Can the Metaverse and its Associated Digital Tools and Technologies Provide an Opportunity for Destinations to Address the Vulnerability of Overtourism?

Nansy Kouroupi (p), Theodoros Metaxas
Department of Economics, University of Thessaly, 38333 Volos, Greece

Abstract
Overtourism has become a critical problem in many popular destinations around the world, leading to negative impacts on the environment, local communities, and the quality of the visitor experience. This article explores the potential of the metaverse, a virtual world that combines elements of augmented reality and virtual reality, and other new digital technologies for addressing the challenges of overtourism. Drawing on a systematic literature review of recent studies, the currently available technologies are listed, and their potential implications for the tourism industry and local communities are portrayed. It was found that while there is some evidence to suggest that the metaverse and its associated digital technologies such as the extended realities/XR (virtual reality/VR, augmented reality/AR, mixed reality/MR), can help mitigate overtourism, further research is necessary to investigate their effectiveness in reducing overtourism and their potential unintended consequences. This article makes an original contribution to overtourism research and adds to existing knowledge by providing a practical list of currently available technologies that could help DMOs and tourism professionals mitigate the negative effects of overtourism. The article concludes with suggestions for future research and practice in the field, highlighting the importance of continued exploration and innovation in this area.

Keywords: *overtourism; metaverse; digital transformation; sustainability; destination management; tourism development*

1. Introduction

Tourism is a major economic sector that has experienced unprecedented growth in recent decades. However, this growth has also led to negative impacts on the environment, culture, and society in many destinations. Overtourism, which refers to the situation where the number of tourists exceeds the carrying capacity of a destination, has become a pressing issue in many parts of the world [1]. The COVID-19 pandemic has affected and changed consumers' behaviour [2], minimising the problem as temporary restrictions and health concerns have reduced tourist flows to some destinations while exposing the vulnerabilities of tourism-dependent economies [3]. In this context, new digital technologies and the metaverse have emerged as potential solutions to address the challenges of overtourism and create new opportunities for destinations [4,5]. The metaverse and new digital technologies are here to stay and to change from the ground up the way we think, experience, remember, and share our vacations and trips [6]. New technologies that are used a lot in gaming right now will most probably be used soon in other fields, like tourism.

This paper was published on Tour. Hosp. 2023, 4(2), 355-373; https://doi.org/10.3390/tourhosp4020022 and will be presented on the 62th ERSA Congress in Alicante, Spain, 28-31 August 2023.
Theme G36: Tourism and Overtourism Issues. Please contact presenter author at akouroupi@uth.gr

The focus of this paper is on investigating how digital transformation can be used by the tourism industry to address overtourism vulnerability and promote destination sustainability. In particular, the article will examine the impact of the metaverse and new digital technologies on the travel and tourism industries, with a view to determining their potential for mitigating destinations' overtourism vulnerability. This article responds to the following research question (RQ): *How and what kind of digital technologies address overtourism issues?*

By addressing this research question, the article aims to provide valuable insights into how destinations can leverage digital tools and technologies to manage tourist flows more effectively while promoting sustainable tourism practices. It is proposed that destination management could use some of the new emerging technologies to ease the burden of overtourism for the world's most popular (or most overexploited) destinations, promoting their sustainability, preservation, and long-term viability. The paper's contribution is to provide an analysis of the existing literature on tourism-related aspects of the metaverse and new digital technologies that could correlate with overtourism. Consequently, some of the various digital tools, methods, and technologies that can be applied to address overtourism are discussed, and their applications and opportunities for destinations are portrayed.

2. Theoretical Background

2.1. Overtourism Phenomenon

As demonstrated by various studies [7,8,9], overtourism is a pressing issue that has detrimental effects on both the environment and local communities. When destinations become too popular and exceed their carrying capacity, it can lead to overcrowding, cultural commodification, and social and economic imbalances [10,11,12]. To combat the negative consequences of overtourism, sustainable tourism practices must be implemented to ensure that destinations can accommodate visitors in a responsible manner [8]. Overtourism has emerged as a significant debate issue in many well-known tourist destinations around the world in recent years. The results of a study by the activist travel company Responsible Travel indicate that 98 locations spread across 63 countries are struggling because of high visitor numbers [13].

One trend that has emerged in the literature regarding overtourism is the need for a more nuanced understanding of overtourism. Scholars have argued that overtourism is a complex and multifaceted phenomenon that cannot simply be reduced to issues of overcrowding and environmental degradation [10,11,12]. The impacts of overtourism can be even more wide-ranging and can include damage to cultural heritage sites, depletion of natural resources, commodification of culture, deterioration of the built environment, and social and economic imbalances [7,8,10,14]. Researchers have identified several key factors that contribute to overtourism, including the growth of low-cost air travel, the rise of online booking platforms, the "touristification of housing", and the increasing popularity of sharing economy services [14,15,16,17]. It is therefore crucial that academics and practitioners adopt a more holistic approach to understanding the various social, economic, and cultural factors that contribute to the phenomenon of overtourism.

Another trend that has emerged in the literature is the importance of community involvement in addressing overtourism. Scholars have argued that local communities have a critical role to play in addressing overtourism, since they are often the most directly impacted by the negative consequences of mass tourism [8,16,18,19]. Therefore, it is essential that tourism planners and policymakers engage with local communities to develop solutions that are mutually beneficial and sustainable [19,20].

Finally, an emerging trend in the literature is the need for more innovative and sustainable tourism practices. Scholars have argued that traditional tourism models based on mass tourism and high-volume, low-value tourism are not sustainable in the long term [21,22,23]. In this regard, some destinations have implemented measures to limit the number of tourists, while others have focused on promoting ecotourism, responsible tourism, cultural tourism, and community-based tourism [14,16,24,25]. All these efforts are aimed at ensuring that tourism is managed in a way that benefits both tourists and local communities while being environmentally and socially sustainable. Additionally, these models embrace principles of sustainability and are more aligned with the values of contemporary tourists who seek authentic, meaningful, and sustainable travel experiences [26,27].

2.2. Destination Management

Destination management has been an important subject in the field of tourism studies, and there have been a number of noteworthy trends in the literature over the past few years.

One trend that has emerged is the importance of destination governance for effective destination management. Scholars have argued that collaborative governance structures that involve local people and stakeholders from multiple sectors and levels of government are critical for sustainable destination management [11,12,21,22]. Another trend in the literature is the need for destination management to be grounded in a solid understanding of the destination's unique characteristics and competitive advantages [22,23,27]. This requires a thorough analysis of the destination's resources, attractions, and visitor profiles, as well as a strategic approach to product and service development.

Finally, there has been an increasing emphasis on the role of technology in destination management. In order to succeed in the new digital era, destinations will need to comprehend their visitors' preferences and sustainably offer them an interconnected and seamless brand experience [6]. This includes the use of data analytics, artificial intelligence, blockchain, and digital platforms to enhance visitor experiences, improve destination marketing, and monitor and mitigate visitor impacts. Scholars have pointed out that these technologies are expected to cause significant changes in how tourism is experienced as well as how destinations are managed [28,29,30]. Destination managers should also be open to embracing these technologies in order to remain competitive in the industry [30]. In fact, Buhalis [30] suggests that the use of such technologies will become a determining factor for competitiveness within the tourism ecosystem. However, scholars caution that technology should be used in ways that are compatible with the destination's cultural and environmental values and should not undermine the authenticity of the destination experience and the human touch [25,26,27]. Additionally, it is crucial to ensure that these technologies do not exacerbate existing inequalities and are accessible to all.

2.3. Metaverse Environment

The metaverse is a concept that has gained significant attention in recent years. It refers to a virtual shared space that is created by the convergence of various physical and virtual environments [31,32]. This environment allows users to interact with each other and with computer-generated elements in real-time [32]. With the help of augmented and virtual reality technologies, the metaverse can expand the physical world and allow people to interact naturally using avatars and holograms [30]. It is an exciting area of research that has the potential to revolutionise how people interact with each other and their surroundings.

The emergence of the metaverse is a result of the convergence of technological advancements and societal changes [33]. As highlighted by Dwivedi [30], the COVID-19 pandemic has accelerated this trend, leading to increased interest from investors and

speculation that the metaverse may be the next frontier in internet development. As such, it is crucial to understand the potential implications and opportunities that arise from this phenomenon.

The transition from the current Internet to the metaverse is being driven by several enabling technologies, including artificial intelligence, blockchain, computer vision, IoT and robotics, edge and cloud computing, user interactivity, and immersive technologies such as virtual reality and augmented reality [32,33,34,35]. These technologies are currently being used in various digital activities that offer insights into user expectations and emergent metaverses [34,35,36]. For instance, platforms such as TikTok, Google Arts & Cultures, Twitch, and Minecraft provide mixed reality settings that can be compared to those found in metaverses [36].

