., 2024. *Inside the "Doomsday" Vault.* [Online]
Available at: https://time.com/doomsday-vault/
[Accessed 5 January 2024].

Dybsand, H. N. H., 2022. The next best thing to being there' – participant perceptions of virtual guided tours offered during the COVID-19 pandemic. *Current Issues in Tourism,* pp. 1-14.

Efteling, 2017. *Efteling to launch virtual experience Dreamflight.* [Online]
Available at: https://www.efteling.com/en/press/efteling-to-launch-virtual-experience-dreamflight/
[Accessed 31 January 2024].

El Archi, Y. & Benbba, B., 2023. *Role of Virtual Reality in Tourism Destination Marketing: Evidence from Morocco. In Proceedings of the ISCONTOUR 2023.* s.l., BoD–Books on Demand.

El-Said, O. & Aziz, H., 2022. Virtual Tours a Means to an End: An Analysis of Virtual Tours' Role in Tourism Recovery Post COVID-19. *Journal of Travel Research,* Volume 61, p. 528–548.

Esmaeili, H., Thwaites, H. & Woods, P. C., 2017. *Workflows and Challenges Involved in Creation of Realistic Immersive Virtual Museum, Heritage, and Tourism Experiences A Comprehensive Reference for 3D Asset Capturing.* Jaipur, IEEE, pp. 465-472.

Fan, X., Jiang, X. & Deng, N., 2022. Immersive Technology: A Meta-Analysis of Augmented/Virtual Reality Applications and Their Impact on Tourism Experience. *Tourism Management,* Volume 91.

Federal Law of Russian Federation N132-F3, A. t. B. o. T. A., 2018. *ConsultantPlus.* [Online]
Available at: www.consultant.ru
[Accessed 16 January 2024].

Felnhofer, A. et al., 2012. *Is virtual reality made for men only? Exploring gender differences in the sense of presence.* Philadelphia, s.n.

Fennell, D. A., 2008. Responsible Tourism: A Kierkegaardian Interpretation. *Tourism Recreation Research,* 33(1), pp. 3-12.

Fennell, D. A., 2021. Technology and the sustainable tourist in the new age of disruption. *Journal of Sustainable Tourism,* 29(5), pp. 767-773.

Field, A., 2013. *Discovering Statistics Using IBM SPSS Statistics.* 5th ed. s.l.:Sage.

Fiocco, A. J. et al., 2021. Virtual tourism for older adults living in residential care: A mixed-methods study. *PLOS ONE,* 16(5).

Fishbein, M. & Ajzen, I., 1975. *Belief, attitude, intention, and behavior: An introduction to theory and research.* s.l.:Addison-Wesley.

Flavián, C., Ibáñez-Sánchez, S. & Orús, C., 2019. Integrating virtual reality devices into the body: Effects of technological embodiment on customer engagement and behavioral intentions toward the destination. *Journal of Travel & Tourism Marketing,* 36(7), pp. 847-863.

Floridi, L., 2007. A Look into the Future Impact of ICT on Our Lives. *The Information Society,* 23(1), pp. 59-64.

Ford, P. J., 2001. Paralysis lost: Impacts of virtual worlds on those with paralysis. *Social Theory and Practice,* 27(4), pp. 661-680.

Foxlin, E. & Stanney, K., 2002. Motion tracking requirements and technologies. *Handbook of virtual environments: Design, implementation, and applications,* pp. 163-210.

Francis, T. & Hoefel, F., 2018. *'True Gen': Generation Z and its implications for companies.* [Online] Available at: https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/true-gen-generation-z-and-its-implications-for-companies
[Accessed 7 February 2024].

Freeman, I. & Selmi, N., 2010. French versus Canadian tourism: Response to the disabled. *Journal of Travel Research,* 49(4), pp. 471-485.

Frey, B. S. & Briviba, A., 2021. A policy proposal to deal with excessive cultural tourism. *European Planning Studies,* 29(4), pp. 601-618.

Friedman, D. et al., 2014. A method for generating an illusion of backwards time travel using immersive virtual reality – an exploratory study. *Frontiers in Psychology,* pp. 943-958.

Funk, D. C., Alexandris, K. & Ping, Y., 2009. To Go or Stay Home and Watch: Exploring the Balance between Motives and Perceived Constraints for Major Events: A Case Study of the 2008 Beijing Olympic Games. *International Journal of Tourism,* 11(1), pp. 41-53.

Fuste-Forne, F. & Ivanov, S., 2021. Robots in service experiences: negotiating food tourism in pandemic futures. *Journal of Tourism Futures,* 7(3), pp. 303-310.

Gabriel, Z. & Bowling, A., 2004. Quality of life from the perspectives of older people. *Ageing and Society,* 24(5), pp. 675-691.

Galagoda, R. U., Jayasinghe, G. Y., Halwatura, R. U. & Rupasinghe, H. T., 2018. The impact of urban green infrastructure as a sustainable approach towards tropical micro-climatic changes and human thermal comfort. *Urban Forestry & Urban Greening,* Volume 34, pp. 1-9.

García-Crespo, Á. et al., 2016. CESARSC: framework for creating cultural entertainment systems with augmented reality in smart cities. *Computer Science and Information Systems,* 13(2), pp. 395-425.

Garibaldi, R. & Pozzi, A., 2020. Gastronomy Tourism and Covid-19: Technologies for overcoming current and future restrictions. In: B. Federica, ed. *Tourism Facing a Pandemic: From Crisis to Recovery.* Bergamo: Università degli Studi di Bergamo, pp. 35-40.

Geng, L. et al., 2023. Advancing tourism recovery through virtual tourism marketing: an integrated approach of uses and gratifications theory and attachment to VR. *Current Issues in Tourism,* 27(2), pp. 234-250.

Gera, E., 2018. *The Neuroscience of Mind-Control Gaming.* [Online]
Available at: https://variety.com/2018/gaming/features/brain-computer-interface-neurable-1203036143/
[Accessed 29 April 2021].

Gilbert, D. & Powell-Perry, J., 2002. Exploring developments in web based relationship marketing within the hotel industry. *Journal of Hospitality & Leisure Marketing,* pp. 141-159.

Gimblett, H., Richards, M. & Itami, R., 2001. RBSim: Geographic Simulation of Wilderness Recreation Behavior. *Journal of Forestry,* 99(4), pp. 36-42.

Glannon, W., 2016. Ethical issues in neuroprosthetics. *Journal of Neural Engineering,* pp. 1-22.

Glaser, B. G. & Strauss, A. L., 2017. *Discovery of grounded theory: Strategies for qualitative research.* s.l.:Routledge.

Godovykh, M., Carissa B., C. & Fyall, A., 2022. VR in Tourism: A New Call for Virtual Tourism Experience amid and after the COVID-19 Pandemic. *Tourism and Hospitality,* 3(1), pp. 265-275.

Google Cardboard, n.d. *Cardboard.* [Online]
Available at: https://arvr.google.com/cardboard/?msclkid=0fb30f01cfa011ec907d45a34612baee
[Accessed 10 May 2022].

Gorsuch, R. L., 1983. *Factor Analysis.* 2nd ed. New York: Psychology Press.

Govers, R., Jansen-Verbeke, M. & Go, F. M., 2000. *Virtual Tourist Destinations: Assessing Their Communication Effectiveness With And Through Foreign Intermediaries.* Vienna, Springer.

Gratzer, M., Werthner, H. & Winiwarter, W., 2004. Electronic business in tourism. *Inderscience,* 2(5), pp. 450-459.

Greenwald, W., 2022. *PC.* [Online]
Available at: https://www.pcmag.com/picks/the-best-vr-headsets?msclkid=67179c5ccfa111ec8d5fa8ee57ece9ea
[Accessed 5 May 2022].

Griffin, T. & Muldoon, M., 2020. Exploring virtual reality experiences of slum tourism. *Tourism Geographies,* 24(6), pp. 1-20.

Guarno, B., 2024. *Elon Musk's Neuralink Has Implanted Its First Chip in a Human Brain. What's Next?.* [Online]
Available at: https://www.scientificamerican.com/article/elon-musks-neuralink-has-implanted-its-first-chip-in-a-human-brain-whats-next/
[Accessed 6 February 2024].

Gupta, K., 2020. *The 8 Biggest VR Gaming Companies Worth Tracking.* [Online]
Available at: https://www.affinityvr.com/the-8-biggest-vr-gaming-companies/
[Accessed 1 May 2022].

Gutierrez, M., Vexo, F. & Thalmann, D., 2008. Stepping into virtual reality. *Springer.*

Guttentag, D., 2010. Virtual reality: Applications and implications for tourism. *Tourism Management,* Volume 31, pp. 637-651.

Guttentag, D., 2020. Virtual Reality and the End of Tourism? A Substitution Acceptance Model. In: Z. F. M. G. U. H. W. Xiang, ed. *Handbook of e-Tourism.* Cham: Springer, pp. 1-19.

Hair, J. F., Hult, G. T. M., Ringle, C. & Sarstedt, M., 2016. *A primer on partial least squares structural equation modeling (PLS-SEM).* s.l.:Sage Publications.

Hamid, S. et al., 2023. UNDERSTANDING BEHAVIOURAL INTENTION OF EXPERIENCING VIRTUAL TOURISM DURING COVID-19: AN EXTENSION OF THEORY OF PLANNED BEHAVIOUR. *TOURISM AND HOSPITALITY MANAGEMENT-CROATIA,* 29(3), pp. 423-437.

Han, H., Hwang, J. & Woods, D., 2013. Choosing virtual–rather than real–leisure activities: An examination of the decision–making process in screen-golf participants. *Asia Pacific Journal of Tourism Research ,* 19(4), pp. 428-450 .

Harmon, J. & Duffy, L., 2021. Alienation from Leisure: Smartphones and the Loss of Presence. *Leisure/Loisir,* 46(1), pp. 1-21.

Hassani, A. & Bastenegar, M., 2020. *Virtual Tourism Misunderstood.* s.l., IEEE.

Hay, B., 2008. *Where the bloody hell are we? Fantasy tourism and Second Life.* Queensland, s.n.

Heeter, C., 1992. Being there: The subjective experience of presence. *Presence: Teleoperators & Virtual Environments,* 1(2), p. 262–271.

Heilig, M., 1984. *Morton Heilig's Sensorama (Interview).mov* [Interview] 1984.

Heizenrader, 2019. *The 3 Types of Virtual Reality.* [Online]
Available at: https://heizenrader.com/the-3-types-of-virtual-reality/#:~:text=Non%2Dimmersive%20virtual%20reality%20systems,a%20non%2Dimmersive%20VR%20experience
[Accessed 3 January 2024].

Heydarian, A. et al., 2015. Immersive virtual environments versus physical built environments: A benchmarking study for building design and user-built environment explorations. *Automation in Construction,* Volume 54, pp. 116-126.

Hirsch, F., 2003. Getting to know "the peoples of the USSR": Ethnographic exhibits as Soviet virtual tourism, 1923-1934. *Slavic Review,* 62(4), pp. 683-709.

HistoryofInformation.com, 2024. *The Sensorama: One of the First Functioning Efforts in Virtual Reality.* [Online]
Available at: https://historyofinformation.com/detail.php?id=2785
[Accessed 2 February 2022].

Hobson, J. S. & Williams, A. P., 1995. Virtual reality: A new horizon for the tourism industry. *Journal of Vacation Marketing,* 1(2), p. 124–135.

Howe, N. & Strauss, W., 1992. *Generations: The History of America's Future, 1584 to 2069.* New York: Quill.

Howe, N. & Strauss, W., 1997. *The Fourth Turning.* New York: Crown.

Howe, N. & Strauss, W., 2003. *Millennials go to college : strategies for a new generation on campus : recruiting and admissions, campus life, and the classroom.* Washington: Print Book.

Hsu, L., 2012. Web 3D simulation-based application in tourism education: A case study with second life. *Journal of Hospitality, Leisure, Sport & Tourism Education,* 11(2), pp. 113-124.

Huang, X. T., Wei, Z. D. & Leung, X. Y., 2020. What you feel may not be what you experience: a psychophysiological study on flow in VR travel experiences. *Asia Pacific Journal of Tourism Research,* 25(7), p. 736–747.

Huang, X.-T.et al., 2023. Experimental study on the influence of virtual tourism spatial situation on the tourists' temperature comfort in the context of metaverse. *Frontiers in Psychology,* Volume 13.

Huang, Y.-C., Backman, K. F., Backman, S. J. & Chang, L. L., 2016. Exploring the Implications of Virtual Reality Technology in Tourism Marketing: An Integrated Research Framework. *International Journal of Tourism Research,* 18(2), pp. 116-128.

Huang, Y. C., Backman, S. J. & Backman, K. F., 2012. Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions. *Journal of Hospitality and Tourism Technology,* 3(1), pp. 4-23.

Huh, C. & Singh, A. J., 2007. Families travelling with a disabled member: Analysing the potential of an emerging niche market segment. *Tourism and Hospitality Research,* 7(3), pp. 212-229.

Hummelbrunner, R. & Miglbauer, E., 1994. Tourism promotion and potential in peripheral areas: the Austrian case. *Journal of Sustainable Tourism,* Volume 2, pp. 41-50.

Hwang, J., Yoon, S. Y. & Bendle, L. J., 2012. Desired privacy and the impact of crowding on customer emotions and approach-avoidance responses: Waiting in a virtual reality restaurant. *International Journal of Contemporary Hospitality Managemen,* pp. 224-250.

Iachini, T. et al., 2019. The experience of virtual reality: Are individual differences in mental imagery associated with sense of presence?. *Cognitive Pressing,* Volume 20, pp. 291-298.

Iftikhar, R., Khan, M. S. & Pasanchay, K., 2023. Virtual reality tourism and technology acceptance: a disability perspective. *Leisure Studies,* 42(6), pp. 849-865.

IJsselsteijn, W. A., De Ridder, H., Freeman, J. & Avons, S. E., 2000. Presence: concept, determinants, and measurement. *Human vision and electronic imaging,* p. 520–529.

Ilkhanizadeh, S., Golabi, M., Hesami, S. & Rjoub, H., 2020. The Potential Use of Drones for Tourism in Crises: A Facility Location Analysis Perspective. *Journal of Risk and Financial Management,* 13(10).

Isdale, J., Fencot, C., Heim, M. & Daly, L., 2002. *Content Design for Virtual Environments. In Handbook for Virtual Environments: Design, Implementation, and Applications.* Stanney, K. M. ed. Mahwah: Lawrence Erlbaum Associates:.

Ives, B. & Piccoli, G., 2007. STA travel island: marketing first life travel services in Second Life. *Communications of the Association fo rInformation Systems,* 20(1), pp. 429-441.

Iwata, H., Yano, H., Uemura, T. & Moriya, T., 2004. *Food simulator: A haptic interface for biting.* s.l., IEEE, pp. 51-57.

Jaehnig, J., 2018. *ARPost.* [Online]
Available at: https://arpost.co/2018/07/12/virtual-reality-technology-bad-environment/
[Accessed 1 May 2022].

Jakubowski, L., 2003. Beyond book learning: Cultivating the pedagogy of experience through field trips. *The Journal of Experiential Education,* pp. 24-33.

Jang, S. & Ham, S., 2009. Double-hurdle analysis of travel expenditure: Baby boomer seniors versus older seniors. *Tourism Management,* 30(4), pp. 372-380.

Jelincic, D. A., Tisma, S., Lantos, Z. & Tolic, I., 2019. Cross the Border: Participative Integrated Approach to Sustainable Tourism Planning. *Geosciences,* 9(10).

Ji, F., Wang, F. & Wu, B., 2023. How does virtual tourism involvement impact the social education effect of cultural heritage?. *JOURNAL OF DESTINATION MARKETING & MANAGEMENT,* Volume 28.

Ji, T. et al., 2015. Simulation and experimental study on the influence of environmental parameters on human thermal comfort in sports. *China Sport Science,* Volume 35, pp. 67-72.

Jung, K., Nguyen, V., Piscarac, D. & Yoo, S.-C., 2020. Meet the Virtual Jeju Dol Harubang—The Mixed VR/AR Application for Cultural Immersion in Korea's Main Heritage. *International Journal of Geo-Information,* 9(6).

Jung, T., Dieck, M. C. T., Lee, H. & Chung, N., 2016. *Effects of virtual reality and augmented reality on visitor experiences in museum.* Cham, Springer.

Jung, T. H. & Dieck, M. C. T., 2017. Augmented reality, virtual reality and 3D printing for the co-creation of value for the visitor experience at cultural heritage places. *Journal of Place Management and Development,* 10(2), pp. 140-151.

Kan, M., Okamoto, S. & Lee, J. H., 2018. *Development of Drone Capable of Autonomous Flight Using GPS.* Hong Kong, IMECS.

Kaplan, R. & Kaplan, S., 1989. *The experience of nature: A psychological perspective.* Cambridge: Cambridge University Press.

Kaptelinin, V. & Nardi, B. A., 2006. Acting with Technology: Activity Theory and Interaction Design. *First Monday,* 12(4).

Karosi, D. & Bujdosó, Z., 2019. Az okosturizmus szerepe az okosvárosok életében a KViHotel példáján keresztül. *Az Eszterházy Károly Egyetem Gyöngyösi Károly Róbert Campusának tudományos közleményei,* 9(1), pp. 111-120.

