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The emergence of virtual reality in the tourism sector: Opportunity or threat for museum

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Diplôme : Master en sciences de gestion, à finalité spécialisée en international strategic marketing
Année académique : 2022-2023
URI/URL : http://hdl.handle.net/2268.2/17573

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THE EMERGENCE OF VIRTUAL REALITY IN THE TOURISM SECTOR: OPPORTUNITY OR THREAT FOR MUSEUMS?

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Academic year 2022/2023

Acknowledgments

I would like to express my deepest gratitude to my promoter, Dr. Laurence Dessart, for giving me the opportunity to write this thesis. Her unwavering support and guidance throughout the process has been considerable. I hope that this work will live up to her expectations, as she has been a very dedicated promoter.

I want to say thank you to my reader, Pr. Michael Schyns, for having chosen my research and to taking the time to read it.

I also want to express my gratitude to my parents for their unconditional support, not only throughout the completion of this thesis, but also throughout my five years of study. I would therefore also like to thank Carine Laloy and Pierre Collin.

I wish to express my gratitude to my dear friends who have accompanied me throughout my two-year master programme, giving me constant support through the highs and lows. I would like to express my deep gratitude to Carla Estevez Alemany and Aurelie Fickers.

The completion of this thesis would not have been possible without the participation of dedicated individuals who gave their time to conduct the experiment. My gratitude extends to Caroline Michotte and Justine Evers, whose help in organising the logistics of the tests was invaluable. In addition, I would like to thank Anne-Christine Cadiat for the "Explore Foreign Market" workshop, which allowed me to deepen my understanding of virtual reality through my participation in various conferences on the subject at the SXSW fair in Austin, Texas.

I am deeply grateful to all these people who gave me their invaluable help, without which this project would not have been possible, and my heart is full of appreciation for them.

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Chapter 1: Introduction

1.1 Context

The concept of digital marketing has emerged when digital Information and Communication Technology (ICT) made significant advances in many different fields including market research (Guttentag, 2010; Sadamali Jayawardena et al., 2023). Digital marketing can be defined as "an adaptive, technology-enabled process by which firms collaborate with customers and partners to jointly create, communicate, deliver, and sustain value for all stakeholders" (Kannan & Li, 2017, p.23). Virtual reality is a topic that is expanding rapidly both in terms of technological advances and in the domains of its applications. Virtual reality allows the simulation of places and, therefore, of experience. In recent years, both managers and scholars have paid increasing attention to virtual reality. Virtual reality tools have become a subject of great interest for advertisers, as they offer the opportunity to provide potential customers with a realistic preview of a product or service experience, regardless of their location (Sadamali Jayawardena et al., 2023). In the past years, business investment in virtual reality has been intense. The first instances of virtual reality date back to the 1990s; even Ford began utilising it in 1999 for the design and manufacture of its automobiles. Virtual reality is not a new technology, but unlike tablets and smartphones, it has not yet become a popular consumer good (Barnes, 2016; Bogicevic et al., 2019). For many people, the technology is just out of reach due to its high cost.

Virtual reality refers to "The computer-generated simulation of a three-dimensional image or environment than can be interacted with in seemingly real or physical way by a person using special electronic equipment, such as helmet with a screen inside or gloves fitted with sensors" (Barnes, 2016, p.3). By building virtual environments that allow user interaction, virtual reality technology offers unparalleled immersive experiences. Numerous industries, including gaming, entertainment, marketing, education, product creation, and communication, have found use for virtual reality (Barnes, 2016; Lo & Cheng, 2020). Applications of this technology are even more widespread in the fields of simulations and video games (Sadamali Jayawardena et al., 2023). For example, theme parks, referred to as location-based entertainment (LBE), surfaced around 1992 and are ideal locations for virtual reality entertainment. One such example of this is the DisneyQuest Indoor Interactive theme park located in Orlando, which features virtual worlds as one of its main attractions (Williams & Hobson, 1995; Guttentag, 2010). An interesting possibility in virtual reality is its effectiveness as a learning and training tool. Compared to real life, virtual reality where multitasking is not possible improves the effectiveness of training and learning (Darnall et al., 2023). Its applications are versatile, such as complementing learners' practical experience, creating surgical simulations for budding doctors or offering virtual tours of architectural designs and structures. Last but not least, in the context of tourism; without leaving your home, tourism has the ability to transport you to places. The travel industry, in particular, is anticipated to benefit greatly from the implementation of virtual reality as a crucial advertising tool (Lo & Cheng, 2020).

However, the impacts of virtual reality on marketing are not always well understood (Barnes, 2016). Nevertheless, since virtual reality is becoming a growing trend in marketing, it is critical to comprehend its consequences. The use of virtual reality as a marketing tool has great promises (Williams & Hobson, 1995; Guttentag, 2010; Barnes 2016; Deng et al., 2019). In the context of tourism, there are several main areas where virtual reality technology might be employed, such as tourist policy and planning, sales and promotion, and environmental issues (Williams & Hobson, 1995; Sussmann & Vanhegan, 2000; Guttentag, 2010).

On the one hand, travel enthusiasts are excited about the promising future of virtual reality, which experts believe will play a central role in the tourism industry (Guttentag, 2010; Tussyadiah et al., 2017; Lo & Cheng, 2020). By stimulating various senses, such as sight and hearing, this revolutionary technology creates a hyper-realistic experience that easily transports customers to another time and place (Lo & Cheng, 2020). This is particularly relevant for intangible services such as holiday planning, facilitating a 'test' scenario for customers (Huang et al., 2013). For agencies trying to promote tourism, it is often difficult to know how to communicate well about a destination due to its intangible nature. Nevertheless, virtual reality stands out as a valuable asset for the destination marketing industry to use over conventional channels such as leaflet.

On the other hand, virtual reality allows for the recreation of any tourist destination's essence and qualities. Furthermore, when more realistic simulations become available, visitors may believe that visiting the place in person is no longer required (Cheong, 1995). This is explained by the phenomena of satiation, which is when you feel less enjoyment from performing something you have completed previously (Deng et al., 2019). The multiple benefits that come with virtual reality support the foundation of the view that it poses a threat to the tourism industry due to its capacity to substitute for travel. Travellers may anticipate a pleasurable experience that not only meets but may even exceeds their expectations due to seeing unreachable regions and going beyond reality by traveling through time becomes feasible with virtual reality. Administrative management (obtaining a visa, making reservations, etc.) and suitcase preparation while planning a vacation or traveling no longer waste time (Cheong, 1995).

Also upon further examination, it appears that the lifespan of a tourist site or attraction is analogous to that of a product. The product cycle theory proposes that the number of initial users of a product will be limited but will increase over time until it reaches a maximum point. After this peak, however, the number of uses and users of the product will gradually decrease. It is the same for a tourist destination; initially, there will be few visitors; as the location gets more well-known, the number of visitors will grow; but there will come a point when the area's desirability will drop (Butler, 1980).

The global epidemic of Covid-19 has also reshuffled the deck because the tourism industry was suffering from immense losses. This epidemic provided a chance to reconsider tourist practices. Indeed, due to travel restrictions, the tourist sector was forced to reinvent itself. Numerous virtual tours have evolved to provide the homebound population with virtual access to faraway places and attractions, fostering the potential of virtual reality to become a replacement alternative (Guttentag, 2020; Akhtar et al., 2021; Keumala et al., 2022). This innovation has been adopted by travel agents and numerous tourism destinations as a means of keeping the industry alive. This is illustrated by the following: The Ministry of Tourism and Creative Economy in Jakarta (Indonesia) has taken a unique approach by implementing virtual tours of the National Museum of Indonesia, a popular tourist attraction in Jakarta. The museum has introduced a virtual tour for promotional purposes, as well as a safe alternative for visitors, especially since physical visit has been prohibited (Keumala et al., 2022).

It is legitimate to ask whether recent developments in the tourism industry could affect the desire to visit certain destinations. Beyond endangering the tourist industry, if this theory turns out to be accurate, it may also be harmful for the nations that depend on tourism, particularly the Third World and emerging nations. The GDP of these nations experiences a non-negligible monetary flow as a result of the influx of people. These foreign investments in tourist infrastructure have a positive impact on both the local population's standard of life and the economy of the host nation (Cheong, 1995).

1.2 Research Motivations & Contributions

While marketing research is not a cure-all for all marketing issues, as stated by the American Marketing Association (AMA), it does assist in bridging the gap between the marketer and the customer and in making judgments regarding prospective possibilities or risks (Malhotra et al., 2017). This is why, in the framework of this research, it was decided to delve deeper into the potential and challenges of virtual reality for marketers in order for them to make the most informed choices possible.

