The influence of virtual attractions on the willingness of potential tourists to visit cultural tourism destinations

Mingxuan Yang

Master in Tourism Development and Culture

Supervisor:
Sílvia Cavalinhos, Adjunct Assistant Professor,
Department of Marketing, Operations and General
Management, ISCTE- IUL

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Resumo

Sendo uma tecnologia importante, a Realidade Virtual (RV) tem atraído a atenção de académicos de um vasto leque de disciplinas devido ao seu realismo, imersão e experiência. Prevê-se também que venha a ter um impacto significativo no turismo. Atualmente, sendo um tema tendência no meio académico do turismo, o marketing turístico da RV tem atraído muitos debates.

A partir de diferentes bases teóricas e perspetivas, os académicos têm-se dedicado a explorar os mecanismos através dos quais a tecnologia de RV promove a vontade dos potenciais turistas de viajar para destinos turísticos. No entanto, devido ao aparecimento tardio da tecnologia e ao curto período de atenção académica, ainda há muito espaço para a exploração de estudos de campo sobre os processos e os resultados, e há uma área por explorar sobre a influência na cultura da tecnologia de RV.

Este estudo criou uma atração virtual, e recolheu dados pós-experiência através do método de inquérito por questionário, tentando complementar e melhorar a tecnologia de realidade virtual para promover a intenção dos potenciais turistas de visitar destinos turísticos. Os resultados mostram que: (1) a qualidade da apresentação da RV não é um fator-chave que afete a experiência dos turistas; (2) o aspeto cultural da RV é crucial, o que afeta diretamente a vontade de gastar dinheiro dos turistas. (3) A importância da conceção da interatividade é superior à da conceção dos aspetos do conteúdo. Com a premissa de tirar conclusões relevantes, o presente estudo sugere que os agentes de viagens e os gestores de destinos turísticos podem promover e comercializar o turismo através da tecnologia de RV, mas no marketing com RV deve ser dada atenção à inovação e desenvolver os recursos culturais das atrações.

Palavras-chave

Atração virtual; Experiência do turista; Interatividade; Turismo cultural;

Classificação JEL

M310- Marketing, L830- Sports; Gambling; Restaurants; Recreation; Tourism

Abstract

As an important technology, Virtual Reality (VR) has attracted the attention of scholars from a wide range of disciplines for its vividness, immersion, and experience. It is also expected to have a significant impact on tourism. Currently, as the hottest topic of VR technology in foreign tourism academia, VR tourism marketing has attracted a lot of heated discussions.

From different theoretical backgrounds and different perspectives, scholars have devoted themselves to exploring the mechanisms by which VR technology promotes potential tourists' willingness to travel to tourist destinations. However, due to the late emergence of the technology and the short period of academic attention, there is still much room for exploration of field studies on mechanisms and outcomes, and there has been an underappreciated area of cultural influence brought about by VR technology.

This study creates a virtual attraction of its own, collects post-experience data through questionnaire survey method, tries to further supplement and improve the mechanism of virtual reality technology to promote potential tourists' intention to visit tourist destinations. The results show that:(1) the quality of the VR presentation is not a key factor affecting tourists' sense of experience;(2) the cultural aspect of VR is crucial, which directly affects tourists' willingness to spend money; (3) The importance of the design of interactivity is greater than the design of content aspects. On the premise of drawing relevant conclusions, this paper suggests that travel agents and destination managers of tourism marketing can promote and market tourism through VR technology, but in VR marketing, attention should be paid to try to innovate and develop the cultural resources contained in the attractions.

Keywords

Cultural tourism; Interactivity;; Tourist’s experience; Virtual attraction

JEL Classification

M310- Marketing, L830- Sports; Gambling; Restaurants; Recreation; Tourism

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1. Introduction

1.1. Background and rationale for the study

In recent years, in the field of science and technology, Virtual Reality (VR) technology, as the development momentum of relatively active emerging technologies, began to continuously integrate into people's lives. As the obvious value of this kind of technology began to be widely used in the scene visualization field, virtual reality technology was used to combine virtualization with a real scene to create a design scene close to the real world (Bec et al., 2021; Guttentag, 2010; Park et al., 2018; Zhang et al., 2018; Jerald, 2015).

VR can deliver new experiences or information to people regardless of time and space. Now, VR can bring the digital world into our reality. People can experience objects that are distant or nonexistent in front of them or see them from any angle in a 360-degree view. IDC (2020) forecasts that global spending on AR/VR will increase from USD 12.0 billion in 2021 to USD 72.8 billion in 2024. According to a study conducted by Statista in Germany, almost 50% of people will use VR as a tool for choosing a holiday destination (provided it is free). 13% of respondents are actually willing to pay for VR (Alsop, 2022). This illustrates the power of VR marketing and the ability of remote virtual tourism to motivate tourists to visit. While VR is niche, the prospects for the VR industry are highly appreciated. In line with this trend, user experience research in VR systems has increased significantly since 2017 (Kim et al., 2020). This shows that VR audiences are constantly expanding.

Several studies have shown that VR has significant advantages over traditional marketing tools in motivating tourists' willingness to travel (e.g., Huang & Hsu, 2009; Xiang et al., 2017). Xiang et al. (2017) found that virtual tourism influences tourists' attitudes toward advertising objects. Many scholars have recognised the potential and power of VR, particularly as a marketing tool (Guttentag, 2010; Lee et al., 2018; Tussyadiah, & Wang, 2018). VR can provide a more engaging destination experience and has the potential to trigger the perception of telepresence. The "immersive" feeling (Qiu et al., 2020) can make consumers "try before they buy". Previous research has found that the particular vividness and interactivity of the medium of representation are fundamental drivers in creating such engaging experiences for consumers. Depending on the medium, the level of vividness and interactivity may vary (Jung et al., 2019).

Cultural tourism is broadly defined as tourism activities that have culture as their theme and core (UNESCO, 2018), including visits to cultural heritage, museums, galleries, cultural festivals, etc. Cultural tourism is also rich in resources, as according to UNESCO (2023), there are 1,121 cultural heritage sites on the World Heritage List worldwide, including cultural landscapes, historic towns, and architectural complexes.

The economic scale of cultural tourism is huge, with the global cultural tourism market reaching US$5.42 trillion in 2019 and expected to reach US$11.2 trillion by 2027 (Allied Market Research, 2021). Currently, AR and VR are widely used in the tourism industry (Manuch, Z., 2017； Talwar et al., 2022). The cultural tourism industry is an industry where experiences and services are the products (Huang & Hsu 2009).

Due to this experiential nature, consumers not only want to gather information about the physical characteristics of the destination and inspiration for their next trip, but also want to preview the look and feel of the destination (Ebejer, 2019), among other things, to engage more intensely with a particular destination. Due to the intangible nature of tourism as a service, it is not possible to discover the 'experiential attributes' of a trip (Qiu et al., 2020), which makes it rather difficult to evaluate a destination before consumption without actually visiting it (Jung et al., 2019; Qiu et al., 2020; Manžuch,2017).

From a tourist perspective, although the cost of travel has been significantly reduced with the development of companies such as low-cost airlines (Correia et al., 2013), there are still many people who are unable to reach their actual destination due to financial problems. With the development of the tourism industry, the increase in tourism products, and the development of tourism resources (Urry, 1990), the supply side of the industry is becoming more abundant while the market becomes more competitive. Moreover, consumers may experience uncertainty in their travel purchase decisions and seek as much information about the destination as possible to reduce their perceived risk (Ozel & Kozak 2012).

How a destination can motivate visitors to travel and stand out among thousands of other destinations is something that needs to be considered by the destination. A similar study conducted by Tourism Australia found that nearly 20% of consumers use VR to choose a holiday destination. Around 25 percent of consumers said they plan to use VR to help them decide on holiday destinations in the future. However, Tourism Australia's research findings were mostly based on natural landscapes, and the marketing role of VR in natural landscape

tourism was recognized by visitors to Australia's natural attractions, with some consumers even showing a view that VR content related to nature, wildlife, aquatic, and coastal products could replace real-life tourism (Gradel & Edson, 2012;Huang & Hsu,2009; Rasul, 2022).

In recent years, scholars (Lee and Kim, 2019; Jung et al., 2019; Park et al., 2018, Xiang et al, 2017) have extensively examined the product effectiveness of VR tourism. However, there remains a research gap concerning the cultural output generated by VR tourism for visitors. Furthermore, there is a lack of clear research on the mediating effects of the VR experience.

Researchers have primarily focused on investigating the impact of VR tourism on various marketing outcomes (Chen et al., 2018; Lee and Kim, 2019; Park et al., 2018), such as tourist satisfaction, destination image, and behavioral intentions. They have explored the ability of VR technology to immerse individuals in virtual environments, providing them with a sense of presence and an opportunity to virtually explore destinations. These studies have highlighted the potential of VR as a powerful marketing tool in the tourism industry.

Nevertheless, limited attention has been given to the cultural output that VR tourism generates for tourists. Cultural understanding refers to the cultural experiences, knowledge, and understanding gained by individuals through their interactions with a particular destination or cultural context (Chen et al., 2018; Kozak and Rimmington 2000). With VR tourism, visitors have the opportunity to virtually engage with different cultural settings, landmarks, and heritage sites (Rasul,2022). However, the extent to which these virtual experiences contribute to visitors' cultural learning, appreciation, and understanding remains largely unexplored.

Furthermore, the mechanism through which the VR experience influences visitors' perceptions, attitudes, and behaviors is not yet clearly understood. The concept of mediating effects refers to the intermediate factors or processes that link an independent variable (in this case, the VR product quality) with a dependent variable (such as cultural understanding and economic effects). It is crucial to identify and understand the underlying mechanisms that drive the relationship between the VR experience and its outcomes.

Based on this, this study fully promotes the use of virtual reality technologies in cultural tourism and looks into how effectively virtual attractions can transmit the cultural experience of the attractions to tourists so that tourists have the willingness to visit the field.

1.2. Objectives and research questions

1.2.1. Study Main goal

This study aims to examine the influence of virtual attractions on the willingness of potential tourists to visit cultural tourism destinations. The study seeks to explore the value of VR tourism as a tourism product and the role of marketing in this context. Specifically, it focuses on the development of virtual scenery related to tourist visits in Lisbon.

1.2.2. Objectives

- To examine the variables that have been previously investigated concerning VR technology and cultural tourism and tourist's willingness.
- To investigate the value of VR tourism as a destination marketing way, particularly in the context of virtual scenery development related to tourist visits in Lisbon.
- To explore the main directions for the development of virtual scenarios (including scenic quality and interaction).
- To evaluate the content of virtual attractions and their influence on tourists' travel experiences and their intentions to engage in potential tourism activities especially the role of cultural aspects.
- To evaluate whether there are significant differences in the potential benefits brought by different types of cultural tourists to the attraction.

By conducting this research, the study contributes to the existing body of academic literature on the impact of VR technology in the field of cultural tourism. It seeks to provide insights into the potential value of VR tourism as a tourism product, shed light on the role of marketing in this context, and offer practical implications for the development and promotion of virtual attractions in Lisbon and similar destinations.

1.2.3. Research questions

RQ1: Are there a path among the quality of virtual attractions, tourist's experience of virtual attraction and tourist's willingness about the original attraction?