Karpunina, A. V. et al., 2021. VR in Social Services for the Elderly: Opportunities and Risks. *Turismp-Estudos e Praticas.*

Kavanagh, S., Luxton-Reilly, A., Wuensche, B. & Plimmer, B., 2017. A Systematic Review of Virtual Reality in Education.. *Themes in Science and Technology Education,* 10(2), pp. 85-119.

Kazeminia, A., Del Chiappa, G. & Jafari, J., 2015. Seniors' Travel Constraints and Their Coping Strategies. *Journal of Travel Research,* 54(1), pp. 80-93.

Kennedy, L., 2023. *The Prehistoric Ages: How Humans Lived Before Written Records,* s.l.: A&E Television Networks.

Kilichenko, O. & Vovchok, Y., 2019. Socio-cultural Adaptation of Children of Migrants In the Process of Ethnographic Tourism. *JOURNAL OF HISTORY CULTURE AND ART RESEARCH,* 8(2), pp. 170-178.

Kim, M. J. & Kang, Y., 2023. Older adults' user experience of virtual tourism: exploring presence and experiential value with respect to age difference. *Virtual Reality,* 27(4), pp. 2967-2987.

Kim, M. J., Lee, C.-K. & Jung, T., 2020. Exploring Consumer Behavior in Virtual Reality Tourism Using an Extended Stimulus-Organism-Response Model. *Journal of Travel Research,* 59(1), pp. 69-89.

Kinseng, R. A. et al., 2023. COVID-19 and the emergence of virtual tourism in Indonesia: A sociological perspective. *Cogent Social Sciences,* 8(1).

Korinth, B., Berdenov, Z., Pashkov, S. & Wendt, J., 2019. The perception of vr of the tourists visiting chosen cultural facilities in Gdańsk. *Ekonomiczne Problemy Turystyki.,* Volume 45, pp. 63-72.

Krippendorff, K., 2018. *Content Analysis: An Introduction to Its Methodology.* s.l.:Sage Publications.

Kripps, C., 2019. *Thomas Cook: A history of one of the world's oldest travel firms,* s.l.: CNN.

Kulakoğlu-Dilek, N., Kızılırmak, I. & Dilek, S. E., 2018. Virtual Reality or Just Reality? A SWOT Analysis of the Tourism Industry. *Journal of Tourismology,* 4(1), pp. 67-74.

Kvale, S. & Brinkmann, S., 2009. *InterViews: Learning the Craft of Qualitative Research Interviewing.* s.l.:Sage Publications.

Laurel, B., 2013. *Computers as Theatre (2nd Edition).* s.l.:Addison-Wesley Professional.

Lee, B. C. & Wicks, B., 2010. Tourism technology training for destination marketing organizations (DMOs): need-based content development. *Journal of Hospitality, Leisure, Sport and Tourism Education,* 9(1), pp. 39-51.

Lee, O. & Oh, J., 2007. The impact of virtual reality functions of a hotel website on travel anxiety. *Cyberpsychol Behav,* 10(4), pp. 584-586.

Lee, U.-K., 2022. Tourism Using Virtual Reality: Media Richness and Information System Successes. *Sustainability,* 14(7).

Leue, M. C., Han, D. & Jung, T., 2014. *Google Glass Creative Tourism Experience: A Case Study of Manchester Art Gallery.* Seoul, WHTF.

Levitt, T., 1965. *Exploit the Product Life Cycle.* [Online]
Available at: https://hbr.org/1965/11/exploit-the-product-life-cycle
[Accessed 20 September 2021].

Li, E. Y., Chang, F.-K. & Jan, A., 2023. Understanding the virtual experiential value and its effect on travel intention. *International Journal of Internet Marketing and Advertisement,* 19(3), pp. 263-285.

Li, M., Wu, B. & Cai, L., 2008. Tourism development of world heritage sites in China: a geographic perspective. *Tourism Management,* pp. 308-319.

Li, S. et al., 2017. *Brain-based computer interfaces in virtual reality.* New York, IEEE.

Littrell, M., Anderson, L. & Brown, P., 1993. What makes a craft souvenir authentic?. *Annals of Tourism Research,* 20(1), pp. 197-215.

Liu, C. & Huang, X., 2023. Does the selection of virtual reality video matter? A laboratory experimental study of the influences of arousal. *Journal of Hospitality and Tourism Management,* Volume 54, pp. 152-165.

Liu, G., 2019. *Design of Virtual Display System for Guangxi Minority Scenic Spots Based on Virtual Reality.* s.l., s.n.

Liu, L.-W.et al., 2023. Does virtual tourism influence tourist visit intention on actual attraction? A study from tourist behavior in Indonesia. *COGENT SOCIAL SCIENCES,* 9(1).

Li, Y. et al., 2022. Would You Accept Virtual Tourism? The Impact of COVID-19 Risk Perception on Technology Acceptance from a Comparative Perspective. *Sustainability,* 14(19).

Lombard, M. & Ditton, T., 1997. At the heart of it all: The concept of presence. *Journal of computer-mediated communication,* 3(2).

Losada, N. et al., 2020. *Could Virtual Reality Substitute the 'Real' Experience? Evidence from a UNESCO World Heritage Site in Northern Portugal.* s.l., ICOTTS.

Loureiro, S. M. C., Guerreiro, J. & Ali, F., 2020. 20 years of research on virtual reality and augmented reality in tourism context: A text-mining approach. *Tourism Management,* Volume 77.

Luciani, A., 2007. Virtual reality and virtual environment. In: *Enaction and enactive interfaces: a handbook of terms, Enactive Systems Book.* s.l.:Enactive Systems Books, pp. 299-300.

Luckey, P., 2012. *Exclusive interview with Palmer Luckey, creator of the Oculus Rift* [Interview] (28 August 2012).

Lu, J. et al., 2022. The potential of virtual tourism in the recovery of tourism industry during the COVID-19 pandemic. *Current Issues in Tourism,* 25(3), pp. 441-457.

Magalhaes, M., Melo, M., Bessa, M. & Coelho, A. F., 2021. The Relationship Between Cybersickness, Sense of Presence, and the Users' Expectancy and Perceived Similarity Between Virtual and Real Places. *IEEE ACCESS,* Volume 9, pp. 79685-79694.

Magalhaes, M., Melo, M., Coelho, A. & Bessa, M., 2019. *Age and level of education impact on expectancy and perceived similarity between virtual and real touristic environments.* Faro, IEEE, pp. 94-100.

Mallinguh, E., Wasike, C., Bilan, Y. & Zeman, Z., 2022. The impact of firm characteristics, business competitiveness, and technology upgrade hurdles on R&D costs. *Problems and Perspectives in Management,* 20(4), pp. 264-277.

Maran, P., Daniëls, R. & Slegers, K., 2022. The use of extensive reality (XR) for people with moderate to severe intellectual disabilities (ID): A scoping review. *Technology and Disability,* 34(2), pp. 53-67.

Marasco, A. & Balbi, B., 2019. Designing Accessible Experiences for Heritage Visitors Through Virtual Reality. *e-Review of Tourism Research,* 17(3).

Mariotto, F. P. & Bonali, F., 2021. Virtual Geosites as Innovative Tools for Geoheritage Popularization: A Case Study from Eastern Iceland. *Geoscience,* 11(4).

Marotta, E., 2015. *Analysis of tourism in Campania as a tool for the development of high-quality cultural services for sightseers: The "Reale Osservatorio Vesuviano" case history - Scientific Figure on ResearchGate.* [Online]
Available at: https://www.researchgate.net/figure/Number-of-international-tourist-arrivals-in-millions-in-the-sub-areas-for-the-years_fig1_305220842
[Accessed 11 April 2024].

Mattila, O. et al., 2020. Restoration in a virtual reality forest environment. *Computers in Human Behavior,* Volume 107.

Mavrin, I., Sebo, D. & Glavas, J., 2022. Immersive Cultural Touriism in the Context of COVID-19 Pandemic - Global Perspectives and Local Impacts. *EKONOMSKI PREGLED,* 73(5), pp. 739-767.

Mazanec, J. A., Wöber, K. & Zins, A. H., 2007. Tourism Destination Competitiveness: From Definition to Explanation?. *Journal of Travel Research,* 46(1), pp. 86-95.

McKercher, B. & Darcy, S., 2018. Re-conceptualizing barriers to travel by people with disabilities. *Tourism Management Perspectives,* Volume 26, pp. 59-66.

McKinsey&Company, 2017. *Coping with success: Managing overcrowding in tourism destinations,* s.l.: Wourld Travel & Tourism Council.

McLean, G., AlYahya, M., Barhorst, J. & Osei-Frimpong, K., 2023. Examining the Influence of Virtual Reality Tourism on Consumers' Subjective Wellbeing.. *Tourism Management Perspectives,* Volume 46.

Mehrabian, A. & Russell, J. A., 1974. *An approach to environmental psychology.* s.l.:MIT Press.

Melo, M. et al., 2022. Immersive multisensory virtual reality technologies for virtual tourism A study of the user's sense of presence, satisfaction, emotions, and attitudes. *Multimedia Systems,* 28(3), pp. 1027-1037.

Melo, M., Vasconcelos-Raposo, J. & Bessa, M., 2018. Presence and cybersickness in immersive content: Effects of content type, exposure time and gender. *Computers & Graphics,* Volume 71, pp. 159-165.

Menke, R., 2013. Are We There Yet? Virtual Tourism and Victorian Realism. *Studies in the Novel,* 45(4), pp. 704-705.

Mennecke, B. E., Terando, W. D., Janvrin, D. .. & Dilla, W. N., 2007. It's just a game, or is it? Real money, real income, and real taxes in virtual worlds. *Communications of the Association for Information Systems,* pp. 134-141.

Meta, 2022. *Meta Quest 2.* [Online]
Available at: https://store.facebook.com/quest/products/quest-2
[Accessed 1 May 2022].

Meta, 2024. *This is Meta Quest Pro.* [Online]
Available at: https://www.meta.com/quest/quest-pro/
[Accessed 7 February 2024].

Miles, W. F. S., 2002. Auschwitz: Museum Interpretation and Darker Tourism. *Annals of Tourism Research,* 29(4), pp. 1175-1178.

Miller, D., Merrilees, B. & Coghlan, A., 2015. Sustainable urban tourism: understanding and developing visitor pro-environmental behaviours. *Journal of Sustainable Tourism,* Volume 23, pp. 26-46.

Mirk, D. & Hlavacs, H., 2014. *Using Drones for Virtual Tourism.* Cham, Springer.

Mittel, N., 2012. Tourism: Concepts and practices. *Annals of Tourism Research,* 39(2), p. 1280–1281.

Monteiro, A. et al., 2021. Tourism and Air Quality during COVID-19 Pandemic: Lessons for the Future. *Sustainability,* 13(7).

Monteiro, D. et al., 2020. *An indepth exploration of the effect of 2D/3D views and controller types on first person shooter games in virtual reality.* s.l., IEEE, pp. 713-724.

Montero-López, E. et al., 2016. A virtual reality approach to the Trier Social Stress Test: Contrasting two distinct protocols. *Behavior Research Methods,* Volume 48, pp. 223-232.

Mura, P. & Lovelock, B., 2009. A not so Little Italy? Tourist and Resident Perceptions of Authenticity in Leichhardt, Sydney. *Tourism Culture & Communication,* 9(1), pp. 29-48.

Mura, P., Tavakoli, R. & Sharif, S., 2016. 'Authentic but not too much': exploring perceptions of authenticity of virtual tourism. *Information Technology & Tourism ,* Volume 17, pp. 145-159.

Myung, J. K., Choong-Kim, L. & Michaelm, W. P., 2020. The impact of innovation and gratification on authentic experience, subjective well-being, and behavioral intention in tourism virtual reality: The moderating role of technology readiness. *Telematics and Informatics,* Volume 49, pp. 53-59.

Naimark, M., 1978. *Aspen Moviemap.* [Online]
Available at: http://www.naimark.net/projects/aspen.html
[Accessed 10 October 2021].

Nam, K., Baker, J. & Dutt, C. S., 2023. Does familiarity with the attraction matter? Antecedents of satisfaction with virtual reality for heritage tourism. *INFORMATION TECHNOLOGY & TOURISM,* 26(1), pp. 25-57.

Napolitano, R., Scherer, G. & Glisic, B., 2018. Virtual tours and informational modeling for conservation of cultural heritage sites. *Journal of Cultural Heritage,* Volume 29, pp. 123-129.

Nichols, S., Haldane, C. & Wilson, J. R., 2000. Measurement of presence and its consequences in virtual environments. *International Journal of Human-Computer Studies,* 52(3), pp. 471-491.

Nimrod, G., 2008. Retirement and tourism: Themes in retiree's narrative. *Annals of Tourism Research,* 35(4), p. 859–878.

Oppert, M. L. et al., 2023. Older adults' experiences of social isolation and loneliness: Can virtual touring increase social connectedness? A pilot study. *GERIATRIC NURSING,* Volume 53, pp. 270-279.

Orru, K., Kask, S. & Nordlund, A., 2019. Satisfaction with virtual nature tour: the roles of the need for emotional arousal and pro-ecological motivations. *Journal of Ecotourism,* 18(3), pp. 221-242.

Ouerghemmi, C., Ertz, M., Bouslama, N. & Tandon, U., 2023. The Impact of Virtual Reality (VR) Tour Experience on Tourists' Intention to Visit. *Information,* 14(10).

Palfrey, J. & Gasser, U., 2010. *Born Digital: Understanding the First Generation of Digital Natives.* New York: Basic Books.

Pallud, J. & Straub, D., 2007. *Real vs. Virtual: A theoretical framework for assessing the role of authenticity in visitor interactions with museum technologies.* s.l., s.n.

Pang, B. & Lee, L., 2008. Opinion Mining and Sentiment Analysis. *Foundations and Trends® in Information Retrieval,* Volume 2, pp. 1-135.

Pan, H. & Yu, X., 2020. Study on the Development Trend of Tourism in the Cloud under the Background of New Crown Epidemic. *Open Access Library Journal,* 7(8), pp. 1-6.

Pankruhin, A. P., 2005. *Marketing.* 3rd ed. Moscow: Omega-L.

Paquet, E. & Viktor, H. L., 2005. *Long-term preservation of 3-D cultural heritage data related to architectural sites.* s.l., s.n.

Park, H., Kim, J., Bang, S. & Woo, W., 2018. *The Effect of Applying Film-induced Tourism to Virtual Reality Tours of Cultural Heritage Sites.* San Francisco, IEEE, pp. 253-256.

Parrish, K., 2016. *Oculus Touch is now available – here's what you should know before you buy.* [Online]
Available at: https://www.digitaltrends.com/computing/oculus-touch-controller-price-release-date-game-com
[Accessed 30 April 2022].

Parry, R., 2007. *Recoding the museum: Digital heritage and the technologies of change.* 1st ed. London: Routledge.

Parsons, T. D. & Rizzo, A. A., 2008. Initial validation of a virtual environment for assessment of memory functioning: Virtual reality cognitive performance assessment test. *CyberPsychology & Behavior,* 11(1), pp. 17-25.

Pashaie, S. & Peric, M., 2023. The future of sports tourism in the light of the COVID-19 pandemic - Developing a new paradigm model. *Journal of Tourism Futures.*

Peeters, P. et al., 2018. *Research for TRAN Committee - Overtourism: impact and possible policy responses.* s.l.:European Union.

Penfold, P., 2009. Learning through the world of second life – a hospitality and tourism experience. *Journal of Teaching in Travel & Tourism,* 8(3), pp. 139-160.

Peperkorn, H. M. & Mühlberger, A., 2013. The impact of different perceptual cues on fear and presence in virtual reality. *Studies in Health Technology and Informatics,* Volume 191, pp. 75-79.

Pfurtscheller, G., Brunner, C., Schlögl, A. & Lopes da Silva, F., 2006. Mu rhythm (de)synchronization and EEG single-trial classification of different motor imagery tasks. *Neuroimage,* 31(1), pp. 153-159.

Philbeck, T. & Davis, N., 2018. The Fourth Industrial Revolution. *Journal of International Affairs Editorial Board,* Volume 72, pp. 17-22.

Podzharaya, N. S. & Sochenkova, A. S., 2018. *The virtual museum development with the use of intelligent and 3d technologies on the basis of the Maritime museum in Kotor.* Zabljak, IEEE.

Polimeris, S. & Calfoglou, C., 2016. Cultural Tourism Destinations and the Power of Virtual Reality. In: *Tourism and Culture in the Age of Innovation.* s.l.:s.n., pp. 577-587.

Polishchuk, E., 2020. *The Effect of COVID-19 Pandemic on Tourists Behavior.* Godollo, s.n.

Polishchuk, E. et al., 2023. The Theoretical Background of Virtual Reality and Its Implications for the Tourism Industry. *Sustainability,* 15(13).

Pons, P. O., Crang, M. & Travlou, P., 2016. *Cultures of Mass Tourism,* New York: Routledge.

Price, M., Mehta, N., Tone, E. B. & Anderson, P. L., 2011. Does engagement with exposure yield better outcomes? Components of presence as a predictor of treatment response for virtual reality exposure therapy for social phobia. *Journal of Anxiety Disorders,* 25(6), p. 763–770.

Prideaux, B., 2002. The cybertourist. In: *The Tourist as a Metaphor of the Social World.* New York: CABI Publishing, pp. 317-339.