First of all, although most of previous research has focused on the positive impact of virtual reality on customer reactions, the rationale behind this research is to investigate the potential for a negative effect on consumer consumption intentions when exposed to such an experience. Specifically, the objective of this research is to explore the impact of virtual reality platforms on consumer consumption behaviour towards services promoted through this medium. Some evidence backs up the suggestion of a potential detrimental influence. Actually, virtual reality has the potential to be a replacement good in the tourist industry (Cheong, 1995; Sussmann & Vanhegan, 2000; Deng et al., 2019; Guttentag, 2020). Substitution would be more of an indirect method in the context of virtual reality. That is, in contrast to television transmission of a sporting event, which directly replaces the in-person attendance at the event, virtual reality in tourism will encourage the replacement in an unconscious way. When considering the time and price constraints of tourists when traveling, exposure to an appropriate virtual reality experience might simply make some tourist excursions less appealing (Guttentag, 2020). A factor affecting the positive or negative impact of a past virtual reality encounter is the sort of experience desired, such as traveling versus visiting a museum. It is argued in destination marketing that a prior exposure to the location will have the impact of inspiring and driving the intention to go there, especially for experiences that are challenging to imitate like leisure travel. In fact, while current virtual reality technology may come close to replicating physical presence in many parts of the world, it is still not able to fully capture the most important aspects of "getting away" on vacation (Deng et al., 2019). As a result, virtual recreations of leisure travel experiences are not entirely reflective of reality. It is crucial to keep in mind, though, that this assertion is moderated by apparent resemblance (Deng et al., 2019). However, Deng et al. (2029) prove that when it comes to activities that require content that stimulates the intellect and emotions, such as visiting an art museum, virtual reality experiences may lead to a decrease in future consumption intention. The conclusions drawn from this research can be further explored as the study only used a 10-minute tour using a 360-degree video application (Google Art Project and Google World Wonder Project). Therefore, participants were not able to explore all areas of the museum due to time constraints. To address this limitation, the research includes a virtual environment where participants can experience a full tour of the museum as it would appear in real life.

The Substitution Acceptance Model has provided insight into what factors influence a person's willingness to accept a virtual reality tourism experience in place of their true counterpart. The model thinks about the user's attributes as well as the quality of the virtual experience (Guttentag, 2020). What our study may offer to this paradigm is a more empirical and current examination. Similarly, since 1995, there has been some reflection on the potential drawbacks of virtual reality on tourism, although the industry was still in its infancy. Nevertheless, no experimental analysis has been conducted in this regard. Moreover, as Cheong pointed out in 1995, it would be interesting to observe how the progress of virtual reality in the coming decades will impact on the future of travel and tourism. The level of newness of virtual reality experiences is an element that remains uncertain. It could be plausible that the initial use of this technology creates an exhilarating experience, and as it becomes more widely accepted, the level of enthusiasm may diminish (Griffin et al., 2017). It is questionable whether modern technology still has the novelty and 'wow' factor it once had.

While there have been previous inquiries into the utilization of virtual reality in museums, very few have delved into its antecedents and consequences in the realm of virtual reality. In essence, there is still a paucity of research regarding the outcomes of immersive virtual reality settings in museum contexts, with current studies remaining in their nascent stages (Jung et al., 2016; Lee et al., 2019; Deng et al., 2019). Therefore, this study will limit itself to the context of museum visit in order to produce insight into the predictor and result of the use of virtual reality in a museum setting. Additionally, museums nowadays are constantly evolving and becoming more digital. The museums that do not provide audio players to go along with the tour are few and few among. However, some institutions have made the decision to go even further. For example, the Royal Museum of Fine Arts of Belgium (RMFAB) introduced the option to see artworks using a cardboard virtual reality headset in 2016 for the first time in Belgium (Escouflaire, 2018). Van Gogh's paintings were recently made for an immersive display in Brussels. All these examples are finally the proof that a visit at home is not far away. Deng et al. (2019) predicted that when comparing a traditional, non-interactive website with a virtual reality website that simulates a museum, the latter is much more lively and engaging. This increased level of interactivity could potentially lead to a decrease in people's desire for real museum experiences. If virtual reality experiences are perceived to be almost identical to real museum visits, individuals may begin to view the latter as repetitive and not worth their time or money. Moreover, all previous studies dealing with virtual reality in tourism used less immersive tools than those used in this research. To date, no research has been conducted using advanced virtual reality headsets, such as the Quest 2. For example, a study was conducted on the effect of experiencing a virtual tour of the National Museum of Indonesia. This tour was based on 360-degree video technology, which is less immersive than a head-mounted display (Keumala et al., 2022). Since the last study on this topic, there have been significant technological advances. For example, modern virtual reality headsets now include sound as well as integrated game controllers to further enhance the immersive experience.

The present research aims to provide further insight into the use of virtual reality in the tourism industry. Specifically, this study will seek to confirm the existence of a relation between virtual experiences and a decrease in a traveller’s perceived risk and increase of traveller’s convenience towards a virtual tour, as well as a decrease to their intention to visit a said destination physically. While previous research, such as that conducted by Tussyadiah and other scholars, has explored the positive impacts of virtual reality on consumer attitudes and intentions in a tourism context, few investigations have examined the negative effects of virtual reality, and even fewer have done so in an experimental manner. This study will also consider the potential influence of perceived risks and convenience on customer intentions, an aspect that has not yet been explored by academics. By investigating the relation between the perceived risk and convenience associated with a virtual tour and a customer intention towards a destination, this work will contribute to the current academic knowledge in this field.

Finally, this study offers benefits not only to researchers, but also to tourism marketing professionals by raising awareness of the positive and negative aspects of virtual reality. In addition, developers of virtual environments can benefit from advice on the crucial attributes of these environments for tourism purposes. The survey will facilitate a better understanding of the variables that influence a traveller's perception and intentions towards a tourist destination. If the study proves that virtual reality is capable of changing travel behaviour without completely replacing traditional tourism, it could pave the way for sustainable tourism and the reduction of mass tourism in certain areas. However, it also presents potential threats to some economies, as their welfare depends on tourism activities (Guttentag, 2020).

1.4 Thesis Approach

In order to carry out this research, an overview of existing studies dealing with virtual reality, as well as its potential effects on consumer intention, will be given in Chapter 2 which is devoted to the literature review (Section 2.1). Academically, virtual reality and its essential ideas will be explored (Sections 2.1.1 and 2.1.2), and its application in the tourist sector will be better appreciated (Section 2.1.3). Finally, six hypotheses will be proposed for examination throughout this first section based on current research. A study model will be provided (Section 2.2) to better visualise the hypothesised link between the different variables.

In Chapter 3, the study design will be constructed, including the methodology used and the way and features of the data obtained in an experimental environment. The analysis and results from the test are presented in Chapter 4, and then will be further discussed in Chapter 5.

Finally, Chapter 6 of the research paper presents the conclusion of the study, which aims to provide an overview of the impact of virtual tours on the tourism industry and the future intentions related to them. First a short summary of the whole study will be presented (Section 6.1). Sections 6.2, 6.3, and 6.4 will investigate the implications of integrating virtual reality into destination marketing, as well as the limitations of the study and recommendations for future research in this area.

Chapter 2: Literature Review

2.1 Literature Review

This chapter provides an overview of the different concepts that will be discussed throughout this research (Section 2.1). First, the virtual reality technology will be defined, after that we will go deeper into the main features of virtual reality experience (Section 2.1.1 and Section 2.1.2). Afterwards, a section will be dedicated to the marketing in the tourism sector, as well as the applications of virtual reality in this specific sector (Section 2.1.3). Finally, a statistical model will be proposed based on the different hypotheses developed from the current literature review (Section 2.2).

2.1.1 Virtual Reality

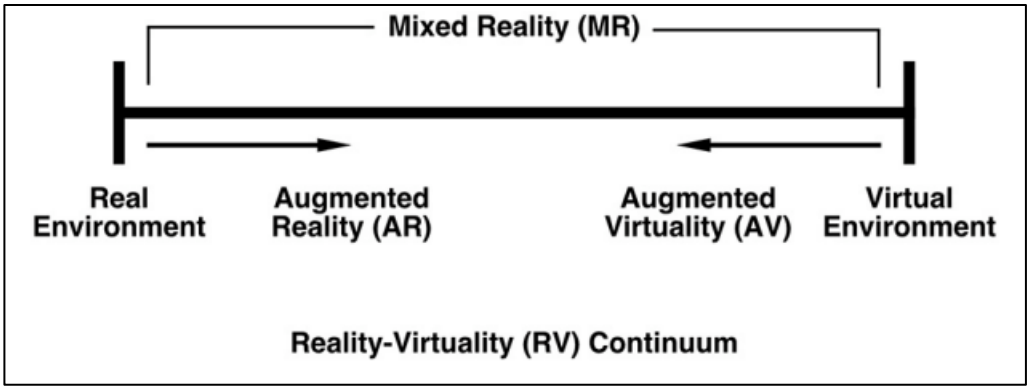
2.1.1.1 Definition

The concept of virtual reality is not new (Barnes, 2016). When the idea of virtual reality first appeared, it generated a lot of curiosity and expectations. The word “virtual reality” is attributed to the computer scientist Jaron Lanier, founder of Virtual Programming Languages Research in 1984 (Tepper et al., 2017). The notion was that this innovation might construct imagined worlds that were indistinguishable from reality (Gutiérrez et al., 2008). In other terms, it is a simulation that uses computer visuals to simulate a realistic-looking world (Burdea & Coiffet, 2003). However, it exists a great disparity in the definitions of virtual reality (Guttentag, 2010). According to Guttentag (2010), virtual reality can be defined as “the use of a computer-generated 3D environment – called a ‘virtual environment’ (VE) – that one can navigate and possibly interact with, resulting in real-time simulation of one or more of the user’s five senses.” (Guttentag, 2010, p.638). Slater & Wilbur (1997), for their part, defined virtual reality as a set of gear and software technologies designed to generate the sensory impression of being present in some other location (Slater & Wilbur, 1997). This separates virtual reality from other devices that improve reality, like as augmented reality and augmented virtuality (Slater & Wilbur, 1997). Despite the many definitions that exist for virtual reality, some concepts are common to all of them : immersion and presence (Guttentag, 2010). A section is dedicated to these two key notions.