The metaverse, the "post-reality universe" that is expected to reach maturity in 2030, holds significant potential for transforming the way individuals and brands interact with each other [32,36]. According to Gartner [37], by 2026, a quarter of people will spend at least an hour per day in the metaverse, engaging in a range of activities such as work, shopping, education, entertainment, and socialising. This suggests that the metaverse is poised to become a major force in shaping the future of human experiences across various domains. Further research is needed to explore how tourism and different industries can leverage this new platform to enhance their operations and engage with consumers in novel ways.

2.4. Tourism-Related Digital Tools and Technologies

To combat the negative effects of overtourism, the tourism industry is crucial to recognise the significance of adopting new technologies, tools, and applications [28,30,38,39]. By keeping abreast of these developments, the tourism sector can provide personalised and sustainable customer experiences while simultaneously contributing to a stronger and more sustainable industry, mitigating the burden of overtourism [6,20,40,41,42]. The tools and technologies that could be utilised in this direction, and are strongly associated to metaverse, are listed below.

2.4.1. Extended Realities/XR (Virtual Reality/VR, Augmented Reality/AR, Mixed Reality/MR)

Extended reality (XR) technologies are a set of technologies that combine real and virtual environments to create immersive, interactive experiences [43,44,45]. XR technologies include virtual reality (VR), augmented reality (AR), and mixed reality (MR). VR is a technology that creates a completely simulated environment that replaces the real world, whereas AR overlays virtual objects onto the real-world environment. MR is a combination of VR and AR, allowing the user to interact with both the virtual and real-world environments simultaneously [40,43,44,45]. These technologies have been used in a variety of industries, including tourism, entertainment, education, healthcare, and retail, since they have proven to be effective in enhancing learning experiences, improving productivity, and providing unique marketing opportunities [40,43,44,45,46,47,48,49,50]. As XR technologies continue to advance, their potential to revolutionize the way we interact with the world around us is becoming increasingly apparent.

The rapid development of XR technologies has the potential to revolutionise tourism by offering visitors immersive and interactive experiences while they are not physically present in the same location [48,49]. Several research findings [6,34,35,40,51] suggest that augmented reality (AR) has the potential to revolutionise the tourism industry by enhancing visitor experiences with immersive and stimulating content. By incorporating cutting-edge technologies such as virtual reality and augmented reality, it may be possible to offer tourists

an alternative way to explore destinations without negatively impacting local communities or depleting natural resources [27,40,52].

In fact, with the increasing accessibility of AR on mobile devices, smart destinations are utilising this technology to enhance sustainability [53], while at the same time creating new visitor experiences and building communities in the metaverse era [52]. VR and AR technologies have allowed destinations to create engaging and interactive experiences that were previously impossible [40,54]. This could not only lead to a more memorable travel experience but also help alleviate issues such as overtourism in popular destinations during peak periods. As such, it is likely that we will see continued growth in the use of immersive technologies in the tourism industry in the coming years.

A study by Hopf et al. [55] explored the potential of virtual reality (VR) and augmented reality (AR) technologies to offer immersive and sustainable tourism experiences. The study suggested that these technologies could be used to create virtual replicas of destinations, allowing tourists to experience a destination without physically visiting it and, in this way, reducing the tourist crowds visiting them [55].

It is clear that the integration of XR technologies into cultural sites, such as museums and cathedrals, has a significant impact on the preservation and accessibility of historical artefacts [25,45,56,57,58,59], which are challenged by overtourism. These immersive technologies provide a means for individuals to explore and experience these sites from anywhere in the world, creating a virtual reality that is indistinguishable from reality [45,54,54]. In addition to physical restoration, the use of XR can enhance visitors' experiences by enabling them to access previously inaccessible areas and providing a profound sense of presence within historical structures [56,58]. As such, it is evident that these technologies have the potential to revolutionise the way we approach cultural preservation and visitor engagement at heritage sites, promoting their sustainability [25,45].

2.4.2. Artificial Intelligence (AI)

The use of AI in destination management will not only benefit the tourism industry but also have a positive impact on the environment [60]. By analysing data on tourist behaviour and preferences, destinations can make informed decisions about resource management and reduce their carbon footprint [21,61].

For example, they can identify peak periods of tourist activity and adjust their energy consumption accordingly. Additionally, AI-powered systems can help with waste management and water conservation, leading to a more sustainable tourism industry in the metaverse. As destinations become more conscious of their environmental impact, they will be able to attract eco-conscious travellers who are increasingly seeking sustainable tourism experiences [24].

Through the use of AI, destination managers could be able to effectively analyse large amounts of data to gain insights into tourist behaviour, traffic patterns, preferences, and environmental impacts [18,21,58]. This will allow destinations to identify vulnerable areas and create targeted strategies for sustainable tourism. Additionally, destinations could create more personalised experiences for visitors, who will "engage in a dynamic co-creation of experiences within the tourism business ecosystem" [30].

By utilising this data, destinations could also target specific parts of the market with their marketing efforts, ultimately leading to a more successful and sustainable tourism industry.

2.4.3. Digital Twins

Digital twins are virtual replicas of physical spaces, such as cities, buildings, and landmarks [62]. In tourism, they are being used to create virtual tourism experiences that

allow visitors to explore destinations before they visit in person, while additionally aiding in the preservation of historical sites and landmarks by creating their accurate digital replicas [38].

Frey [57] proposed the replication of heavily visited historical sites in nearby locations, enhanced with the use of advanced digital technologies such as holograms and digital twins, to make these cultural sites more appealing to tourists from all backgrounds. This approach not only helps to distribute the tourist flow and reduce overcrowding, but it also provides visitors with a more immersive and interactive experience. By incorporating cutting-edge technologies, tourists can engage with historical sites, events, and cultural practices in a more engaging and informative way [58,63].

This approach has already been successfully implemented in many famous museums around the world, such as the British Museum in London, the Pergamon Museum in Berlin, the Guggenheim Museum in New York, and the Hermitage Museum in St. Petersburg, among others. In addition, in China's Forbidden City, visitors can explore the ancient palace through a virtual reality experience, whereas Dubai has also created a digital twin of the city that allows visitors to explore its landmarks and attractions virtually.

The technology not only provides a preview of the destination but also helps in efficiently planning the trip [64]. As cultural tourism continues to grow in popularity, it is essential to explore innovative solutions that balance the needs of visitors with the preservation of cultural heritage sites [25,38].

2.4.4. Blockchain

Another technology that can help address overtourism is blockchain. It could offer a decentralised and secure communication system that facilitates direct interactions between tourists and local communities as well as transparent record-keeping of tourism transactions [21,38,41]. Blockchain can provide a framework for sustainable tourism by allowing tourists to engage directly with local communities and tourism providers while ensuring that all parties' benefits are properly documented [41].

Blockchain technology is being used to create decentralised tourism platforms that allow tourists to book travel services and experiences directly from local providers. These platforms can help promote more sustainable tourism practices [41] while also controlling visitor numbers and avoiding overtourism. Decentralised platforms could also provide a more authentic and personalised travel experience by connecting tourists with local hosts and promoting community-based tourism [18,23].

2.4.5. Internet of Things (IoT)

The Internet of Things is another technology that is likely to impact destination management. By connecting devices and sensors, the IoT can help destination managers monitor and optimise the use of resources such as energy and water [21,61,65]. It can also be used to create smart tourism experiences such as interactive exhibits, augmented reality tours, and virtual reality experiences [60,61,66]. The European Commission [67] highlighted the need for updated digital infrastructure as destinations "provide digitally enhanced tourism services and implement more digital business processes, or consider developing digital tourism services". This way, the targeted digital transformation of the tourism sector will move across the metaverse and unite destinations, businesses, and customers with digital experiences, services, and business processes in a seamless way. The integration of the internet of things and smart technologies in the tourism sector could be a valuable asset, offering innovative and sustainable solutions for efficient and effective management that can potentially address overtourism challenges [68]. With the emergence of smart applications,

services, and management techniques, there is great potential for the IoT to transform the way we approach evidence-based practice in tourism management [61].

IoT, together with blockchain, can assist in the management of tourist flows, enabling destination managers to better understand and predict patterns of movement and congestion. This information can be used to improve infrastructure and services, reducing the impact of tourism on local communities and the environment. Digitalization tools are already helping destinations improve their brand loyalty and engagement, as "smart tourism technologies and memorable tourism experiences play essential roles in enhancing tourist satisfaction and destination loyalty" [69]. The integration of these technologies has the potential to revolutionise the way we manage tourism, creating a more sustainable, overtourism-free, and enjoyable experience for both tourists and locals alike [27,64].

In conclusion, these tools and technologies have the potential to mitigate the negative impacts of overtourism by providing data-driven insights into tourist behaviour, facilitating stronger relationships between tourists and local communities, and creating immersive experiences. The adoption of these innovations can pave the way for a more sustainable future for the global tourism industry. However, it is important to ensure that the use of digital technologies does not completely replace physical tourism and negatively impact local economies that rely on tourism revenue. Studies highlighted the need for careful consideration of the environmental impact of virtual tourism experiences, as they still require significant energy and resources (data, storage, computing power, etc.) to create and maintain the requested experiences [4,70]. Therefore, a balance between physical and virtual tourism could be the best way to ensure sustainable tourism development.