Prodinger, B. & Neuhofer, B., 2023. *Never-Ending Tourism: Tourism Experience Scenarios for 2030.* Johannesburg, Springer, pp. 288-299.

Rácz, A. & Zilizi, G., 2019. *Virtual reality aided tourism.* Prague, IEEE, pp. 1-5.

Rahman, A. F. W. A., Mohamed, M. & Sulong, F., 2022. Does COVID-19 drive robot acceptance? An exploratory study of service robot in hospitality. *Tourism and Hospitality Management,* 28(1), pp. 193-209.

Ramsey, E., 2017. Virtual Wolverhampton: Recreating the Historic City in Virtual Reality. *International Journal of Architectural Research,* 11(3), p. 42–57.

Ranasinghe, R., Karunarathna, C. & Pradeepamali, J., 2020. After Corona (COVID19) Impacts on Global Poverty and Recovery of Tourism Based Service Economies: an Apprisal. *SSRN Electronic Journal.*

Rao, A. S. R. S. & Krantz, S. G., 2020. Data Science for Virtual Tourism Using Cutting-Edge Visualizations: Information Geometry and Conformal Mapping. *Patterns,* 1(5).

Refsland, S., Ojika, T., Addison, A. & Stone, R., 2000. Virtual Heritage: Breathing new life into our ancient past. *IEEE MultiMedia,* 7(2), pp. 20-21.

Roman, M. et al., 2022. Virtual and Space Tourism as New Trends in Travelling at the Time of the COVID-19 Pandemic. *Sustainability,* 14(2).

Rosenblum, L. D., 2011. *See What I'm Saying: The Extraordinary Powers of Our Five Senses.* s.l.:W. W. Norton & Company.

Ross, S. P., Skelton, R. W. & Mueller, S. C., 2006. Gender differences in spatial navigation in virtual space: implications when using virtual environments in instruction and assessment. *Virtual Reality,* 10(3), pp. 175-184.

Roussou, M., 2004. Learning by doing and learning through play: An exploration of interactivity in virtual environments. *Computers in Entertainment,* 2(1).

RStudio Team, 2020. *RStudio: Integrated Development for R. RStudio.* [Online]
Available at: http://www.rstudio.com/
[Accessed 30 January 2024].

Russell, J. A., 1980. A circumplex model of affect. *Journal of Personality and Social Psychology,* 39(6), pp. 1161-1178.

Ryan, R. M. & Deci, E. L., 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist,* 55(1), pp. 68-78.

Ryu, H.-C., 2013. Cultural Heritage Management System and Improvement of the Limits - focused on establishing the tangible cultural heritage on-site management organization. *History, Environmental Science, Law,* Volume 54, p. 183–214.

Sacau, A., Laarni, J. & Hartmann, T., 2008. Influence of individual factors on presence. *Computer in Humans Behavior,* 24(5), p. 2255–2273.

Salmon, G., 2009. The future for (second) life and learning. *British Journal of Educational Technology,* 40(3), p. 526–538.

Sancaktar, I. & Demirkan, H., 2008. Spatial updating of objects after rotational and translational body movements in virtual environments. *Computers in Human Behavior,* 24(6), p. 2682–2696.

Sathiendrakumar, R. & Tisdell, C., 1989. Tourism and the Economic Development of the Maldives. *Annals of Tourism Research,* Volume 16, p. 254–269.

Scarce, R., 1997. Field trips as short-term experiential education. *Teaching Sociology,* Volume 25, pp. 219-226.

Schellen, L. et al., 2013. The use of a thermophysiological model in the built environment to predict thermal sensation: coupling with the indoor environment and thermal sensation. *Building and Environment,* Volume 59, pp. 10-22.

Schott, C., 2017. Virtual fieldtrips and climate change education for tourism students. *Journal of Hospitality, Leisure, Sport & Tourism Education,* Volume 21, pp. 13-22.

Schroeder, R., 2008. Defining Virtual Worlds and Virtual Environments. *Journal of Virtual Worlds Research,* 1(1), p. 3.

ScienceSoft, n.d. *Virtual Reality Technology: Architecture, Tools, Team, and Costs.* [Online]
Available at: https://www.scnsoft.com/virtual-reality
[Accessed 20 November 2021].

Sensales, G. & Greenfield, P., 1995. Attitudes toward computers, science, and technology: A cross-cultural comparison between students in Rome and Los Angeles.. *Journal of Cross-Cultural Psychology,* 26(3), p. 229–242.

Shang, Y. et al., 2023. Eco-tourism, climate change, and environmental policies: empirical evidence from developing economies. *Humanities and Social Sciences Communications ,* Volume 10.

Sharma, G., Thomas, A. & Paul, J., 2021. Reviving Tourism Industry Post-COVID-19: A Resilience-Based Framework. *Tourism management perspectives,* Volume 37.

Sherman, W. R. & Craig, A., 2018. *Understanding Virtual Reality (2nd Edition).* s.l.:s.n.

Shoaib, M. S. et al., 2022. Permission and Usage Control for Virtual Tourism using Blockchain-based Smart Contracts. *International Journal of Advanced Computer Science and Applications,* 13(11), pp. 231-240.

Shoaib, M. S. et al., 2022. Virtual tourism and digital heritage: An analysis of VR/AR technologies and applications. *International Journal of Advanced Computer Science and Applications,* 13(7).

Siddiqui, M. S. et al., 2022. Virtual Tourism and Digital Heritage: An Analysis of VR/AR Technologies and Applications. *International Journal of Advanced Computer Science and Applications,* 13(7).

Sigala, M., 2020. Tourism and COVID-19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research,* Volume 117, pp. 312-321.

Simón, F. J., Narangajavana, Y. & Marqués, D. P., 2004. Carrying capacity in the tourism industry: a case study of Hengistbury Head. *Tourism Management,* 25(2), pp. 275-283.

Singh, L., 2008. *Fundamental Of Tourism And Travel.* Delhi: Isha Books.

Singh, R., Sibi, P. S., Yost, E. & Mann, D. S., 2021. Tourism and disability: A bibliometric review. *Tourism Recreation Research,* 48(5), pp. 749-765.

Sirgy, M. J., Kruger, P. S., Lee, D.-J. & Yu, G. B., 2011. How Does a Travel Trip Affect Tourists' Life Satisfaction?. *Journal of Travel Research,* 50(3), pp. 261-275.

Siriaraya, P., Ang, C. S. & Bobrowicz, A., 2014. Exploring the potential of virtual worlds in engaging older people and supporting healthy aging. *Behaviour & Information Technology,* 33(3), pp. 283-294.

Skondras, E., Siountri, K., Michalas, A. & Vergados, D. D., 2018. *A Route Selection Scheme for Supporting Virtual Tours in Sites with Cultural Interest Using Drones.* Zakynthos, IEEE.

Slater, M. & Usoh, M., 1993. Representations systems, perceptual position, and presence in immersive virtual environments. *Presence: Teleoperators & Virtual Environments,* 2(3), pp. 221-233.

Slavin, O. G. E., 2019. *Review of Virtual and Augmented Reality Technologies.* s.l., ISA RAN.

Smith, R. W., 1987. Leisure of disable tourists. Barriers to participation. *Annals of Tourism Research,* 14(3), pp. 376-389.

Sochenkova, A., Podzharaya, N., Trofimov, P. & Novikova, G., 2018. *Design and Implementation of Information Retrieval Mechanism for the Virtual Museum Creation.* Budva, IEEE, pp. 376-379.

Sokhanych, A., 2021. *What is VR and how does it work?.* [Online]
Available at: https://thinkmobiles.com/blog/what-is-vr/
[Accessed 4 April 2022].

Soomro, T., Zheng, K., Turay, A. & Pan, Y., 1999. Capabilities of multimedia GIS. *Chinese Geographical Science,* 9(2), pp. 159-165.

Sousa, N. et al., 2023. An Exploratory Study about the Effect of COVID-19 on the Intention to Adopt Virtual Reality in the Tourism Sector. *Sustainability,* 15(11).

Srinivasa Rao, A. & Krantz, S., 2020. Data Science for Virtual Tourism using Cutting-Edge Visualizations: Information Geometry and Conformal Mapping. *Patterns,* 1(5), pp. 1-4.

Sr, M. & Croes, R., 2003. Growth, Development and Tourism in a Small Economy: Evidence from Aruba. *International journal of tourism research,* Volume 5, p. 315–330.

Stainfield, J., Fisher, P., Ford, B. & Solem, M., 2000. International Virtual Field Trips: a New Direction?. *Journal of Geography in Higher Education,* 24(2), pp. 255-262.

Stanco, F., Battiato, S. & Gallo, G., 2011. *Digital imagingfor cultural heritage preservation: Analysis, Restoration, and Reconstraction of Ancient Artworks.* Boca Raton: CRC Press.

Stendal, K., 2012. How do people with disability use and experience virtual worlds and ICT: A literature review. *Journal of Virtual Worlds Research,* 5(1), pp. 1-17.

Stern, C. D., 2000. New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues,* Volume 56, pp. 407-424.

Styliadis, A. D. et al., 2009. Metadata-based heritage sites modeling with e-learning functionality. *Journal of Cultural Heritage,* 10(2), pp. 296-312.

Styliaras, G., Koukopoulos, D. & Lazarinis, F., 2011. *Handbook of Research on Technologies and Cultural Heritage: Applications and Environments.* s.l.:IGI Global.

Sultan, C., 2022. *Popular types of Virtual Reality.* [Online]
Available at: https://rextheme.com/types-of-virtual-reality/
[Accessed 20 December 2022].

Sussmann, S. & Vanhegan, H. J., 2000. *Virtual Reality and the Tourism Product: Substitution or Complement?.* Vienna, s.n.

Sweden, V., 2024. *State of the Art Digitalization & Content Production.* [Online]
Available at: https://virtualsweden.se/
[Accessed 7 February 2024].

Tabachnick, B. S. & Fidell, L. S., 2012. *Using Multivariate Statistics.* 6th ed. s.l.:Pearson.

Talafubieke, M., Mai, S. & Xialifuhan, N., 2021. Evaluation of the Virtual Economic Effect of Tourism Product Emotional Marketing Based on Virtual Reality. *Frontiers in Psychology,* Volume 12.

Talwar, S., Kaur, P., Nunkoo, R. & Dhir, A., 2022. Digitalization and sustainability: Virtual reality tourism in a post pandemic world. *Journal of Sustainable Tourism,* 31(11), pp. 2564-2591.

Tatzgern, M. et al., 2015. Exploring real world points of interest: Design and evaluation of object centric exploration techniques for augmented reality. *Pervasive and Mobile Computing,* Volume 18, pp. 55-70.

Tavakoli, R. & Mura, P., 2015. 'Journeys in Second Life' - Iranian Muslim women's behaviour in virtual tourist destinations. *Tourism Management,* Volume 46, pp. 398-407.

Tecău, A. et al., 2019. Responsible Tourism—Integrating Families with Disabled Children in Tourist Destinations. *Sustainability,* Volume 11.

Terando, W. D., Mennecke, B. E., Janvin, D. J. & Dilla, W. M., 2007. It's Just a Game, Or Is It? Real Money, Real Income, and Real Taxes in Virtual Worlds. *Scholarship and Professional Work - Business. 53,* Volume 20, pp. 134-141.

Thai, H. H. et al., 2023. Analyzing Public Opinions Regarding Virtual Tourism in the Context of COVID-19: Unidirectional vs. 360-Degree Videos. *Information,* 12(1).

Thalmeiner, G., Gáspár, S., Barta, Á. & Zéman, Z., 2021. Application of Fuzzy Logic to Evaluate the Economic Impact of COVID-19: Case Study of a Project-Oriented Travel Agency. *Sustainability,* 13(17).

Thomas, E., 2017. *Brazil's 'Snake Island' Is The Place Of Nightmares, We're Pretty Sure.* [Online]
Available at: https://www.huffpost.com/entry/brazil-snake-island-viper-venom_n_5552149
[Accessed 5 January 2024].

Thomas, W. & Carey, S., 2005. *Actual/Virtual Visits: What Are The Links?.* Toronto, s.n.

Toivonen, A., 2022. Sustainability Dimensions in space tourism: The case of Finland. *Journal of Sustainable Tourism,* 30(9), pp. 2223-2239.

Tornatzky, L. G. & Fleischer, M., 1990. *The process of technological innovation.* s.l.:Lexington Books.

Trifonov, V. A., Grishakina, N. I. & Semyonova, A. V., 2019. *System of Modeling the Tourist Sphere.* Veliky Novgorod, European Proceedings of Social and Behavioural Sciences, pp. 668-677.

Tsai, L., 2022. Factors That Influence Virtual Tourism Holistic Image: The Moderating Role of Sense of Presence. *Sustainability,* 14(1).

Turi, J., 2014. *The sights and scents of the Sensorama Simulator.* [Online]
Available at: https://www.engadget.com/2014-02-16-morton-heiligs-sensorama-simulator.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuYmlu
[Accessed 1 May 2022].

Tussyadiah, I., Wang, D., Jung, T. & tom Dieck, M., 2018. Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism Management,* Volume 66, pp. 140-154.

Udovicic, G., Topic, A. & Russo, M., 2016. *Wearable technologies for smart environments: A review with emphasis on BCI.* Split, IEEE, pp. 1-9.

Ulrich, R., 1983. Aesthetic and Affective Response to Natural Environment. In: I. Altman & J. Wohlwill, eds. *Behavior and the Natural Environment. Human Behavior and Environment.* Boston: Springer, p. 85–125.

UN, 2010. *International Recommendations for Tourism Statistics 2008.* New York: United Nations.

UNESCO, 2015. *Policy Document for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention,* s.l.: General Assembly of States Parties.

UNESCO, 2021. *UNESCO and Sustainable Development Goals.* [Online]
Available at: https://en.unesco.org/sustainabledevelopmentgoals
[Accessed 6 January 2024].

UNESCO, 2024. *UNESCO in brief.* [Online]
Available at: https://www.unesco.org/en/brief
[Accessed 5 January 2024].

UNESCO, n.d. *Mount Athos.* [Online]
Available at: https://whc.unesco.org/en/list/454/
[Accessed 5 January 2024].

United Nations, 2010. *International Recommendations for Tourism Statistics 2008.* New York: United Nations.

Urry, J., 2000. *Sociology Beyond Societies: Mobilities for the Twenty-First Century.* London: Routledge.

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D., 2003. User acceptance of information technology: Toward a unified view. *MIS Quarterly,* 27(3), pp. 425-478.

Venkatesh, V., Thong, J. Y. & Xu, X., 2012. Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly,* 36(1), pp. 157-178.

Vichitvejpaisal, P., Porwongsawang, N. & Ingpochai, P., 2019. *Relive History: VR time travel at the world heritage site.* Brisbane, VRCAI.

Vince, J., 2004. Introduction to virtual reality. *Springer.*

Virtual Reality Society, 2017. *Virtual Reality Society.* [Online]
Available at: https://www.vrs.org.uk/virtual-reality/beginning.html
[Accessed 16 June 2021].

VRS, 2017. *Applications Of Virtual Reality.* [Online]
Available at: https://www.vrs.org.uk/virtual-reality-applications/
[Accessed 05 July 2021].

VRS, 2017. *Virtual Reality and Ethical Issues.* [Online]
Available at: https://www.vrs.org.uk/virtual-reality/ethical-issues.html
[Accessed 21 June 2021].

Wagler, A. & Hanus, M. D., 2018. Comparing Virtual Reality Tourism to Real-Life Experience: Effects of Presence and Engagement on Attitude and Enjoyment. *Communication Research Reports,* 35(5), pp. 456-464.

Waitt, G., 2000. Consuming heritage: Perceived historical authenticity. *Annals of Tourism Research,* 27(4), pp. 835-862.

Walters, G., Gill, C., Pham, L. D. Q. & Filep, S., 2022. Virtual Tourism Experiences and Mental Restoration. *Journal of Hospitality & Tourism Research,* 48(3), pp. 564-569.

Wan, C. S., Tsaur, S. H., Chiu, Y. L. & Chiou, W. B., 2007. Is the Advertising Effect of Virtual Experience Always Better or Contingent on Different Travel Destinations?. *Information Technology & Tourism,* Volume 9, pp. 45-54.

Wang, F., Huang, S., Morrison, A. M. & Wu, B., 2022. The effects of virtual reality tourism involvement on place attachment and behavioral intentions: virtual reality tourism of the Yellow Crane Tower in Wuhan. *Asia Pacific Journal of Tourism Research,* 27(3), pp. 274-289.

Wang, J. et al., 2023. Effect of Display Methods on Intentions to Use Virtual Reality in Museum Tourism. *Journal of Travel Research,* 63(2), pp. 314-334.

Wang, L., Wang, J., Huang, X. & Chi, H., 2022. Environmental Temperature in Thermal Comfort Under Different Virtual Tourism Activity Intensities: Based on Microclimate Simulation Experiment. *Fronntiers in Neuroscience,* Volume 15.

Warburton, S., 2009. Second Life in higher education: assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology,* 40(3), pp. 414-426.

Ward, G., 2000. *Cities of God.* 1st ed. London: Routledge.

Weeden, C., 2011. Responsible tourist motivation: how valuable is the Schwartz value survey?. *Journal of Ecotourism,* 10(3), pp. 214-234.