The reality-virtuality-continuum of Milgram and Kishino (1994), Figure 1, helps to understand the different types of Mixed Reality. They describe Mixed Reality to include any environment that combines real and virtual components. They anchor one end with a purely real environment, “consisting solely of real objects,” and the other end, with a purely virtual environment, “consisting solely of virtual objects” (Milgram et al., 1994). The immersion into a virtual world can be classified in the virtual side of the reality-virtuality continuum and requires virtual reality technology. Nevertheless, some researchers consider that augmented reality and virtual reality are connected, and it is very reasonable to discuss the two concepts together (Milgram and al., 1995). However, others argue that augmented reality is not strictly speaking virtual reality (Burdea & Coiffet, 2003; Sadamali Jayawardena et al., 2023), although it may be regarded as a form of virtual reality system (Vince, 2004). From the reality-virtuality-continuum of Milgram and Kishino (1994), the difference between virtual reality and augmented reality is unclear. In fact, the model demonstrates a fluid augmented reality-virtual reality continuum, thus no real distinction between augmented and virtual reality can be established (Sadamali Jayawardena et al., 2023). In augmented reality, a user would view both the virtual and real worlds (Reiners et al., 1999). In other words, augmented reality is a technology that incorporates visuals of virtual items with real-world views, physical environment contributes therefore to the user experience (Reiners et al., 1999; Sadamali Jayawardena et al., 2023). According to Guerra, Pinto, and Beato (2015, p. 50), the "difference between augmented reality and virtual reality is that the first adds

digital information to images and real-life contexts, whereas the second immerses the user in a new world, allowing, for example, to fly over a city without taking his feet off the ground."

Figure 1 - Reality-virtuality continuum



Skarbez et al. (2021, p.2) adapted from Milgram et al., 1994.

2.1.1.2 Devices & Technologies

In order to enter a virtual environment, a variety of devices and tools are needed. There are virtual reality systems that enable individuals to explore a virtual environment using several human senses, most notably sight, hearing, and touch, but maybe even smell and taste in the future. However, many problems exist when developing virtual reality systems, including software, hardware, human aspects, and virtual reality across high-speed networks (Tepper et al., 2017). Visual displays are the primary category of today's display technology and are all part of the Head-Mounted Displays (HMDs). Within the category of Head-Mounted Display solutions, a distinction can be made between wired and mobile one. Mobile Head-Mounted Displays are characterized by the ability to operate without a second computer and having wireless capabilities (Anthes et al., 2016). A famous and affordable example is the Google Cardboard, using a smartphone case with additional lenses to display 360-degree panoramas from a stationary perspective. The 360-degree without Google Cardboard is one method that most people may use by just seeing a video through a normal screen. All of the 360-degree videos on YouTube are in this situation. See-through Head-Mounted Displays overlap virtual 3-D elements on the actual world in augmented reality, thus besides the computer-generated images, the external world is apparent (Tepper et al., 2017). Desktop virtual reality uses conventional computer input and output devices such as keyboard, mouse and monitor, no Head-Mounted Display is needed (Tepper et al.,2017). As a result, both static (i.e., still pictures depicting a single visuospatial perspective) and dynamic (i.e., features that react to user actions) elements may be used in the interface of virtual worlds (Bogicevic et al., 2019). Virtual reality, 360-degree virtual tours, and other interactive virtual environments may increase realism to the point that visual representations might take the role of substantive information searches and the actual world (Burke, 1996).

Comparing the various instruments that provide a more or less immersive retreat is also noteworthy. The virtual reality video platform that projects in 360-degrees was a first true technological breakthrough. It offers a highly immersive experience while being incredibly cost-effective, making it a popular choice for delivering news. Depending on the system used, such as Head-Mounted Display, tablet, or desktop computer, 360-degree virtual reality videos can produce varying effects on the viewer. The efficacy of advertisements, for instance, can be affected by the use of different perceptual systems (Lo & Cheng, 2020). To put it simply, 360-degree video refers to dynamic visuals that have been recorded in a way that allows the audience to adjust their perspective as if they are controlling the camera's movements (Bessa et al., 2016). Empirically, it has been demonstrated

that virtual reality is more successful at creating a sense of presence and immersion than 360-degree online tours and static images. However, there was no discernible difference in presence between 360-degree tour and static images (Bogicevic et al., 2019). It is unclear how a 360-degree virtual tour would compare to being physically there at the location in question (Wagler & Hanus, 2018). The use of 3D technology in conjunction with 360-degree video enhances depth perception, resulting in a more realistic experience, however, the sense of presence is not significantly different from 360-degree 2D video (Bessa et al., 2016). In general, a Head-Mounted Display will create a higher sense of immersion since it isolates the user from the outside world when they are in a virtual environment (Witmer & Singer, 1998; Lo & Cheng, 2020). When comparing the experience of using cardboard goggles to high-end wearable devices, it is evident that the former provides a lesser degree of presence. While Cardboard users are immersed in the virtual world, their vision is limited to the centre of the scene depicted, despite being shielded from the outside environment. On the other hand, more advanced headsets offer a more comprehensive experience by utilising sensors to track head movements, with a computer adjusting the viewpoint in the virtual world to match the orientation and position of the user's head (Lo & Cheng, 2020). The size and weight of such a device, on the other hand, might disrupt this isolation and remind one of a headset (Lo & Cheng, 2020). However, contrary to popular belief, it has been demonstrated that the size of a screen is more important than a completely immersive system, such as a Head-Mounted Display with a 360-degree information space, in determining immersion and consequently realism (Baños et al., 2004).

2.1.2 Main Concepts of Virtual Reality

2.1.2.1 Feeling of Presence and Immersion

Establishing a differentiation between presence and immersion is not a common practice; nevertheless, it is a valuable one. Studies have shown that immersion has an impact on presence through its unique characteristics. Initially, we will examine the two concepts independently before exploring their influence on each other.

Presence is a subjective measure that is linked to the user's psychology (Gutiérrez et al., 2008). The experience of being present is multifaceted and encompasses two distinct dimensions: physical or perceptual, and social. The physical dimension describes the sensation of being physically situated within a mediated environment. In contrast, the social dimension of presence refers to the perception of others' presence and the potential for interaction (Sacau et al., 2008). The cognitive state of presence arises when the brain interprets and analyses the abundance of stimulating information forced on the human sensory systems (Barfield et al., 1995). In fact, the concept of feeling present, often referred to as telepresence, is a term frequently used to refer to the psychological impact of feeling present in a mediated environment (Grüter & Myrach, 2012; Sadamali Jayawardena et al., 2023). In other terms, the telepresence phenomenon, defined by Marvin Minsky in 1980, refers to the sensation of being physically present within a distant environment that interacts with the user. Telepresence is therefore made feasible by the perceptual feedback that the user receives as a result of one of his actions via the intermediary of the proper teleoperation technology (IJsselsteijn et al., 2000). More specifically, according to Slater and Wilbur (1997), “Presence is a state of consciousness, the (psychological) sense of being in the virtual environment” (Slater & Wilbur, 1997, p.605). To fully experience presence in immersive virtual reality, three key factors must be present: immersion, allowing for isolation from the real world; interaction, enabling natural exploration of the virtual environment; and imagination, drawing on an individual's abilities with mental imagery (Iachini et al., 2018). A complicated spatial or auditory representation is merely one aspect of the experience of presence. Reading a compelling book, seeing a movie or a play, or simply fantasizing about a different time or place could all make one feel present (Barfield et al., 1995). The concept of presence has been introduced by Steuer (1992) who emphasize the lack of consideration for user experience in the definition of virtual reality (Boyd & Koles, 2019). Presence is a transdisciplinary term that many scholars

have attempted to define or categorise (Jung et al., 2016). The core premise is that individuals who are fully present should perceive the virtual environment as a more engaging reality than the actual physical world, and view the environment represented by the displays as locations visited rather than pictures seen (Slater & Wilbur, 1997). The less synthetic or mediated experience technology customers perceive, the stronger the social presence (Kang & Gretzel, 2012; Lee, 2002). Virtual space, physical space, and mental imagery space are three crucial sources of spatial signals for the development of presence, according to Biocca, Kim, and Choi (2001). According to theory, people can only perceive presence in a computer-mediated environment if they fully ignore technology, immerse themselves in it, and allow themselves to be carried away into the virtual universe (Haans & IJsselsteijn, 2012). The sense of presence, as was already indicated, comes from sensory data. However, only a subset of this data contributes to a sense of presence; information from the visual and auditory modalities will predominate any experience (Barfield et al., 1995). This discovery illustrates that a virtual world without employing the five senses can appeal to the sensation of presence since it can exist using only a subset of sensory input, namely sight and hearing. Many existing virtual environments use only auditory and visual cues to elicit a sense of presence (Barfield et al., 1995).