3. Methodology

3.1. Research Strategy

The chosen research methodology for this study is a systematic review of the existing literature, using the PRISMA statement for literature reporting. This approach allows for a comprehensive and detailed examination of the available research on a particular subject, enabling the identification of patterns, discrepancies, and gaps in existing literature through a methodical search and analysis of all relevant studies. Grant and Booth [71] argue that this method can provide a more nuanced understanding of the topic being researched.

A critical literature review paper, according to Garrod [72], is a "self-contained academic work that seeks to review the literature on a specific subject or theme using a critical-thinking approach." In the case of this paper, a systematic literature review can assist in identifying areas that require further study. By analysing the existing literature, it is possible to identify knowledge gaps and areas with contradictory findings, thereby facilitating the identification of novel and significant research questions.

The systematic literature review is a crucial research methodology that ensures thorough and transparent analysis [72,73]. In order to ensure the validity and dependability of the review, Grant and Booth [71] stress the importance of adhering to a predefined protocol or plan that outlines evaluation criteria. This view is supported by Pollock and Berge [74], who assert that for an effective and exhaustive systematic review, it is essential to establish a clear protocol, identify relevant research, collect data, evaluate study quality, synthesise evidence, and interpret results. By following these essential steps, researchers can ensure that their systematic reviews are reliable and valuable contributions to their respective fields of study.

When a clear protocol is required for a systematic review, adherence to the PRISMA statement is highly recommended [75]. The use of PRISMA's standardized checklist ensures

that all necessary information is included, resulting in transparent and reproducible research, while also assisting in the identification of potential biases and limitations, thereby enhancing the study's quality and credibility [75,76,77].

Based on the abovementioned, through a systematic literature review, researchers can gather and analyse existing studies related to their topic of interest, identifying trends, gaps in knowledge, and potential areas for future research. This approach is particularly useful for policymakers and practitioners who require evidence-based information to inform their decision-making processes. By conducting a systematic review, they can be confident that they have considered all available evidence and have a comprehensive understanding of the current state of knowledge on their topic. Ultimately, this can help to ensure that resources are allocated effectively, leading to better outcomes for individuals and communities.

3.2. Materials

The present study is grounded in a rigorous selection of the literature that is deemed original and critical in its discussion of overtourism and new digital technologies, particularly the metaverse. Employing the systematic literature review method, the study examines recent works published between 2019 and 2023 as a means to capture the latest developments in this emerging field of tourism research. Given the growing interest in the metaverse and its potential impact on overtourism, this focus on the recent literature is particularly relevant to our research goals.

3.3. PRISMA

The PRISMA methodology, 2020 version, was used in this study. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement (henceforth referred to as PRISMA) is a reporting guideline intended to address inadequate reporting of systematic reviews [75]. The PRISMA statement includes a checklist of items recommended for reporting in systematic reviews, an "explanation and elaboration" paper that provides additional reporting guidance for each item, as well as reporting examples [75,76,77].

3.3.1. Eligibility Criteria

The authors decided to use the keywords "overtourism" OR "over-tourism" due to their ambiguity and wide use in the literature, excluding "over tourism" which does not refer to the subject. Additionally, AND "metaverse" OR "artificial intelligence, augmented reality, virtual reality, digital twins, digital transformation" keywords were used in order to indicate the connection to the remaining researched aspects. Moreover, the papers were limited based on their publication dates. Only the more contemporary works published between 2019 and 2023 were included in the sample. As can be seen in **Table 1** below, 260 potentially selectable contributions were identified within the selected databases, complying with the set eligibility criteria.

Table 1. Potentially selectable contributions.

Database	Search String	Years Range	Potentially Selectable Sources
GOOGLE SCHOLAR	"overtourism" OR "over-tourism" AND (metaverse, OR artificial OR intelligence, OR augmented OR reality, OR virtual OR reality, OR digital OR twins, OR digital OR transformation)	2019–2023	38 (as of 20 March 2023)
EMERALD INSIGHT	overtourism OR (over-tourism) AND (metaverse) OR (artificial intelligence, augmented reality, virtual reality, digital twins, digital transformation)—(over tourism)	2019–2023	222 (as of 1 April 2023)

3.3.2. Information Sources and Search Strategy

The following academic databases were chosen for assessment: Emerald Inside and Google Scholar. Using Boolean operators (AND, OR, NOT, or AND NOT; including brackets and quote marks) as conjunctions to include or exclude keywords in our search, a search string was constructed, resulting in more concentrated and effective results. Because of the finding that researchers do not use univocal language to describe overtourism, it became obvious that exploratory research played an essential role in determining the list of keywords.

After the selected searched records (n = 260) were exported from the Zotero tool, they were screened following the PRISMA methodology procedures described in **Figure 1**. Each author independently reviewed and evaluated the retrieved records. The authors then gathered and discussed the evaluation's results. Articles were included only if consensus was reached among all authors. A significant strategy for preventing a single reviewer from implementing a biased (or flawed) explanation of review criteria was implemented at this stage in order for the two independent reviewers to minimise bias at pivotal phases of the review process. This approach not only ensures the reliability and validity of the review process but also helps to minimise the risk of errors and inconsistencies; whereas, it also allows for a more comprehensive evaluation of the articles under consideration [**76**,**78**,**79**].

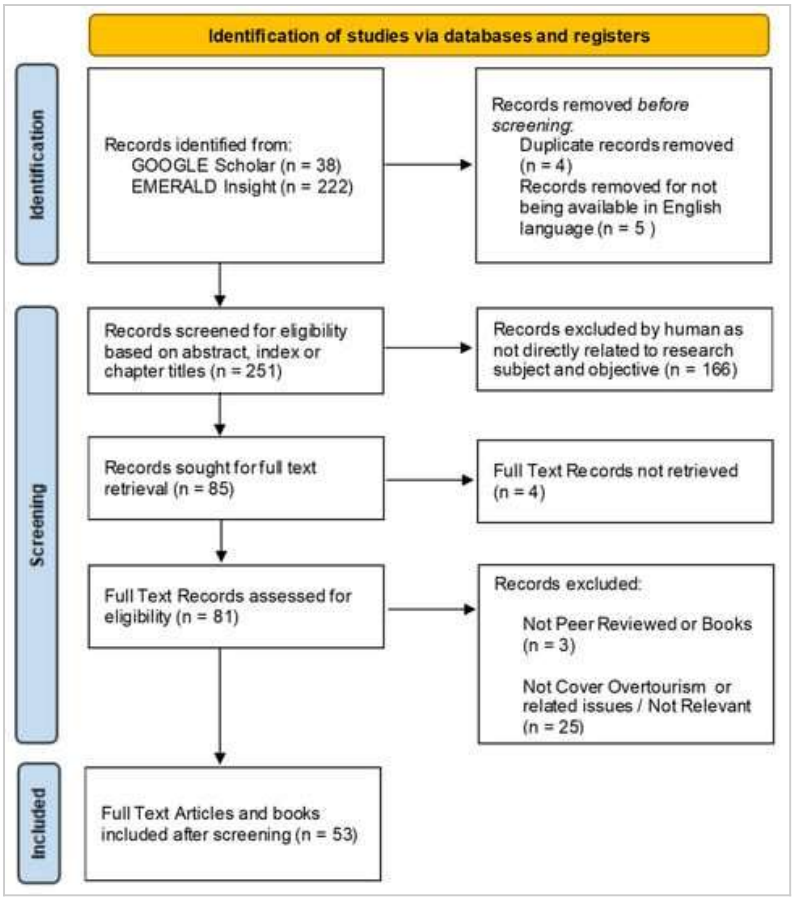

Figure 1. PRISMA 2020 Flow Diagram for systematic literature search strategy and review process.

3.3.3. Selection Process Analysis

At this stage, the papers noted as duplicates (n = 4) were initially deleted. Continuing, the scientific papers that were not written in English (n = 5) were excluded.

After that, the remaining papers were subjected to a screening of their abstracts. In books and book chapters, the indexed contents and chapter titles were screened. This process selected only the sources that were focused on the review's research thematic and topics. As a result, were selected only the sources where the selected three (n = 3) keywords "tourism", "overtourism", and "travel" were included in the abstract, index, or chapter titles of the finally selected papers (n = 85). At this stage, one hundred and sixty-six (n = 166) papers were eliminated as not directly related to the research's thematic, subject, and objective.

A full-text screening was then performed on the remaining eight-five (n = 85) papers to confirm the existence of the aforementioned eligibility requirements related to overtourism thematic. In four (n = 4) cases, no full-text records were available, and these papers were excluded. In addition, another group of twenty-five (n = 25) papers were eliminated because, in their full texts, they did not address the overtourism thematic or overtourism-related issues and, therefore, would not have been able to answer the study's research question. Furthermore, another criterion was applied and of this only peer-reviewed articles, conference papers, white papers, and published books were chosen, and as a result, three (n = 3) additional papers were eliminated. The implementation of the above-mentioned search techniques resulted in the final selection of fifty-three (n = 53) papers (**Table 1**), which fulfilled the set relationship between the metaverse, new digital technologies, and overtourism-related issues.