Wei, Z., Zhang, J., Huang, X. & Qiu, H., 2023. Can Gamification Improve the Virtual Reality Tourism Experience? Analyzing the Mediating Role of Tourism Fatigue. *Tourism Management,* Volume 96.

Wen, H. & Leung, X. Y., 2021. Virtual wine tours and wine tasting: The influence of offline and online embodiment integration on wine purchase decisions. *Tourism Management,* 83(2).

Wertheim, M., 1999. *The pearly gates of cyberspace : a history of space from Dante to the Internet.* New York: W.W. Norton.

WHO, 2020. *Health risks when travelling.* [Online]
Available at: https://www.who.int/news-room/questions-and-answers/item/health-risks-when-traveling
[Accessed 7 January 2024].

WHO, 2023. *WHO Coronavirus (COVID-19) Dashboard.* [Online]
Available at: https://covid19.who.int/
[Accessed 3 January 2024].

Widaningrum, D., Surjandari, I. & Sudiana, D., 2020. Analyzing Land-Use Changes in Tourism Development Area: A Case Study of Cultural World Heritage Sites in Java Island, Indonesia. *International Journal of Technology,* 11(4), p. 688–697.

Williams, A. M. & Shaw, G., 2009. Future play: tourism, recreation and land use. *Land Use Policy,* 26(1), pp. 326-335.

Williams, A. R., 2016. *Discoveries May Rewrite History of China's Terra-Cotta Warriors.* [Online]
Available at: https://www.nationalgeographic.com/history/article/china-first-emperor-terra-cotta-warriors-tomb
[Accessed 5 January 2024].

Williams, P. & Hobson, J. S. P., 1995. Virtual reality and tourism: fact or fantasy?. *Touurism Management,* 16(6), pp. 423-427.

Witmer, B. G. & Singer, M. J., 1998. Measuring Presence in Virtual Environments: A Presence Questionnaire. *Presence: Teleoperators and Virtual Environments,* 7(3), p. 225–240.

Wong, I. A., Lin, S. K., Lin, Z. & Xiong, X., 2022. Welcome to stay-at-home travel and virtual attention restoration. *Journal of Hospitality and Tourism Management,* Volume 51.

Wong, I. A., Lu, M. V., Lin, S. & Lin, Z., 2023. The transformative virtual experience paradigm: the case of Airbnb's online experience. *International Journal of Contemporary Hospitality Management,* 35(4), pp. 1398-1422.

Wrzesien, M. et al., 2013. The therapeutic lamp: treating small-animal phobias. *IEEE Computer Graphics and Applications,* 33(1), pp. 80-86.

WTTC, 2020. *Economic Impact Research.* [Online]
Available at: https://wttc.org/Research/Economic-Impact
[Accessed 30 October 2020].

Wu, X. & Lai, I. K. W., 2022. The use of 360-degree virtual tours to promote mountain walking tourism: stimulus-organism-response model. *Information Technology & Tourism,* 24(1), pp. 85-107.

Xiao, W. et al., 2018. Geoinformatics for the conservation and promotion of cultural heritage in support of the UN Sustainable Development Goals. *ISPRS Journal of Photogrammetry and Remote Sensing,* Volume 142, pp. 389-406.

Yang, T., Lai, I. K. W., Fan, Z. B. & Mo, Q. M., 2021. The impact of a 360° virtual tour on the reduction of psychological stress caused by COVID-19. *Technology in Society,* Volume 64.

Yau, M. K., McKercher, B. & Packer, T. L., 2004. Traveling with a disability: More than an access issue. *Annals of Tourism Research,* 31(4), pp. 946-960.

Ye, D. et al., 2022. Investigating the impact of virtual tourism on travel intention during the post-COVID-19 era: evidence from China. *Universal Aaccess in the Information Society.*

Yin, R. K., 2018. *Case Study Research and Applications: Design and Methods.* s.l.:Sage Publications.

Yoon, S., Laffey, J. & Oh, H., 2008. Understanding usability and user experience of web-based 3D graphics technology. *International Journal of Human–Computer Interaction,* pp. 288-306.

Yu, J. et al., 2023. The effects of virtual reality (VR) and augmented reality (AR) on senior tourists' experiential quality, perceived advantages, perceived enjoyment, and reuse intention. *Current Issues in Tourism,* 27(3), pp. 464-478.

Yung, R. & Khoo-Lattimore, C., 2019. New realities: A systematic literature review on virtual reality and augmented. *Current Issues in Tourism,* 22(17), p. 2056–2081.

Yusoff, R., Zaman, H. & Ahmad, A., 2011. Evaluation of user acceptance of mixed reality technology. *Australasian Journal of Educational Technology,* Volume 27, p. 1369–1387.

Zaichkowsky, J. L., 1985. Measuring the involvement construct. *Journal of Consumer Research,* 12(3), pp. 341-352.

Zeqiri, A., 2023. Virtual tourism as a substitute for physical tourism during COVID-19 pandemic. *Envirnmental Economics and Policy Studies.*

Zhang, L., 2017. *Research on the Innovative Mode of Undergraduate Tourism Management Talents Training in Jiangxi Province.* Jiangxi, FRANCIS ACAD PRESS, pp. 346-349.

Zhang, S.-N., Li, Y.-Q., Ruan, W.-Q. & Liu, C.-H., 2022. Would you enjoy virtual travel? The characteristics and causes of virtual tourists' sentiment under the influence of the COVID-19 pandemic. *Tourism Management,* Volume 88.

Zhang, S. et al., 2023. Psychological recovery effects of 3D virtual tourism with real scenes -- a comparative study. *INFORMATION TECHNOLOGY & TOURISM,* 25(1), pp. 71-103.

Zheng, C., Chen, Z., Zhang, Y. & Guo, Y., 2022. Does Vivid Imagination Deter Visitation? The Role of Mental Imagery Processing in Virtual Tourism on Tourists' Behavior. *Journal of Travel Research,* 61(7), pp. 1528-1541.

Zubiaga, M. et al., 2019. Towards Smarter Management of Overtourism in Historic Centres Through Visitor-Flow Monitoring. *Sustainability,* 11(24).

8. APPENDICES

8.1 Appendix 1: Questionnaire Form

Users' Behavior Towards Virtual Tourism //
Отношение пользователей к виртуальному туризму

Greetings!

This questionnaire is created to understand people's understanding of Virtual Tourism (VT) and their willingness to use Virtual Reality (VR) as a traveling tool. The results of this questionnaire contribute to the academic recognition of Virtual Tourism (VT) as a type of tourism and its advantages and disadvantages compared to the traditional form of traveling. The COVID-19 pandemic and traveling restrictions incorporated by many countries gave a start for this new type of traveling. Travel companies, local governments, and destination management organizations can use the received data for creating modern touristic routes that may satisfy more customers' needs.

Virtual Tourism (VT) is a process of immersing people in a virtual environment that generates touristic destinations to recreate a touristic experience by using VR technologies, special video clips, and different gadgets.

This questionnaire contains 3 main parts, each requesting specific information about respondents' traveling behavior, their familiarity with Virtual Reality (VR) and perception of Virtual Tourism (VT), and their demographic information. The results are anonymous, personal data of the participants are not going to be disclosed. The average time needed to complete this survey is 5 minutes.

Kindly ask you to forward this questionnaire to others, who might be interested in this topic. If you have any questions about the research, do not hesitate to contact the researcher via email at mikhalna1996@gmail.com.

Thank you!

Эта анкета создана, чтобы понять, как люди понимают виртуальный туризм (ВТ) и их готовность использовать виртуальную реальность (ВР) в качестве инструмента для путешествий. Результаты этого опроса способствуют академическому признанию виртуального туризма (ВТ) как вида туризма, его преимуществ и недостатков по сравнению с традиционной формой путешествий. Пандемия COVID-19 и ограничения на поездки, введенные многими странами, положили начало этому новому типу путешествий. Туристические компании, органы местного самоуправления и организации по управлению направлениями могут использовать полученные данные для создания современных туристических маршрутов, способных удовлетворить больше потребностей клиентов.

Виртуальный туризм (ВТ) — это процесс погружения людей в виртуальную среду, которая генерирует туристические направления для воссоздания туристического опыта с использованием технологий виртуальной реальности, специальных видеоклипов и различных гаджетов.

Этот вопросник состоит из 3 основных частей, в каждой из которых запрашивается конкретная информация о поведении респондентов в поездках, их знакомстве с виртуальной реальностью (ВР) и восприятии виртуального туризма (ВТ), а также их демографическая информация. Результаты анонимны, персональные данные участников не разглашаются. Среднее время, необходимое для завершения этого опроса, составляет 5 минут.

Убедительно просим вас переслать эту анкету другим, кому может быть интересна эта тема. Если у вас есть какие-либо вопросы по поводу исследования, не стесняйтесь обращаться к исследователю по электронной почте mikhalna1996@gmail.com.

Спасибо!

Section 1. Travelling habits // Раздел 1. Туристические привычки
This section helps to evaluate tourists' habits.
Этот раздел помогает оценить привычки туристов.
1.1 How often have you been traveling before 2020?
1.1 Как часто вы путешествовали до 2020 года?*
- less than once a year // реже одного раза в год
- once a year // раз в год
- 2 - 3 times a year // 2 - 3 раза в год
- more than 3 times a year // более 3 раз в год

1.2 What form of tourism do you prefer?
1.2 Какой вид туризма вы предпочитаете?*
- Domestic traveling // Внутренние путешествия
- International traveling // Международные путешествия

1.3 What is the most common purpose of your traveling?
1.3 Какова наиболее частая цель вашего путешествия?*
- Leisure // Досуг
- Visiting friends and relatives // Посещение друзей и родственников
- Education // Образование
- Health and medical care // Здоровье и медицинское обслуживание
- Religion // Религия
- Business // Бизнес
- Other:_____

1.4 Are you interested in tours around the city?
1.4 Вас интересуют экскурсии по городу?*
- Yes, this is a top priority // Да, это первоочередная задача
- Maybe, I go on a city tour if I have time // Может быть, если у меня будет время
- No, I am not interested in them // Нет, они мне не интересны

1.5 How much does one trip last usually?
1.5 Сколько обычно длится одна поездка?*
- A weekend // Выходные
- 3 - 4 days // 3 - 4 дня
- up to one week // до одной недели
- up to two weeks // до двух недель
- more than two weeks // более двух недель

1.6 Approximately, how much do you spend during one trip (for one person)?
1.6 Сколько примерно вы тратите за одну поездку (на одного человека)?*
- less than 100€ // менее 100€
- 100€ - 300€
- 300€ - 600€
- 600€ - 1000€
- more than 1000€ // более 1000€

1.7 Do you prefer to organize your tour by yourself or buy a package from travel agency?
1.7 Вы предпочитаете организовать свой тур самостоятельно или купить пакет в туристическом агентстве?*
- I organize my tour by myself // Я организую свой тур сам
- I do both equally // Одинаково
- I use travel agency's services // Я пользуюсь услугами турагентства

Health condition // Состояние здоровья
This question is necessary for the evaluation process.
Этот вопрос необходим для анализа опроса.
Do you have a motor disability that makes it difficult to move around?
Есть ли у вас инвалидность, из-за которой вам трудно передвигаться?*
- Yes, I do // Да
- No, I don't // Нет

Section 2. Virtual Reality (VR) // Раздел 2. Виртуальная реальность (ВР)
This section helps to understand the statistics on how much people are familiar with Virtual Reality (VR) and its application in tourism industry.
Этот раздел помогает понять статистику о том, насколько люди знакомы с виртуальной реальностью (ВР) и ее применением в индустрии туризма.
2.1 Are you familiar with VR?
2.1 Знакомы ли вы с виртуальной реальностью?*
- Yes, I use it often // Да, я часто ею пользуюсь
- Yes, I use it occasionally // Да, иногда пользуюсь
- Yes, but I don't use it // Да, но я ею не пользуюсь
- No, I haven't used it // Нет, я её не использовал(а)

2.2 Have you ever seen how VR is used in tourism (for marketing, management, as an attraction, etc...)
2.2 Вы когда-нибудь видели, как VR используется в туризме (для маркетинга, управления, как аттракцион и т. д.)*
- Yes, I tried it myself // Да, я сам(а) пробовал(а)
- Yes, but I haven't tried it // Да, но я не пробовал(а)
- No, never heard of it // Нет, никогда не слышал(а) об этом

2.3 What are your opinions of the statements about Virtual Tourism (VT) compared to traditional tourism?
2.3 Что вы думаете о заявлениях о виртуальном туризме (ВТ) по сравнению с традиционным туризмом?*
Please indicate the option that is corresponding with your opinion the most.
Пожалуйста, укажите вариант, наиболее соответствующий вашему мнению.

	strongly disagree // категорически	disagree // не согласен	slightly disagree // немного	slightly agree // немного	agree // согласен	strongly agree // категорически согласен

	не согласен		не согласен	согласен		
VT is cheaper // ВТ дешевле	○	○	○	○	○	○
VT is easier to plan and arrange // ВТ легче спланировать и организовать	○	○	○	○	○	○
VT allows people to travel to places that are difficult to reach // ВТ позволяет людям путешествовать в труднодоступные места	○	○	○	○	○	○
VT allows people to travel to places that don't exist // ВТ позволяет людям путешествовать в несуществующие места	○	○	○	○	○	○
VT is safer // ВТ безопаснее	○	○	○	○	○	○
VT is more sustainable // ВТ более устойчивый	○	○	○	○	○	○
VT is more inclusive // ВТ более инклюзивен	○	○	○	○	○	○
There are no technologies that can recreate real experience // Нет технологий, которые могут воссоздать реальный опыт	○	○	○	○	○	○

2.4 Do you think Virtual Tourism (VT) can make traveling easier for people with motor disabilities?

2.4 Считаете ли вы, что виртуальный туризм (VT) может облегчить путешествие для людей с нарушениями опорно-двигательного аппарата?*

- Yes // Да
- No // Нет

2.5 If you'd like, please leave your opinion about Virtual tourism (VT).
2.5 Если хотите, оставьте свое мнение о Виртуальном туризме (ВТ).

_____

2.6 Are you willing to use Virtual Tourism (VT)?
2.6 Готовы ли вы использовать виртуальный туризм (ВТ)?*

- Yes // Да
- I would try once // я бы попробовал(а) один раз
- No // Нет

Section 3. Demographics // Раздел 3. Демография

The main aim of this section is to collect information about the respondents that helps to create a portrait of the traveler.
Основная цель этого раздела — сбор информации о респондентах, которая поможет составить портрет путешественника.

3.1 Please, indicate your gender
3.1 Пожалуйста, укажите свой пол*

- Male // Мужской
- Female // Женский
- Prefer not to say // Предпочитаю не говорить

3.2 Please, indicate your age-group
3.2 Пожалуйста, укажите вашу возрастную группу*

- less than 18 // меньше 18
- 18 - 24
- 25 - 35
- 36 - 50
- more than 50 // более 50

3.3 Please, indicate country of your residence
3.3 Пожалуйста, укажите страну вашего проживания*

_____

3.4 Please, indicate your marital status
3.4 Пожалуйста, укажите ваше семейное положение*

- I am single // я свободен
- I have a partner // я в отношениях
- I am married // я в браке

3.5 Do you have kids?
3.5 У вас есть дети?*

- Yes // Да
- No // Нет

3.6 Please, indicate your status
3.6 Пожалуйста, укажите свой статус*

- I am a student // студент
- I have a part-time job // неполный рабочий день
- I have a full-time job // полный рабочий день
- I currently not working // безработный(ая)
- I am a pensioner // пенсионер
- Other:_____

3.7 Please, indicate your monthly income
3.7 Пожалуйста, укажите ваш ежемесячный доход*

- less than 500€ // менее 500€
- 500€ - 1000€
- 1000€ - 2000€
- 2000€ - 3000€
- more than 3000€ // более 3000€
- Prefer not to say // Предпочитаю не говорить

THANK YOU! // СПАСИБО!
Thank you for contributing in this research.
Kindly ask you to forward this questionnaire to others, who might be interested in this topic.

Спасибо за участие в этом исследовании.
Убедительно просим вас переслать эту анкету другим, кому может быть интересна эта тема.