It is worth considering how much the individual dimension, such as its distinctive features, impacts the sense of presence. The ability to be fully absorbed and immersed, as well as other personality-related factors, have been found to significantly impact one's sense of presence (Sacau et al., 2008). Even if several people are immersed in a virtually identical environment, they will not have the same sense of presence (Ling et al., 2013). There are various reasons why a person may feel more or less involved in a virtual world, affecting their feeling of presence. Expertise in computer technology, for example, might lead to scepticism while engaged in a virtual world, lowering the person's feeling of presence (Ling et al., 2013). Demographic characteristics, visual aptitude, empathy, absorption, locus of control, spatial intelligence, and an immersive inclination all influence presence (Ling et al., 2013). Moreover, studies have shown that gender plays a role in determining the intensity of the feeling of presence. Specifically, some research (e.g., Felnhofer et al., 2014) has found that women tend to have a deeper sense of presence than men and other rejected this difference (e.g., Iachini et al., 2018).

On the contrary, immersion is more related to the technology. Immersion could refer to objective and quantitative description of what a given system offers (Slater & Wilbur, 1997). This connection between technology and immersion, while the former is significant, is not commonly accepted. For Witmer and Singer (1998), immersion is a sensation that the individual feels, similar to presence, rather than a straightforward objective explanation of the technology of the virtual world. Immersion can be defined as “a psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences” (Witmer & Singer, 1998, p.227). It plays a significant part in creating a successful personal experience within a virtual reality environment (Slater et al., 1997). Slater and Wilbur define immersion as having FIVE characteristics: inclusivity (diversion of focus from the actual world), extensiveness (amount of sensory input), surroundingness (amount of panoramic presentation), vividness (amount of feature richness), and proprioceptive matching (alignment of perceptual means with the virtual interface). Several factors can influence the degree of immersion that users feel in a virtual world. A sensation of separation from the actual world, a sense of inclusion in the virtual environment, natural modalities of interaction and control, and the perception of personal mobility are among these. Users' immersion may be reduced if they face difficulty engaging with the virtual environment. However, when users engage naturally with a virtual world and are able to both influence and be impacted by the stimuli it contains, their degree of immersion increases. Furthermore, the capacity to perceive movement in a simulated world, or to interact directly with other things inside it, might contribute to a better sense of immersion (Witmer & Singer, 1998).

It is critical to create a virtual environment immersive since this makes the perception of virtual environments more akin to the perception of reality. The immersive effect of virtual reality can make it difficult to distinguish the real world from the world created in the virtual space (Cheong, 1995; Blascovich et al., 2002). It occurs because the more immersed individuals feel in a virtual environment, the more realistic they perceived the experience to be. In fact, they experience ideas, feelings, and behaviours in the same way that they would in real life. Immersion necessitates a virtual representation of oneself in the virtual environment, that can be called "Virtual Body". The virtual body is both a component of the observed world and a representation of the being performing the perceiving (Slater & Wilbur, 1992). Based on these findings, this study may infer, as Blascovich et al. (2002) and Cheong (1995) did, that the more immersed a person feels in a virtual world, the more the environment appears to be an exact copy of reality.

H1: Immersion has a positive impact on the verisimilitude of the Virtual Environment.

As mentioned above, immersion can have an influence on the degree of presence a participant will experience (Witmer & Singer, 1998; Baños et al., 2004). Witmer and Singer (1998) demonstrate this link by arguing that the stronger the sensation of immersion, the greater the feeling of presence in a virtual experience. In term of inclusivity, presence necessitates that the exhibits be devoid of cues indicating the devices' existence (Slater & Wilbur, 1997). According to an experiment conducted by Slater and Usoh (1992) through a questionnaire, certain external circumstances influence the feeling of presence. Indeed, it was found that the experimenter's voice, poor screen update, low resolution and high lag negatively influenced the feeling of presence. However, it was also shown that when an individual has a high sense of presence perceived external noises as being in the virtual environment (Slater & Wilbur, 1997). Navigation denotes the capacity to move about and examine large components of a 3D world. The capacity to grab and control objects in this environment is referred to as "interaction" (Gutiérrez et al., 2008). A certain amount of flexibility for the user to engage physically with the environment is crucial for it to be considered real (Guttentag, 2010). The possibility that immersion perception could disrupt the user's mental state and interfere with regular psychological processes should be taken into consideration (Cheong, 1995).

Vividness also has an influence on an individual's sense of presence, and thus immersion. Indeed, the dynamics of shadows in the virtual world can have a positive influence on the feeling of presence (Slater & Wilbur, 1997). Beyond the importance of the pictorial realism provided by the technology, the effectiveness of the head tracking plays a terminal role in the sense of presence (Slater & Wilbur, 1997). The lower the head tracking delay, the more animated the individual becomes in the use of their body. It has been shown that a person walking on the spot has a greater sense of presence because the match between optic flow and proprioception of the walking technique is better than if he/she has to hand-held pointing for navigation (Slater & Wilbur, 1997). Therefore, one can argue that presence is a potential psychological and behavioural response to immersion (Slater & Wilbur, 1997).

Although, we highlight the relationship that can be made between immersion and presence, the conceptual difference between immersion and presence is relevant in the context of this research. It would be inappropriate to assume immersion and presence to have a binary connection. Indeed, as previously said, more attributes must be considered when dealing with immersion, such as media content as well as user features (Baños et al., 2004). Moreover, presence does not imply realism, although immersion does. It is possible that a non-realistic graphic improves presence, but it is not the same for immersion (Slater & Wilbur, 1997). The distinction between immersion and presence permits both to be explored, and even if they are found to be connected in a certain usage, this may not be due to a causal relationship (Slater & Wilbur, 1997).

2.1.3 Tourism Marketing

2.1.3.1 Tourism

Although the terms 'tourism' and 'travel' are often used interchangeably, there are significant differences between the two concepts. The term tourist originally appeared in English in the early 1800s. The subject of what defines tourism has piqued the interest of many researchers from many disciplines, and, predictably, no one notion or definition of it exists (Wilson, 1998). It is critical to understand the nature of travel and tourism for practical marketing considerations. Because it is the primary management factor that may affect the size and behaviour of this significant worldwide market, marketing is a topic of important interest in the travel and tourist industry (Middelton, 2001). It is possible to think of tourism as a complex, multidimensional activity that affects a wide range of social and economic activities (Cooper et al., 2005). Tourism is defined as any activity involving a momentary short-term shift of people to locations other than their usual areas of residence and employment, as well as their activities while visiting these locations (The Tourism Society, 1979). In other words, tourism is the activity of people who travel to and stay in locations outside of their normal surroundings for up to one year in a row for pleasure, business, or other reasons (Middleton, 2001; WTO, 1992). The term does not include any type of normal commuting or simply local travel, such as going to the local grocery store, clinic, or school (Middleton, 2001). Tourism is an activity that individuals enjoy; tourists are people who travel for pleasure and leisure. Tourism combines the satisfaction of emotional expectations with the consumption of a concrete good or service (Frochot & Morrison, 2000).

Travel, on the other hand, is broad; people can travel for many reasons. To travel is to set off on a journey. It only denotes a person moving from point A to point B. A long journey is typically referred to as traveling (Hasa, 2016). For instance, you do not refer to going to the supermarket to buy some food as traveling. But you may claim to be traveling if you are departing for a two-week business meeting in another nation. There are several more reasons why someone would travel, including to see family, friends, attend weddings or funerals. These factors might not be related to tourism (Hasa, 2016). One can travel for a variety of reasons, as was already noted. Sometimes people go to locations for reasons unrelated to those mentioned above. This is the time when we just want to relax and take in a new environment; this is referred regarded as tourism as defined previously. Although not all travel is tourism; all tourism does include a travel component (Middleton, 2001).

Leisure activities can be categorised based on literature related to activity analysis, leisure time, and travel. This categorisation helps to discern the purpose behind partaking in an activity. Tinsley and Eldredge (1995) have developed a taxonomy of 11 classifications of leisure behaviour based on the psychological benefit derived from the behaviour. These categories include: Agency (such as jogging and swimming); Novelty (like backpacking and nature walks); Belongingness (such as team sports); Service (including attending church and visiting friends); Sensual Enjoyment (like attending plays and musical performances); Cognitive Stimulation (such as visiting art shows, museums, and galleries or reading); Self-Expression (like ceramics or stamp collecting); Creativity (including painting and piano playing); Competition (such as card games or computer games); Vicarious Competition (like watching football or rugby); and Relaxation (such as listening to the radio or watching TV shows).