RQ2: What is the role of the cultural factors in the process of the paths from the quality of virtual attractions to tourist's willingness?

RQ3: Is there any significant difference in the potential value brought by different types of cultural tourists?

To gather relevant data, the study employs a questionnaire-based data collection method that targets potential tourists. The questionnaire aims to assess the tourists' experiences and their willingness to visit virtual attractions. Furthermore, it seeks to evaluate the content of virtual attractions, as well as the tourists' overall travel experiences and their intentions to engage in potential tourism activities.

1.3. Dissertation Structure

This research provides an overview of the current state of cultural tourism development and the challenges faced by cultural tourism destinations in their development efforts. A literature review is conducted to examine the recent popularity of virtual reality (VR) technology and consider how it can be integrated with cultural tourism to foster the development of cultural tourism and enhance the revenue-generating capacity of cultural tourism destinations. Subsequently, quantitative analysis is performed based on field survey data collected in the region under study. The analysis explores the path relationships among variables and investigates the mediating effects of virtual tourism experiences. Furthermore, differential analysis is conducted to examine the potential economic impacts of different population segments on the tourism destination. The finding are discussed and theoretical and practical implications recommendations offered. The existing study's limitations and future research directions in the field are presented.

2. Literature Review

2.1. Cultural tourism

Before defining cultural tourist destinations, it is necessary to clarify what cultural tourism is. The emergence of tourism as a social phenomenon and as an object of academic research can be traced back to the rise in post-World War II leisure travel. With the post-war economic recovery and the spread of Fordism, tourism has gradually become a need of people's daily lives, and tourism is gradually becoming a modern industry. With the increase in demand, modern landscapes have begun early planning, development, and operational activities (Richards, 2018).

The first formal meeting of European tourism ministers took place in December 1988, following proposals from the Commission. A large number of the actions undertaken in 1990 were related to cultural tourism (Richard, 1996; Van der Borg et al, 1996). The European Commission designated cultural tourism as a key area of tourism development in Europe in 1990 (Richards, 1996). Since the 1990s, in many tourist destinations, cultural tourism has become a good phenomenon and is increasingly becoming the target of academic research. Increasing numbers of research articles were published, each of which related to a unique combination of theoretical and methodological methods (Smith & Richards, 2013). In his study on the history of cultural tourism development, found that literature on cultural travel has also emerged since 1990 and that its number has been growing year by year.

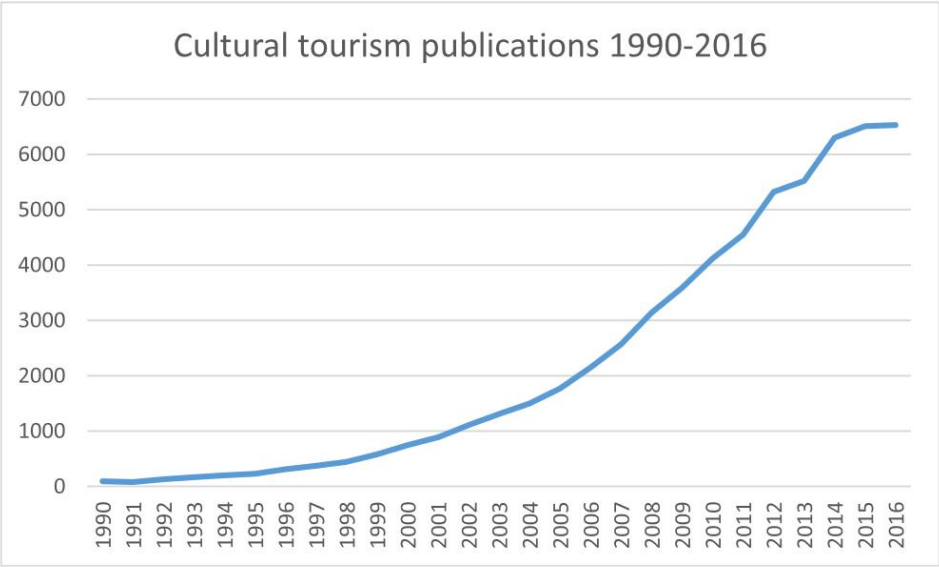


Figure 1 – Cultural tourism publications 1990-2016

Source: Greg Richards, 2018

In 2014 cultural tourism was identified as one of the most common types of tourism practiced in the modern world. Some estimates suggest that between 50 and 80 percent of all domestic and international travel involves some element of culture, such as going to museums and historic sites and being immersed in the living culture of a destination, which can be found in Figure 1.(Richards, 2018). At the 22nd session of the General Assembly of the United Nations World Tourism Organization (UNWTO), held in Chengdu, China (UNWTO, 2018), cultural tourism was given a new operational definition as one of the types of tourism.

The definition of cultural tourism has been debated since the end of the last century, and cultural tourism itself is difficult to define, as culture and tourism are two intertwined and mutually influential objects, and in the eyes of some scholars, tourists visiting cultural heritage are clearly engaging in cultural tourism. However, the act of watching a show, visiting a beach, etc. is not part of cultural tourism (Ebejer, 2019). Other scholars hold a different view, like Urry (1990) that believes that "tourism is culture". He argues that all acts of tourism are a form of local cultural export and that all tourism products are to some extent embedded in local culture.

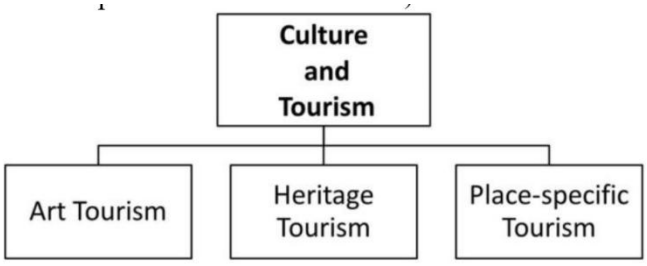


Figure 2 – Definitions of culture related to tourism.

Source: Ashworth, 1995

Ashworth (1995) classifies culture and tourism, in Figure 2, with the first and most limited definition being aesthetic productivity. This is regarded as 'art tourism', which in his definition is the most commercial aspect of cultural tourism, expressed in terms of creative products, cultural performances, cultural exhibitions, etc. The second category is heritage

tourism, where tourism activities are based on the tourism resources of the heritage itself, selling tickets and other commercial activities (Ashworth,1995). Heritage is defined as preserved buildings, conserved urban landscapes, and morphological patterns and places associated with historical events and personalities (UNESCO,2023), meaning that culture can be defined as the common set of values, attitudes, and thus the behaviour of a social group.

Ashworth (1995) gives a conceptual definition of cultural tourism as "the movement of persons to cultural attractions away from their normal places of residence with the intention to gather new information and experiences to satisfy their cultural needs'(Ashworth, 1995, p.7). Another more technical definition is "All movements of persons to specific cultural attractions, such as heritage sites, artistic and cultural manifestations, arts and drama outside their normal place of residence" (Richards, 2010, p.15). Richards (1996; 2018) defines cultural tourism as a type of tourism activity in which the visitor's essential motivation is to learn, discover, experience, and consume the tangible and intangible cultural attractions and products in a tourist destination.

In conjunction with the definition of cultural tourism, cultural tourism destinations can be those attractions that pertain to a collection of distinct material, intellectual, spiritual, and emotional characteristics of a civilization, including arts and architecture, historical and cultural heritage, and living cultures with their lives, values, beliefs, and customs.

2.1.1. Motivations and behaviour of cultural tourists

Several studies on the analysis of cultural tourism tourists' motivations, culture is the first motivation of cultural tourists (Richards 2018; McKercher and Du Cros, 2002). Distinguishing whether a tourist's first motivation is to experience culture can be done through a simple questionnaire, as the tourist's first motivation is often more obvious and the first motivation is a decisive factor in making tourism decisions. Galí-Espelt (2012) defines two broad kinds of cultural tourists: those whose primary objective is to consume culture, and those whose primary motivation is something other than culture.

Ozel and Kozak (2012) found five separate cultural tourism incentive groups based on cluster analysis: "Relaxation Seekers," "Sports Seekers," " Family Focused," "Escapists," and "Achievement and Autonomy Seekers". Correia, Kozak, and Ferradeira (2013)'s work also demonstrate the distinction between people who seek culture and those who use it as an

escape. Stebbins (1996) argues that, in general, cultural tourists can be divided into two types, specialized and general, both of which have little interest in the consumption of cultural part.

McKercher and Du Gros (2002) provide a more detailed classification of cultural tourism. They categories cultural tourists into five types based on two dimensions, namely 'centrality of cultural tourism in the decision to visit a destination' and 'depth of experience'. Three types of cultural tourists; “serendipitous cultural tourist”,” purposeful cultural tourist” and “sightseeing cultural tourist”, can be described as cultural tourists in depth (specialized), as their main motivation and the experience they are looking for is cultural values, thus choosing a cultural tourist destination.

According to the list provided by Stebbins(1996), these three types of cultural tourists can be considered specialised and the other two; ”incidental cultural tourist and casual cultural tourist”, fall under the category of general cultural tourists. McKercher(2002),concluded that in quantitative terms "specialized" and "general" cultural travelers are almost identical worldwide.(Figure 3)

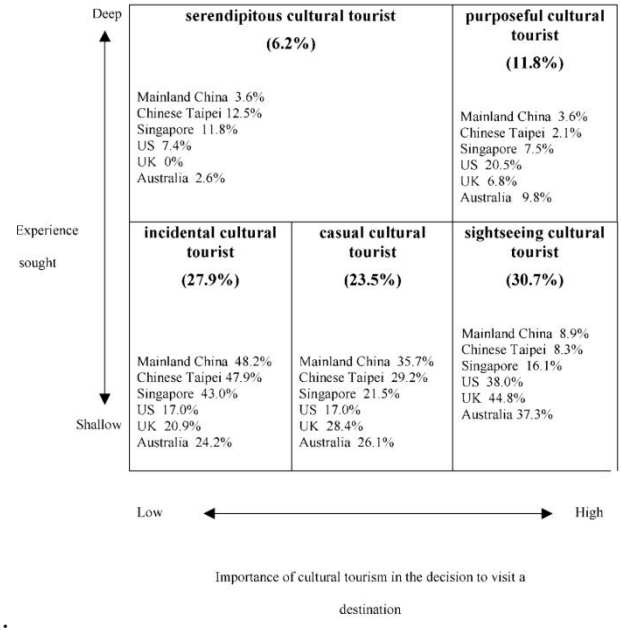


Figure 3 - A cultural tourist typology. Source: McKercher, 2002

In 2013, Niemczyk (2013) divided six hundred tourists visiting monuments and museums in Cracow into three groups based on their travel motives and tourist behaviour and conducted a questionnaire. He found that among the 600 tourists who visited Krakow, the

number of visitors who belonged to the category of "purposeful cultural tourists" was much higher than that of those belonging to the category of "incidental cultural tourists", and that the richer the tourist destination's cultural resources were, the higher the proportion of tourists among them. The provision of sports, recreation, and entertainment is not connected with culture but satisfies tourist's time.