If you would like to know about the research results, please leave your email address
Если вы хотите узнать о результатах исследования, пожалуйста, оставьте свой адрес электронной почты

_____

8.2 Appendix 2: RStudio Analysis

VT bibliometrix analysis

Elizaveta Polishchuk

2024-01-11

The following is the analysis process that involved examining 185 articles oriented towards VT retrieved from the WoS:

1. To install needed library:

2. To upload data that was collected from WoS:

```
file <- "C:/VT/data.txt"
```

3. To turn this data into a data frame:

```
VT <- convert2df(file, dbsource = "wos", format = "plaintext")

##
## Converting your wos collection into a bibliographic dataframe
##
## Done!
##
##
## Generating affiliation field tag AU_UN from C1:  Done!
```

4. To conduct the bibliometric analysis:

```
results <- biblioAnalysis(VT)
```

5. To summarize received data into tables:

```
summary(results, k=10, pause=F, width=130)

##
##
## MAIN INFORMATION ABOUT DATA
##
##  Timespan                          1999 : 2024
##  Sources (Journals, Books, etc)        134
##  Documents                             185
##  Annual Growth Rate %                 2.81
##  Document Average Age                 3.67
##  Average citations per doc           11.31
##  Average citations per year per doc    2.403
##  References                           7824
##
## DOCUMENT TYPES
##  article                 106
##  article; book chapter     3
##  article; early access    29
##  book review               1
##  editorial material        3
##  proceedings paper        37
##  review                    6
##
## DOCUMENT CONTENTS
##  Keywords Plus (ID)                   342
##  Author's Keywords (DE)               666
##
## AUTHORS
##  Authors                              571
##  Author Appearances                   631
##  Authors of single-authored docs       28
##
## AUTHORS COLLABORATION
##  Single-authored docs                 28
##  Documents per Author                  0.324
##  Co-Authors per Doc                   3.41
##  International co-authorships %       27.57
##
##
## Annual Scientific Production
##
##  Year    Articles
##    1999        1
##    2003        1
##    2008        1
##    2009        1
##    2011        1
##    2012        1
##    2013        5
```

```
##     2014        2
##     2015        2
##     2016        2
##     2017       10
##     2018       14
##     2019       13
##     2020        8
##     2021       28
##     2022       40
##     2023       53
##     2024        2
##
## Annual Percentage Growth Rate 2.81
##
##
## Most Productive Authors
##
##    Authors        Articles   Authors        Articles Fractionalized
## 1     BESSA M            5 ARMSTRONG S                          1
## 2     MELO M             5 BAIK A                           1
## 3     CLAVEL C           3 BASARABA N                           1
## 4     HUANG XT           3 BLAER M                          1
## 5     JORGE F            3 CENNI I                          1
## 6     LI Y               3 CHASE-LEVENSON A                     1
## 7     LOSADA N           3 CLAVEL C                         1
## 8     POTDEVIN D         3 DE D                             1
## 9     SABOURET N         3 DEWITT MF                            1
## 10    TEIXEIRA MS        3 DYBSAND HNH                          1
##
##
## Top manuscripts per citations
##
##                       Paper                                DOI  TC TCperYear   NTC
## 1  YUNG R, 2019, CURR ISSUES TOUR       10.1080/13683500.2017.1417359   339
56.50 11.82
## 2  HUANG YC, 2016, INT J TOUR RES       10.1002/jtr.2038               272     30.22  1.88
## 3  LU JY, 2022, CURR ISSUES TOUR        10.1080/13683500.2021.1959526   107
35.67  7.85
## 4  GURSOY D, 2022, J HOSP MARKET MANAG  10.1080/19368623.2022.2072504
92     30.67  6.75
## 5  XIAO W, 2018, ISPRS J PHOTOGRAMM     10.1016/j.isprsjprs.2018.01.001  78
11.14  4.90
## 6  FAN XJ, 2022, TOURISM MANAGE         10.1016/j.tourman.2022.104534    69
23.00  5.06
## 7  ZHANG SN, 2022, TOURISM MANAGE       10.1016/j.tourman.2021.104429    67
22.33  4.92
## 8  AKHTAR N, 2021, SUSTAINABILITY-BASEL 10.3390/su13105352               57
14.25  6.14
## 9  TAVAKOLI R, 2015, TOURISM MANAGE     10.1016/j.tourman.2014.07.015    56
5.60  1.90
```

```
## 10 LUO L, 2018, REMOTE SENS-BASEL       10.3390/rs10101558              50      7.14
3.14
##
##
## Corresponding Author's Countries
##
##      Country Articles   Freq SCP MCP MCP_Ratio
## 1  CHINA          56 0.3060  45  11     0.196
## 2  USA            17 0.0929  13   4     0.235
## 3  PORTUGAL       10 0.0546   8   2     0.200
## 4  AUSTRALIA       7 0.0383   6   1     0.143
## 5  ITALY           7 0.0383   6   1     0.143
## 6  KOREA           6 0.0328   4   2     0.333
## 7  ROMANIA         6 0.0328   6   0     0.000
## 8  INDIA           5 0.0273   5   0     0.000
## 9  MALAYSIA        5 0.0273   3   2     0.400
## 10 FRANCE          4 0.0219   3   1     0.250
##
##
## SCP: Single Country Publications
##
## MCP: Multiple Country Publications
##
##
## Total Citations per Country
##
##      Country      Total Citations Average Article Citations
## 1  USA                   531                31.24
## 2  CHINA                 456                 8.14
## 3  AUSTRALIA             369                52.71
## 4  UNITED KINGDOM        127                31.75
## 5  MALAYSIA              126                25.20
## 6  NORWAY                95                 31.67
## 7  GREECE                49                 12.25
## 8  ROMANIA               45                  7.50
## 9  PORTUGAL              36                  3.60
## 10 INDIA                 35                 7.00
##
##
## Most Relevant Sources
##
##                            Sources        Articles
## 1  CURRENT ISSUES IN TOURISM                      10
## 2  SUSTAINABILITY                                  9
## 3  INFORMATION TECHNOLOGY & TOURISM                4
## 4  JOURNAL OF HOSPITALITY & TOURISM RESEARCH       4
## 5  JOURNAL OF HOSPITALITY AND TOURISM MANAGEMENT   4
## 6  ASIA PACIFIC JOURNAL OF TOURISM RESEARCH        3
## 7  COGENT SOCIAL SCIENCES                          3
## 8  JOURNAL OF TRAVEL RESEARCH                      3
```

```
## 9  TOURISM MANAGEMENT                              3
## 10 FRONTIERS IN PSYCHOLOGY                         2
##
##
## Most Relevant Keywords
##
##    Author Keywords (DE)      Articles Keywords-Plus (ID)     Articles
## 1          VIRTUAL TOURISM         82        REALITY              25
## 2          VIRTUAL REALITY         30        TRAVEL               25
## 3          COVID-19                29        EXPERIENCE           23
## 4          TOURISM                 12        MODEL                23
## 5          AUGMENTED REALITY       11        IMPACT               19
## 6          CULTURAL HERITAGE        7        DESTINATION          15
## 7          AIRBNB                   4        TOURISM              13
## 8          COVID-19 PANDEMIC        4        SATISFACTION         12
## 9          DIGITAL TOURISM          4        TECHNOLOGY           12
## 10         SATISFACTION             4        VIRTUAL-REALITY      11
```

6. To conduct a citation analysis:

```
CR <- citations(VT, field="article", sep=";")
```

7. To create a table with the most popular citations:

```
cbind(CR$Cited[1:20])
```

```
##                                                          [,1]
## GUTTENTAG DA, 2010, TOURISM MANAGE, V31, P637, DOI
10.1016/J.TOURMAN.2009.07.003       47
## TUSSYADIAH IP, 2018, TOURISM MANAGE, V66, P140, DOI
10.1016/J.TOURMAN.2017.12.003       41
## BOGICEVIC V, 2019, TOURISM MANAGE, V74, P55, DOI
10.1016/J.TOURMAN.2019.02.009         30
## KIM MJ, 2020, J TRAVEL RES, V59, P69, DOI 10.1177/0047287518818915
28
## BECK J, 2019, TOUR REV, V74, P586, DOI 10.1108/TR-03-2017-0049
25
## EL-SAID O, 2022, J TRAVEL RES, V61, P528, DOI 10.1177/0047287521997567
25
## HUANG YC, 2013, TOURISM MANAGE, V36, P490, DOI
10.1016/J.TOURMAN.2012.09.009           24
## LOUREIRO SMC, 2020, TOURISM MANAGE, V77, DOI
10.1016/J.TOURMAN.2019.104028             24
## HUANG YC, 2016, INT J TOUR RES, V18, P116, DOI 10.1002/JTR.2038
23
## LU JY, 2022, CURR ISSUES TOUR, V25, P441, DOI 10.1080/13683500.2021.1959526
23
## KIM MJ, 2019, INT J INFORM MANAGE, V46, P236, DOI
10.1016/J.IJINFOMGT.2018.11.016       22
## YUNG R, 2019, CURR ISSUES TOUR, V22, P2056, DOI
10.1080/13683500.2017.1417359           21
## WILLIAMS P, 1995, TOURISM MANAGE, V16, P423, DOI 10.1016/0261-
5177(95)00050-X           20
```

ZHANG SN, 2022, TOURISM MANAGE, V88, DOI 10.1016/J.TOURMAN.2021.104429 20
CHEONG R, 1995, TOURISM MANAGE, V16, P417, DOI 10.1016/0261-5177(95)00049-T 19
MURA P, 2017, INF TECHNOL TOUR, V17, P145, DOI 10.1007/S40558-016-0059-Y 18
FORNELL C, 1981, J MARKETING RES, V18, P39, DOI 10.2307/3151312 17
PERRY HOBSON J.S., 1995, J. VACAT. MARK, V1, P124, DOI DOI 10.1177/135676679500100202 17
WEI W, 2019, TOURISM MANAGE, V71, P282, DOI 10.1016/J.TOURMAN.2018.10.024 17
HAIR J.F., 2006, MULTIVARIATE DATA ANALYSIS, V6TH ED. 16

8.3 Appendix 3: Systematic Review

N	Source	Aim	Method	Results	Suggestions
1	(Tavakoli & Mura, 2015)	To understand Iranian Muslim women behaviour in VT destination in SL.	- Experiment (10): Iranian Muslim women - SL - Observation - Interview (10)	- Women's choice of avatars is a significant aspect. While participants expressed a desire for avatars resembling their real selves, observations revealed discrepancies. Some participants aimed for attractiveness and sexual appeal in their avatars. Non-human avatars were considered negatively. - The study also delves into women's behavior in VT destinations. Avatars influenced behavior, allowing women to express themselves hedonistically without fear of judgment. - SL was seen as a space for the reinterpretation and discussion of personal religions, where women could critically engage with and challenge certain religious norms.	- Explore the relationship between hyperreality, sustainability, authenticity, and tourist satisfaction.
2	(Huang, et al., 2016)	To enhance the empirical TAM literature by applying the model to a 3D VT site and incorporate psychological elements from SDT to capture the entertainment	- Experiment: new users (105), experienced users (98) - SL - Survey (186) - TAM - SDT	- Perceived usefulness is positively related to the experience of enjoyment. - 3D tourism site usefulness in planning a trip was a predictor of behavioural intentions. - Nonsignificant effect of perceived ease of use on experience of enjoyment and behavioural intentions to travel can be interpreted in accordance with previous findings. - The perceptions of autonomy and relatedness had positive impacts on the	- Future research efforts should investigate why the construct of competence is not a significant predictor in influencing enjoyment and behavioural intentions.

		nature of the virtual world.		experience of enjoyment. These perceptions of autonomy and relatedness also positively correlated with behavioural intentions to take a trip. - Nonsignificant findings for the effects of competence on enjoyment and behavioural intentions were identified.	
3	(Coldham & Cook, 2017)	- This research delves into the emerging field of VR usability, particularly focusing on addressing the concerns of late adopters - elderly cohorts.	- Experiment (19) - Semi-immersive VR (HMD and controllers)	- Despite expressing low expectations, many participants discovered practical applications and perceived the experience positively. - Authentic tasking, particularly navigating using VR Google Earth maps, engaged participants strongly, and frustrations/hesitations were identified, such as difficulties with buttons and concerns about headset weight and tethering. - Three-dimensional fears, combining VR experiences with physical sensations, emerged as a significant factor influencing rejection.	- To investigate the incorporation of authentic tasking into VR software designed for elderly users, particularly focusing on navigational map-based options to assist with mobility and accessibility limitations. - Research on changing the texture of buttons and the trackpad to improve controller usability. - Comparing hardware with non-tethered solutions among the elderly. - Adapting the smooth surface structures of controllers with different substrates featuring coarse textures and non-standard surfaces.
4	(Mura, et al., 2016)	Understanding of VT and authenticity by conducting empirical research.	- Interview (20)	- All the participants acknowledged the importance of digital VT as technological improvements may be able to provide more sophisticated sensorial experiences in the near future. - Six of the respondents do not exclude the possibility that in the future VT may become as 'authentic' as non-VT. - All the respondents pointed out that VT could only complement, rather than replace, corporeal travel as the latter is	- The relationship between virtuality and authenticity in tourism experiences. - The contribution of VT to forms of tourism perceived as authentic. - The influence of non-corporeal

				perceived as essential to experience authenticity. - Some of the participants also mentioned that even when technology will provide complex sensorial experiences they will still prefer corporal travel over virtual forms of tourism. - Some of the interviewees, for example, emphasised the importance of physical travel to collect tangible evidence of the trip, such as photos and souvenirs, and 'consume' them during the recollection stage at home. - Other respondents described their excitement and anxieties before travelling to a destination as well as the rituals performed in preparation of the trip.	travel patterns on the perceptions of authenticity. - Tourists willingness to replace or combine corporeal travels with VT. - The relationship between virtual and non-virtual tourist experiences.
5	(Wagler & Hanus, 2018)	To understand how users perceive and engage with 360-degree video tourism experiences in comparison to physically visiting the location and watching traditional 2-D video tours.	- Experiment: - real tour (36) - Non-immersive VR (2D online tour) (40) - Semi-immersive VR (360 VR tour) (41) - Survey after the experience (116)	- Those in 2D viewing condition scored lower. - Those in the 360-degree video and physically present condition had no significant difference between their scores. - Those in the 360-degree video or physically present conditions reported higher spatial presence scores, which increased emotional engagement and ultimately led to increases in tour outreach intentions and sponsor liking. - 360-degree video experiences are viewed very similarly to real-world experiences.	N/A
6	(Park, et al., 2018)	To investigate the effects of a video-based virtual tour, implemented through film-induced tourism, on post-VR attitude and behavioural visit intention to a cultural heritage site.	- Experiment (30) - virtual tour - survey - a video-based VR tour - survey - Interview (30)	- Video-based virtual experience is more effective in improving visitors sense of presence, enjoyment, positive attitude, and visit intention. - They did not think they could do whatever they wanted in the different types of virtual tours.	- To explore how to reassemble the existing media according to various user contexts, such as tour modes, and tailor the desired interactive media experience to each user.
7	(Magalhaes, et	To investigate the	- Experiment (45)	- There is no statistically significant impact between the two independent	- To explore the influence of human

	al., 2019)	combination of 360-degree video and VR to enhance the tourist experience.	- Semi-immersive VR (360-degree video with HMD) - Real visit	variables (users' age and level of education) and perceived similarity and users' expectancy. - VT can act as an efficient promotion tool, considering that users' perceived destination image is not compromised regarding their age or level of education. - There are no statistically significant differences between the studied variables. - Such results suggest that VT can act as an efficient promotion tool, since it does not affect the image of touristic places, independently on users' age and level of education	factors on the users' perceived virtual experiences, taking into consideration both perceived similarity and expectancy constructs, as mentioned before.
8	(Orru, et al., 2019)	- To investigate the factors influencing satisfaction with virtual nature tours in ecologically vulnerable areas using interactive multimedia.	- Survey (299)	- Individuals aged 51–70 expressed the highest satisfaction with VT. - People with higher education are less likely to accept mediated nature experiences. - Men are less likely to be satisfied with VT. - People with a low need for emotional arousal exhibit positive responses to VT, even with weak emotional triggers, indicating easier satisfaction with virtual nature experiences. - Pro-ecological values, norms, and intentions, along with beliefs about positive social and environmental effects of sustainable tourism, can enhance subjective positive judgments about VT having a smaller environmental impact than physical nature tourism. - Pro-ecological factors play a less significant role in acceptance of VT among individuals with a low need for arousal compared to those with a high need. - The hedonic goal of increased emotional arousal is crucial for the uptake of virtual nature tourism alternatives. - Among those with low need for arousal, a pro-ecological narrative is a less significant predictor of satisfaction with VT. - Among people with low need for	- The role of individual bio-psychological triggers. - The effect of symbolic attributes in acceptance of VT.

				arousal, personal norms related to avoiding broader impacts of travel on biota or longer flights predict stronger acceptance of VT. - Social values, beliefs about sustainable tourism, and pro-ecological norms play a less significant role in the acceptance of VT among individuals with low need for arousal.	
9	(Boglio lo, et al., 2021)	To present a set of technologies developed to replicate the school trip experience, particularly focusing on virtual visits during the COVID-19 pandemic. The goal is to enable students to virtually experience educational trips from the comfort of their homes or schools using a web browser and Internet access.	- Case study. - Remote tour via YouTube - Survey 1 (1031), for all participants - Survey 2 (236), for teachers exclusively. - Spontaneous feedback and comments from teachers collected through social channels and direct messaging chats.	- Virtual field trips are perceived to be more effective as an educational experience, but students in particular remark that they should not entirely supplant real ones.	- The adoption of VR headsets, possibly in combination with 360-degree recording instruments, thus providing a virtual tour that allows single users and groups to navigate the visited locations with a certain amount of freedom.
10	(Magal haes, et al., 2021)	To investigate the influence of the sense of presence and cybersickness on users' expectancy and perceived similarity between VE and their real-world counterparts.	- Experiment (45) - Non-immersive VR (laptop version) (22) - Immersive VR (HMD version) (23) - Real visit - Survey (45)	- The non-immersive VR environment exhibited statistically significant positive correlations between the global sense of presence score and users' perceived similarity and expectancy. - The sense of presence subscale 'realism' also correlated positively with perceived similarity and expectancy in the non-immersive environment. - No significant correlations were found between cybersickness subscales and perceived similarity or expectancy in the non-immersive environment. - In the immersive VR environment, the cybersickness global score showed a statistically significant positive	- Involve a bigger sample size and the concern for the individual characteristics, such as age, gender, ethnicity, education level, and personality, considering their influence on the VR experiences.