2.1.3.2 Virtual Reality in Tourism

Tourism is a significant worldwide service sector. The wide variety of tourism attractions need vigorous advertising and promotion by tourist services (Miller et al., 2017). It was discovered that the tourist sector was really about delivering people with experiences. Virtual reality is frequently seen as the next natural step in the road of creating experiences. Given the nature of tourist experiences, which are intended to be consumed according to the consumer's preferences, virtual reality appears

to make sense. Because it can be used as a "try before you buy" opportunity and gives users a sense of what it would be like to be there, virtual reality plays a crucial role in tourism marketing and management (Tussyadiah et al., 2017). Since the tourism industry is intangible, consumers must sacrifice a material good, represented by the money spend in exchange for only expectations (Magalhaes et al., 2019). The benefit of virtual reality is that the customer may be able to choose and personalise these experiences to an unprecedented degree (Williams & Hobson, 1995). Therefore, the tourist sector has a huge opportunity because to recent advancements in virtual reality technology. According to Miller et al. (2017), in order to effectively advertise tourism locations, the degree of realism must be higher in order to provide appropriate verisimilitude. Verisimilitude is the appearance of something being genuine or truthful. It is synonymous with trustworthiness and plausibility (Miller et al., 2017). For instance, it is highly regarded when a writer can provide believable descriptions of the scene and circumstance, giving the narrative more verisimilitude. The same holds true for clients who are fully immersed in a tourism area (Helmick, 1995). The confirmation or disconfirmation of users' expectations influences whether or not their mental image of the destination matches the real location, which can lead to either a favourable or poor customer experience (Magalhaes et al., 2019). The perception of a place might be affected by past experiences at that location (Marchiori & Cantoni, 2015). Bagozzi (1981) demonstrated that a prior experience may be an explanatory and determining factor that leads to a change in behaviour and can shape intentions toward an object (Bagozzi, 1981). This claim was examined in the context of tourism, and it was discovered that individuals having prior knowledge of a place would be impacted in their search for information regarding that destination, both in the manner and the kind of resources employed (Kerstetter & Cho, 2004). This may show how a person's perception of a location during a virtual reality visit will be influenced by earlier experiences there. In fact, Tussyadiah and his colleagues (2017) have examined the impact of a previous experience with a tourist destination. Prior knowledge of the location, stored in the user's memory following a previous visit, will serve as a reference for the perception of the mental representation of the virtual world. This, in turn, will have an influence on the sense of presence and immersion, and hence on attitudes toward it. As a result, the attitude toward the tourist destination after the virtual reality encounter will be conditioned by a previous experience or not in that location (Tussyadiah et al., 2017). As a result, a previous visit, i.e., a previous experience, may have a negative influence on the impression of the resemblance of the virtual environment.

H2: A past experience impacts negatively the verisimilitude.

Within the tourist environment, virtual reality has a variety of applications spanning from planning and administration, marketing, entertainment, and education to the preservation of history and accessibility of tourism sites and destinations (Jung et al., 2016). In the context of tourism, virtual reality has often been viewed and investigated as a tool to improve brand experiences, boost accessibility to the industry, and support historical preservation (Guttentag, 2010; Barnes, 2016). Virtual reality is frequently viewed as a sales and promotional tool; Travel agents can use this tool to simulate a journey for potential visitors. Unlike brochures and motion pictures, which are passive tools that only give brief and restricted glances of a trip, this simulated experience of a future trip provides a comprehensive overview of the experience that awaits them. After having "lived" the experience, the prospective visitor will have all the information needed to make the best selection on places he/she wants to go to. Countries with less marketing publicity such as emerging and Eastern European countries, may be the first to gain from virtual reality as a promotional tool (Sussmann & Vanhegan, 2000). However, using virtual reality for travel sales and promotion may not only be costly for travel agencies, but it will also necessitate them adapting to a completely new type of technology. As technology advances, it may be possible to offer comprehensive virtual reality tours that compete with the offerings of travel firms (Williams & Hobson, 1995).

Actually, with the advent of virtual reality technology, it could theoretically be possible to travel completely in virtual reality without ever having to leave the comfort of your home. Virtual reality travel can provide various benefits, such as access to areas that have been forbidden in order to preserve them (Williams & Hobson, 1995). Virtual tourism opens up the possibility to visit protected (e.g., historical) or impossible to visit (e.g., outer space) sites (Wagler & Hanus, 2018). Furthermore, virtual reality will ensure good weather and will keep you out of long holiday traffic jams. Last but not least, a physically handicapped person will be able to use a virtual body and travel like an able-bodied person (Williams & Hobson, 1995). Additionally, virtual reality enables the reduction of perceived risks associated with intangible services like a vacation. During the holiday period, visitors are exposed to a multitude of hazards and accidents. Many tourists have been injured or lost their lives as a result of documented accidents and incidents during the year (Cheong, 1995). Humans have a natural wanting for security. Risk has been acknowledged as a significant worry when it comes to travel. A person may even decide against physically traveling to a place if they perceive it to be risky (Kozak et al., 2007). Traveling may come with a variety of dangers. For instance, the risk can be connected to a disease that is prevalent in a certain location. An activity that has been planned for may potentially be linked to the risk. Indeed, numerous external variables can impact destination decisions, which are difficult for tourist agencies to govern but might be moderated by a virtual visit. Economic, political, or temporal features that appear in both visitor-generating and visitor-attracting countries, such as age, income, occupation, personality, cost, time, motivation, distance, party size and composition, risk, and the existence of alternative destinations, can all disrupt flow to a destination (Kozak et al., 2007). Traveling in virtual reality also makes the visit more convenient. A virtual reality experience can alleviate many of the hassles that a tourist may face, such as long lines, probable airline delays, and so on. It removes the worry and trouble out of what is intended to be a peaceful hobby in the first place (Cheong, 1995; Deng et al., 2019). As a consequence, an argument may be made based on the fact that it appears to be of greater convenience and "security" to visit a destination in a virtual environment that is similar to the real place.

H3a: Verisimilitude negatively impacts the perceived risk.

H3b: Verisimilitude impacts positively the convenience.

The level to which people engage with a virtual reality tour may be determined by their sense of presence, sometimes known as the experience of being there (Wagler & Hanus, 2018). On the one hand, a bodily presence will make the experience feel more vivid and lifelike. To take advantage of and navigate their surroundings, tourists must pay close attention and use all of their senses. On the other hand, controlled settings that make use of immersive media, such 360-degree movies, as well as total immersion experiences in a virtual world might assist reduce distractions and/or unpleasant encounters such as loud cars, or even being jostled in a crowd. The user must, however, be able to maintain balance between the two spaces they are in at once (i.e., the room where they are using the headset to observe the site and the room where the virtual tour is taking place) (Wagler & Hanus, 2018).

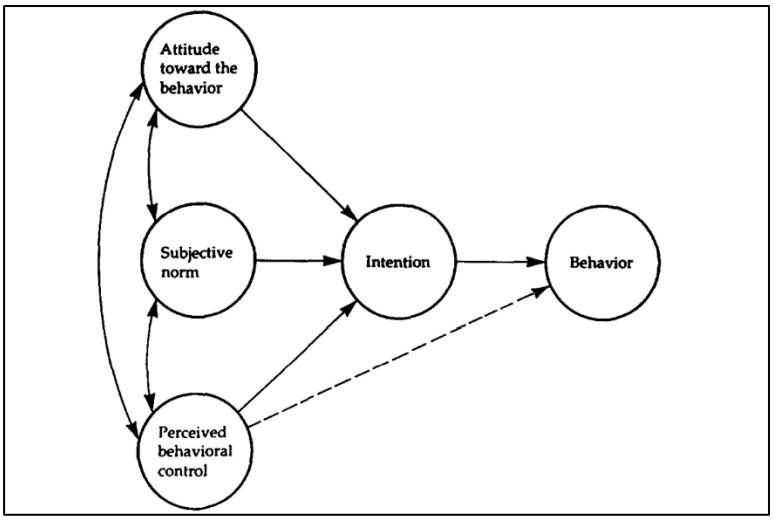
2.1.3.3 Visit Intention

Acceptance of the technology may be viewed as the initial stage in determining the influence of virtual reality on visitor intentions, more specifically on the person decision-making and behaviour (Chung et al., 2015). The Technology Acceptance Model (TAM) is a paradigm for technology acceptance that is based on the Theory of Reasoned Action (TRA). The foundations of behaviour and motivation to use technology, according to this concept, are perceived utility and considered simplicity of use (Chung et al., 2015). Consumer attitudes regarding new technologies are becoming increasingly important to destination marketing and tourism organisations that choose to embrace these new tools as they proliferate (Chung et al., 2015). Chung, Han, and Joun (2015) explored elements that might

persuade consumers to employ augmented reality in the context of tourist information study. They also elaborate on Technological Readiness (TR), defined as “a user’s state of mind when ready to utilize technology” (Chung et al., 2015, p.1), as well as visual stimuli and situational aspects in their study. Technology Readiness was shown to be an indicator of perceived utility, resulting in a favourable attitude toward augmented reality and an increased propensity to employ augmented reality. As a result, they discovered that a user's favourable attitude and belief in augmented reality enhanced their desire to visit (Chung et al., 2015).