This means that virtual exhibitions do not make much sense in a tourist attraction because of the high content of "purposeful cultural tourism" in cultural tourism-rich areas, this type of person is not very interested in entertainment facilities and only uses them for entertainment rather than experience. Then the equipment for laying the scene cannot focus on entertainment but on culture. In addition, in the general sense, common tourists prefer entertainment. Therefore, for the 'purposeful cultural tourist', the benefits of remote VR are far more likely to attract them to visit a tourist attraction than to visit a VR device set up in a tourist attraction. For the common tourist, both remote and scenic installations are attractive but with a focus on entertainment.

2.1.2. Importance of cultural tourism destinations for local and national economies

Cultural tourism is becoming a major source of business and employment in today's economy (Richards, 2018). The World Tourism Organization estimates that cultural tourism accounts for about 40% of global tourism (UNWTO, 2018). Cultural tourism is defined as a form of tourism in which cultural attractions are the main reason to visit a destination, providing visitors with the opportunity to understand and appreciate the essence of a place. The optimal utilization and revitalization of the cultural resource base has promoted the economic development of the destination, affected employment, increased consumption, and ensured people's living and life satisfaction in the destination. (Ruden, 2023).

The development of cultural travel, clearer and more diverse in terms of cultural content, motivation, and experience (Niemczyk, 2013), has generated demand for travel-related services and attracted digital marketers looking for potential customers. Many companies use digital multilateral platforms or simply sell travel products (e.g. C-Trip) (Shang et al., 2020). Other travel companies use the combination of digital technology with cultural tourism products, such as Lisbon Story Centre, the history that relies on Lisbon culture and history as a major tourism project, as a private company that combines technology such as voice

navigation, digital exhibitions, and traditional cultures to make a profit, is an example of a company that sells travel products.

Overall, cultural tourism is still a small-scale market today. McKercher's (2002) found that it accounts for only 11.8 percent of loyal tourists. These loyal tourists do not have a strong consumer capacity either. Tilden (1977) believes that the main goal of visitors to museums and heritage sites is to learn. Purposeful heritage tourists would be more willing to spend more on entrance fees than on other additional items (Prentice, 1989).

Although there is no evidence that cultural tourism tourists consume less than other forms of tourism, compared with cultural tourist attractions and spa services in the resort, the level of consumption in the form of entertainment tourism is higher than in culture tourism. But the kinds and prices of cultural tourism products are simpler and cheaper for tourism compared to recreational forms, so because of the limited variety and price of cultural travel products, even if 11 % of the loyal tourists have a high purchasing power, the sightseeing area does not provide services or products that can make high consumption (Niemczyk, 2013).

The correspondingly loyal customers for cultural tourism may not be consumers who don't like entertainment in their habits, but rather cultural tourist destinations that do not offer entertainment where tourists really consume. So, the key is to use VR products that combine entertainment and culture（Silva & Henriques, 2021). Keep a loyal audience while attracting the other four categories of tourists as they make more money. Meanwhile look at the common characteristic among five different types of cultural traveller is benefit to attract travelers from different types.

2.2. Virtual Reality – evolution, advantadges and challenges

2.2.1. VR technology and evolution

The term "virtual reality" refers to a combination of computer-generated, three-dimensional, graphical, interactive environments and interface devices (Bryson, 1995; Wann and Mon-Williams, 1996). As early as the 1930s, the writer Aldous Huxley, in his book "A Brave New World,", envisioned a future society in which humans could be better immersed in films with the help of a headset or device that could simulate the adult senses of smell and perception (Woiak, 2007). In 1935, the British author Stanley G. Weinbaum introduced virtual reality

glasses in his literary work "Pygmalion's Spectacles". Suppose that a person wearing a device can see a virtual world that has the same sense of reality as the real world (Martirosov and Kopecek, 2017).

VR was conceptualized in the early 1900s, and it took many people to bring it from paper to reality. Although the early virtual reality devices were still functionally flawed, this laid the technical foundation and ideological theory for the future development of virtual reality technology (Williams & Hobson , 1995). VR in the modern sense was first introduced by Ivan Sutherland in 1965 in an academic study entitled The Ultimate Display (Druck, 2006). The ultimate display in which the concept of the laptop monitor as a window into the world of make-believe is explicitly stated, is considered to be a great milestone in the history of virtual reality technology. In this article, the author argues for the use of the computer's touchscreen monitor as a "window into the virtual world" (Sutherland, 1965).

The first time that the key technologies of virtual reality were explored, was in the book Interaction design: Designed human-computer Interaction, edited by Preece et al (2015). VR is also presented from the perspective of interface design, although the book has been revised in successive editions to include corresponding spatial and action-oriented product design ideas. Jason Jerald (2015) is more systematic in his study of virtual reality and interaction in Human-centered design for virtual reality, in which the author takes the delayed perception of head-mounted displays as the research.

Since the 1970s, technology giants such as IBM in the United States have been applying virtual reality to specific aspects of their work. They were the first to commercialize virtual reality technology in the context of rapid advances in computer technology (Renz and Hilbig, 2020). In 1995, Nintendo released the Virtual Boy, the first portable virtual reality video game console, and the Virtual Boy is said to be the first video game console to represent stereoscopic 3D images (Boyer, 2009). In 2012, a VR device project from the crowdfunding network Kickstarter rekindled interest in the concept of VR. That year, a young Palmer Luckey launched a crowdfunding campaign for an Oculus VR device on Kickstarter. Oculus' project also seemed to arouse human enthusiasm for VR technology, and the crowdfunding project was widely appreciated by the market. In 2014, Facebook announced that it had bought Oculus for $2 billion, and the acquisition completely ignited a new wave in the VR industry. In nearly half a century of development, cutting-edge VR devices such as the HTC

Vive, Oculus, Steam VR, and PS VR were eventually created (Gleasure and Feller, 2016; Harley, 2020). In the content area, major game makers are also actively exploring ways to represent VR games.

There are two main applications of VR in tourism: one is erected in scenic areas and is geared towards tourists as a tourism product. This is one of the more popular forms of VR in cultural tourism, and this form of application has very little impact on tourists' willingness to visit a attraction during tourism planning and can only be considered as a tourism resource with little to no marketing role (Tussyadiah & Wang, 2018). The other is remote virtual attractions, a form of virtual tourism that allows tourists to experience the tourism resources of a tourist attraction without having to leave their homes. On the one hand, such virtual attractions can be used as a kind of tourism product on a VR platform to charge tourists for the experience, and on the other hand, they can also be used as a form of content marketing for the tourist attraction (Xiang et al., 2017).

VR has been in development for nearly half a century now, and it has only moved from cutting-edge technology to a form of entertainment available to the masses when digital devices became widespread. However, due to the high price of VR devices and the limited availability of VR products, virtual reality is not yet considered a universal service (Tuomaala, J, 2020) But with the rapid development of technology, the market for VR technology has been growing. Its global market size is estimated to increase from $7.3 billion in 2018 to $120.5 billion in 2026 (Tuomaala, 2020).However, a significant part of the VR market share is consumer software, especially video games, as VR helmets like Facebook’s Oculus Quest and HTC’s VIVE are about to radically transform gaming and entertainment. Under this trend, the game concept of VR promotes the rapid development of the industry. According to China Signal Institute data, the global shipment of virtual reality (VR) terminals in 2020 will be approximately 5.67 million units, and it is expected to reach 33.75 million by 2024, with a combined annual growth rate of 56% (Mordor Intelligence, 2019). It can be said that the market prospects of VR are foreseeable in the future.

2.2.2. Advantages and challenges of VR in tourism

VR products have a direct promotional effect on tourist income, and the process for visitors to experience VR products is inspired by the desire to visit attractions. After conducting a qualitative study of 30 VR panoramic video experiences, Park et al. (2018)

found that visitors had a significant improvement in the attraction's Visit Intention, which verified the effect of VR video on promoting tourism.

VR is also effective in protecting heritage. Hajirasouli et al(2021), who conducted research on the collection and recording of the visual content and development patterns of cultural heritage, used VR devices to export the process to visitors in a visualized form by collecting the process of destruction of the heritage and successfully stimulating the interest of visitors and raising awareness of heritage protection.

"This implies that consumers' favorable attitude towards VR tourism as an environmentally sustainable and pandemic-wise viable option of touristic travel positively associates with their willingness to sacrifice the enjoyment of in-situ tourist travel and opt instead for VR tourism to protect the environment and support sustainability initiatives." (Talwar et al., 2021, p.19). The result is that VR tourism is an effective means of reducing pandemic anxiety, and the anxieties of pandemics in the epidemic environment at the time are positively linked to consumer ecological guilt based on environmental sustainability concerns, i.e., VR travel directly or indirectly reduces ecological blame, explaining the motivation of VR users in the context that even at the end of the pandemic, people can choose to abandon real tourism.With only a year to go until the end of the pandemic, we look forward to more research on whether attitudes toward VR in the post-pandemic era are the same as before.

Virtual attractions are difficult for tourists to experience compared to the authenticity of the tour itself（Park et al. 2018; Talwar et al., 2021; Niemczyk, 2013). Although virtual attractions are computer-programmed to show virtual things, real objects such as fire bulbs, cameras, etc. will seriously affect the reality of the attractions, especially in the virtual sites where historical sites will not appear. But given the difficulty of modeling, it is impossible to fully restore all the details of the sights; the authenticity of the virtual sight needs to be further tested; and it is also difficult to completely restore the sites around the site, which is also an important factor affecting the reality of the site. Hence, the goal of VR tourism is not to replace real tourism behaviour, but like out-of-campus training institutions in schools, VR should be a beneficial complement to actual cultural tourism destinations.

2.2.3. Applications of VR in tourism

The development of virtual reality in tourism is still in the exploratory stage. The focus of most scholarly research has been on the concept of virtual tourism, its characteristics, and the analysis of the pros and cons of its development. To fully understand the potential of the technology, preliminary research is needed to assess users' willingness to adopt and accept or reject the technology, as well as tourists' feelings and experiences during virtual tourism, so that tourism products (i.e., museum visits, tours of cultural heritage sites, amusement park experiences, etc.) can be developed innovatively and marketed appropriately (Xiang et al., 2017).

German scholars B. Lutz and M. Weintke (1999) studied the Dunhuang Caves and found that tourists' tourism needs could be met in a virtual reality environment even if they did not visit the caves in person. Daniel A. Guttentag (2010) is very optimistic about the future of virtual reality in tourism, arguing that it can provide direct, practical value to the industry and has potential for heritage conservation.

VR technology offers unlimited potential for large-scale virtual tours of real tourism destinations. With its unique capabilities and ability to simulate complex, real-life situations and contexts, VR is touted as an alternative to actual travel. However, some scholars argue that this has so far been unrealistic. For example, Tavakoli and Mura (2015) found that their participants did not consider virtual travel in its current form to be realistic enough to replace physical travel. Obtaining a sufficient degree of authenticity from the virtual world could be the tipping point for the influx of interest in virtual tourism from the academic and travel industries. Similarly, Wreford et al (2019) have shown that current 360° VR technology is not a substitute for actual tourism activities but could encourage users to engage in future tourism activities. While VR travel is still not a substitute for reality travel, it is worth exploring how much VR can serve as a complement to real travel.

Since the rapid development of e-commerce at the beginning of this century, digital marketing methods relying on new media have gradually become the mainstream way of marketing, especially in the destination marketing of cultural tourism destinations. Digital marketing methods can be highly effective in reaching and engaging potential travelers, and are often more cost effective than traditional marketing methods（Gretzel et al., 2015). By leveraging the power of digital marketing, destination marketers can target specific audiences, measure the success of their campaigns, and build relationships with potential travelers.