				correlation with users' perceived similarity and expectancy. - Four other statistically significant positive correlations were found between specific cybersickness subscales ('disorientation,' 'oculomotor discomfort,' 'oculomotor discomfort,' and 'nausea') and either perceived similarity or expectancy. - No significant correlations were found between presence subscales and perceived similarity or expectancy in the immersive environment. - Cybersickness, sense of presence, perceived similarity, and expectancy are interconnected in both non-immersive and immersive VR experiences, highlighting the complex relationship between these factors.	
11	(Karpunina, et al., 2021)	The opportunities of introducing VR technologies into social services for the elderly.	- Experiment - 3 semi-immersive VR sessions with elderly people (35); - Interview (35)	- 100% “really liked” the tourism sessions. - All respondents reported improved mood and getting positive emotions after the classes. - The elderly were most interested in activities associated with learning something new. - The elderly primarily wanted to see or do something previously unavailable to them. - The least number of the elderly were interested in the gaming elements. - 100% of them indicated that it had only taken them one class to become familiar with VE. - Only few mentioned sickness. - By the second session complaints of dizziness had become two times less frequent. After the third session, almost all clients noted that dizziness became less frequent in everyday life as well. - 11.4% of the respondents indicated experiencing fatigue in the eyes and difficulty focusing during VR training which persisted for all three sessions. - Most elderly people expressed a desire to continue and repeat these activities in the future. - The seniors replied that each lesson should be conducted using a new VR	N/A

				map. They considered visiting the same places again "uninteresting" and even if some places on the map had been left undiscovered, they only agreed to use it if there were no new maps.	
12	(Fiocco, et al., 2021)	To explore the effects of immersive VR tourism exposure on psychosocial well-being among older adults residing in residential care.	- Experiment - Semi-immersive VR sessions for 6 weeks 3 times a week (18) - Interview (18)	- 94.4% no longer travelled for various reasons including financial and insurance restrictions, health, companion-related concerns, and mobility issues. - Revealed a marginal decrease in cybersickness from pre- to post-VR exposure. - Revealed a significant decrease in anxiousness (i.e. increased relaxation) pre- to post-VR exposure. - No statistically significant changes were found for unhappy/happy or bored/engaged. - Revealed a significant increase in quality of life and social engagement. - Failed to show a significant change from pre-VR tourism program assessment to post-VR tourism program assessment in depressive symptoms. - Participants enjoyed and would like to engage in such activity. - A number of participants reported that they looked forward to participating in each VT session. - Although participants shared several immediate benefits from engaging in VT, long-term benefits of VT were less clear. - VT presented something different for experienced travellers and for those who had not travelled in the past. - Two residents reported that they were "sad" that they could not travel to these places anymore, however they still appreciated the ability to travel to them virtually. - In several videos, the music was not relevant to the virtual destination. - Suggestions for improvement revolved around the need to increase contextual cues and information in the videos, the importance of culturally appropriate music, quality of the images and length of videos to capture the scope of each	- To determine whether benefits associated with VR tourism are greater than standard programming.

				destination. - Overall, participants reported that they would appreciate longer videos as some were less than ten minutes, and that the VR quality could be improved with respect to clarity of the images. - One participant also expressed an interest in more active VR experiences, much like scuba diving. - The finding of minimal cybersickness in response to immersive VR content among older adults is especially noteworthy. - Some participants were captivated by the immersive experience and one participant expressed that VT distracted them from their physical pain.	
13	(Lu, et al., 2022)	To investigate the factors influencing people's acceptability of using VT during the COVID-19 pandemic in China.	- Experiment (30) - Live streaming via a smartphone. - 360° view app. - Interviews (30) - Survey (1288)	- The respondents who are aware of VT, who browse the pictures/videos/websites of the tourism destination frequently, and who show a willingness to use VT are more likely to use VT. - The major constraint for not using VT is lack of familiarity with it and not being aware of it. - Most of our interviewees pointed out that they prefer to use VT for the cultural landscape (e.g. museum) rather than the natural landscape, because for the cultural landscape, VT is particularly favourable for people to learn knowledge, while for the natural landscape, it will be better to go for an on-site visit. - Even after the pandemic, people still show willingness to use VT for diverse purposes.	- Tourism destinations (museums and indoor scenic sites) should adopt VT as an important component in their products and services. - Tourism destinations could develop innovative ways to incorporate the internet selling of souvenirs/products into their VT product. - VT can influence people's on-site destination choices and can be used as an effective marketing tool to promote destinations.
14	(Zheng, et al., 2022)	To investigate the psychological mechanisms underlying VT, particularly focusing on	- Experiment (28) - 360 view - Interviews (28) - Surveys (434) and	- Virtual Nanjing Memorial was laden with heavy, negative emotions and created vivid imagery for the user. The intensity of these emotions for the user not only failed to develop their interest but also impacted on the user's intention to visit.	- To consider multisensory stimuli to evoke tourist imagery processing in the context of digital technologies.

		mental imagery processing (MIP) of sensory stimuli in VT attractions.	(552)		- Incorporation of respondents from different cultures to provide a holistic understanding of psychological process and experiences
15	(Wu & Lai, 2022)	To explore the motivational factors that drive audiences' intention to engage in real mountain walking after experiencing 360-degree virtual mountain walking tours.	- Survey (320) - SOR	- The results show that the vividness of a 360-degree virtual tour has a positive influence on audiences' sense of presence. - Emotional involvement leads to a flow state and enjoyment. Furthermore, a flow state is also a vehicle for creating user's enjoyment. - Emotional involvement shows the greatest impact on audiences' intention to walk in a real mountain, followed by flow state and enjoyment.	- Future studies may test the model in different regions and countries to generalise the results. - Future studies can include more emotional and psychological measures. - To include more antecedents of VR presence to construct a more comprehensive research model. - To conduct further research to understand the emotional and psychological states of visitors in real mountain walking. - This study only evaluated the use of 360-degree virtual tours in HMD. However, 360-degree virtual videos can be viewed on a computer screen. Further study is recommended to verify any difference between using these two types of devices.
16	(Driand a, et	To investigate the	- Interviews (15) with	- The virtual tours offered easy access, as there was no need to log in or register	N/A

	al., 2022)	perceptions, feelings, and expectations of Indonesian consumers of "Hallyu" through VT offered by South Korea, focusing on the case study material of Imagine Korea VR.	women	to start the exploration. - They also emphasized how the virtual tours offered by Imagine Your Korea saved them money and time. It enables those under financial constraints to at least virtually enjoy Korea. - A virtual tour is flexible, it can be accessed while doing something else, and it is not constrained by time as it can be taken anywhere. - Most respondents agreed that virtual tours could help them to navigate Seoul before visiting the city in person. - Virtual tour helped them identify and familiarize themselves with the available attractions. - Most respondents pointed out the high-quality images and some of the interactive features of the virtual tours, such as interactive photo-spot functions that allow users to screenshot their virtual experience at designated places. - Most respondents believe they could never replace traditional travel. They missed the opportunities to taste real food and see real people. - There was no audio during the tour, such as the sounds of the surrounding environment or even simple Korean greetings, indicating the tour lacked something. - Although they could spend time exploring an area, they could not explore another side of a street which they might find appealing.	
17	(Roman, et al., 2022)	The exploration virtual and space tourism as emerging travel trends during various crises, particularly focusing on the impact of VR technology.	- Survey (564)	- The most important factor in choosing VT is the possibility of visiting inaccessible places. A similar group indicated unique offers of VT and instant access to the places visited. The least important factors indicated by the respondents were the location of places visited and other people's opinions. - Over 56% of the respondents indicated that VT is not able to satisfy a contemporary tourist's cognitional needs. - Almost 90% of respondents were convinced that tourism with VR cannot	- Further research should investigate following issues of VR in tourism: - conditions for applying various promotional instruments in this area; - institutional cooperation in the development of VT; - identification of

				substitute for traveling in the real world. - The country that attracted the biggest number of the respondents within VT was one that, for political reasons and, to a smaller extent, geographical location, is the most difficult to visit within real world travel: North Korea. - The biggest group of the respondents indicated that new technologies, security and changes in travelling caused by the COVID-19 pandemic were the most important factors in determining the development of VR in tourism. Comfort and accessibility of such places to disabled people were not recognized as such factors. - Almost 70% of the respondents expressed an opinion that the use of VR is important at the time of the COVID-19 pandemic, and only 10% had the opposite view. - 70% of respondents believed that the new technologies would determine VR tourism development.	forms of tourism taken virtually by humans; - determining the factors influencing the development of VT among the disabled; - research on the development of virtual space tourism.
18	(Tsai, 2022)	To investigate the impact of tourist involvement on the three components of holistic image - cognitive, affective, and conative images - within the context of non-immersive VT.	- Survey (386)	- The degree of prospective tourists' involvement can effectively predict these three image components of the holistic tourist destination image. - The moderating effect of sense of presence implies that the holistic image of prospective tourists' VT can be strengthened through the enhancement of a sense of presence. - Tourist involvement can affect the formation of destination images and influence the intention to travel. - VT can attract people with environmental awareness or those who want to reduce travel risks, encouraging them to replace on-site tourism with VT. - VT provides a timely and temporary solution for prospective tourists. However, the majority of people may still adopt and want to use VT even after the pandemic.	- To examine different VT environments, such as semi-immersive or fully immersive methods, to implement 360◦ VR video, and compare whether respondents will have different levels of perception on the destination images due to VR devices. - To consider extending the research subject to past tourists and compare differences between the two groups. - To supplement other variables, such as familiarity

					and experience of tourist destinations, which will affect the formation of the tourist destination image - To consider using other specific VT components, such as immersion, interactivity, and imagination, to validate whether these factors can enhance the formation of a holistic image.
19	(Wang, et al., 2022)	To explore the thermal comfort and satisfaction of virtual tourists under various activity intensities through a combination of experimental and semi-structured interview methods, microclimate simulation experiments, and monitoring of physiological indicators using electrocardiogram data.	- Experiment (60) in a tourism microclimate simulation laboratory -Interviews (60)	- The environmental temperature affected the perceived thermal comfort of VT, and there was a significant relationship between perceived thermal comfort and environmental temperature in the VT experience. - Activity intensity can moderate the relationship between environmental temperature and perceived thermal comfort. - Tourists' comfortable temperature range for all activity types was 19.8–25.0◦C. - Under different intensities of VT activity, the environmental temperature will affect the physiological thermal comfort of tourists.	- To try to improve tourists' sense of immersion in VT. - To combine AR, VR, MR, and other equipment to improve the simulation degree of VT and construct a more realistic tourism scenario, resulting in a more rigorous experiment. - To integrate tourism fatigue and time sensation in the model to conduct a comprehensive tourism experiment. - To conduct comparative experiments based on age, physical condition, and region to obtain more extensive and universal results.
20	(Melo, et al., 2022)	To investigate the impact of multisensory	- Experiment (80) - Non-	- This result does not support the literature reports that men generally are typically associated with more	- To expand the sample age towards different age

		VR setups and gender on users' sense of presence, satisfaction, emotions, and attitudes in the context of tourism marketing.	immersive (desk computer) (40) - semi-immersive (HMD) (40)	significant development of the sense of presence since they are considered to have more familiarity with virtual scenarios and handling with hardware and software. - There are no statistically significant differences were found. - There are no significant differences were found regarding user emotions and attitudes at any level. - There is statistically significant strong correlation for the pair Spatial Presence–Emotions and a statistically significant moderate correlation for Spatial Presence–Enjoyment, revealing that the capability of the VR experience to make the users feel physically in the VE contribute to positive emotions. - There is a strong correlations between Satisfaction and Usefulness for promoting the destination further reveal that the more the user is satisfied with the VR experience, the more susceptible he is to the content and the more the value he recognizes in the VR technology as a promotional tool the destination.	groups. - The interaction with the environment should be considered when comparing gender differences.
21	(Wang, et al., 2022)	To investigate the relationships among Virtual Reality Tourism Involvement (VRTI), place attachment, and behavioural intentions.	- Survey (693)	- VRTI can positively influence place attachment. - VRTI had significant positive effects on behavioural intentions. This confirms that pleasure and sign motivate people to travel to the real places they experience through VR tourism. - Place dependence did not have a significant effect on behavioural intentions, whilst place identity did have. - Place attachment had a mediating effect between VRTI and behavioural intentions. - Place attachment is affected by VRTI, and this has an influence on the outcome variable of behavioural intentions.	- Different age groups could be consulted with offline research for additional model verification. - To choose other VT destinations for further model testing, especially world-famous attractions, and destinations. - Other VR methods such as virtual conferences and exhibitions (e.g., through Zoom, Teams, and WeChat), tourism broadcasts, and tourism commentaries

					should be analyzed. - Other variables should be introduced into the VRTI model.
22	(Wong, et al., 2022)	To explore Airbnb's Online Experience as a new VT initiative using the framework of ART.	- Reviews analysis (400) from the Online Experience platform (via Zoom) at Airbnb	- Were revealed six unique features: super host, storytelling, personalized tours, virtual connection, stay-at-home indulgence, and technology enablement. - There are nine major themes of virtual experience: Deep Immersion Experience, Authentic Experience, Nostalgic Experience, Social Interaction Experience, Past-Present Resonance Experience, Touristic Learning Experience, Escape Experience, Hedonic Experience, Novelty Experience. - Overall, these experiences contribute to the unique and diverse VT offerings of Airbnb, enriching tourists' engagement during the COVID-19 pandemic.	- Future research could validate our findings with additional data collected from Airbnb and other platforms. - To compare of user evaluations for this initiative at different waves (post-pandemic era). - To compare how much VR/MR arcades could improve tourist experience over that of Zoom. - To develop an agenda to evaluate negative valences in order to better understand the long-term impact of tourism in cyberspace.
23	(Siddiqui, et al., 2022)	- To conduct a comprehensive literature review on the latest technologies and applications relevant to VT and digital heritage. - To analyze user requirements to VT.	- Survey (534)	Advantages of VR: Safety and security. Control on view. Cost effectiveness. Less impact on vulnerable destinations. Preserve environment. Try before buy. Permanent memory in high resolution. Visit the past, the present and even the future. Disadvantages of VT: Lack of physical interaction. Artificially enhanced scenery. Lack of relaxation. Anti-globle village concept. Change of environment. Lack of availability to everyone. Lack of financial gains.	N/A

24	(Walters, et al., 2022)	To investigate the potential of VR tourism experiences as a restorative intervention strategy to enhance the mental well-being of employees in the workplace.	- Experiment (20) - Surveys (3 days before and after)	- 73% of participants felt content and tranquil after participating in the VR experience which was reassuring to the researchers that the chosen stimulus was effective in inducing this intended state. - The findings offer support for the restorative power of natural environments. - VR experience did not reduce mental fatigue.	- To explore the effectiveness of VR interventions for employees in the workplace. - To focus on how long the restorative effects are endured through a longitudinal study while comparing a VR experience with other interventions known for their restorative benefits and how a VR experience can generate future visitation to the featured destination.
25	(Dybsand, 2022)	To investigate the participant experience of virtual guided tours offered during the COVID-19 pandemic.	- Companies (213) offering guided virtual tours. - Reviews analysis (3661)	- Connection to physical travel: nostalgic feelings about previous traveling to the same location; substitutes of cancelled tours because of COVID; opportunity to visit places that people couldn't (didn't). - The perceived benefits of virtual guided tours: cover more ground because the guide did not have to bring the group physically from site to site; reduced costs compared with physical travel; access to elements that could not be accessed on traditional tours; better compare the past and the present by showing old and new photographs; fewer distractions (no queues and disrespecting tourists); get a closer look at the sights; useful for disabled or elderly; "better during winter" and "less physically challenging"; - Elements that made virtual guided tours better or worse: Bad or good guide; Interactive or not enough interactive	- To applying other methods, such as interviews, focus groups, and surveys with participants and operators, may wish to triangulate the themes and outcomes identified here. - Other forms of virtual experiences offered during the pandemic, such as online food and drink tastings, online escape rooms, and online classes and workshops, may provide further insights into how participants have used virtual experiences to get through this challenging time.

				tours; Info (or lack of it) about how to join the virtual tour; Good or bad quality of visual or audio. - Bringing people together: creating a community; connect with old friends, family, coworkers. - Escaping reality, feeling present, and having an increased desire to visit the destination: feel as if they were present at the destination; made them want to visit the destination even more. - The future of virtual guided tours: good but temporary substitutes for actual travel during the pandemic; hoped virtual guided tours would continue after the pandemic. - The comments that were found indicated that there might be a (smaller) market for virtual tours after the pandemic.	
26	(Mavrin, et al., 2022)	- An overview of tourism perspectives during and after the COVID-19 crisis, with an emphasis on cultural tourism and related facilities. - Creating a new – immersive cultural tourism model.	- Survey (228)	- 83.8% are familiar with VR. - 13.6% haven't heard of VR, AR nor XR - VR, AR, XR are useful tools in touristic presentation of the destination. - VR, AR, and XR are useful tools in touristic presentation of the cultural heritage. - VR, AR, and XR can contribute to virtual revival of lost historical localities for tourists and visitors. - VR, AR, and XR applications can contribute to safety of visitors in COVID-19 pandemic conditions. - Either as physical touristic office equipped with immersive technologies and XR simulations, or as virtual place for the ones equipped with their own technology, virtual tourist office gives an opportunity for: buying VT product and additional products within the simulation (e.g. virtual souvenirs); short experience after which tourists decide on destination.	- To focus on Croatian travellers, comparison with the ones from surrounding countries and from European Union. - To focus on Generation Z as more prone to technology. - To focus on experienced in immersive technologies respondents.
2	(Li, et	To assess the	- Survey (239)	- The technology acceptance of VT does	- Presented