Individual intentions cannot be investigated directly. Indeed, intention is affected by an individual's attitude; if the function of attitudes is overlooked, consumer intents cannot be effectively assessed and evaluated (Li et al., 2017). Plötz et al. (2014) believed that attitudes were the most powerful psychological indicators of an individual's intention. Attitudes can be defined as "individual mental experiences that reflect strong preferences or dislikes, as well as positive or negative evaluations of a particular behaviour” (Li et al., 2017, p.324). On the other hand, intention can be defined as “an individual’s anticipated or planned future behaviour” (Lam & Hsu, 2004, p.466). The link between attitudes and intentions may be further investigated using the Theory of Planned Behaviour (TPB) model created by Ajzen and Fischbein (1977). This model has been extensively applied and verified by several research in the discipline of social psychology (Lam & Hsu, 2004). This model suggests an explanation for the origins of human behaviour. Individual intentions, according to Theory of Planned Behaviour, are generated by three explanatory variables: subjective norms, perceived behavioural control, and personal attitudes. In other words, attitude cannot directly influence an individual behaviour, a specific behaviour is a function of the intention to perform that behaviour. The person's intention is in turn a function of the attitude towards that behaviour and the individual's subjective norms (Ajzen & Fishbein, 1977; Ajzen, 1991). Theory of Planned Behaviour implies that every behaviour is deliberate, reasoned, and well-planned. One of its primary shortcomings is the ignoring of the individual's emotional characteristics, which play a part in the decision-making process of a behaviour, such as grief, rage, joy, and so on.

Figure 2 - Theory of Planned Behaviour



From Ajzen (1991, p.182)

“Intentions are assumed to capture the motivational factors that influence behaviour; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour. As a general rule, the stronger the intention to engage in a behaviour, the more likely should be its performance” (Ajzen, 1991, p. 181). An individual cannot

instantly translate an experience into an intention but must first create a favourable or negative attitude toward this experience. It was successfully established that a person who has a good attitude toward an experience/object will tend to support the intention to do the behaviour, resulting in the behaviour being favourable to the experience/object, and vice versa (Ajzen & Fishbein, 1977; Lam & Hsu, 2004; Li et al., 2017). Based on this statement, because it is thought that following a virtual reality visit, the perceived risk connected with this visit is less than that which would have been felt for a physical visit, and that a virtual visit eliminates numerous hassles, this virtual visit is more compelling. As a result, it is plausible to expect that attitudes toward physical visits will be more negative than attitudes about virtual visits, which, according to the Theory of Planned Behaviour of Ajzen and Fishbein (1977), will result in an unfavourable intention to visit the location physically.

H4a: Virtual reality perceived risk impact positively the visit intentions.

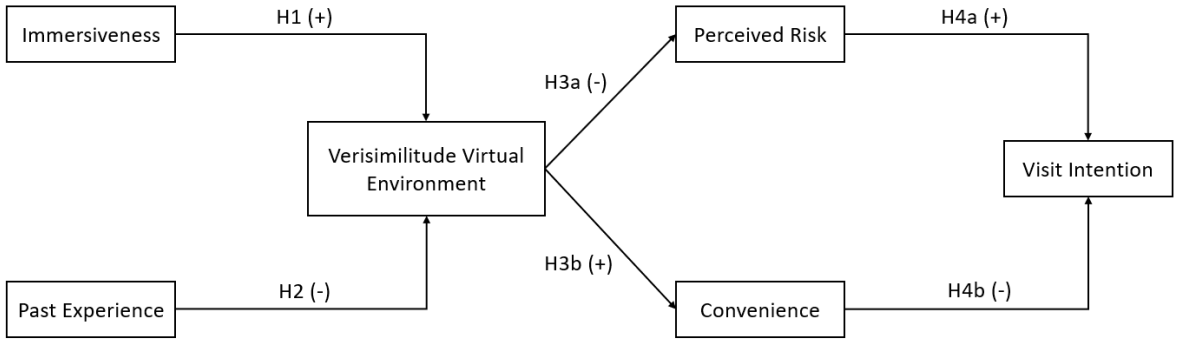
H4b: Virtual reality convenience negatively impacts the visit intentions.

An interesting point to consider is that museum visits fall under the "cognitive stimulation" category of the previously described taxonomy, leading to the similarity between virtual and physical museum visits and potentially decreasing the desire to visit the museum in person later on (Deng et al., 2019).

2.2 Proposed Research Model

The majority of the existing research on virtual reality tourism experiences only views virtual reality tourism experiences as a tool to enhance or moderate the visitor experience. Numerous studies examine spatial presence in virtual reality settings and its effects on attitudes toward tourist locations in an effort to better understand how the virtual reality experience may affect travel decision-making (Tussyadiah et al., 2017). These studies generally come to the conclusion that virtual reality applications in tourism can mediate the tourist experience positively regardless of the form of visitor experience at hand, and that virtual reality can therefore be used as an effective marketing tool for tourism destinations and businesses (Sussmann & Vanhegan, 2000; Guttentag, 2010; Barnes, 2016; Tussyadiah et al., 2017). The research that has been done on virtual reality tourist experiences only looks at the technology's potential benefits, largely in the context of marketing (Merkx, 2021). The aim of this research paper is to find out if the idyllic image of virtual reality in the tourism sector is still true. Indeed, it is possible that the excitement surrounding this new technology will no longer seduce with its initial wow effect. This research aims to answer the main question of whether the use of virtual reality as part of a tourist attraction could be a potential threat, contrary to the common belief that it presents an opportunity. This study is based on a model, depicted in Figure 3, that has been constructed from assumptions drawn from the existing literature.

Figure 3 - Research Model



Chapter 3: Research Design

The purpose of this chapter is to present the method used to determine the effects of a visit in the setting of virtual reality on visit intention. Section 3.1 outlines the methodology that was established and implemented; Section 3.2 explains how the data was gathered; and Section 3.3 describes the many procedures required in constructing a relevant questionnaire.

3.1 Methodology

Defining the problem, developing a research approach, elaborating a research design, collecting data, analysing, integrating the data, and conveying the conclusions are the six processes in the market research process (Malhotra et al., 2017). Chapter 1 provides a definition of the problem, and Chapter 2 explores the theoretical framework needed to collect reliable information that would serve as the basis for future study. The third chapter will concentrate on the creation of a suitable research design. A research design illustrates the steps involved in gathering the information needed to address a marketing problem (Malhotra et al., 2017).

This research's design may be described as conclusive research. The purpose of this study is to test particular hypotheses and investigate relationships between variables (Malhotra et al., 2017). This sort of study is distinguished by a clearly stated demand for information, a formal and structured research approach, and a large sample that should be as representative of the population as feasible. As a result, an empirical investigation based on a quantitative experimental design was carried out. This allowed for the generalization of the findings.

The study was conducted mainly on current or former students from the University of Liège (Belgium), and, to a lesser extent, to everyone willing to take part in the experiment. The aim of this experiment was to examine whether the feeling of being fully engaged in a virtual environment and/or a previous visit to the same location influence the perceived authenticity of the virtual setting and its resemblance to the real world. In addition, the study aimed to assess the impact of these factors on the perceived danger and ease associated with visiting the virtual location, and whether this affects the intention to physically visit the location in the future. Each participant was immersed in a tour of the Anne Frank House in Amsterdam (Netherlands) using a Quest 2 headset. Each user was immersed in Anne's thoughts while touring the numerous rooms of the Annex (the secret place where a group of eight Jews took refuge for two years) using the power of virtual reality. A link to preview the experience of visiting the Anne Frank House in virtual reality is available in Appendix A.

This choice can be supported by the fact that virtual reality has been suggested to be a substitute for a visit to a tourist destination (museum, tourist site, etc.), but does not match the demands of a field trip (rest, escape, etc.) (Lee et al., 2019). The user can interact with and control (to some extent) the virtual environment, and there is a dedicated virtual body part, hands, that allows the user to perceive the movements made in the virtual world, increasing the sense of immersion as seen in the Literature Review (Witmer & Singer, 1998). Additionally, it is challenging to secure tickets to this museum because of how popular it is. As space is limited, it is advised to purchase your tickets online weeks or months in advance of your visit. On-site lines are always an option, although they often last longer than two hours (Hurikat, n.d.).

3.2 Data Collection

To obtain the required quantitative data, the survey method was used. This technique is based on the distribution of a set of pre-defined questions, designed to obtain information on the behaviours, intentions, attitudes and demographic characteristics of the respondents. More specifically, the questions were asked in a planned order because the questionnaire was created using structured data collection techniques. This kind of methodology is particularly intriguing since it employs fixed response questions, which ensures that the data obtained is consistent because the replies are constrained to the options and so the findings' variability is minimized. Fixed response questions may, however, be less appropriate for other sorts of data, such as beliefs and feelings (Malhotra et al., 2017). Despite the fact that the experiment required being in the field with the subject, because the Quest 2 helmet requirement is not available to everyone, the data was collected online through a link that guided the user to the questionnaire. Qualtrics, a survey software package, was used to create the complete questionnaire. The questionnaire was solely conducted in French in order to reach as many individuals as possible, i.e., people of various ages and educational levels. The detailed questionnaire design can be found in Appendix B.