Among these digital marketing methods, social media marketing is the most common and effective method for tourism destinations.

Social media marketing involves using social media platforms such as Facebook, Instagram, Twitter, and TikTok to promote a destination through targeted advertising, influencer partnerships, and user-generated content (Lee & Yoon, 2018).

Oh and Parks (2015) examined the antecedents and effects of social media usage on destination brand awareness and travel intention in the context of South Korea. The results showed that social media usage has a positive effect on both destination brand awareness and travel intention. In addition, the study found that the relationship between social media usage and destination brand awareness is mediated by perceived informativeness, perceived entertainment, and perceived credibility. Overall, the study suggests that social media can be a powerful tool for destination marketers to increase brand awareness and attract more tourists. The study also provides insights into the mechanisms through which social media influences destination brand awareness, and highlights the importance of perceived informativeness, entertainment, and credibility.

The advent of VR has changed the way tourism providers create and deliver tourism experiences, and the way visitors perceive and experience destinations. The commercialisation of virtual environments for mobile phones and the web has enabled marketers to use virtual reality applications to motivate and guide guests into active participants who can experience products and destinations from the comfort of their homes. The most common context in which virtual reality is currently being researched is as a marketing tool that provides potential visitors with a more engaging image of the destination by giving them a 'try before you buy' experience (Jung et al., 2019). It can enhance awareness, and help branding and destination marketing, with the goal of increasing visitor numbers to the destination.

In a study on the impact of VR on tourism, Williams & Hobson (1995) predicted the revolutionary impact of VR on the promotion and sale of tourism products. Meanwhile, numerous foreign scholars have argued that VR can help destination marketers create memorable experiences and integrate them into their communication strategies, as well as help tourists in their information search and decision-making.

Zhang et al. (2000) point out that the realization of virtual tourism achieves a great tourism promotion effect and is able to attract the attention of tourists. The virtual tour also fulfills the visitation and aesthetic needs of those who have never visited the site before. Yuan (2005) uses virtual reality technology to integrate tourism attractions into the natural environment in an online game scenario. Through the publicity of the Internet game, the promotion impact of the attraction is increased, and the effectiveness of the marketing of the tourism attraction is achieved. Just in 2017, virtual reality destination marketing campaigns made a breakthrough with global brands such as Etihad Airways, The New York Times, and Disney.

Social media marketing has become one of the newest, most widespread, and most effective marketing methods for tourist destinations, and VR marketing, as a new form of digital marketing, is a content marketing method that is worthy of comparison. As a new form of digital marketing, VR marketing is worth comparing with social media marketing in terms of its effect on the willingness of tourists to travel.

3. Research Hypothesis

In their study, Moura et al. (2017) compared the impact of different communication media, namely Virtual Reality (VR), websites, and brochures. They observed that VR significantly increased travel intentions compared to the other two mediums. However, comparing VR with traditional marketing methods in the context of cultural tourism became less relevant, as tourist destinations have increasingly shifted their marketing focus towards new media marketing, particularly social media (Lee & Yoon, 2018).

Regarding the quality of VR products and user experiences, several scholars have explored the relationship between the two. For instance, Sarah Kenderdine (2016) discussed the utilization of immersive virtual reality in museums, highlighting its potential to enhance visitor experiences by creating interactive and engaging exhibits. Jungkeun Kim and Ju-Young Kim (2021) found that interactive virtual reality can increase consumer engagement and enhance brand experiences in luxury fashion brand marketing. The level of interactivity in a campaign positively influences customer experiences. Dana Mitroff Silvers (2013) demonstrated that augmented reality and virtual reality can enhance the visitor experience in museums by providing interactive and engaging exhibits. Masanori Sugimoto et al. (2019) focused on graphics and discovered that high-quality graphics and interaction in virtual reality marketing can enhance consumer engagement and improve their overall experience. Therefore, we anticipate a positive correlation between the Immersion Interaction Graphics rating of a virtual attraction and visitors' enjoyment of the experience within the virtual attraction:

H1a: Tourists’ evaluation of interactivity (TEI) has a positive impact on the Tourists' experience of virtual attraction (TEVA).

H1b: Tourist's evaluation of interactivity (TEI) has a positive impact on the Tourists' Cultural understanding (TCU).

Virtual products have been found to have a positive impact on visitors' cultural understanding. Barceló and Forte's (2015) explores how virtual reality and gaming technologies can enhance cultural heritage experiences and improve visitors' cultural understanding. Similarly, Ioannides and colleagues' (2014) discusses how virtual and augmented reality technologies can be used to preserve and present cultural heritage sites and

enhance visitors' cultural understanding. Zarei and Moinzadeh's (2016) study on Iranian English as a foreign language learners found that a game-based learning approach improved their cultural knowledge and awareness. Finally, Timmers and colleagues' (2017) study showed that a serious game improved participants' cultural knowledge and skills. Several studies suggest that virtual games can play an important role in improving visitors' cultural understanding. Consistent with previous studies, hypothesis that when experiencing virtual tourism destinations, tourists' evaluation of virtual attractions is positively correlated with their cultural understanding .

H2a: Tourist's evaluation of graphics (TEG) has a positive impact on the Tourists' experience of virtual attraction (TEVA).

H2b: Tourist's evaluation of graphics (TEG) has a positive impact on the Tourists' Cultural understanding (TCU).

Research in tourism field has demonstrated that tourists' evaluation of their virtual tourism experience has positive effects on their willingness to visit attractions, consume related products, actively promote, and participate in cultural activities. Lee et al. (2018) found that virtual reality experiences positively affected tourists' willingness to visit attractions and engage in cultural activities. Buhalis and Li (2018) demonstrated that virtual reality experiences had a positive effect on tourists' evaluation of destination attributes and their willingness to consume related products. Similarly, Xiang et al. (2017) showed that virtual reality experiences positively affected tourists' evaluation of destination attributes and their willingness to promote the destination. Tussyadiah and Wang (2018) proposed a conceptual framework for understanding the impacts of virtual reality tourism, including its effects on tourists' evaluation of destination attributes and their willingness to participate in cultural activities. These academic studies highlight the importance of considering tourists' evaluation of their virtual tourism experience when designing and promoting tourism products and destinations. Hence, we formulated the following hypotheses:

H3a: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists’ willingness to consume the attraction (TWC).

H3b: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists' willingness to actively promote (TWAP).

H3c: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists' willingness to cultural participation (TWCP).

Previous studies have demonstrated that tourists' cultural understanding of the tourism destination has positive effects on their willingness to visit attractions, consume related products, and actively promote, and participate in cultural activities, such as, Kozak and Rimmington's (2000) study, that found that tourists' cultural understanding positively affected their destination loyalty, which includes their willingness to visit attractions, consume related products, and participate in cultural activities. Similarly, Huang and Hsu (2009) demonstrated that cultural tourism experiences positively affected tourists' destination loyalty. Chen and colleagues (2018) found that tourists' cultural understanding positively affected their destination image and visit intention, which includes their willingness to visit attractions, consume related products, and participate in cultural activities. These studies highlight the importance of considering tourists' cultural understanding of the destination when designing and promoting tourism products and destinations. In this way, the following hypotheses are formulated:

H4a: Tourists' Cultural understanding (TCU) has a positive impact on Tourists's willingness to consume for the attraction (TWC).

H4b: Tourists' Cultural understanding (TCU) has a positive impact on Tourists' willingness to actively promote (TWAP).

H4c: Tourists' Cultural Understanding (TCU)) has a positive impact on Tourists' willingness to cultural participation (TWCP).

Further, Chen and Huang (2019), who explored the impact of virtual reality (VR) on tourists' evaluation of a cultural tourism experience, found that tourists who experienced VR had higher levels of satisfaction and the intention to revisit the destination compared to those who did not experience VR. In addition, Qiu et al. (2020) investigated the relationship between tourists' evaluation of virtual attractions and their overall experience in a museum context. They found that tourists' evaluation of virtual attractions positively influenced their overall evaluation of the museum experience.

These results demonstrate that tourists' evaluation of virtual attractions can have a positive effect on their evaluation of the overall tourism experience. Implementing virtual attractions such as VR and AR can enhance tourists' satisfaction and their intention to revisit the destination or attraction. Therefore, virtual attractions can be a useful tool for tourism managers to improve the overall quality of the tourism experience. Based on this, hypothesizes could be set up as:

H5: Tourists' evaluation of experience (TEE) has a mediating effect between the Tourists' evaluation of virtual attraction (TEV) and The potential value brought by tourists to the original attraction(PTO).

Based on McKercher and Du Gros' (2002) definition to categorise tourists into five types of cultural tourists, the two variables are the centrality of cultural tourism in the decision to visit a destination and the depth of experience. The 'depth of experience' component, as explained in McKercher's (2002) study, is replaced by 'the proportion of culture-related content in the trip, which was used as a proxy. The reason for not using Niemczyk's (2013) definition of the five categories of cultural tourists is that Niemczyk uses qualitative research in his studyto categories travelers by interviewing them about their motivations and specific travel behaviours, which on the one hand is not the focus of the research but only to explore the target market for virtual tourism and to paint a picture of consumers. On the other hand, it is not appropriate for this study, which uses quantitative research. However, the specific classification criteria refer to the research of Niemczyk's (2013).

The categorisation of cultural travelers comprised five distinct types. The presence of a significant difference in their respective willingness to visit after experiencing the virtual attractions would directly impact the marketing target audience of cultural tourism destinations and subsequent market segmentation. As a result, we formulated the following hypothesis:

H6 - There are significant differences between different types of cultural travelers.

The tourist experience of the visitors was assessed, focusing on two aspects: firstly, the evaluation of virtual attractions, which included the following dimensions: Immersion, referring to the extent to which users felt transported into the virtual world and disconnected from reality; Interaction, examining the quality and responsiveness of user interactions with

the virtual world and objects (Bec et al., 2021); and Graphics, assessing the quality and realism of visual and audio elements in the game (Atzeni et al., 2022). Additionally, the tourists' travel experience was taken into account. The concept of enjoyment and comfort was associated with what Venkatesh (2000) categorized as essential motivations for participation in virtual worlds. Another dimension considered was Cultural Understanding, examining the extent to which users comprehended the culture of the attraction (Atzeni et al., 2022; Ebejer, 2019).