7	al., 2022)	effectiveness of the emerging VT market, particularly in the context of the COVID-19 pandemic. The research focuses on developing and testing a measurement scale that includes factors such as ease of use, usefulness, autonomy, enjoyment, perceived risk of COVID-19, and attitude.	- TAM	not significantly influence tourists' attitude towards use from both actual and potential perspectives. - The expected ease of use is important to potential tourists and will positively affect their expected autonomy, which in turn will further affect their expected enjoyment of the virtual experience. - Intrinsic (enjoyment, autonomy) and extrinsic (usefulness, ease of use) are significant predictors in VT. - The difference in sample counts between potential tourists and actual tourists intuitively reflects the limited popularity of VT at the current stage of development. - The VT product designer should pay more attention to easy operation and high efficiency and try not to complicate the tourism activities in the virtual world. - VT product designs should provide more possibilities for tourists to create the activities by themselves or allow more decisive steps and options to shorten the psychological distance between the virtual world and the tourist experience.	theoretical framework and constructed measurements need more support from other empirical tests. - To explore more micro causes from technology applications, e.g., technical elements such as colour, voice, sensitivity, and interactivity and embodied experiences such as vision, auditory, and touch. - To control and explore these variables: age, gender, SI.
28	(Cheng & Huang, 2022)	To explore and understand the factors influencing users' continuous intention to use virtual tours, with a focus on pleasure, arousal, and dominance, based on the pleasure–arousal–dominance model.	- Experiment (509) - Non-immersive (with keyboard and mouse) - Survey (509) - PAD	- Ubiquity in VT positively affects perceived dominance, that telepresence and vividness positively affect perceived pleasure, and that interactivity and background music congruency positively affect perceived arousal. - The atmospheric cues affect word of mouth and continuous usage intention through affective factors: perceived dominance, perceived pleasure, and perceived arousal. - This study revealed that the ubiquity of VT affects consumers' willingness to engage in word of mouth and the intention to use VT through perceived dominance. - Telepresence and vividness create perceived pleasure in VT. - Telepresence and vividness in VT affect consumers' willingness to engage in word of mouth and intention to use	- Employ a longitudinal research design to provide insights into the evolution of consumer attitudes towards VT across different time points. - To determine whether consumers' creativity affects their intention to use VT. - To investigate aspects related to dominance, pleasure, and arousal, such as whether enjoyment affects pleasure and

				VT through perceived pleasure. - Interactivity and background music congruency increase arousal and continuous usage intention and thus encourage word of mouth.	intention to use VT. - To incorporate behavioural variables to explore consumers' intention to use VT. - To conduct VT experiments with VR headsets to enhance the immersive effect. - To examine the framework by using other scenarios than museums.
29	(Ye, et al., 2022)	- To investigate the mechanisms influencing travel intention in the realm of VT using S-O-R. - To explore the roles of virtual attachment and travel intention.	- Experiment (390) - Survey (390) - Interview (some of them) - SOR	- There is a significant positive relationship between content quality, system quality, and interaction quality of VT on tourists' tourism experience, virtual attachment, and travel intention through model testing and mediating effect testing, which is consistent with the findings of previous studies. - As a new type of tourism, VT has novel and unique characteristics that attract tourists and inspire their curiosity. As a result, VT strengthens tourists' intention to run to the destinations promoted in VT by providing immersive tourism experiences and realistic virtual attachments. - Tourism experience has the most significant impact on travel intention in the field, followed by virtual attachment, which is mainly relevant to the form and nature of VT. - System quality may directly and significantly affect travel intention positively. Tourism experience and virtual attachment play a complementary mediating role in influencing relationships of content quality, system quality, and interaction quality. - There is no significant positive impact of tourism experience on virtual	- To make holographic projection technology universal so that tourists' homes become distant scenic spots. - To use cinematic stunts to allow users to pose for photos with scenes in virtual scenes. - To incorporate the function of take-out recommendation during the VT scenario setting. - Developers can add restaurant recommendations during VT. - To optimize VT from other perspectives, such as growing tourists' olfactory or tactile experience.

				attachment. - Tourism experiences and virtual attachment do not have a direct correlation. - Virtual attachment is an antecedent factor influencing tourists' travel intention in the field, rarely seen in VT research. The study revealed that virtual attachment is a prominent variable influencing tourists' travel intention in the field when users are experiencing VT. - VT has a room for development in the interactivity aspect. - Tourists can communicate and interact through real-time voice and other means. - Photographing is usually one of how people interact with the scenery. Techniques such as AR photography and photoshop (PS) can also increase tourists' engagement. - VT will not wholly replace offline tourism because offline tourism is the root of VT. Without the development of offline tourism, VT will also lose the creative material. Although VT is not the pure auxiliary tool it used to be, an essential role of VT in the post-pandemic era is still to provide a reference for people to travel offline.	
30	(Liu & Huang, 2023)	To investigate the importance of selecting appropriate VR videos, specifically focusing on how VR video stimulation (arousal) contributes to user flow experience and subsequent satisfaction using SOR paradigm.	- Experiment (170): strong and weak stimuli - Survey (170) - SOR - PLS-SEM	- Self-reported arousal had a statistically significant effect on enjoyment. PLS-MGA further revealed that the self-reported arousal → enjoyment relationship was weaker when participants viewed the VR video with weak stimulation compared to when they viewed the VR video with strong stimulation. - Respiration rate reported similar effects on enjoyment, while heart rate demonstrated insignificant effects on enjoyment. - Self-reported arousal also proved its significant relationships with focused attention and time distortion. - Respiration rate indicated a significant impact on time distortion. - The heart rate → time distortion	- To add additional behavioural responses (e.g., intentions of offline visit). - To investigate the connections among VR video length, content stimuli, affective and cognitive responses, and satisfaction. - To investigate the viewpoints of practitioners on the usage of VR as a marketing tool or substitute for real

				relationship was more pronounced when individuals viewed the VR video with intense stimulation compared to weak stimulation. That is, a person is more likely to focus on and get completely immersed in a VR video with stronger stimulation than one with weaker stimulation. - The findings suggest that VR video stimulation affects user satisfaction through enjoyment. Therefore, destination managers (e.g., theme park managers) could focus on promoting and offering thrilling activities (e.g., roller coaster rides) rather than emphasizing exhibits.	tourism.
31	(Kinseng, et al., 2023)	To investigate the positive effects of the Covid-19 pandemic on the development of VT, a novel form of tourism that has emerged in response to the global crisis.	- Interviews (6) with tour guides - Field observations (5)	- VT has its advantages in that anyone from anywhere can join a tour, without the limitation of movement, space, or distance, and the time requirements are more flexible. - In terms of experience for tourists, a virtual tour is not as "real" as an actual one. - VT that emerged from the Covid-19 pandemic was basically triggered by structural factors that "forced" tour guides and organizations into new directions and action. - For the tour operators it was clear that the shift to a new business model was a product of the actors spotting a new opportunity and using their innovative minds to develop viable businesses. - While VT cannot replace traditional tourism in terms of travel satisfaction, it can be used as an alternative for tourists who have limitations for actual travel, whether from physical impediments, distance, financial constraints, or time.	- Tourists' experience of virtual tours are worth exploring for gaining insights into the prospect of this new form of industry and its potential development worldwide.
32	(Li, et al., 2023)	To investigate how tourism virtualization, specifically through the utilization of a VR system called The Panoramic Palace	- Experiment (211) - 360-degree interactive photography. - Surveys (211): before and after the experiment. - CFA	- Tourism service providers could promote their tour packages by using tour videos or VR systems to virtually experience the destinations.	- Tourism service providers should strive to improve the values of these two constructs, leading to higher travel intention and more sales of tour packages.

		Museum, influences consumers' experiences, and subsequently impacts the experiential value of VT.	- TPB		
33	(Hamid, et al., 2023)	To assess consumers' behavioural intentions regarding VT COVID -19 using the TPB.	- Survey (408) - TPB - BI	- Since VT is relatively a new concept in India, people are not much familiar with it and might believe that it will not give an authentic experience of travel, which could be the possible reason for this insignificant outcome. - SN significantly and positively influences BI of experiencing VT during COVID-19. It shows the strongest influence on BI among other variables. - The possible reason for the insignificant relationship between PBC and BI in this study could be that India is a developing country and not much technologically centric as compared to western developed nations. Therefore, people might have trust issues with the technology which could be the reason to restrict their behaviour towards VR-based tours. - PS is taken as the level of security that users feel when they intend to experience VT during COVID-19 both in terms of data security and physical security. - VT in any way cannot be a full-time replacement for on-site tourism activities, although it is a novel way to visit a location virtually for the purpose of entertainment, that can also be utilised in crisis times.	- To consider a larger sample size. - To consider both online and offline consumers. - The intention might not necessarily translated into to actual behaviour therefore future studies can include actual behaviour as a variable to get more detailed findings.
34	(Prodinger & Neuhofer, 2023)	To assess the initial impact of a mobile application designed to facilitate technology-enabled relationship	- Interviews (15)	- When having lunchbreak at the firm, the friends love to put on their VR glasses and immerse themselves into Paris repeatedly. - To enhance their throwback memories, the women order some croissants online, which they enjoy eating, while virtually immersing themselves into this beautiful French city once again.	- To exam never-ending tourism in relation to accessibility in specific tourism sectors (e.g. heritage, visitor attractions, museums).

		building in rural Lebanon.		- The attention shifted to one of the Metaverse' virtual spaces. They appreciate the "immersive experiences where you can find yourself within a story". Each space can be designed on its own. This is "where they got to know each other, different brands and other people even better". The places they travelled to virtually, "are spaces that someone else, maybe a metaverse designer from a destination, hotel, attraction or other brand created for them". - The virtual trips to Monaco did not "degrade their environmental footprint", aligning with their values for a sustainable life which is very important to them. They were able to "experience dangerous adventures in this virtual replication, challenges where they would not have been able to accomplish physically". While in reality, "visiting certain sights can come with barriers". - A strange feeling of familiarity acquired while actually never having been there physically before.	- To research new tourism business models that focus on closing the loop between the post-travel stage and the next pre-travel stage are of interest to understand how long-term customer engagement, relationship and brand loyalty can be successfully maintained in the virtual space.
35	(Thai, et al., 2023)	To investigate sentiment analysis techniques in the context of YouTube videos related to VR travel, particularly comparing 360-degree and unidirectional videos.	- Reviews analysis (4000) - 360-degree videos (3), unidirectional videos (3)	- Proportion of viewers who have neutral opinions when watching 360 videos appears to be higher than that of unidirectional videos. - The unidirectional video garnered more positive sentiments than the 360-degree videos. - 360-degree videos, to some extent, appeal to viewers but apparently do not have a significant influence on the viewers when compared with unidirectional videos.	- Tourism marketers and planners capitalize on text-mining technologies such as SenticNet7 and analyse tourist sentiments. - 360-degree videos can be compounded with VR capabilities to promote niche forms of tourism such as adventure, nature-based, and sports. - To deploy advanced NLP modelling techniques such as CNN-LSTM. - CNN and RF employed in

					sentiment analysis should be studied.
36	(Huang, et al., 2023)	To investigate the impact of VT audio-visual conditions and environmental temperature within the context of the Metaverse.	- Experiment (180), divided in 3 groups. - Survey (180)	- Temperature condition has a significant effect on the participants' travel experience such as temperature comfort. - Higher environmental temperature evoked higher thermal sensation, body temperature, heart rate, pulse rate, and SPO2, while higher environmental temperature intrigued lower blood pressure - Lower environmental temperature, evoked the worst temperature comfort, and mid-environmental temperature elicit the best temperature comfort. - Audio conditions of VT only have the main effect on participants' thermal sensation, part of the physiological sensation (SPO2), and temperature comfort. - No significant differences were identified in body temperature, blood pressure, heart rate, pulse rate, and respiratory rate. - When traveling under the natural sounds condition of VT, participants have lower SPO2 and are expected to perceive cooler thermal sensation and better temperature comfort. - Visual conditions of VT only had a main effect on participants' thermal sensation, part of the physiological sensation (Respiratory rate), and temperature comfort. - There are no significant differences were identified in body temperature, blood pressure, heart rate, pulse rate, and SPO2. - When traveling under the outdoor condition of VT, participants have a lower respiratory rate and are expected to perceive cooler thermal sensation and better temperature comfort. - Environmental temperature interacted with audio situation to influence thermal sensation. - The interaction between audio situation and visual situation also significantly influences thermal	- To explore the tourists' temperature comfort in the extreme environmental temperature. - To conduct group comparison experiments according to age, physical condition, and region. - To consider other aspects of spatial contexts such as environmental colour and population intensity.

				sensation. - Environmental temperature interacted with the visual situation to influence thermal sensation. - Psychological response thermal sensation did not show a significant mediating effect between all three independent variables and temperature comfort.	
37	(Bilinska, et al., 2023)	To investigate the sustainability and evolution of the new trend of online tourism that gained popularity during the COVID-19 pandemic, especially in the context of Generation Z.	- Interviews (380) group and individual, targeting Gen Z	- People feel pandemic fatigue and the need to return to traditional forms of travel. - They would still use VT but for planning the trip. - Using VT to compensate lack of traveling in real life. - VT does not pose a threat to the tourism industry, since they cannot imagine replacing a real journey with virtual one.	- To conduct further empirical research related to the issues raised in other countries.
38	(Blaer, 2023)	To investigate an innovative campaign adopted by a nature-based wildlife tourism operator in response to the COVID-19 lockdowns and travel restrictions of 2020/21.	- Interviews (2) with managers - Survey (590) - Reviews analysis: - 114 YouTube video posts (62,495 comments); - 111 Facebook Live video posts (10,780 comments).	- Helping viewers cope with lockdown isolation, especially for those suffering from extreme loneliness, depression, and anxiety due to the pandemic. - For some, physical travel was not possible for a variety of reasons and the interactive webcam livestream provided a vicarious experience through telepresence. - The webcam livestream provided a sense of connection with the outside world, especially nature and wildlife, as well as a reminiscence of pre-COVID times with people reflecting on past travels. - The most prominent subject was that a sense of community was generated with other viewers. - The webcam travel can contribute to psychological wellbeing amongst online viewers. - Viewers reported wanting to visit the Penguin Parade to meet and thank the hosts.	- Regarding the content, timing and style of interpretation regarding interactive webcam travel as well as virtual travel experiences more broadly.
39	(Yu, et al.,	To investigate the utilization	- Interviews (12) with	- It is possible to overcome traditional tourism's limitations: older adults can	- To expand the scope of the

	2023)	of VR and AR in VT to address challenges and limitations within the senior tourism market.	expert group. - Survey (412) with elderly.	participate more actively in society when they experience VT using VR and their quality of life improves. - Older adults are aware of various advantages and pleasures when they experience tourism using VR/AR, and this creates a willingness to experience tourism products using VR/AR again. - Tourism practitioners should develop and offer tourism products targeting easy and comfortable enjoyment for older adults by accurately employing the properties of VR/AR.	research, considering the limitations of this study. - To offer meaningful investigations into the topic by study VR and AR separetaly.
40	(Zhang, et al., 2023)	To explore the psychological recovery effects of VT on individuals.	- Experiment (70) - ART and SRT	The key findings: - Mood (Pm) Changes: Forest-oriented: 62 participants had an increased Pm. Lake-oriented: 56 participants showed an increased Pm. Grassland-oriented: 60 participants experienced an increased Pm. Desert-oriented: 61 participants had an increased Pm. No significant gender effect on Pm changes in the forest, grassland, and desert attractions. Gender had a significant effect on Pm changes in the lake-oriented attraction. - Pleasure (Pa) Changes: Forest-oriented: 60 participants' Pa increased. Lake-oriented: 61 participants' Pa increased. Grassland-oriented: 59 participants' Pa increased. Desert-oriented: 48 participants' Pa increased. No consistent significance based on gender for Pa changes. - Positive Affect (PA) Changes: Forest-oriented: 62 participants' PA increased. Lake-oriented: 64 participants' PA increased. Grassland-oriented: 60 participants' PA increased. Desert-oriented: 44 participants' PA increased. Gender had little significance in PA changes.	- Experimental conditions should be controlled more strictly, and the number of participants should be increased. - The measurement of participants' physiological indicators is essential, and the number of psychological and physiological indicators should be increased. - A comparative study can be conducted to determine the psychological recovery effects of 3D VT with real scenes, such as comparing the psychological recovery effects among natural environments, VR environments, and 3D VT with real scenes, or comparing the psychological recovery effects between urban VE