The sampling method used was convenience sampling. It is a non-probabilistic sampling method, that results from a selection of participants based on their accessibility and willingness to participate in the study. Although this sample technique is the fastest and least expensive, it has a few drawbacks. There are several possible sources of selection bias, including participant self-selection. Convenience samples are not typical of the population as a whole. Therefore, generalising a population based on a convenience sample is not conceptually sound (Malhotra et al., 2017). For ethical and confidentiality reasons, the anonymity of each participant was assured and notified at the beginning of the questionnaire.

During the visit to the Anne Frank House, each participant had to wear a Meta Quest 2 helmet and follow a story. However, instructions for safety and expedition management were provided during the visit. Although the user is standing and immersed in a variety of places, he or she cannot physically move around the virtual space but can use the controllers. In fact, the system requires point and click to indicate a movement. The tour lasts about 15 minutes, as passages from Anne Frank's diary and interaction with specific objects in each room were required. At the end of the tour, participants were given a questionnaire to complete. As this research only deals with one condition, the same questionnaire was administered to all participants. Some of the data collection took place on HEC premises while others took place in a private space.

3.3 Measurements

The questionnaire measured the independent variable immersiveness with five items on a 5-point Likert scale, from 5 = strongly agree to 1 = strongly disagree based on Agarwal & Karahanna, 2000, who originally measured what is called focused immersion. They investigated focused immersion as one of the five dimensions that characterize the multidimensional construct of cognitive absorption, which is defined as a state of profound engagement with software, in their case the web (Agarwal & Karahanna, 2000). Their scale has been adapted to a virtual reality experience. It is quite difficult to find an appropriate scale for this variable, and despite the fact that it is not ideal, this one has been validated due to a lack of an alternative. However, a simple close question was used to know if a past experience at the museum existed (1= yes/ 2=no).

To test the dependent variable of the perception of the similarity of the virtual environment with the real world museum, three items on a 7-point semantic differential based on Miller et al., 2017 were used. Their scale had already been applied in the field of tourism, but a little adjustment was

required because it was tied to a TV advertising rather than a virtual tour. Three questions on a 5-point Likert scale modified for being used in the tourism sector from Kim et al. (2008) were used to assess the perceived risk associated with a virtual reality visit (1= very less risky / 5= much more risky). Concerning the assessment of the perceived convenience associated with a virtual reality visit, three items on a 5-point Likert scale proposed by Ozturk et al. (2016) and adapted from Yoon & Kim (2007) were used. Finally, a scale from Horng et al. (2012) with a 5-point Linkert scale was utilized to assess the subject's visit intention following exposure to the virtual setting of the Anne Frank House.

Table 1 offers a summary of the many items used to evaluate all the research-related variables and also includes a thorough discussion of the items and statements used for each construct. As can be seen, the majority of this questionnaire is made up of 5-point Likert scales and 7-point semantic differential scale. These interval and non-comparative scales offer the benefit of allowing attitudes and views to be measured. Furthermore, such scales are simple to use, which lowers response mistakes and makes them suited for online data collecting (Malhotra et al., 2017).

Table 1 - Measurement Scales Summary

Constructs	Scale	Item	Statement Adapted (EN)
Immersiveness (Agarwal & Karahanna, 2000)	5-point Likert scale going from "Strongly agree" to "Strongly disagree"	Im1	When I am in the virtual world, I am able to block out most other distractions
		Im2	When I am in the virtual world, I am absorbed in what I am visiting
		Im3	When I am in the virtual world, I am immersed in the task I am performing
		Im4	When I am in the virtual world, I get distracted by other attention very easily
		Im5	When I am in the virtual world, my attention does not get diverted very easily
Verisimilitude Virtual Environement (Miller et al., 2017)	7-point sementic-differential scales	Ps1	The Anne Frank House depicted in the Virtual Environment seemed natural/unatural
		Ps2	The Anne Frank House depicted in the Virtual Environment seemed realistic/unrealistic
		Ps3	The Anne Frank House depicted in the Virtual Environment seemed to have the appearance of truth/to not have the apperance of truth
Past Experience	Yes/No	PE1	Have you ever visited the Anne Frank House Museum in Amsterdam?
Perceived Risk (Kim et al., 2008)	5-point Likert scale going from "Strongly agree" to "Strongly disagree"	PR1	Visiting via virtual reality would involve more service risk for me (i.e. not satisfying visit experience) compared to a real visit.
		PR2	Visiting via virtual reality would involve more financial risk (i.e. money poorly invested - entry fees, travel fees) compared to a real visit.
		PR3	How would you rate your overall perception of risk from this virtual visit?
Convenience (Ozturk et al., 2016) (Yoon & Kim, 2007)	5-point Likert scale going from "Strongly agree" to "Strongly disagree"	PC1	I can visit the Anne Frank House at any time thanks to virtual reality.
		PC2	I can visit the Anne Frank House at any place thanks to virtual reality.
		PC3	I feel that virtual visit is convenient for me to experience the Anne Frank House visit.
Visit Intention (Horng, Liu, Chou & Tsai, 2012)	5-point Likert scale going from "Strongly agree" to "Strongly disagree"	VI1	I may visit the Anne Frank House in the future.
		VI2	I do plan to visit Anne Frank House in the future.
		VI3	I do wish to visit Anne Frank House in the future.

Other factors that might impact the outcome of the experiment must be monitored in order for the conclusions of this study to be accurate. It is therefore critical to investigate such variables to guarantee that the findings produced are attributable to the influence of an independent variable on a dependent variable and not to other external causes.

First, the analysis of the model's relationships may be influenced by the participants' experience with the modern technology used in the experiment, i.e., the Quest 2 headset. The level of immersion experienced by an individual might be influenced by his or her familiarity with technology. For example, someone who has previously used a Quest 2 will have more autonomy in the virtual environment and will therefore require less instructions, resulting in a greater sense of comfort and disconnection from the outside world, thus improving their sense of immersion (Slater & Usoh, 1992; Witmer & Singer, 1998). A question with a 7-point continuous scale was added to the survey to gauge

each participant's level of familiarity with virtual reality. The scale ranged from "not at all familiar" (=1) to "fully familiar" (=7). Second, a condition known as "cybersickness"—a bad case of nausea or other uncomfortable symptoms—can also interfere with the experience. Aside from the discomfort, it was determined that there is evidence to indicate a negative association between the experience of presence and cybersickness (Weech et al., 2019). The same continuous scale was used going from very sick (=1) to no sick at all (=7).

Then, although this variable has not been measured, it should be highlighted that the prevailing attitude toward the subject of the visit, i.e., the Second World War, may, however, distort the experience. A person who is captivated by this (moving) subject will be drawn deeper into the world of the Anne Frank House than somebody who is not.

Finally, to acquire a general knowledge of the profile of the participants who participated in the experiment, they were asked to submit information about their gender, age, and educational level.

3.3.2 Sample

The experiment ran for just over a month, from April 2023 to early May 2023, a total of 78 valid questionnaires (100%) were collected. Of those who participated, the overwhelming majority were women (n=62; 79%), with men making up the rest (n=16; 21%). The youngest respondent was 11 years old, while the oldest was 61 years old. The average age of the respondents was 29 years old. This broad age range provides a more complete picture of the population, which is advantageous for the purposes of this research, which produces findings of general application. Most of the respondents have a university degree, bachelor or master.

Table 2 - Sample Demographics

Gender	Homme	20.50%
	Femme	79.50%
	Non-binary	0.00%
Level of Education	Less than high school - CEB	2.60%
	High school graduate - CESS	5.10%
	Bachelor's graduate	35.90%
	Master's graduate	44.90%
	PhD	11.50%
Age	Min	11
	Max	61
	Average	29

Chapter 4: Results

This chapter focuses on the examination of the data that was collected throughout the experimental phase. The chapter is divided into several sections. The first section, Section 4.1, will discuss the preparation of the data and will also cover some preliminary checks that were carried out before testing the hypotheses. The second section, Section 4.2, will analyse the hypotheses using various methods. This includes the study of correlations in Section 4.2.1, a T-test in Section 4.2.3 and several regressions in Section 4.2.4.

4.1 Data Preparation & Prior Analysis

Prior to examining the data and getting deeper into testing the hypotheses, preliminary preparations and assessments of all the data were conducted. In order to prepare the data, it was necessary to verify the consistency of the scales and the coding of the questions. Then, some assessments were conducted to determine the normality, reliability and validity of the different scales that were used to construct the different constructs.

4.1.1 Data Preparation

In order to ensure accuracy, confirmation of the encoded data must be done before any manipulation. Participants in this study were monitored while completing the questionnaire, which ensured that complete questionnaires were collected, free of any omitted responses, and that participants took the task seriously. This was an essential part of this study due to technological and time limitations, and the fact that only a small number of participants were involved.