Comparing individual years, the article publications were as noted: three (n = 3) articles were published in 2019, six (n = 6) in 2020, twelve (n = 12) in 2021, eighteen (n = 18) in 2022, and fourteen (n = 14) papers were published on the topic in 2023. These figures highlight a clear trend in the number of publications related to the intersection of the metaverse, digital technologies, and overtourism. The significant increase noted in articles published from 2019 to 2023 indicates a growing interest in this area of research. This trend suggests that scholars are recognising the importance of understanding the impact of the metaverse and new technologies on overtourism related issues and are actively contributing to the discourse through their published work. The dispersion of articles across different years also suggests an evolution in the research, with scholars likely building on each other's work to deepen our understanding of this emerging field.

4. Results

It is evident from the research literature that the metaverse presents a promising opportunity for the tourism industry to generate additional revenue streams and create new, unique experiences for tourists [4,30,63,64]. By offering new and unique virtual experiences, destinations can attract a wider audience while also reducing the negative impact of physical tourism on natural resources [27,40,53]. At present, the tourism industry contributes significantly to overtourism in popular destinations worldwide, often leading to overcrowding, environmental degradation, and damage to cultural heritage sites [7,8,14,80,81]. The integration of these technologies into destination management plans appears to have the potential to alleviate some of the negative impacts associated with high levels of tourism in a destination [6,20,39].

4.1. Economic Aspects

The metaverse concept applied in tourism could offer tourists a virtual experience of destinations, which could create new business opportunities besides reducing the negative impacts associated with physical tourism [4,30,38,51,82,83,84,85]. This virtual experience could also offer unique opportunities for tourism businesses to showcase their products and services in a new way [38,40,84]. For example, local businesses could partner with tourism boards to create virtual experiences that highlight the culture and history of their area, not only attracting more visitors but also providing an additional revenue stream. According to Go and Kang [4], licencing destinations' digital products could provide an additional revenue stream for destinations that may have been struggling due to declining physical visits. This approach has the potential to benefit both the tourism industry and the environment by offering a sustainable and innovative way for people to explore the world while also supporting local economies.

A shift towards virtual tourism experiences could also help distribute the economic benefits of tourism more evenly and allow smaller and less well-known destinations to attract visitors [23,27]. For instance, Metaverse applications could be used to offer virtual tourism experiences in isolated, rural, or sensitive areas that cannot support mass tourism physically [27,40,86]. This would permit visitors to discover, explore, and appreciate these areas without negatively impacting the environment or local communities.

4.2. Customer Experience Aspects

Metaverse virtual experiences could be customised to the users' preferences and interests, creating targeted and personalised recommendations that facilitate tourism without

overstressing a destination [6,64]. With the ability to customise experiences based on user preferences, metaverse tourism could provide targeted and personalised recommendations that encourage a more even distribution of visitors throughout the year [6,20,39,42]. This approach would not only reduce the strain on popular destinations but also offer opportunities for people who are unable to travel physically or cannot afford financially to experience different parts of the world [40].

In addition, the implementation of immersive digital technologies can serve as a potent tool for destination marketing, improving the destination image and raising awareness among potential visitors [9,18,50,82]. Immersive digital technologies, such as virtual reality and augmented reality, can offer visitors a unique and engaging experience of the destination before they arrive [30,40,58]. This not only helps to attract more visitors, but it also enhances the overall customer experience by enabling visitors to make informed travel decisions. By combining tourism practices with cutting-edge digital technologies, destinations can provide tourists with a more comprehensive and enjoyable experience [38].

The use of the metaverse and its associated technologies could offer tourists an opportunity to experience and engage with destinations in a sustainable and controlled manner that could mitigate overtourism phenomena [4,6]. However, it is important to ensure that these technologies are accessible and inclusive for all tourists to experience them. It is vital to consider the potential digital divide that may exist within a destination, as not all residents and tourists may have equal access to or familiarity with the new technologies [17,40,65]. Therefore, efforts should be made to ensure that these technologies are accessible and user-friendly for all stakeholders, so that all visitors have the same level of customer experience and satisfaction.

Additionally, the use of digital technologies can facilitate better communication and collaboration between tourists, residents, and local authorities, resulting in more effective management strategies towards sustainable tourism [11,16,87], which could in its turn address overtourism and have as a result a better customer experience for destination visitors.

4.3. Sustainability Aspects

By enabling stakeholders to monitor and mitigate the environmental impact of tourism activities, immersive technologies can also aid in the development of sustainable tourism practices [28,39,40]. This can help ensure that tourism remains a viable and sustainable industry for years to come. The integration of immersive digital technologies (like AR and VR) into the tourism industry could offer immense potential for destination managers to gain valuable insights into tourists' preferences and behaviours [7,14,24,28]. The utilisation of these technologies can inform decision-making processes, leading to improved sustainability practices that could address overtourism and enhance visitor experiences.

Metaverse and the related digital tools and technologies can reduce the physical movement of people, limit the impact of tourism on the environment and cultural heritage sites, and even mitigate the spread of diseases, as it is becoming increasingly challenging to manage tourism in a post-COVID-19 world [3,20,25]. However, it is essential to identify different best practices for implementing these technologies in different environments and view them as one of many sustainable tourism strategies in the context of strategic destination management planning [18,21,24,88]. By leveraging the power of digital technologies, it is possible to create a more sustainable and responsible tourism industry that will address the overtourism issue and benefits both tourists and local communities alike.

4.4. Considerations

Incorporating digital technologies into the tourism industry carries with it both potential benefits and obstacles, which must be acknowledged. While the metaverse offers opportunities for locals to showcase their culture and heritage in a sustainable way [23,25,58,89], it is also important to preserve the quality and authentic travel experiences [86,88]. Scholars [12,18,19,90] stress the significance of involving the local community in planning and management activities to ensure that digital technologies are aligned with the needs and values of the destination. To achieve this balance, thorough research and consultation with local communities must be conducted to ensure that the use of technology aligns with their cultural values and beliefs [23,65,86]. It is crucial for the tourism industry to adapt to this new dynamic environment and re-position itself accordingly [6,30] in order to create a more sustainable and responsible sector.

Virtual experiences could not fully replace the authenticity of actually visiting a destination [40,55] and, therefore, if used detached from other actions, would probably not be a sufficient solution to overtourism, as they do not address the root cause of the problem [1,7,10,12,18,24,39,87]. The success of implementing these new technologies depends on various factors, such as the destination context, the level of stakeholder engagement, and the type of technology employed [11,16,40,41,57,64,84,87]. Therefore, it is imperative to carefully evaluate the potential impacts and limitations before deciding on the adoption of these technologies to ensure their successful integration into the destination's tourism industry and minimise any negative consequences that may arise. This can be achieved through conducting thorough feasibility studies and involving all relevant stakeholders in the decision-making process [7,11,12,16,87].

The metaverse related digital technologies could have potential negative effects, such as the displacement of local communities and the erosion of cultural authenticity [19,22,27]. Despite the optimism surrounding their possibilities for addressing overtourism, it is unclear whether metaverse tourism will potentially completely substitute physical travel or function only as a supplementary option for travellers [40].

It is essential to ensure that the metaverse and virtual tourism do not completely replace physical travel, as this could have negative impacts on local economies that rely heavily on tourism. Furthermore, the technology and infrastructure required for metaverse tourism could be costly and require significant investment, which may not be viable for all destinations, especially those located in less developed regions [51].

Given these uncertainties, additional research and analysis are necessary to fully comprehend the implications of this emerging trend.

In conclusion, the metaverse and its associated emerging technologies have the potential to mitigate overtourism at destinations, but in order to ensure their successful integration and minimise any negative consequences, it is crucial to conduct thorough feasibility studies and involve all relevant stakeholders in the decision-making process. The existence of a digital divide within a destination should be taken into account, and measures should be taken to make it accessible to all parties involved. Despite the fact that these innovations have the potential to tackle the issue of overtourism, more study is required to determine optimal deployment strategies and assess their effectiveness in various settings. It is important to view these technologies as one tool among many sustainable tourism strategies and continue to assess their potential impact on destinations and stakeholders.

5. Discussion

5.1. Findings

The research question addressed by this paper is: how and what kind of digital technologies address overtourism issues?

Based on the findings, the metaverse and its associated digital technologies have the potential to assist in the campaign against overtourism in popular tourist destinations by providing virtual experiences that decrease the physical impact of tourism. Virtual experiences can provide visitors with a taste of a destination without requiring them to physically travel there, thereby reducing the tourism industry's footprint.

Metaverse technologies could facilitate tourists' experiences of destinations without physically visiting them, thereby reducing the strain on local infrastructure and reducing the number of tourists. Furthermore, technology such as the metaverse has the potential to support sustainable tourism practices by enabling local stakeholders to monitor and mitigate environmental impacts. With careful consideration and planning, the metaverse and virtual experiences can offer promising solutions for sustainable development in the tourism industry.