				- Negative Affect (NA) Changes: Forest-oriented: 58 participants' NA declined. Lake-oriented: 45 participants' NA decreased. Grassland-oriented: 59 participants' NA decreased. Desert-oriented: 51 participants' NA decreased. Gender was minimally significant to changes in NA. - Effectiveness of Virtual Attractions: Grassland-oriented VT worked best in increasing Pm and reducing NA. Lake-oriented VT promoted Pa and PA the most, lifting people's spirits. A 10-minute VT experience significantly increased Pa and Pm, along with increasing PA and decreasing NA. Studies suggested that even a 5-minute stay in a VR forest environment can enhance subjective activation, mood, and resilience. - VT, even in short durations, significantly improved participants' psychological states without the need to leave their physical space. - The results emphasize the potential of VT in positively influencing individuals' emotional well-being and suggest specific preferences for different VE.	and natural VE. - Attention should be paid to the impact of VT as a marketing tool on tourism destinations and its contribution to literal tourism.
41	(Ji, et al., 2023)	To explore the social education mechanism of VT in the context of cultural heritage, using the Forbidden City as a case study.	- Case study. - Survey (108 as test) and (620). - CFA - Involvement Theory	- VT involvement positively affects place imagination, experience memory, affective attachment. - Place imagination positively affects experience memory, affective attachment. - Place imagination partially mediates the relationship between VT involvement and affective attachment and between VT involvement and experience memory. - Experience memory positively affects affective attachment. - Experience memory partially mediates the relationship between VT involvement and affective attachment and between place imagination and	- Offline surveys could be conducted to obtain more diverse perspectives in the future. - Other variables could be introduced into the model, such as flow experience and satisfaction with VR. - Additional variables might help deepen and refine this research

				affective attachment. - Affective attachment positively affects society education. - Past experience has a nonlinear moderating effect on the relational structure of VT involvement to place imagination. The impact of VT involvement on place imagination is slightly stronger for the group without past experience, while the influence of VT involvement on place imagination is slightly weaker for the group with past experience. - Past experience has a nonlinear moderating effect on the relational structure of VT involvement to experience memory. The impact of VT involvement on the experience memory of the group without past experience is slightly stronger, while the impact of VT involvement on the experience memory of the group with past experience is slightly weaker. - Past experience has a nonlinear moderating effect on the relational structure of VT involvement to affective attachment. The impact of VT involvement on the affective attachment of the group without past experience is slightly weaker, while the impact of VT involvement on the affective attachment of the group with past experience is slightly greater.	field, such as the frequency of participation in VT.
42	(Wang, et al., 2023)	To investigate the characteristics of visitor experiences in museum tourism when utilizing VR, with a focus on world-famous paintings, specifically Vincent van Gogh's "The Starry Night" and Claude Monet's	- Three Experiments (100) - Photographic group vs VR group - Survey (272) - Flow Theory - SOR	- Compared with the photographic group, the VR group's novel experience stimulated the subjects' positive emotions and attitudes. It affected their acceptance of the technology, producing a stronger intention to use VR. - Flow experience plays a mediating role in the influence of display methods on the intention to use VR. - Familiarity with VR generally had a moderating effect on the mediating effect of flow experience but not the main effect. - The interaction effect between familiarity with VR and display methods was not significant at the 5% level and the moderating effect was	- This finding may inspire tourism practitioners to promote products with such emerging technologies to people unfamiliar with the new technologies to achieve greater visitor satisfaction. - Museum managers should actively embrace and apply new technologies such as VR.

		"Water Lilies."		insignificant. - It is easier for tourists with low familiarity with VR to achieve a balance of skills and challenges, which leads to a higher level of flow experience and a stronger intention to use VR. - The display methods for museum exhibits significantly affects intention to use VR. Compared with the traditional photographic displays, people had stronger intention to use VR. - Compared with the photographic group, visitors in the VR group are more likely to enter the state of personal skills equal to the required challenges, namely, flow experience, and further generate a stronger willingness to use VR. - Those with low familiarity with VR experienced a more significant impact on intention to use VR through flow experience than people with high familiarity with VR.	- To subdivide the display method category into more specific factors to capture direct and detailed influences on usage intentions. - To extending the study to include various experimental materials like sculptures and ancient architecture to enhance the generalizability of the findings. - To expand the scope beyond the current focus on display methods and flow experience. - To investigate other factors that could influence users' attitudes and behaviours related to VR usage in a museum context. - To explore personal experiences in real museum settings. - To investigate the museum tourism experience using traditional VR devices.
43	(Pashaie & Peric, 2023)	To explore the future of sports tourism considering the COVID-19 pandemic and provides an alternative paradigm model.	- Interviews (13) with sport experts. - GT	- The results of the interview suggest that the problem of COVID-19 will be resolved, and the world will gradually return to normal. - Physical tourism develops and acquires the features of virtual. - VT can trigger visitation of destinations and has benefits for tourists. - VT uses immersive technologies and	- This finding may inspire tourism practitioners to promote products with such emerging technologies to people unfamiliar with the new technologies to achieve greater

				can provide experiences of existing and non-existent destinations.	visitor satisfaction. - Museum managers should actively embrace and apply new technologies such as VR. - The perspective of other stakeholders such as sports tourism practitioners and sports tourists themselves might contribute to a better understanding of future sports tourism and increase the generalizability of this study's findings. - To use quantitative approach in nature in define individual constructs and examine the relationships between them. - Analyzing the well-being, health and safety of sports tourists and employees in order to see how these concepts fit within the new paradigm model. - To investigate sports tourists' actual expectations and needs regarding sports tourism, including whether sports tourism can reduce the mental and psychological

					consequences of a crisis like COVID-19. - To focus on particular type of sports, providing more specific insights and recommendations.
44	(Sousa, et al., 2023)	To investigate the impact of the COVID-19 health crisis on the intention of tourism industry managers to adopt VR technology in the post-pandemic period.	- Survey (15) with professionals in tourism. - TOE	- The willingness to invest in technology is one of the main determinants of adoption intention, as the willingness to invest in technology in the work context is the issue that most influences managers' intention to adopt VR in their companies. - The intention to adopt VR is strongly influenced by managers who consider VR a business strategy. - The presence study highlights the importance of managers' perceptions of the impact of COVID-19 on the adoption of VR, which is explained by the need for an alternative way for promotion. - Previous experience with VR has a significant effect on users' intention to adopt the technology. - Providing adequate technical support can be an effective strategy to promote VR adoption. - The greater the effect of the COVID-19 pandemic the greater the intention to adopt VR. The fear of the similar crisis makes managers adopt VR. - It is necessary to consider other factors that may influence VR adoption, such as the availability of technology, the costs associated with adoption, and users' level of knowledge and experience. - It is important to consider the role of education and training in VR adoption since many users may not be familiar with the technology.	- To conduct studies with more diverse samples in different sectors and contexts to increase the generalizability of the results. - To use other data sources besides participants' self-reports to assess effective VR adoption behaviour. - To conduct studies that investigate the factors that influence effective VR adoption after the intention is formed. - To investigate the actual adoption behaviour of the technology to better understand the factors that affect users' decision to adopt or not adopt the technology. - To investigate the factors that influence the actual adoption of VR after adoption intention is formed since intention does not always translate

					into behaviour. - To consider other factors that may influence VR adoption, such as the availability of technology, the costs associated with adoption, and users' level of knowledge and experience. - To consider the role of education and training in VR adoption since many users may not be familiar with the technology.
45	(Polishchuk, et al., 2023)	To explore VT as a distinctive category within the broader tourism industry, focusing on the potential future developments and the integration of VT.	- Focus-group interview (5) - Survey (243)	- The participants expressed interest in trying VT and identified effective marketing as a key factor for its popularity. - Significant portion of respondents were unfamiliar with VR, and only a small percentage had tried it. - Participants demonstrated awareness of the potential advantages of VT, such as safety within simulations, sustainability, and inclusiveness for those with health or legal constraints. - The majority of respondents were willing to try VT, but skepticism and concerns about the technological aspects persisted. - The study highlighted the cautiousness of consumers towards VT as a new form of tourism, emphasizing the need for further technological development and effective marketing to increase its adoption. - The general openness to experimentation with VT, recognizing its potential benefits while acknowledging the current limitations of technology. - VT can offer a distinctive and accessible alternative to physical tourism, particularly for individuals encountering physical or financial	- To involve a larger sample size comprising respondents from diverse backgrounds and encompassing both experienced and inexperienced individuals in VT to facilitate a comprehensive analysis of discrepancies. - The viewpoints of local governments on VT, including potential restrictions or regulations they may wish to enforce, as well as exploring avenues for collaboration between VT and government representatives. - To examine the potential impact of VT on the tourism industry and reveal

				constraints.	the best-suited technological equipment.
46	(Oppert, et al., 2023)	To understand how independent-living older adults experience social isolation and loneliness and to explore whether virtual tour digital technology could enhance their social connectedness.	- Individual Interview (9). - Group experience: - semi-immersive VR (HMD) (4); - non-immersive VR (tablet) (5). - Individual experience: - semi-immersive VR (HMD) (3); - non-immersive VR (tablet) (5). - individual interview (9)	- During the group experience, hearing others' voices through the devices was an issue for both VR and tablet groups, with in-ear speaker buds providing little help. This was somewhat improved when the participants experienced the independent virtual tour in their homes, as it was quieter and without the background noise. - Existing fears: technophobia, no trust in social platforms, fear being hacked and computer viruses, sometimes it is not technology but people on the other side, gaps in knowledge how to use technology. - A potential benefit could be to aged care workers through providing larger scale lifestyle support offerings and therefore providing the workers with more time to practice other duties such as attending activities of daily living or person-centred care.	- To use larger culturally and linguistically diverse population to represent First Peoples and the 37% of older Australians born overseas, particularly considering the desire to revisit places they may have visited before. - To include younger-older populations who have been exposed to more digital technology to understand if this will enhance imagination and uptake. - To apply simplicity to platforms to enhance ease of use to encourage continued use, such as connecting to a familiar social networking platform and assessing the preference of devices.
47	(Kim & Kang, 2023)	To investigate and analyze the user experiences of VR tourism, specifically through HMDs, across different age groups.	- Experiment: (20) elderly and (17) younger people. - Semi-immersive VR (HMD). - Observation. - Interviews	- Older adults perceived temporal involvement the most, with realistic immersion and spatial involvement second and third, respectively. - Younger adults perceived realistic immersion the most, followed by spatial involvement and temporal involvement in descending order. - Older adults felt a stronger sense of temporal involvement and realistic	- To consider using various VR tourism contents, including places that are unfamiliar to participants. - To experiment with a variety of different videos to improve the

			(37)	immersion than younger adults. - There was no significant difference in spatial involvement between the groups. - Older adults expressed less agreement with the item than younger adults. - The tendency of older adults not to move their heads or bodies to the point that they could feel that some scenes were shot in the water or the sky. - Older adults perceived the highest sense for aesthetic, followed by entertainment, escapism, and education, in descending order. - Among younger adults, entertainment had the highest value, followed by aesthetic, escapism, and education. - Education did not show significant difference. - Presence had a certain impact on the experiential values for both groups, with more impact in the group of younger adults. - Presence was found that the group with no previous experience of VR had a higher sense of temporal involvement than those with experience, but not other aspects of presence. - The group with no previous experience of VR experienced a higher sense of entertainment and escapism. - Younger adults tended to be less vocal and instead, many of them began to move their bodies and heads more frequently and actively than the older adults, because they are more flexible, more familiar with VR and know that they can check around 360 degrees. - Older adults were immerged too much and didn't control their vocal expressions	validity of forthcoming studies. - The length of the clip could be also varied to explore users' experiences more accurately. - To increase the number and characteristics of the participants. - To consider the viewpoints of different population groups including a range of socioeconomic and racial backgrounds. - To take into account users' perceptions of the technological aspects of VR devices, including variables such as system quality, user interface quality, and ease of use.
48	(Nam, et al., 2023)	To investigate the factors that influence satisfaction with VR.	- Survey (254) - PLS-SEM	- There is positive relationship of system quality with both with enjoyment and usefulness of information. - Presence has a positive relationship only with enjoyment and no relationship was found with usefulness of information, this implies that the perception of presence is less important to VR users in terms of satisfaction for	- The role of enjoyment could be exaggerated and should be considered. - To consider further investigation of object-related authenticity in VR

				those who use VR to obtain information on a destination. - When the users enjoy the VR content, presence is an important factor affecting the quality of using VR. - Results confirm that enjoyment and usefulness of information are two different dimensions of using VR because they are affected by different factors. - Authenticity has the highest explanatory power of the three factors. - Results indicate that familiarity negatively moderates the relationship between enjoyment and satisfaction while it does not moderate the relationship from usefulness of information to satisfaction. - When people watch VR content on a destination, they are familiar with, their satisfaction decreases, but the VR content is still useful to obtain information about the destination regardless of familiarity.	research to understand its role and impact more thoroughly, particularly considering the impact of digital twins. - To consider replicating this study at non-heritage sites. - To consider how the nature of the depicted site can affect the determinants of satisfaction with VR systems.
49	(Ouerghemmi, et al., 2023)	To investigate the impact of rich media, particularly VR, on visit intentions for a specific tourist destination.	- Interview (34) - CFA and EFA	- Participants felt like they are in a real place. - They felt immersed into VR, they were feeling disconnected from real world. - They felt being present at the virtual destination. - The emergence of a significant direct effect between telepresence and actual visit intention while controlling the mediating variables was indicated. - Mental imagery and attitude have a direct and positive effect on actual visit intention. - The indirect effect through attitude and mental imagery is also significant. - The direct effect of telepresence on visit intentions in the presence of mediating variables is significant, suggesting a partial mediation of mental imagery and attitude. - Telepresence has a positive impact on mental imagery. - The feeling of telepresence resulting from the VR tour experience positively affects tourists' attitudes towards the	- Tourism professionals must go beyond the traditional model of presenting tourism products (e.g., 2D images, descriptive posters) and adopt VR devices to create an immersive virtual visit experience that is differentiated and original to arouse the feeling of belonging to the virtual world and generate favourable emotional, attitudinal, and behavioural responses. -the role of enjoyment could be exaggerated and

				destination. - There is a positive effect of mental imagery and attitudes towards the tourist destination on tourists' actual visit intention. - Telepresence exerts a direct and positive effect on the actual visit intention of potential tourists, which means that VR plays an important role in generating favourable visit and travel intentions. - The effect of telepresence on actual visit intention can be manifested by tourists creating realistic mental images. - A positive indirect effect of telepresence on actual visit intention was found through attitudes towards the tourist destination.	should, therefore, be considered in future studies. - To consider further investigation of object-related authenticity in VR research to understand its role and impact more thoroughly, particularly considering the impact of digital twins. - To consider replicating this study at non-heritage sites to consider how the nature of the depicted site can affect the determinants of satisfaction with VR systems.
50	(Zeqiri, 2023)	To quantitatively examine whether VT was perceived as a substitute for physical tourism during the COVID-19 lockdown in Kosovo.	- Survey (674)	- Authentic experience, enjoyment, and flow experience are crucial for enhanced VT experience. Some VT experiences are not perceived as authentic or enjoyable because of their poor quality. In some cases, only physical tourism provides authenticity and enjoyment. - Authentic experience in VT affects perception of VT as a substitute for physical tourism. - Since authenticity increases the intensity of use of VT, this means that people are more likely to consider VT as a substitute for physical tourism. - The intensity of use of VT increases if people consider it to be a substitute for physical tourism. - Enjoyment of VT increases the flow experience. - People have different levels of enjoyment for different experiences. The more they enjoy the virtual	- To extend this model to other, especially Balkan countries, to check for differences in the use of VT. - Consideration of other aspects would provide a better understanding of consumer behaviour in the context of VT. - To analyze the use of VT in other circumstances and how in a post-COVID-19 world. - To employ MR to understand consumer behaviour in different events by

				experience, the more they will be involved in VT. - VT seems to be linked less to skills and more to consumers' profiles and perception of the services provided. - It is assumed that the more digitally skilled individuals were more able to work from home during COVID-19, while less skilled individuals had more time to consume entertainment VT activities. - VT products and services are less sophisticated and are customized to allow anyone to access them. - Most of the surveyed people were young. The youth have continuous access to the internet and online activities, and they have the basic skills to use VT activities.	extending the current study's model.
51	(Bilynets, et al., 2023)	To investigate the factors influencing end-users' adoption, participation, and readiness to pay for VT experiences.	- Survey (656)	- Among those who were offered a VT experience for 0.5 EUR that was to be deducted from their survey rewards, 33% agreed to pay and participate. - Of those offered an experience for free, 83% chose to participate. - EE and previous experience with technology, the traditional technology acceptance constructs, did not have an expected effect on the user's intention to use VT. - VT is not seen as a substitute for actual travel. - Even a small payment for virtual experiences significantly reduces actual participation. - The potential to sell purely virtual experiences may be viewed with some scepticism since people are used to free virtual products.	- It is crucial to measure actual behaviour to avoid drawing conclusions based on the results of self-report studies, which have considerable validity limitations. - A real VT provider could use more advanced virtual experiences that could bring different results. - To explore whether VT is perceived as a replacement or addition to real tourism or as a substitute for other virtual experiences such as playing VR games.
52	(Liu, et al., 2023)	To investigate tourist behaviour in VT during the COVID-19	- Survey (217) - TPB - BI	- VT could help the T&H industries in times of crisis to improve customer satisfaction with new technologies and generate destination attraction. - The manager and stakeholders in the	- To extend the observation methods to understand tourist behaviour better

		pandemic using the framework of TPB and behaviour intention.		tourism sector can provide the infrastructure of VT as a strategy for marketing tourism destinations.	when using VT. - To compare tourist behaviour in in developed and developing countries.

8.4 Appendix 4: Acknowledgments

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