The role of virtual reality in sustainable tourism – a systematic literature review and research agenda

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Objectives | Tourism is an important industry for global economies, contributing to a significant proportion of jobs worldwide and moving millions of people each year (OECD, 2020). At the same time, tourism is also one of the most polluting industries and generates negative externalities in destinations (Gössling, 2013). For this reason, the scientific debate on sustainable tourism is so important since it can contribute to solving this problem by suggesting more sustainable practices. The pandemic crisis resulted in an abrupt and huge decrease in tourism worldwide. The restrictions on people's mobility made it impossible for them to enjoy face-to-face tourism services during some periods, and the importance of virtual tours has thus increased. Virtual Reality was one of the technologies used to conduct the virtual tours. This technology has also been demonstrated to satisfy tourists and influence their future intentions towards the destination. Therefore, previous literature suggests that, in the post-pandemic period, virtual reality can be used to contribute to the sustainability of the tourism industry (El-Said & Aziz, 2022; Talwar et al., 2022). Although there are previous studies that indicate that VR can contribute to more sustainable tourism, to our best knowledge there is no literature review that summarises the possible contribution of this technology to the sustainability of the tourism industry. The present research aims to better understand how virtual reality can contribute to sustainable tourism.

Methodology | To accomplish this objective, a systematic literature review was conducted using the PRISMA procedure, following the guidelines of Moher et al. (2009). The data collection process was performed while using two databases, namely Scopus and Web of Science. The data collection process was conducted until the 29th of June 2023. To collect data from data bases, it was used the following equation to search for scientific articles TITLE-ABS-KEY(touris*) AND TITLE-ABS-KEY(sustainab*) AND TITLE-ABS-KEY(("virtual tour*"). For an article being included in our sample, the three keywords used must be present in the title, abstract and keywords. To guarantee that all

documents have passed through a peer review process, this search was limited to articles, excluding book chapters and conference procedures. As this research aims to have a deeper understanding on sustainable tourism, the subject area was limited to tourism and business/management areas. Finally, only articles in English were considered. After, apply all these conditions, 61 articles were obtained in Web of Science and 92 articles were obtained in Scopus, being all of them were considered for the identification stage of PRISMA procedure. In the screening stage, all abstracts have been read, but when some uncertainties exist, the conclusions and implications sections were also read. From the 153 initial articles, 98 articles were excluded because did not accomplish one of the following criteria: use Virtual reality technology, discuss the use of this technology for tourism purposes and refer sustainability of VR used for tourism. Finally, 7 articles were excluded due to duplication. All the articles included in the sample were analyzed the content of each one, in particular, it was captured information about authors, year of publication, publication source, number of citations, country of application, objective, method, VR experience, sustainable tourism addressed and marketing implication(s).

Main Results and Contributions | Virtual reality is a technology included in a broader concept, that is virtual tourism. However, this technology has several advantages compared with other technologies, as it provides a more immersive and authentic experience. This technology may contribute to sustainability by replacing some face-to-face physical tourist experiences, which reduces the environmental and social impact of tourism. In addition, VR can also be introduced into the business model of organizations in this industry as a promotional tool for local products, improving the appreciation of these products by tourists. The literature on this topic is mostly composed of very specific case studies worldwide, which makes generalization of the results difficult. For example, the study of Plata et al. (2022) provides a description of a situation where a VR system is used to contribute to a more sustainable heritage management about Mérida. The present research also proposes a research agenda composed of three main research lines for future studies. The first line is related to the concepts that may influence tourists' intentions to use this technology to substitute tourism activities that can be more negative to the environment or to the destination. The second research line is related to the determinants of virtual reality adoption by tourism organizations. Lastly, the third research line is related to the features that virtual reality experiences should have to increase tourists' perceptions and intentions towards the destination.

This study aims to contribute to the scientific literature and to tourism marketing professionals. For the scientific literature, this study aims to contribute by discussing how VR can increase tourism industry sustainability, since it collects the empirical evidence from the previous literature since this study collects what has already been studied about the potential of VR for the development of more sustainable tourism activities. Additionally, this study also provides to the literature a research agenda for future investigations to answer questions that have not yet been answered by the

previous studies. In terms of contributions to marketing practitioners in the tourism industry, this study aims to contribute by systematizing information that was dispersed in several studies. This systematization of the literature will enable them to make more informed decisions about adopting VR to offer more sustainable tourism services. Furthermore, the present study provides several insights into the effect that VR can have on tourists' future intentions toward tourism services or destinations. For this reason, tourism marketing professionals should consider the use of VR for promotion purposes and to include the adoption of VR in digital transformation strategies.

Limitations | The present study also has limitations, like other scientific studies. The main limitation is related to the collection of data process, since Scopus and Web of Science databases were used in this process. However, these data bases were select to collect articles since both are two of the most relevant scientific data bases with documents that are peer review (Adriaanse & Rensleigh, 2013).

Conclusions | Although there has been some research into the use of VR to provide more sustainable tourism services, there are still few developments that provide a solid theoretical framework about this topic. Despite the few empirical evidence, some studies have already used VR to provide tourist activities to increase the sustainability of the experience and users have reported positive perceptions about these VR experiences.

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