To assess the positive and negative impact that visitors can have on the attraction. The first dimension is the willingness to visit attractions. Whether or not visitors are willing to visit the actual attractions after visiting the virtual ones needs to be studied, as it is related to the revenue of the entrance fees and the revenue of the cultural and creative products related to the attractions Mayer and Vogt,2016). The third dimension is the willingness to consume related products, where souvenirs and other creative products are an important part of tourism revenue for destinations (Mayer and Vogt,2016; Tiefenbacher,2000). The fourth dimension is the willingness to actively promote, where consumers can bring not only economic benefits but also potential benefits from publicity (Reynard, 2008). These dimensions can be found in the table 1 and Figure 4 reveals the relations among the dimensions and the directions of further researches

Table 1- Model constructs and Measurement items Source: Own elaboration

Construct Names		**Measurement Items**	**Sources**
Tourists' evaluation of virtual attraction(TEV)	Tourist's evaluation of interactivity （TEI）	Video interactivity Audio interactivity Image interactivity Text interactivity	Bec et al., 2021
	Tourist's evaluation on graphics（TEG）	Graphics authenticity Graphics aesthetic Graphics size	
Tourists'	Tourists'	Comfort	Atzeni et al., 2022

evaluation of experience(TEE)	experience of virtual attraction （TEVA）	Enjoyment Immersion	Ebejer, 2019 Venkatesh ,2000
	Tourists' Cultural Understanding （TCU）	Cultural understanding Cultural attraction Cultural appreciation	
The potential value brought by tourists to the original attraction(PTO)	Tourists' willingness to consume for the attraction(TWC)	The willingness to visit the original site. The willingness to consume related products in VR The willingness to consume related products on the site	Mayer and Vogt,2016 Tiefenbacher,2000
	Tourists' willingness to actively promote (TWAP)	The willingness to actively promote the Virtual attraction in person The willingness to actively promote the original attraction in person The willingness to actively promote Virtual attraction online The willingness to actively promote the original attraction online	Reynard, 2008
	Tourists' willingness to cultural participation	The willingness to participate in relevant cultural activities, exhibitions, etc.	Wang et al.,2015

	(TWCP)	The willingness to learn more about the local culture. The willingness to learn about the history of the scenic area

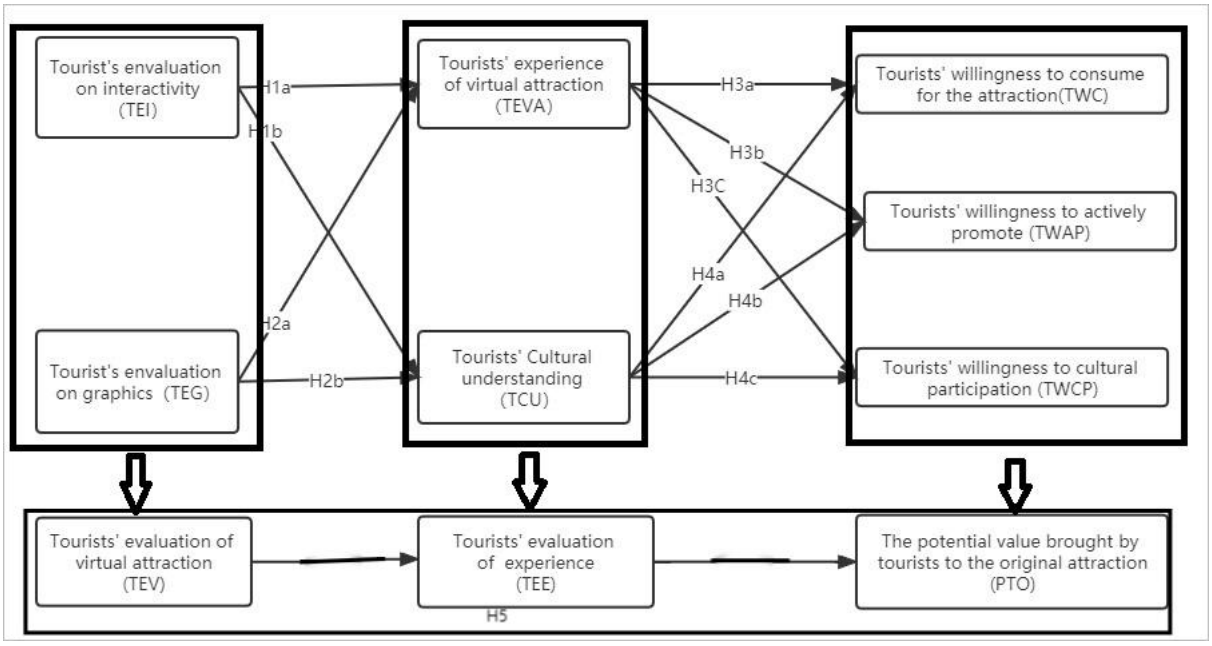


Figure 4 – Statistical model of the research Source: Own elaboration

4. Methodology

The research method used in this study is quantitative, and the data was collected using a questionnaire and applied by the researcher. The questionnaire was divided into categorical variables and numeric variables (Likert scale). The categorical variables were gender, age, occupation, education, whether the respondents had used VR products, and whether they had visited the source area. Settling variables: the questionnaire used a 7- point Likert scale to measure the items or the answers.

The survey was divided into 3 sections. The first part of the study focuses on descriptive characteristics such as age, gender, and occupation. The second part is based on Niemczyk's (2013) framework and consists of two questions. The first question measures the importance of cultural factors in the pre-travel planning process for tourists. The second question seeks to capture a descriptive account of tourists' travel behavior in Lisbon. The third part of the study is the key component for validating the statistical model. After experiencing the VR attractions, tourists are invited to complete assessments in three areas:

Evaluation of VR attraction quality: Tourists provide their assessment of the quality of the VR attraction they experienced. This evaluation may include factors such as the level of immersion, graph quality, and overall interactivity with the virtual experience.

Evaluation of the sense of presence during the VR experience: Tourists rate their level of presence or comfort in the virtual environment during their VR experience. At the same time, the degree of cultural absorption of the attraction is also a part of our assessment. This evaluation measures the extent to which the VR technology successfully transported them to the simulated destination.

Evaluation of willingness to consume the original physical destination: Tourists indicate their willingness to engage in actual tourism activities and spend money at the original physical destination, and the desire to explore the local culture based on their VR experience. This assessment aims to determine the impact of the VR experience on tourists' intention to visit and spend money at the real-world location.

4.1. Data collection

This research focuses on heritage tourism, the most typical form of cultural tourism. Using the National Pantheon in Lisbon, Portugal, as a destination, modelling and developing an application through Unity, and using the Pico 4, a VR device, as the research equipment.

The primary data for this study were obtained by collecting information from participants through a self-administered web-based questionnaire. The questionnaire was used to collect data for testing the research questions, all of which involved closed-ended questions about participants' virtual tourism experiences in a 3D virtual tourism environment. The data collection of virtual scenic experiencers was carried out in early May 2023 at Parque Eduardo VII and Alameda Dom Afonso Henriques.

VR tourism can be a new tourism product for tourism destinations, but this is still an emerging process that requires research on its business prospects, especially from the customer's perspective. Therefore, in this research, It was used the newest and latest technology, Blender and Unity Engine, to build a virtual attraction and research three aspects: the scope of the audience of virtual scenery in the context of cultural tourism; the way the virtual scenery brings the tourist experience to the visitors; and the potential economic benefits that visitors can bring to an attraction by experiencing a virtual attraction. To evaluate the business potential of the virtual attraction.

The National Pantheon (Church of Santa Engrácia) is a historical 17th-century monument located in Lisbon, Portugal. Initially serving as a church, it underwent conversion into the National Pantheon, designated as the final resting place for significant Portuguese figures.

4.2. Sampling and sample size

Reinhard (2010) suggests that a combined data collection approach is needed to understand the experience of virtual worlds. Similarly, Choi, Kim, and Kim (2007) suggest that researchers should collect data from a diverse sample to reduce bias and enhance the generalizability of results. Therefore, in this study, I set up booths in two parks and randomly invite visitors to experience a virtual attraction developed by myself and then fill out a questionnaire. The sample of participants was voluntary and randomly selected. The experiment will last for a fortnight, and the sample size is 151. The sample size of 151 is

determined according to the following formula, z determines the confidence level, the z value is generally 1.96 corresponding to the 95% confidence level; d is the percentage of a feature in the target population set to 0.05; p is the acceptable accuracy level, we take 0.08

$$n = \frac{z^2 \cdot p \cdot (1-p)}{d^2}$$

The convenient sample of tourists who visited Lisbon in early May was selected to participate in the study, experiencing the self-built virtual site.

4.3. Data analysis

SPSS was the software used for data analysis. Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to analyze the data. Inferential statistical techniques such as correlation and regression analysis were used to test the research hypotheses. Path analysis was used to examine the relationship between model effects and test the model hypotheses, which were employed to test hypotheses 1–4. The bootstrap analysis was used to indirectly test the results of the path analysis and analyze the mediation effects on tourists' evaluation of the experience regarding tourists' evaluation of virtual attractions (TEV) and the dependent variable, tourists' willingness to travel (TWT). An independent sample t-test was used to test hypothesis 5. Hypothesis 6 was tested using a T-test after classifying cultural tourists into five categories based on Niemczyk's (2013) classification criteria.

Data was collected using a questionnaire administered through the Qualtrics platform, with the aim of studying the target population's perspective on the cultural tourism destination and assessing the potential positive impacts of VR tourism on tourism development in the area. A tabular format was employed for data presentation and analysis in the survey.

4.4. Ethical considerations

Informed consent was obtained from all participants before they completed the survey questionnaire. Participants were assured of the confidentiality of their responses, and no identifying information was collected. The study complied with all relevant ethical guidelines and regulations.

5. Results

5.1. Sample profile

Among the 151 respondents, 45.03% identified as female, while 54.97% identified as male, indicating a slight male predominance. The participants were aged between 18 and 25 (41.06%), with younger age groups (<35) representing a significant portion of the sample. In educational level, 74.83% held a bachelor's degree, while 22.52% had completed primary school or high school education. Only 2.65% possessed advanced degrees. Regarding occupation, employees constituted the largest group (41.06%), followed by students (29.14%) and self-employed individuals (15.89%). The study revealed that 19.21% of respondents had used VR devices, while 80.79% had not engaged with VR technology. These findings provide valuable insights into the demographics of potential VR users and can inform future research and marketing strategies in the virtual reality industry (Table 2).

Table 2 - Descriptive statistics for dimensions constructs Source: SPSS

Name	Characteristics	N (151)	percentage% (100)
Gender	Female	68	45.03
	Male	83	54.97
Age	< 18	21	13.91
	18-25	62	41.06
	26-35	35	23.18
	35-45	26	17.22
	>46	7	4.64
Educational level	Primary school or high school	34	22.52
	Bachelor	113	74.83
	Master or PhD	4	2.65
Occupation	Student	44	29.14
	Employee	62	41.06
	Entrepreneur/Professional	4	2.65

Name	Characteristics	N (151)	percentage% (100)
	Self-employed	24	15.89
	Homemaker	14	9.27
	Retired	2	1.32
	Unemployed	1	0.66
Actual use VR devices	Yes	29	19.21
	No	122	80.79
Sum		151	100.0

5.2. Classification of cultural tourists

The role of cultural factors in travel planning to Lisbon varied among the respondents can be found in table3 . The majority (42.38%) identified as sightseeing cultural tourists, who were interested in sightseeing and experiencing the interesting and unusual sites or learning a little about Lisbon's culture and heritage in the city as well as regarding cultural factors are important while tourism planning. Casual cultural tourists comprised a significant portion (23.84%) of the respondents, indicating a strong focus on exploring the cultural heritage of Lisbon. Serendipitous cultural tourists and purposeful cultural tourists represented 12.58% and 11.26% of the sample, respectively. A smaller percentage (9.93%) represents the number of incidental cultural tourists.