Moreover, the metaverse can provide residents with opportunities to sustainably exhibit their culture and heritage. This can also lead to increased awareness and appreciation of diverse cultures, as well as provide economic benefits for local communities through virtual tourism. However, it is important to ensure that virtual experiences are used in a complementary way to enhance the overall tourism experience. Additionally, virtual experiences can offer accessibility to individuals with physical disabilities or financial limitations who may not have been able to travel otherwise.

However, it is crucial to ensure that virtual tourism does not entirely replace physical travel, as this could negatively affect local economies that rely heavily on tourism. While the metaverse and virtual experiences offer promising solutions to overtourism, they should be viewed as complementary rather than a substitute for physical travel. In this way, virtual tourism can support sustainable development while also promoting economic growth in local communities.

The success of implementing these new technologies is contingent on a number of variables, including the destination context, the level of stakeholder engagement, and the employed technology. Before deciding to adopt these technologies, it is essential to evaluate their potential impacts and limitations in order to ensure their successful integration into the destination's tourism industry and minimise any potential negative consequences.

It is also essential to be aware of the potential negative consequences of implementing the metaverse's digital tools and technologies, such as the displacement of local communities and the erosion of cultural authenticity. Promoting responsible tourism practices that aid local small and medium companies and offer job opportunities to locals can help achieve this. As a rule, a destination's tourism industry needs to be integrated successfully into the community in a way that promotes local prosperity, environmental preservation, and social cohesion.

While metaverse tourism could be a solution to the problem of overtourism, it is not yet known whether the necessary technology and infrastructure can be afforded by all destinations, especially those in less developed regions, due to their high costs and high investment requirements.

Overall, the integration of digital technologies into the tourism industry can contribute to a more responsible and sustainable industry, but it is essential to establish a balance between leveraging these technologies, preserving authentic travel experiences and including all stakeholders in the decision-making process. Scholars stress the significance of involving the local community in planning and management activities to ensure that digital technologies are aligned with the requirements and values of the destination.

This paper's findings suggest that the utilisation of the metaverse and its associated tools and technologies could be a promising solution to the issue of overtourism if accompanied by

the planning and implementation of a coherent destination strategy towards sustainable tourism. The metaverse has been identified as a potential sustainable alternative to physical tourism, which is particularly relevant in light of issues surrounding overtourism. Nevertheless, the success of the metaverse as a tourism mode will depend on a range of factors including destination management policies, local regulations, technological infrastructure, and stakeholder engagement. New technologies have the potential to mitigate overtourism at destinations, but it is essential to undertake exhaustive feasibility studies and involve all relevant stakeholders in decision-making. In addition, it is essential to consider the possibility of a digital divide within a destination and to make efforts to ensure accessibility for all stakeholders. In addition, more research is necessary to identify best practices for their implementation and evaluate their efficacy in a variety of contexts, as it is essential to view these technologies as one of many sustainable tourism strategies and to continue evaluating their impact on destinations and stakeholders. Research into the advantages, disadvantages, and potential solutions to this ever-changing landscape is essential before it can become a dominant form of tourism.

Table 2, presented below, displays the results and findings of the research conducted in this paper. The presented table outlines the cumulative outcomes, advantages, and limitations of utilising the metaverse technologies in tourism destinations as a means of mitigating the problem of overtourism. These findings are categorised according to the economic, customer experience, and sustainability dimensions. In general, the research suggests that metaverse technologies have the potential to address the challenges of overtourism in tourism destinations. However, there are also limitations and challenges that need to be addressed to fully realise the benefits of these technologies. The findings presented in **Table 1** provide a comprehensive overview of the advantages and limitations of utilising metaverse technologies in tourism destinations.

Table 2. Cumulative outcomes, advantages, and limitations of the metaverse technologies in tourism destinations.

	Results	Benefits	Limitations
Economic Aspects	The metaverse concept applied in tourism could offer tourists a virtual experience of destinations, which could create new business opportunities besides reducing the negative impacts associated with physical tourism	Assist in the campaign against overtourism	It is crucial to ensure that virtual tourism does not entirely replace physical travel, as this could negatively affect local economies that rely heavily on tourism
	Virtual experience could also offer unique opportunities for tourism businesses to showcase their products and services in a new way	Reducing the tourism industry's footprint	Involving the local community in planning and management activities to ensure that digital technologies are aligned with the requirements and values of the destination
	A shift towards virtual tourism experiences could also help distribute the economic benefits of tourism more evenly and allow smaller and less well-known destinations to attract visitors. Metaverse applications could be used to offer virtual tourism experiences in isolated, rural, or sensitive areas that cannot support mass tourism physically	Support sustainable tourism practices	Should be viewed as complementary rather than a substitute for physical travel
Customer Experience Aspects	Metaverse tourism could provide targeted and personalised recommendations that encourage a more even distribution of visitors throughout the year	Offer promising solutions for sustainable development	The success of the metaverse as a tourism mode will depend on a range of factors including destination management policies, local regulations, technological infrastructure and stakeholder engagement
Sustainability Aspects	Inform decision-making processes, leading to improved sustainability practices that could address overtourism and enhanced visitor experiences	Provide residents with opportunities to sustainably exhibit their culture and heritage	A destination's tourism industry needs to be integrated successfully into the community in a way that promotes local prosperity, environmental preservation, and social cohesion
	Metaverse and the related digital tools and technologies can reduce the physical movement of people, limit the impact of tourism on the environment, cultural heritage sites, and even mitigate the spread of diseases, as it is becoming increasingly challenging to manage tourism in a post-covid world	Offer accessibility to individuals with physical disabilities or financial limitations who may not have been able to travel otherwise	While metaverse tourism could be a solution to the problem of overtourism, it is not yet known whether the necessary technology and infrastructure can be afforded by all destinations, especially those in less developed regions, due to their high costs and high investment requirements
		Promoting economic growth in local communities	It is essential to establish a balance between leveraging these technologies, preserving authentic travel experiences and including all stakeholders in the decision-making process
			Could be a promising solution to the issue of overtourism if accompanied with the planning and implementation of a coherent destination strategy towards sustainable tourism
			New technologies have the potential to mitigate overtourism at destinations, but it is essential to undertake exhaustive feasibility studies and involve all relevant stakeholders in decision-making.
			It is essential to consider the possibility of a digital divide within a destination and to make efforts to ensure accessibility for all stakeholders.
			It is essential to be aware of the potential negative consequences of implementing the metaverse's digital tools and technologies, such as the displacement of local communities and the erosion of cultural authenticity

Source: Authors analysis.

5.2. Future Research

As the current academic literature on the topic of overtourism is limited and relatively new, it is proposed that the phenomenon be studied in greater depth in the future. The causes of overtourism vary by destination, necessitating the application of diverse solutions, including the digital ones proposed in this research. The complexity and utility of defining the phenomenon's parameters from a theoretical perspective and proposing pertinent solutions justifies a broader scope for future research.

This study contributes to the growing body of the literature on overtourism and highlights the need for additional research to better comprehend and address this complex issue.

The potential impact of digital technologies and the metaverse on social and cultural aspects of tourism is an important area for future research, as these innovations may have unintended consequences that require careful consideration. It is crucial to understand how these new technologies will affect local communities, cultural heritage, and social interactions in the context of tourism. In the future, studies could also investigate the technological infrastructure required to support the integration of digital technologies and the metaverse in the tourism industry in order to fully comprehend their potential impact. Without sufficient infrastructure and testing, judgement regarding their effectiveness in reducing overtourism cannot be established. Future research could also focus on developing strategies to address these challenges and limitations, such as improving the energy efficiency of digital technologies and ensuring equitable access to virtual tourism experiences.

Potential research could also investigate various strategies for managing overtourism, such as alternative tourism models and diversification of destinations. Finally, additional

investigations and development are needed to fully realize the potential of the metaverse and other digital technologies to offer new solutions to the tourism industry and address its challenges, such as enhancing cultural preservation and promoting sustainable tourism practices.

5.3. Research Limitations

Acknowledging the limitations of a study is a crucial aspect of ensuring the validity and reliability of research findings. This study identified areas where further investigation is necessary to gain a more comprehensive understanding of the topic under scrutiny. Future studies can build on the current research and address these limitations to enhance our knowledge about the subject matter.

Despite the growing interest in the impact of the metaverse on tourism, this study highlights the need for empirical evidence to support its potential as a solution to overtourism. Therefore, future studies should focus on collecting data that can shed light on the actual effects of metaverse-based tourism initiatives in real-world scenarios.

This study examined only the effects of digital technology, and its findings raise the possibility of unanticipated social and cultural implications that require additional investigation.

Furthermore, it is important to consider the level of technological infrastructure available in different destinations before assuming the application results can be generalised. Future studies should aim to investigate these topics more thoroughly.