Table 3 - Classification of cultural travelers in Lisbon Source: SPSS

Classification		What is the role of cultural factors in your travel planning to Lisbon?			Sum
		Unimportant/ not very important	Neither important nor unimportant	Important or very important	
Which option best matches your behavior since you arrived in Lisbon?	Mostly sightseeing/ photography or seeing interesting and unusual sites	15(9.93%) incidental cultural tourist	36(23.84%) casual cultural tourist	64(42.38%) sightseeing cultural tourist	115
	To learn a little about				

	Lisbon's culture and heritage				
	To learn a lot about Lisbon culture and heritage	5(3.31%)		17(11.26%) purposeful cultural tourist	36
	To develop a deep understanding of Lisbon's culture and heritage	14(9.27%) serendipitous cultural tourist			
	Sum	20	50	81	151

Table 4 T test result of different traveller's PTO Source: SPSS

	cultural travelers	N	Mean	Std. Deviation
PTO	Specialized cultural travelers	100	4.303	.9203
	General cultural travelers	51	4.202	.9638

Independent Samples Test

		F	Sig.	t	Df
PTO	Equal variances assumed	.291	.590	.628	149
	Equal variances not assumed			.619	96.743

The study examined the role of cultural factors in travel planning to Lisbon among different types of cultural tourists. According to McKercher's (2002) classification of cultural tourists., the majority of respondents (42.38%) identified as sightseeing cultural tourists, indicating their interest in sightseeing, experiencing interesting and unusual sites, and learning a little about Lisbon's culture and heritage. Casual cultural tourists accounted for a significant portion (23.84%) and demonstrated a strong focus on exploring the cultural heritage of Lisbon. Serendipitous cultural tourists and purposeful cultural tourists represented 12.58% and

11.26% of the sample, respectively. A smaller percentage (9.93%) consisted of incidental cultural tourists. Tourists' willingness to cultural participation (Niemczyk, 2013).

To further analyze the potential value brought by these cultural tourists to the original attractions in Lisbon, the participants were divided into two groups: specialized cultural travelers (including serendipitous cultural tourists, purposeful cultural tourists, and sightseeing cultural tourists) and general cultural travelers (incidental cultural tourists and other serendipitous cultural tourists). The mean and standard deviation of the variable PTO (potential value brought by tourists) were calculated for each group in Table 4.

An Independent Samples Test was conducted to determine if there was a significant difference in the mean PTO scores between the two groups. The test assumed equal variances, but the obtained F-value of 0.291 with a p-value of 0.590 indicated that the assumption of equal variances was marginally violated. Overall, the results suggest that there is no significant difference in the mean PTO scores between specialized cultural travelers and general cultural travelers, regardless of the assumption about equal variances.

For specialized cultural travelers, the mean PTO score was 4.303 with a standard deviation of 0.9203. In comparison, for general cultural travelers, the mean PTO score was 4.202 with a standard deviation of 0.9638. These findings indicate that both specialized and general cultural travelers contribute a similar level of potential value to the original attractions in Lisbon.

In conclusion, the study highlights the varied role of cultural factors in travel planning among different types of cultural tourists visiting Lisbon. The majority of tourists identified as sightseeing cultural tourists, but no significant difference was found in the potential value brought to the original attractions between specialized and general cultural travelers. This suggests that both groups play a significant role in contributing to the potential value of cultural tourism in Lisbon.

5.3. Cronbach's Reliability Analysis and Confirmatory factor analysis

The analysis of the questionnaire items using Cronbach's Reliability Analysis and Confirmatory Factor Analysis yielded ensuring results. The questionnaire demonstrated strong internal consistency, with high Cronbach's alpha coefficients ranging from 0.817 to

0.864 for the various question sets. This suggests that the questions within each set are highly reliable and consistently measure the intended construct.

The Confirmatory Factor Analysis provided further support for the validity of the questionnaire. The standardized factor loadings ranged from 0.764 to 0.823, indicating strong associations between the questionnaire items and their respective factors. The Average Variance Extracted (AVE) values ranged from 0.534 to 0.794, indicating that the questionnaire items accounted for a substantial amount of variance in their respective factors. These findings confirm the questionnaire's ability to accurately measure the construct of interest.

Overall, the reliability and validity analyses indicate that the questionnaire is a robust and effective tool for gathering data on the intended construct. The questionnaire has accurate and consistent data, suitable for meaningful analysis and interpretation(Table 5).

Table 5 Cronbach's Reliability Analysis and confirmatory factor analysis Source: SPSS

Cronbach's Reliability Analysis and confirmatory factor analysis						
Questions	CITC	α coefficient with deleted terms	Cronbach αc	Standardised factor Loading (Std. Estimate)	AVE	CR
Q9_1	0.703	0.817	0.864	0.778	0.601	0.858
Q9_2	0.711	0.814		0.794		
Q9_3	0.685	0.825		0.765		
Q9_4	0.708	0.816		0.764		
Q10_1	0.599	0.731	0.783	0.698	0.548	0.784
Q10_2	0.640	0.687		0.778		
Q10_3	0.627	0.701		0.742		
Q11_1	0.696	0.683	0.804	0.823	0.584	0.808
Q11_2	0.633	0.754		0.740		
Q11_3	0.630	0.755		0.726		
Q12_1	0.611	0.751	0.795	0.700	0.567	0.797
Q12_2	0.662	0.699		0.771		

Cronbach's Reliability Analysis and confirmatory factor analysis						
Questions	CITC	α coefficient with deleted terms	Cronbach αc	Standardised factor Loading (Std. Estimate)	AVE	CR
Q12_3	0.644	0.715		0.786		
Q13_1	0.311	0.863		0.702		
Q13_2	0.417	0.860	0.792	0.775	0.561	0.793
Q13_3	0.463	0.858		0.768		
Q14_1	0.700	0.818		0.780		
Q14_2	0.712	0.813		0.806		
Q14_3	0.694	0.820	0.857	0.753	0.598	0.856
Q14_4	0.694	0.820		0.754		
Q15_1	0.582	0.723		0.685		
Q15_2	0.609	0.694	0.774	0.760	0.534	0.774
Q15_3	0.634	0.666		0.745		

5.4. KMO and Bartlett test and discriminant validity

For the Tourist's evaluation of interactivity (TEI), the square root of the AVE was 0.775, which is greater than the absolute value of the inter-factor correlation coefficient of 0.332, meaning that it has good discriminant validity. For Tourists' evaluation of graphics (TEG), the AVE square root value of 0.740 is greater than the absolute value of the inter-factor correlation coefficient of 0.310, which means that it has good discriminant validity. For Tourists' experience of virtual attraction (TEVA), the AVE square root value of 0.764 is greater than the maximum value of the absolute inter-factor correlation coefficient of 0.332, implying good discriminant validity. For Tourists' Cultural understanding (TCU), the AVE square root value of 0.753 is greater than the maximum value of the absolute inter-factor correlation coefficient of 0.293, which means that it has good discriminant validity. For Tourists' willingness to consume the attraction (TWC), the AVE square root value of 0.749 is greater than the maximum value of the absolute inter-factor correlation coefficient of 0.330, which means that it has good discriminant validity. For Tourists' willingness to actively promote (TWAP), the AVE square root value of 0.774 is greater than the maximum value of the absolute inter-factor correlation coefficient of 0.332, which means that it has good

discriminant validity. For Tourists' willingness to cultural participation (TWCP), the AVE square root value of 0.731 is greater than the maximum value of the absolute inter-factor correlation coefficient of 0.323, which means that it has good discriminant validity.

The validity of the questionnaire was assessed using the Kaiser-Meyer-Olkin (KMO) measure and the Bartlett's sphericity test which can be found in (table 6). The KMO value was 0.765, indicating a satisfactory level of sampling adequacy. The Bartlett's test of sphericity yielded a significant result, with an approximate chi-square value of 1438.190 and a p-value of 0.000, suggesting that the correlation matrix was not an identity matrix and that the variables were significantly correlated. These results provide evidence of the reliability and validity of the questionnaire, supporting its suitability for measuring the construct under investigation.

Table 6 -Correlation and KMO and Bartlett test Source: SPSS

Correlation of the constructs							
Construct	TEI	TEG	TEVA	TCU	TWC	TWAP	TWCP
TEI	0.775						
TEG	0.246	0.740					
TEVA	0.332	0.303	0.764				
TCU	0.206	0.127	0.292	0.753			
TWC	0.312	0.162	0.169	0.261	0.749		
TWAP	0.332	0.305	0.284	0.293	0.330	0.774	
TWCP	0.323	0.310	0.232	0.267	0.073	0.249	0.731
KMO and Bartlett test							
KMO						0.765	
Bartlett sphericity test			Approximate chi-square			1438.190	
			df			231	
			p-value			0.000	

5.5. Path analysis

Path analysis, sometimes referred to as structural equation modelling, if it includes both measurement and structural models, or path analysis if it includes only structural models. Path analysis is the study of model influence relationships and is used to test model assumptions (Stage et al., 2004)

Table 7- Summary table of model regression coefficients of path analysis (part 1) Source: SPSS

Summary table of model regression coefficients						
X	→ Y	Unstandardized coefficients	SE	z (CRvalue)	p	standardized coefficients
TEG	→ TCU	0.080	0.080	0.990	0.322	0.081
TEI	→ TCU	0.184	0.081	2.268	0.023	0.186
TEG	→ TEVA	0.234	0.076	3.058	0.002	0.235
TEI	→ TEVA	0.276	0.077	3.565	0.000	0.274

The path analysis examined the relationships between variables X and Y, revealing important insights into their effects. The results indicate that Tourist's Evaluation of Graphics (TEG) had a weak and non-significant effect on Tourists' Cultural Understanding (TCU), as indicated by the unstandardized coefficient of 0.080, standard error of 0.080, and non-significant p-value of 0.322. On the other hand, Tourist's Evaluation of Interactivity (TEI) had a moderate and statistically significant effect on TCU, with an unstandardized coefficient of 0.184, a standard error of 0.081, and a significant p-value of 0.023. These findings highlight the importance of interactivity in shaping tourists' cultural understanding. Regarding the relationship between TEG and Tourists' Evaluation of Virtual Attraction (TEVA), two separate paths were examined. The first path revealed that TEG had a moderate positive effect on TEVA, with an unstandardized coefficient of 0.234, standard error of 0.076, highly significant p-value of 0.002, and a standardized coefficient of 0.235. Similarly, the second path demonstrated that TEI had a significant and positive impact on TEVA, with an unstandardized coefficient of 0.276, standard error of 0.077, highly significant p-value of 0.000, and a standardized coefficient of 0.274. These results emphasize the importance of interactivity in shaping tourists' evaluation of virtual attractions. Overall, the findings highlight the role of interactivity in influencing both cultural understanding and evaluation of virtual attractions among tourists.