6. Conclusions

The systematic literature review conducted in this paper highlights the potential of the metaverse and new digital technologies in tourism as viable solutions to overtourism. Through analysis of existing literature, the study provides valuable insights into how these technologies can be harnessed to mitigate the adverse effects of tourism on local communities and destinations.

The metaverse, a digital world where individuals can interact with each other and artificial intelligence, has been suggested as a possible solution to overtourism. By creating virtual destinations that mimic real-world locations, tourists can experience the culture and beauty of a place without physically visiting it. This could potentially alleviate the negative impacts of overtourism while still allowing people to explore new places. However, it remains to be seen if this approach will be widely adopted and if it can truly address the complex challenges of overtourism.

Researchers have proposed the use of digital technologies like the metaverse for virtual tourism experiences. This innovation has the potential to lessen the environmental impact of physical tourism by reducing visitor numbers and mitigating negative effects on destinations. Moreover, virtual tourism experiences can offer alternative opportunities for those who face financial or physical constraints when travelling, thereby promoting inclusivity and accessibility in tourism.

Despite its limitations, this study holds significant value for both academia and practice. To the best of the researchers' knowledge, this is the first study focused on how overtourism could be minimised with the use of the metaverse and digital technologies. This way, it contributes to current knowledge on overtourism. The study also highlights critical issues that have impacted the overtourism phenomenon and provides solutions that could be applicable in practice. Moreover, its findings can aid in promoting destination sustainability, improving local residents' daily lives, and preserving cultural sites.

The tourism industry can be greatly benefited from the potential of the metaverse and other digital technologies to address the issue of overtourism. However, further research and development are necessary to fully utilize their capabilities. It is crucial to address the digital divide and ensure that access to these technologies is equitable for all communities. Policymakers and industry stakeholders must also collaborate to ensure responsible and sustainable use of these technologies in addressing overtourism without creating new problems or worsening existing ones.

References

1. Adie, B.A.; Falk, M.; Savioli, M. Overtourism as a perceived threat to cultural heritage in Europe. *Curr. Issues Tour.* **2020**, *23*, 1737–2174. [**Google Scholar**] [**CrossRef**]
2. Kouroupi, A.; Karagouni, G. Exploring the effects of COVID-19 pandemic on shopping centres. In Proceedings of the 15th Annual Conference of the EuroMed Academy of Business, Palermo, Italy, 21–23 September 2022; pp. 392–405. Available online: **https://emrbi.org/wp-content/uploads/2022/09/euromed2022-book-of-proceedings-2022-09-16.pdf** (accessed on 28 March 2023).
3. Chaney, D.; Seraphin, H. COVID-19 crisis as an unexpected opportunity to adopt radical changes to tackle overtourism. *Anatolia* **2020**, *32*, 510–512. [**Google Scholar**] [**CrossRef**]
4. Go, H.; Kang, M. Metaverse tourism for sustainable tourism development: Tourism Agenda 2030. *Tour. Rev.* **2023**, *78*, 381–394. [**Google Scholar**] [**CrossRef**]
5. Power, S.; Di Domenico, M.; Miller, G. An investigation into sustainability paradoxes in a dynamic and shifting tourism landscape. In Proceedings of the Tourism 22 and Beyond—What Matters Now to the Global Tourist? Cork, Ireland, 6–9 September 2022; p. 102. [**Google Scholar**]
6. Buhalis, D.; Lin, M.S.; Leung, D. Metaverse as a driver for customer experience and value co-creation: Implications for hospitality and tourism management and marketing. *Int. J. Contemp. Hosp. Manag.* **2023**, *35*, 701–716. [**Google Scholar**] [**CrossRef**]
7. Mihalic, T.; Kuščer, K. Can overtourism be managed? Destination management factors affecting residents' irritation and quality of life. *Tour. Rev.* **2022**, *77*, 16–34. [**Google Scholar**] [**CrossRef**]
8. Duignan, M. 'Overtourism'? Understanding and Managing Urban Tourism Growth beyond Perceptions: Cambridge Case Study: Strategies and Tactics to Tackle Overtourism. In *'Overtourism'? Understanding and Managing Urban Tourism Growth beyond Perceptions: Case Studies*; United Nations World Tourism Organisation (UNWTO): Madrid, Spain, 2019; Volume 2, pp. 34–39. [**Google Scholar**]
9. Séraphin, H.; Zaman, M.; Olver, S.; Bourliataux-Lajoinie, S.; Dosquet, F. Destination branding and overtourism. *J. Hosp. Tour. Manag.* **2019**, *38*, 1–4. [**Google Scholar**] [**CrossRef**]
10. Dhiraj, A.; Kumar, S. Overtourism: Causes, Impacts and Solution. In *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*; Sharma, A., Hassan, A., Eds.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 49–56. [**Google Scholar**] [**CrossRef**]
11. Gupta, V.; Chomplay, P. Local Residents' Perceptions Regarding the Negative Impacts of Overtourism: A Case of Shimla. In *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*; Sharma, A., Hassan, A., Eds.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 69–80. [**Google Scholar**] [**CrossRef**]
12. Koç, B.; Küçükergin, K.G. Community Development, Frustration and Overtourism. In *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*;

Sharma, A., Hassan, A., Eds.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 81–93. [**Google Scholar**] [**CrossRef**]

13. Travel Pulse. Mapping the Destruction Caused by Overtourism, Mia Taylor on 13 June 2019. Available online: **https://www.travelpulse.com/News/Features/Mapping-the-Destruction-Caused-by-Overtourism** (accessed on 26 March 2023).
14. Giordano, E. Mobility infrastructures and the emergence of the short-term city: The management of parking garages in Venice historical center. In Proceedings of the Tourism 22 and Beyond—What Matters Now to the Global Tourist? Cork, Ireland, 6–9 September 2022; p. 72. [**Google Scholar**]
15. Martín Martín, J.M.; Rodriguez Martín, J.A.; Zermeño Mejía, K.A.; Salinas Fernández, J.A. Effects of vacation rental websites on the concentration of tourists—Potential environmental impacts. An application to the Balearic Islands in Spain. *Int. J. Environ. Res. Public Health* **2018**, *15*, 347. [**Google Scholar**] [**CrossRef**]
16. Seraphin, H.; Ivanov, S.; Dosquet, F.; Bourliataux-Lajoinie, S. Archetypes of locals in destinations victim of overtourism. *J. Hosp. Tour. Manag.* **2020**, *43*, 283–288. [**Google Scholar**] [**CrossRef**]
17. Morais, D.B. (Ed.) Introduction: Hence Tourism Microentrepreneurship. In *Tourism Microentrepreneurship (Bridging Tourism Theory and Practice, Vol. 12)*; Emerald Publishing Limited: Bingley, UK, 2021; pp. 1–8. [**Google Scholar**] [**CrossRef**]
18. Redko, V.Y.; Krasnikova, N.O.; Krupskyi, O.P. *Overtourism Effect Management in Destinations*; Valeri, M., Ed.; Tourism Risk; Emerald Publishing Limited: Bingley, UK, 2022; pp. 199–219. [**Google Scholar**] [**CrossRef**]
19. Valeri, M. (Ed.) *"Index" Tourism Risk*; Emerald Publishing Limited: Bingley, UK, 2022; pp. 319–325. [**Google Scholar**]
20. Seeler, S. A research agenda for sustainable tourism. *J. Tour. Futures* **2020**, *6*, 287–289. [**Google Scholar**] [**CrossRef**]
21. Peretta, R.; Cuomo, M.; Rovelli, L.; Milesi, G. Addressing the Challenges of DMOs in the Italian Alps Through CBL in a Time of Pandemic: A 2020–2021 Online Workshop at the University of Bergamo. In *The Emerald Handbook of Challenge Based Learning*; Vilalta-Perdomo, E., Membrillo-Hernández, J., Michel-Villarreal, R., Lakshmi, G., Martínez-Acosta, M., Eds.; Emerald Publishing Limited: Bingley, UK, 2022; pp. 157–175. [**Google Scholar**] [**CrossRef**]
22. Borelli, G. Overtourism as a Worrying Tide: A Rhythmanalytic Experiment on Venetian Everyday Life. In *Rhythmanalysis (Research in Urban Sociology, Vol. 17)*; Lyon, D., Ed.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 171–187. [**Google Scholar**] [**CrossRef**]
23. Aznar, M.; Hoefnagels, H. Empowering Small Rural Communities through Heritage Tourism. In *Delivering Tourism Intelligence (Bridging Tourism Theory and Practice, Vol. 11)*; Emerald Publishing Limited: Bingley, UK, 2019; pp. 49–60. [**Google Scholar**] [**CrossRef**]
24. Iflazoglu, N.; Can, I.I. As a Possible Solution of Overtourism in Destination: Alternative Tourism Movement. In *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*; Sharma, A., Hassan, A., Eds.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 97–110. [**Google Scholar**] [**CrossRef**]
25. de Oliveira, R.A.; Baracho, R.M.A.; Cantoni, L. The perception of UNESCO World Heritage Sites' managers about concepts and elements of cultural sustainability in tourism. *J. Cult. Herit. Manag. Sustain. Dev.* 2022; *ahead-of-print*. [**Google Scholar**]
26. Oktadiana, H. Making Tourism Technology User-friendly. In *Delivering Tourism Intelligence (Bridging Tourism Theory and Practice, Vol. 11)*; Emerald Publishing Limited: Bingley, UK, 2019; pp. 143–159. [**Google Scholar**] [**CrossRef**]

27. Babolian Hendijani, R. Delivering Tourism Intelligence about Agritourism. In *Delivering Tourism Intelligence (Bridging Tourism Theory and Practice, Vol. 11)*; Emerald Publishing Limited: Bingley, UK, 2019; pp. 77–89. [**Google Scholar**] [**CrossRef**]

28. Pearce, P.L.; Oktadiana, H. The Value of Tourism Intelligence. In *Delivering Tourism Intelligence (Bridging Tourism Theory and Practice, Vol. 11)*; Emerald Publishing Limited: Bingley, UK, 2019; pp. 1–11. [**Google Scholar**] [**CrossRef**]

29. Buhalis, D.; Papathanassis, A.; Vafeidou, M. Smart cruising: Smart technology applications and their diffusion in cruise tourism. *J. Hosp. Tour. Technol.* **2022**, *13*, 626–649. [**Google Scholar**] [**CrossRef**]

30. Dwivedi, Y.; Hughes, L.; Baabdullah, A.; Ribeiro-Navarrete, S.; Giannakis, M.; Al-Debei, M.; Dennehy, D.; Metri, B.; Buhalis, D.; Cheung, C.; et al. Fosso Wamba, Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *Int. J. Inf. Manag.* **2023**, *66*, 102542. [**Google Scholar**] [**CrossRef**]

31. Díaz, J.; Saldaña, C.; Avila, C. Virtual world as a resource for hybrid education. *Int. J. Emerg. Technol. Learn.* **2020**, *15*, 94–109. [**Google Scholar**] [**CrossRef**]

32. Mystakidis, S. Metaverse. *Encyclopedia* **2020**, *2*, 486–497. [**Google Scholar**] [**CrossRef**]

33. Huh, S. Emergence of the metaverse and ChatGPT in journal publishing after the COVID-19 pandemic. *Sci. Ed.* **2023**, *10*, 1–4. [**Google Scholar**] [**CrossRef**]

34. Lee, L.H.; Lin, Z.; Hu, R.; Gong, Z.; Kumar, A.; Li, T.; Li, S.; Hui, P. When creators meet the metaverse: A survey on computational arts. *arXiv* **2021**, arXiv:2111.1348. [**Google Scholar**] [**CrossRef**]

35. Lee, L.H.; Braud, T.; Zhou, P.; Wang, L.; Xu, D.; Lin, Z.; Kumar, A.; Bermejo, C.; Hui, P. All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda. *arXiv* **2021**, arXiv:2110.05352. [**Google Scholar**] [**CrossRef**]

36. Prieto, J.F.; Lacasa, P.; Martínez-Borda, R. Approaching metaverses: Mixed reality interfaces in youth media platforms. *New Techno Humanit.* **2022**, *2*, 136–145. [**Google Scholar**] [**CrossRef**]

37. Gartner. How the Metaverse Might Transform Supply Chain. 2022. Available online: **https://blogs.gartner.com/beyond-supply-chain-blog/meta-meta-everywhere/** (accessed on 27 March 2023).

38. Grant, M.J.; Booth, A. A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Inf. Libr. J.* **2009**, *26*, 91–108. [**Google Scholar**] [**CrossRef**]

39. Garrod, B. What Makes a Good Critical Literature Review Paper? *Tour. Hosp.* **2023**, *4*, 141–147. [**Google Scholar**] [**CrossRef**]

40. Higgins, J.; Green, S. (Eds.) *Cochrane Handbook for Systematic Reviews of Interventions*; Version 5.1.0 [updated March 2011]; The Cochrane Collaboration: London, UK, 2011. [**Google Scholar**]

41. Pollock, A.; Berge, E. How to do a systematic review. *Int. J. Stroke* **2018**, *13*, 138–156. [**Google Scholar**] [**CrossRef**]

42. Page, M.J.; Moher, D.; Bossuyt, P.M.; Boutron, I.; Hoffmann, T.C.; Mulrow, C.D.; Shamseer, L.; Tetzlaff, J.M.; Akl, E.A.; Brennan, S.E.; et al. PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ* **2021**, *372*, n160. [**Google Scholar**] [**CrossRef**] [**PubMed**]

43. Liberati, A.; Altman, D.G.; Tetzlaff, J.; Mulrow, C. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *J. Clin. Epidemiol.* **2009**, *62*, e1–e34. [**Google Scholar**] [**CrossRef**] [**PubMed**]

44. Haddaway, N.R.; Page, M.J.; Pritchard, C.C.; McGuinness, L.A. PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Syst. Rev.* **2022**, *18*, e1230. [**Google Scholar**] [**CrossRef**] [**PubMed**]

45. Kainthola, S.; Tiwari, P.; Chowdhary, N.R. Myths and Realities of Overtourism. In *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*; Sharma, A., Hassan, A., Eds.; Emerald Publishing Limited: Bingley, UK, 2021; pp. 19–31. [**Google Scholar**] [**CrossRef**]

46. Tian, S.; Song, Q. Study on the Technical Model Design of a Tourist Attraction from the Metaverse Perspective. Highlights in Business. *Econ. Manag.* **2023**, *6*, 371–380. [**Google Scholar**]

47. Monaco, S.; Sacchi, G. Travelling the Metaverse: Potential Benefits and Main Challenges for Tourism Sectors and Research Applications. *Sustainability* **2023**, *15*, 3348. [**Google Scholar**] [**CrossRef**]

48. Godenzi, C. The importance of Digital Technologies in Promoting the Image of a Tourist Destination. Case Study: Region of Lugano, Switzerland. PhD Thesis, Scuola Universitaria della Svizzera Italiana (SUPSI), Lugano, Switzerland, 2022. [**Google Scholar**]

49. Nannelli, M.; Capone, F.; Lazzeretti, L. Artificial intelligence in hospitality and tourism. State of the art and future research avenues. *Eur. Plan. Stud.* **2023**, 1–20. [**Google Scholar**] [**CrossRef**]

50. Ozdemir, O.; Dogru, T.; Kizildag, M.; Erkmen, E. A critical reflection on digitalization for the hospitality and tourism industry: Value implications for stakeholders. *Int. J. Contemp. Hosp. Manag.* **2023**. [**Google Scholar**] [**CrossRef**]

51. Champion, E. Virtual Travel: Being Not Quite "There". In *Playing with the Past: Into the Future*; Springer International Publishing: Cham, Switzerland, 2023; pp. 1–19. [**Google Scholar**]

52. Buhalis, D.; Leung, D.; Lin, M. Metaverse as a disruptive technology revolutionising tourism management and marketing. *Tour. Manag.* **2023**, *97*, 104724. [**Google Scholar**] [**CrossRef**]

53. Prodinger, B.; Neuhofer, B. Never-Ending Tourism: Tourism Experience Scenarios for 2030. In *Information and Communication Technologies in Tourism 2023*; Ferrer-Rosell, B., Massimo, D., Berezina, K., Eds.; ENTER 2023; Springer Proceedings in Business and Economics; Springer: Cham, Switzerland, 2023. [**Google Scholar**]

54. Yang, F.X.; Wang, Y. Rethinking Metaverse Tourism: A Taxonomy and an Agenda for Future Research. *J. Hosp. Tour. Res.* **2023**. [**Google Scholar**] [**CrossRef**]

55. Guttentag, D. Digital Destinations and Avatar Tourists: A Futuristic Look at Virtual Reality Tourism and its Real-World Impacts. Science Fiction, Disruption and Tourism. In *The Future of Tourism*; Yeoman, I., McMahon-Beattie, U., Sigala, M., Eds.; Channel View Publications: Bristol, UK, 2021; Volume 6, ISBN 1845418697. [**Google Scholar**]

56. Weber-Sabil, J.; Han, D.-I.D. Immersive Tourism—State of the Art of Immersive Tourism Realities through XR Technology. Breda University of Applied Sciences. 2021. Available online: **https://www.buas.nl/sites/default/files/2021-05/Immersive%20Tourism_State%20of%20the%20Art_final.pdf** (accessed on 12 April 2023).