Table 8 - Summary table of model regression coefficients of path analysis (part 2) Source: SPSS

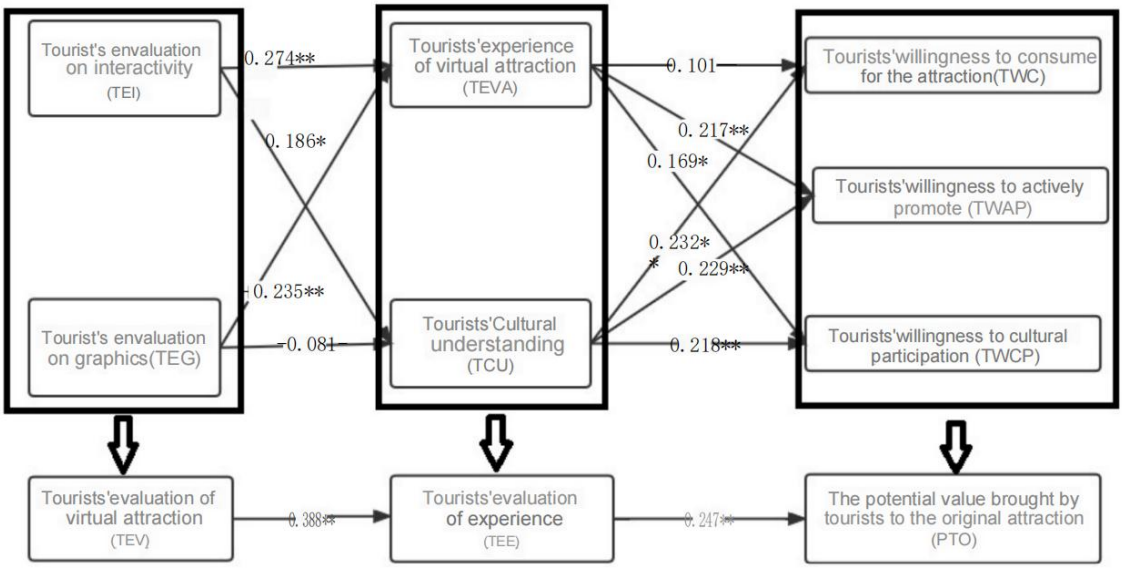
Summary table of model regression coefficients						
X	→ Y	Unstandardized coefficients	SE	z (CR value)	p	standardized coefficients
TCU	→ TWC	0.229	0.081	2.833	0.005	0.232
TEVA	→ TWC	0.099	0.080	1.239	0.215	0.101
TCU	→ TWCP	0.212	0.079	2.697	0.007	0.218
TEVA	→ TWCP	0.162	0.078	2.086	0.037	0.169
TCU	→ TWAP	0.227	0.079	2.887	0.004	0.229
TEVA	→ TWAP	0.212	0.077	2.737	0.006	0.217

The path analysis conducted in this study examined the relationships between variables in the model and their effects on various outcomes. The results indicate that Tourists' Cultural Understanding (TCU) has a significant and positive effect on Tourists' Willingness to Consume (TWC), Tourists' Willingness to Cultural Participation (TWCP), and Tourists' Willingness to Actively Promote (TWAP). The unstandardized coefficients for the TCU → TWC, TCU → TWCP, and TCU → TWAP relationships were 0.229, 0.212, and 0.227, respectively. These relationships were statistically significant, with z-values (CR values) of 2.833, 2.697, and 2.887, and p-values of 0.005, 0.007, and 0.004, respectively. The standardized coefficients were 0.232, 0.218, and 0.229, indicating a moderate positive effect of TCU on these outcomes.

On the other hand, the relationship between Tourists' Evaluation of Virtual Attraction (TEVA) and TWC showed a weak effect, with an unstandardized coefficient of 0.099, a z-value (CR value) of 1.239, and a non-significant $p = 0.215 > 0.05$. The standardized coefficient for this relationship was 0.101.TEVA had a moderate positive effect on both TWCP (standardized coefficient = 0.169) and TWAP (standardized coefficient = 0.217) with $p=0.037<0.05$ and $p=0.006<0.01$). These relationships were statistically significant, indicating their importance.Specific data of the path analysis can be found in the table 7 &8.

These findings highlight the importance of tourists' cultural understanding in influencing their willingness to consume, participate in cultural activities, and actively promote virtual

attractions cause all relations are significant. Meanwhile, the experience still makes an important role in effecting the TWCP, and TWAP. The findings contribute to a better understanding of the influences of TCU and TEVA on TWC, TWCP, and TWAP, and provide valuable insights for further research and practical applications.



*p<0.05 ** p<0.01

Figure 5 - Statistical model with standardized coefficients Source: Own elaboration

5.6. Testing mediating effects

As can be seen from the table, there are three models involved in the mediation effect analysis, which are:

PTO=2.327+0.458*TEV

TEE=2.758+0.388*TEV

PTO=1.647+0.363*TEV+0.247*TEE

These three models provide us with an exhaustive analysis of the mediating effects. The direct effect of variable Tourists' evaluation of virtual attraction (TEV) on The potential value brought by tourists to the original attraction (PTO) is 0.871 (p<0.01), which clearly indicates that TEV has a significant positive effect on PTO.

The sampling method of bootstrap was adopted for this mediation effect analysis, and through the data in the table below, it can be seen that a is significant, b is significant, and c' is also significant, and at the same time, a*b and c' are positive, so it is concluded that the mediator variable, Tourists' evaluation of experience (TEE), plays a partially mediating role in the relationship between the independent variable, TEV, and the dependent variable, PTO, and the effect size is 20.862 %.Specific data of the path analysis can be found in the table 9.

Table 9 - Results of the mediating test Source: SPSS

Results of the mediating test (n=151)												
	PTO				TEE				PTO			
	B	t	p	β	B	t	p	β	B	t	p	β
Constant	2.327**	8.934	0.000	-	2.758**	8.289	0.000	-	1.647**	5.493	0.000	-
TEV	0.458**	7.698	0.000	0.533	0.388**	5.097	0.000	0.385	0.363**	5.903	0.000	0.422
TEE									0.247**	4.038	0.000	0.289
R 2	0.285				0.148				0.356			
F	F (1,149)=59.256,p=0.000				F (1,149)=25.983,p=0.000				F (2,148)=40.826,p=0.000			
* p<0.05 ** p<0.01												

	c	a	b	a*b	a*b (p)	c’	Conclusion	Effect size
TEV=>TEE=>PTO	0.458**	0.388**	0.247**	0.096	0.002	0.363**	partial mediation	20.862%
* p<0.05 ** p<0.01								

Figure shows the result of path analysis and mediating effect test and Table 10 reveal the results of every hypothesis.

Table10 - Hypothesis verification results are based on path analysis Source: Own elaboration

Hypothesis to Test	**Decision**
H1a: Tourists' evaluation of interactivity (TEI) has a positive impact on the Tourists' experience of virtual attraction (TEVA).	**Supported**
H1b: Tourist's evaluation of interactivity (TEI) has a positive impact on the Tourists' Cultural understanding (TCU).	**Supported**
H2a: Tourists' evaluation of graphics (TEG) has a positive impact on the Tourists' experience of virtual attraction (TEVA).	**Supported**
H2b: Tourists' evaluation of graphics (TEG) has a positive impact on the Tourists' Cultural understanding (TCU).	**Not supported**
H3a: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists' willingness to consume the attraction(TWC).	**Not supported**
H3b: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists' willingness to actively promote (TWAP).	**Supported**
H3c: Tourists' experience of virtual attraction (TEVA) has a positive impact on Tourists' willingness to cultural participation (TWCP).	**Supported**
H4a: Tourists' Cultural understanding (TCU) has a positive impact on Tourists' willingness to consume for the attraction(TWC).	**Supported**
H4b: Tourists' Cultural Understanding (TCU) has a positive impact on Tourists' willingness to actively promote (TWAP).	**Supported**
H4c: Tourists' Cultural Understanding (TCU)) has a positive impact on Tourists' willingness to cultural participation (TWCP).	**Supported**
H5: Tourists' evaluation of experience (TEE) Influences tourists to the original in tourists' evaluation of virtual attraction (TEV). The mediating effect was produced in the process of attraction (PTO).	**"Partially" Supported***
H6 There are significant differences between different types of cultural travelers.	**Not supported**

6. Findings and Discussion

VR tourism has experienced a long period of development and has become an important reference factor for VR users to select tourist destinations, and its largely “previewable” nature of attractions determines that VR products can help attractions conduct marketing activities (Chen et al., 2018; Lee and Kim, 2019; Park et al., 2018； Chen and Huang,2019; Jung et al.,2019).

Despite the growing interest and importance of virtual reality tourism, there has been limited research in the field of virtual reality tourism on the impact of virtual programs on the cultural understanding and culture exploration aspects of tourists (Wang,2018; Xiang et al.,2017), as well as the lack of clear primary and secondary relations between the content of VR program and the way VR present to the tourists by evaluating the potential value that tourists could give to destination (Buhalis and Li , 2018) . To fill this gap, it was developed and studied a conceptual-statistical model that analyzes the evaluation of experience with the potential value brought by tourists to the original attraction resulting from the sense of virtual experience brought by the virtual attraction to tourists. In addition, this research examines the role of TEE as a mediating effect of TEV and PTO to a double-check.

The findings of the study provide valuable insights into the relationships between various constructs in the context of virtual attractions and cultural tourism. The path analysis results reveal important associations and effects among the variables examined. Firstly, the relationship between Tourist's evaluation of graphics (TEG) and Tourists' Cultural Understanding (TCU) was found to be weak and statistically non-significant. This suggests that the graphics-related factors, including authenticity, aesthetic, and size, do not significantly influence tourists' cultural understanding in the context of virtual attractions. This finding challenges the assumption that graphics play a significant role in shaping tourists' cultural perceptions (Dana,2013;Sarah,2016;Barceló and Forte 2015)

On the other hand, the relationship between Tourist's evaluation of interactivity (TEI) and Tourists' Cultural Understanding (TCU) was found to be moderate and statistically significant. This indicates that the level of interactivity in virtual attractions positively affects tourists' cultural understanding. Interactive features such as video, audio, image, and text interactivity enhance tourists' engagement and immersion, leading to a better understanding of

the cultural aspects presented in the virtual attraction. This means in the field of the cultural aspects content of VR products itself (quality) showed a lower place compare with the present way of VR products(interactivity)

Moreover, the study identified significant relationships between Tourist evaluation of graphics (TEG) and Tourists' evaluation of the virtual attraction experience (TEVA). Both the authenticity and aesthetic dimensions of graphics were found to have a moderate positive impact on tourists' overall evaluation of the virtual attraction. This highlights the importance of visually appealing and aesthetically pleasing graphics in enhancing tourists' satisfaction and enjoyment of the virtual attraction. Similarly, Tourist's evaluation of interactivity (TEI) was found to have a significant and positive effect on Tourists' evaluation of the virtual attraction experience (TEVA) like Masanori Sugimoto et al's finding (2019). The interactive elements, such as video, audio, image, and text interactivity, contribute to tourists' comfort, enjoyment, and immersion in the virtual attraction, thereby influencing their overall evaluation of the experience. Therefore, both quality and interactivity of VR products can affect on the tourist's experience of VR products.

Moving on to the second set of regression coefficients, the relationships between Tourists' Cultural Understanding (TCU) and various outcomes were examined. It was found that TCU has a significant positive effect on Tourists' willingness to consume for the attraction (TWC), Tourists' willingness to actively promote the virtual attraction (TWAP), and Tourists' willingness to cultural participation (TWCP). This implies that tourists with a higher level of cultural understanding are more likely to engage in consumption activities related to the attraction, actively promote the attraction, and participate in cultural activities and exhibitions, which showed the important role of the culture aspect in virtual tourism. Chen and colleagues (2018) found the similar result that tourists' cultural understanding positively affected their destination image and visit intention, which includes their willingness to visit attractions, consume related products, and participate in cultural activities.