57. Nascimento, J.; Loureiro, S.M.C. The Impact of Augmented and Virtual Reality for Sustainable Tourism. In *Extended Reality and Metaverse. XR 2022; Springer Proceedings in Business and Economics*; Jung, T., Tom Dieck, M.C., Correia Loureiro, S.M., Eds.; Springer: Cham, Switzerland, 2023. [**Google Scholar**]

58. Hui, X.; Raza, S.H.; Khan, S.W.; Zaman, U.; Ogadimma, E.C. Exploring Regenerative Tourism Using Media Richness Theory: Emerging Role of Immersive Journalism,

Metaverse-Based Promotion, Eco-Literacy, and Pro-Environmental Behavior. *Sustainability* **2023**, *15*, 5046. [**Google Scholar**] [**CrossRef**]
59. Hopf, J.; Scholl, M.; Neuhofer, B.; Egger, R. Exploring the Impact of Multisensory VR on Travel Recommendation: A Presence Perspective. In *Information and Communication Technologies in Tourism*; Neidhardt, J., Wörndl, W., Eds.; Springer: Cham, Switzerland, 2020. [**Google Scholar**]
60. Sharma, A.; Hassan, A. (Eds.) *Overtourism as Destination Risk (Tourism Security-Safety and Post Conflict Destinations)*; Emerald Publishing Limited: Bingley, UK, 2021; pp. 285–288. [**Google Scholar**] [**CrossRef**]
61. Frey, B.S. *Overcoming Overtourism: Creating Revived Originals*; Springer: Cham, Switzerland, 2021. [**Google Scholar**]
62. Frey, B.; Briviba, A. A policy proposal to deal with excessive cultural tourism. *Eur. Plan. Stud.* **2021**, *29*, 601–618. [**Google Scholar**] [**CrossRef**]
63. Casais, B.; Ferreira, L. Smart and sustainable hotels: Tourism Agenda 2030 perspective article. *Tour. Rev.* **2023**, *78*, 344–351. [**Google Scholar**] [**CrossRef**]
64. Novera, C.N.; Ahmed, Z.; Kushol, R.; Wanke, P.; Azad, M.A.K. Internet of Things (IoT) in smart tourism: A literature review. *Span. J. Mark.—ESIC* **2022**, *26*, 325–344. [**Google Scholar**] [**CrossRef**]
65. Oihab Allal-Chérif. Intelligent cathedrals: Using augmented reality, virtual reality, and artificial intelligence to provide an intense cultural, historical, and religious visitor experience. *Technol. Forecast. Soc. Chang.* **2022**, *178*, 121604. [**Google Scholar**] [**CrossRef**]
66. Jiang, Y.; Yin, S.; Li, K.; Luo, H.; Kaynak, O. Industrial applications of digital twins. *Philos. Trans. R. Soc. A* **2021**, *379*, 20200360. [**Google Scholar**] [**CrossRef**]
67. Prados-Castillo, J.F.; Guaita Martínez, J.M.; Zielińska, A.; Gorgues Comas, D. A Review of Blockchain Technology Adoption in the Tourism Industry from a Sustainability Perspective. *J. Theor. Appl. Electron. Commer. Res.* **2023**, *18*, 814–830. [**Google Scholar**] [**CrossRef**]
68. Seraphin, H. Book review—Sustainable and Collaborative Tourism in a Digital World. *J. Tour. Futures* **2021**, *7*, 411–412. [**Google Scholar**] [**CrossRef**]
69. Zeng, Z.; Chen, P.-J.; Xiao, X.; Liu, P.; Zhang, J. The mediating and moderating effects on the intention to use navigation apps. *J. Hosp. Tour. Technol.* **2022**, *13*, 972–991. [**Google Scholar**] [**CrossRef**]
70. European Commission. Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. In *Transition Pathway for Tourism*; Publications Office of the European Union: Luxembourg, 2022. [**Google Scholar**]
71. Seraphin, H.; Gowreesunkar, V.G.B. Conclusion—Tourism: How to achieve the sustainable development goals? *Worldw. Hosp. Tour. Themes* **2021**, *13*, 148–152. [**Google Scholar**] [**CrossRef**]
72. Azis, N.; Amin, M.; Chan, S.; Aprilia, C. How smart tourism technologies affect tourist destination loyalty. *J. Hosp. Tour. Technol.* **2020**, *11*, 603–625. [**Google Scholar**] [**CrossRef**]
73. Radianti, J.; Majchrzak, T.A.; Fromm, J.; Wohlgenannt, I. A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Comput. Educ.* **2020**, *147*, 103778. [**Google Scholar**] [**CrossRef**]
74. Nazneen, S.; Xu, H.; Ud Din, N. Assessment of residents' destination image and their pro-tourism development behaviour: Perspectives on the China–Pakistan economic corridor. *Tour. Rev.* **2021**, *76*, 184–197. [**Google Scholar**] [**CrossRef**]
75. Benner, M. From Overtourism to Sustainability: A Research Agenda for Qualitative Tourism Development in the Adriatic, Heidelberg University. MPRA Paper No 92213. 2019. Available online: **https://mpra.ub.uni-muenchen.de/92213/** (accessed on 1 April 2023).

76. Capocchi, A.; Vallone, C.; Pierotti, M.; Amaduzzi, A. Overtourism: A Literature Review to Assess Implications and Future Perspectives. *Sustainability* **2019**, *11*, 3303. [**Google Scholar**] [**CrossRef**]

77. Zubiaga, M.; Izkara, J.L.; Gandini, A.; Alonso, I.; Saralegui, U. Towards smarter management of overtourism in historic centres through visitor-flow monitoring. *Sustainability* **2019**, *11*, 7254–7298. [**Google Scholar**] [**CrossRef**]

78. Volgger, M.; Pfister, D. (Eds.) Atmospheric Turn in Culture and Tourism: Place, Design and Process Impacts on Customer Behaviour, Marketing and Branding. In *Advances in Culture, Tourism and Hospitality Research, Vol. 16*; Emerald Publishing Limited: Bingley, UK, 2019; pp. 333–339. [**Google Scholar**] [**CrossRef**]

79. Oskam, J.A. (Ed.) *The Overtourism Debate*; Emerald Publishing Limited: Bingley, UK, 2020; pp. 301–302. [**Google Scholar**] [**CrossRef**]

80. Seakhoa-King, A.; Augustyn, M.M.; Mason, P. *"Index", Tourism Destination Quality*; Emerald Publishing Limited: Bingley, UK, 2020; pp. 287–293. [**Google Scholar**] [**CrossRef**]

81. Chowdhary, N.; Billa, S.; Tiwari, P. (Eds.) Indian Tourism. In *Diaspora Perspectives*; Emerald Publishing Limited: Bingley, UK, 2022. [**Google Scholar**] [**CrossRef**]

82. Doolani, S.; Wessels, C.; Kanal, V.; Sevastopoulos, C.; Jaiswal, A.; Nambiappan, H.; Makedon, F. A Review of Extended Reality (XR) Technologies for Manufacturing Training. *Technologies* **2020**, *8*, 77. [**Google Scholar**] [**CrossRef**]

83. Alnagrat, A.; Che Ismail, R.; Syed Idrus, S.Z.; Abdulhafith Alfaqi, R.M. A Review of Extended Reality (XR) Technologies in the Future of Human Education: Current Trend and Future Opportunity. *J. Hum. Cent. Technol.* **2022**, *1*, 81–96. [**Google Scholar**] [**CrossRef**]

84. Silva, M.; Teixeira, L. eXtended Reality (XR) Experiences in Museums for Cultural Heritage: A Systematic Review. In *Intelligent Technologies for Interactive Entertainment. INTETAIN 2021. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*; Lv, Z., Song, H., Eds.; Springer: Cham, Switzerland, 2022; Volume 429. [**Google Scholar**] [**CrossRef**]

85. Fourman, M.S.; Ghaednia, H.; Lans, A.; Lloyd, S.; Sweeney, A.; Detels, K.; Dijkstra, H.; Oosterhoff, J.H.; Ramsey, D.C.; Do, S.; et al. Applications of augmented and virtual reality in spine surgery and education: A review. *Semin. Spine Surg.* **2021**, *33*, 100875. [**Google Scholar**] [**CrossRef**]

86. Kumar, T.S. Study of retail applications with virtual and augmented reality technologies. *J. Innov. Image Process.* **2021**, *3*, 144–156. [**Google Scholar**] [**CrossRef**]

87. Abdelmaged, M.A.M. Implementation of Virtual Reality in Healthcare, Entertainment, Tourism, Education, and Retail Sectors. 2021. Available online: **https://mpra.ub.uni-muenchen.de/id/eprint/110491** (accessed on 28 March 2023).

88. Nayyar, A.; Mahapatra, B.; Le, D.N.; Suseendran, G. Virtual Reality (VR) & Augmented Reality (AR) technologies for tourism and hospitality industry. *Int. J. Eng. Technol.* **2018**, *7*, 156–160. [**Google Scholar**]

89. Herman, G.; Caciora, T.; Ilies, D.C.; Ilies, A.; Deac, A.; Sturza, A.; Sonko, S.; Suba, N.; Nistor, S. 3D Modeling of the Cultural Heritage: Between Opportunity and Necessity. *J. Appl. Eng. Sci.* **2020**, *10*, 27–30. [**Google Scholar**] [**CrossRef**]

90. Oncioiu, I.; Priescu, I. The Use of Virtual Reality in Tourism Destinations as a Tool to Develop Tourist Behavior Perspective. *Sustainability* **2022**, *14*, 4191. [**Google Scholar**] [**CrossRef**]