Similarly, Tourists' evaluation of the virtual attraction experience (TEVA) was also found to have a significant positive effect on Tourists' willingness to actively promote the virtual attraction (TWAP), and Tourists' willingness to cultural participation (TWCP). This suggests that tourists who have a positive evaluation of the virtual attraction experience are more inclined to, actively promoting, and participate in cultural activities associated with it.

But the relation between TEVA and Tourists' willingness to consume for the attraction (TWC) is weak so it can not be concluded that good experience on virtual attraction can motivate tourists consuming in the real attraction.

The study also found that a significant number of respondents (53.64%) considered cultural factors as important or very important in their travel planning to Lisbon, but in real tourism behavior, the proportion of cultural factors will be less. Around 76.15% of tourists will not put culture in an important position in tourism activities. This is a very interesting contradiction, which shows that at the level of cultural tourism, publicity work or cultural attraction has been done well, but the actual cultural output effect, cultural tourism experience and cultural tourism resources cannot very attract tourists to truly experience culture and learn cultural connotation and this needs further researchs. The majority of tourists identified as sightseeing cultural tourists, but no significant difference was found in the potential value brought to the original attractions between specialized and general cultural travelers.

7. Conclusions

These conclusions provide valuable insights for both academics and practitioners in the field of virtual attractions and cultural tourism. They contribute to theoretical advancements by expanding our understanding of the factors influencing tourist experiences in virtual attractions. Moreover, the managerial implications offer practical guidance for the development, design, and management of virtual attractions to create immersive and culturally enriching experiences that resonate with tourists and drive their engagement and involvement.

7.1. Theoretical Contributions

This theory-based study contributes significantly to the field of VR tourism in the following ways: Firstly, it presents an integrated model that represents the path relationships among seven factors. This model is the first of its kind to assess how virtual reality products influence tourists' cultural understanding and their willingness to engage in cultural aspects of attractions. The empirical results of this study show that since TEG has no significant relationship to TCU, and TEVA and TWC do not have a significant relationship, which means out of the ten paths, eight were successfully confirmed.

Specifically, the study finds that TEI significantly affects TEVA and TEVA significantly affects TWAP, as well as TWCP. This indicates that the interactivity of virtual reality significantly impacts tourists' sense of experience and, consequently, influences their willingness to promote and participate in cultural activities.

Moving on to the perspective of cultural output, the study shows that TEI has significant paths to TCU, TWAP, and TWCP. This highlights the importance of interactivity in the scenic area and the transmission of content for cultural output. A positive cultural output effect can significantly influence tourists' willingness to consume the scenic area and participate in cultural activities. Comparatively, cultural output plays a crucial role in tourists' cultural understanding, making it an important aspect for creating potential income for attractions. Therefore, the development of interactivity in virtual reality products is essential.

Furthermore, the study indicates that TEG has significant paths to TEVA, TWAP, and TWCP, suggesting that virtual scenic areas can indirectly gain economic benefits by

improving their content and expression. This, in turn, enhances tourists' overall tour experience, which indirectly influences their willingness to spend money. However, improving content quality does not significantly affect tourists' cultural understanding or their willingness to spend money from a cultural perspective. Nonetheless, the cultural understanding of the attraction directly impacts the willingness to spend, while TEI, which does not significantly influence cultural understanding, is less crucial than TEI.

This research also evaluated the mediating effect of TEE between the independent variable TEV and the dependent variable PTO. The finding is that the partially mediating effect of TEE is proved and indirectly proved the integrated model mentioned before.

In conclusion, this study sheds light on the interplay between virtual reality, cultural understanding, and tourists' behavior. It emphasizes the importance of interactivity in virtual reality products and its potential impact on cultural output and economic benefits in the context of VR tourism.

7.2. Managerial Contributions

Numerous studies in the literature have demonstrated the significant positive impact of virtual tourism products on the promotion and marketing of attractions (Bec et al., 2021; Jung and Lee 2019). This study further supports these findings, revealing that virtual tourism products can indeed enhance tourists' willingness to engage in consuming, promoting, and exploring the cultural aspects of attractions.

Then in practice, based on the theoretical basis, in the design of virtual tourism products, the image quality of virtual attractions, the development of the content of the expression of resources should be put at the second place, under the interactive design of virtual tourism products. It is more important than stacking virtual tourism products to be able to design more interactive ways to deliver the content to the tourists' brains more effectively.

When designing virtual tourism products, tourist destination operators should try to show factors related to the history of the attraction, religion, and other culturally related factors, because the cultural identity and cultural understanding of tourists for the attraction are very helpful for tourists to generate the willingness to consume the attraction, the willingness to

publicize the attraction and the willingness to explore the culture, which attracts potential revenue for the attraction to attract tourists.

In the part of cultural traveler classification, tourist destination operators need to found that the attractiveness of the cultural products that the attraction can output in reality (including spiritual cultural cultivation and cultural and creative products in reality) to the tourists is far less than the attractiveness of the culture that the attraction advertises. Therefore, trying to innovate and develop the cultural resources contained in the attraction is the core competitiveness of the attraction to compete with other attractions in the future stage of the development of virtual reality technology. Specific measures may include designing special cultural and creative products, regularly holding cultural performances, cultural exhibitions and other activities, digging deep into historical materials, and enriching the content of attractions based on historical events.

In the future development of virtual attractions, developers should try to highlight the cultural factors in the attractions, such as adding traditional music as much as possible, adding historical story annotations to the items in the attractions, inserting cultural performance videos, etc., so as to completely bind the cultural content to the attractions, forcing tourists to leave a deep cultural content of the attractions after visiting the virtual attractions.

7.3. Main Conclusions

Interactivity, representing how the content of virtual attractions output including video, audio, image, and text interactivity, significantly influences tourists' cultural understanding and evaluation of virtual attractions. Graphics represent the content itself, specifically authenticity and aesthetic dimensions and have a significant positive impact on tourists' overall evaluation of the virtual attraction experience.

Cultural understanding plays a crucial role in influencing tourists' willingness to consume, actively promote, and participate in cultural activities related to virtual attractions. Tourists' evaluation of the virtual attraction experience has a positive effect on actively promote and engage in cultural participation but not their willingness to consume. On the other side of the cultural aspect, there is no significant difference in the revenue that these tourists potentially generate for the scenic area such as the willingness to consume generated by different cultural tourists after experiencing the virtual scenic area.

The study highlights the importance of interactivity in virtual attractions, demonstrating its positive influence on tourists' cultural understanding and evaluation of the overall experience. It underscores the role of cultural understanding and evaluation of the virtual attraction experience in driving tourists' willingness to consume, participate, and actively promote the attraction. The findings also suggest that while graphics-related factors may not directly impact cultural understanding, they contribute to the visual appeal of the virtual environment.

7.4. Limitations and Future Research

It is important to acknowledge the limitations of this study. Firstly, the study was conducted within a specific context, and the findings may not be generalizable to other cultural tourism settings or virtual attractions. Secondly, the study relied on self-reported data, which may be subject to response biases. Furthermore, the study focused on a specific set of variables related to interactivity, graphics, cultural understanding, and tourist behaviors. By addressing the limitations and exploring new avenues, future studies can contribute to the advancement of knowledge in this field and provide valuable insights for both researchers and practitioners in the cultural tourism industry.

For future research on virtual attractions and their marketing role, two research directions are given based on the results of this research, In terms of marketing effect, when sufficient data is accumulated, other content marketing means such as live broadcasts and video promotion can be Because after all, VR is not a very mainstream marketing method, and the influencer benefits and content marketing effects brought by social media are popular marketing methods(Moura et al., 2017), so comparing the marketing effect of virtual attractions with different content marketing channels is a crucial future research direction.

The other research direction for virtual tourism research is environment carrying capacity. From the perspective of climate change and over-tourism, those can threaten the environment of cultural tourism destinations, on the one hand, difficult climate can whether cultural tourists might be more sensitive to travel in difficult climatic cause wastage of the heritages and threaten the environment and infrastructures while tourists travelling(Firmansyah et al., 2020.). Even there is no data about whether cultural tourists might be more sensitive to travel in difficult climatic but there is still a possibility that VR can be an alternative to traditional travel

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9. Appendices

Appendix A：Questionnaire

1, Did you ever visit the national pantheon Lisbon before? (screening question)

Yes

No

2, What's your gender?

Female

Male

3, What's your age?

< 18

18~25

26~35

35~45

>46

4, What's your education background?*

Primary school or high school

Bachelor

Master or PhD

5, What's your occupation?*

Student

Employee

Entrepreneur/Professional

Self-employed

Homemaker

Retired

Unemployed

6, Did you ever use VR devices before?* (including personal VR devices and Commercial VR devices)

No

Yes

7, What is the role of cultural factors in your travel planning to Lisbon?

(Cultural factors include the cultural attraction of the destination, cultural activities and religious factors)

Unimportant/not very important

Neither important nor unimportant

Important or very important

8, Which option best matches your behavior since you arrived in Lisbon?

Mostly sightseeing/ photography or seeing interesting and unusual sites

To learn a little about Lisbon culture and heritage

To learn a lot about Lisbon culture and heritage

To develop a deep understanding of Lisbon culture and heritage

Question 9~15 used 7- point Likert scale

9, How would you rate the interactivity of the virtual attraction?

Video interactivity

Audio interactivity

Image interactivity

Text interactivity

10, How would you rate the graphics of the virtual attraction?（Graphics: the quality and realism of the visual and audio elements in the virtual attraction.）

Graphics' authenticity

Graphics' aesthetic

Graphics' size

11, How do you evaluate the experience by the virtual attraction?

Comfort

Enjoyment

Immersion

12, How do you evaluate the culture you received by the virtual attraction?

Cultural understanding

Cultural attraction

Cultural appreciation

13, How willing are you to consume for the original site?

The willingness to visit the original site

The willingness to consume related products in VR device

The willingness to consume related products in the original site

14, The willingness to consume related products in the original site?

The willingness to actively promote the Virtual attraction in person

The willingness to actively promote the original attraction in person

The willingness to actively promote the Virtual attraction online

The willingness to actively promote the original attraction online

15, How willing are you to participate in local culture?

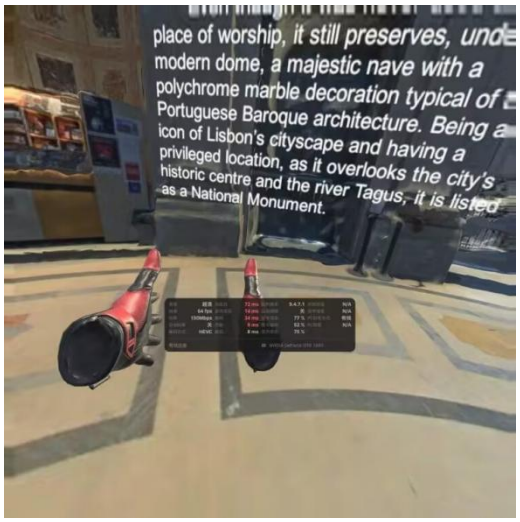
The willingness to participate in relevant cultural activities, exhibitions, etc.

The willingness to learn more about the local culture.

The willingness to learn about the history of the scenic area.

Appendix B： VR project screenshot

The hall of attraction



The gloves and text

Video of the attraction