Before carrying out any statistical analysis, it is crucial to check that the data to be used in the statistical software, more particularly here SPSS, is correctly coded and at the same scale. Failure to do so can lead to very anomalous results when testing for internal consistency based on Cronbach's alpha. In particular, it was imperative to address item 4 of the immersion scale, as this question was reversed. This meant that instead of 5 representing a full agreeing, it will represent a full disagreement with the statement and vice versa. Without this manipulation, Cronbach's alpha will produce a negative correlation between this item and the others. In addition, the perceived similarity scale was originally on a 7-point scale but had to be recoded to fit the 5-point scale of the other questions. To keep consistency with the extremes each record was divided by 7 and multiplied by 5 (rounded), so a 7 now represents a 5. In addition to that, the coding of this question had to be adjusted, as e.g., it had to be set to natural equals 5 and not natural equals 1, as was done for item 4 of the immersion scale.

4.1.2 Normality

It is important to check whether the data follow a normal distribution as this greatly simplifies the statistical analysis. In addition, many statistical tests such as ANOVA, Student's T-test or even regression require that the data are normally distributed ("*Vérifier La Normalité Des Données*", n.d.). This is necessary for these statistical tools to be applied appropriately and produce valid results. It should be noted that in a quantitative study, normality of data is not always feasible or mandatory. In such cases, alternative statistical tests must be used.

The first step in this process was to examine the normality of each item in the scales. The Shapiro Wilk test was used for this purpose. The results of these tests can be found in Appendix C. It was found that the data deviated significantly from a normal distribution for all items. For each item $p<0.05$ which results in the rejection of the null hypothesis of a normal distribution. However, Curran et al. (1996) proposed a moderately normal threshold when skewness is between -7 and 7, and kurtosis

between -2 and 2 (Curran et al., 1996; Hair et al., Byrne, 2010). Skewness and kurtosis were therefore calculated for each item (Appendix D), and the skewness and kurtosis values met the acceptance conditions for the distribution to be considered normal. As a conclusion, based on Curran and other authors, all items are being considered normally distributed.

4.1.3 Reliability

A reliability check was performed on all items, with several questions are combined to form one variable. Because each variable is made up of three or more questions, Cronbach's Alpha may be determined for each one. The results, presented in Appendix E, are as follows: immersiveness (α: 0.677), verisimilitude (α: 0.798), perceived risk (α: 0.844, after deleting item 2), convenience (α: 0.414), and visit intention (α: 0.953 and α:0.964 after deleting item 1).

For the visit intention construct, having an alpha above 0.95 could indicate an excessive homogeneity in the items, e.i., a redundancy in the items, that is why we prefer the alpha before the deletion of item 1 by keeping this item. For a construct to be considered to be reliably measured by the items, the Cronbach's Alpha should reach a minimum of 0.70. Looking at the result, except for the items measuring the convenience (α: 0.414) and to a lesser degree the immersiveness (α: 0.677), all construct items are considered to be reasonably reliable. In terms of convenience and immersion, eliminating objects simply worsens the alpha. The findings should have produced alphas larger than the required minimum of 0.70 for good dependability (Miller et al., 2017). This outcome is a bit unexpected since all items in this research were selected from validated scales. However, it was decided to keep these variables so that this research would retain its original meaning. This will be discussed further in the section 6.4 describing the limitations of this study. As a conclusion to this check, it will be decided to delete item 2 in order to measure the perception of risk, all other items remain.

4.1.4 Validity

In order to verify the validity of the item for each construct, a Pearson Correlation analysis has been executed. For the construct "immersiveness" (Appendix F_1), all items expect from item 2 and item 5 are significantly ($p<0.05$) correlated ($r > 0.234$), "verisimilitude" (Appendix F_2) all items are significantly ($p>0.001$) correlated, "perceived risk" (Appendix F_3)the two items, after deleting item 2 as suggested by the Cronbach's Alpha, are significantly ($p<0.001$) correlated (r: 0.731; r>0.456 with item 2 deleted), "convenience" (Appendix F_4) only item 1 and item 3 are significantly correlated (r: 0.260; p: 0.021). Finally, for "visit intention" (Appendix F_5) all items are significantly correlated ($r > 0.828$; $p<0.001$). The low score for both constructs "convenience" and "immersiveness" may be explained by the weak Alpha of Cronbach, but it was decided to keep them for being able to test the constructs.

4.1.4 Confirmatory Factor Analysis

Finally, a Confirmatory Factor Analysis has been conducted on each item in order to estimate the model fit of the different constructs. Appendix E displays the different factor loadings for each item. The principal component analysis was performed on each of the items for each of the variables using an extraction approach based on an eigenvalue greater than one. As a consequence, we have five different factors representing our five variables, each consisting of its own items showing that these items assess each variable.

The Kaiser-Meyer-Olkin (KMO) is a tool for assessing the quality of inter-item correlations. It is a numerical index that ranges from 0 to 1 and completes the correlation matrix. In this study, the KMO of our items is above 0.60 (KMO: 0.698), indicating an acceptable level of inter-item correlation (SPSS, 2023). Bartlett's test of sphericity is also used to determine whether the correlation matrix consists of

zero (null hypothesis). In this case, the null hypothesis is rejected (p<0.001) for all variables, indicating that they are completely independent of each other.

4.2 Hypotheses Testing

4.2.1 Correlation

The correlation study sheds light on the strength of the linear link between several constructs. It is crucial in order to be able to have valuable insights from the linear regression. Pearson's Correlation coefficient (r) spans from +1 to -1, indicating that when one variable changes, the other does as well, either in the same way or not. The results of the examination of the correlation between the model' s variables are shown in Table 3. The Pearson Correlation is always 1 in the diagonal (the greatest value that the Pearson Correlation may take). It is entirely typical because we are analysing the correlation of one variable with itself on the diagonal. Result from Pearson Correlation indicates that there was a significant (p<0.001) positive (r>0) correlation between immersiveness and verisimilitude (r: 0.341; p: 0.004), verisimilitude and convenience (r: 0.390; p<0.001), perceived risk and visit intention (r: 0.432; p<0.001). A significant and weaker correlation was found between convenience and visit intention (r: -0.238; p: 0.036). All of these relationships, both positive and negative, provide preliminary support to a number of hypotheses; respectively, H1, H3b, H4a, and H4b. However, no significant correlation was found between past experience and verisimilitude (H2), and verisimilitude and perceived risk (H3a).

Some other significant correlations were found between immersiveness and convenience (r: 0.247; p:0.029), perceived risk and convenience (r: -0.340; p:0.002), and finally immersiveness and past experience (r: -0.295; p: 0.009).

However, these results do not indicate a causality relationship between the variables, but only the existence of a linear relationship between these variables. To be able to correctly test the hypotheses further analyses will be conducted like regression in order to have a better understanding of possible cause-effects relationship between two variables.

Table 3 - Correlation Table

		Immersiveness	***Verisimilitude***	***Perceived Risk***	***Convenience***	***Visit Intention***	***Past Experience***
Immersiveness	Pearson's Correlation	1					
	P-Value						
Verisimilitude	Pearson's Correlation	**.341**	1				
	P-Value	.002					
Perceived Risk	Pearson's Correlation	-.133	-.020	1			
	P-Value	.245	.860				
Convenience	Pearson's Correlation	***.247***	**.390**	**-.340**	1		
	P-Value	.029	<.001	.002			
Visite Intention	Pearson's Correlation	.049	.051	**.432**	***-.238***	1	
	P-Value	.667	.659	<.001	.036		
Past Experience	Pearson's Correlation	**-.295**	-.153	.172	-.137	.125	1
	P-Value	.009	.181	.132	.232	.276	

4.2.3 T-Test

The relationship between two variables is not the subject of interest when doing a T-test. In testing the statistical significance of two groups' means, a reliable technique is the T-test. It analyses whether a variance in the means of two samples is due to mere chance. The T-test can also determine if there is a difference between a single group and a known value, or between two diverse groups.

There are two forms of T-tests: independent and paired. The former assesses the means of two distinct sets, while the latter examines the means of two associated sets. Although this study did not use an experimental design with a control and a treatment group, it will be interesting to see if there is a significative difference between people who have already visited the museum before participating in the virtual experience of the museum and those who discover it during the virtual reality visit on the perception of the verisimilitude of the virtual environment. On the basis of this result, as well as the non-existent correlation between these variables, the hypothesis that having visited the museum prior to visiting the same museum in virtual reality does not impact the perception of the realism of the virtual environment. Therefore, the hypothesis 2 is being rejected.

Table 4 - T-test for Past Experience

	Past Experience	N	Mean
Verisimilitude	Yes	8	5
	No	70	4.67
Significance		NO t:1.350; p:.181	

4.2.4 Regression Analysis

In order to go beyond the simple study of the correlation between variables and to investigate whether the variance of one independent variable can partially explain the variance of another dependent variable. Simple regressions will be performed to investigate the accuracy of the various hypotheses of the model of this research. A multiple regression analysis will next be performed to check if two independent variables (IV, hereafter), e.i., combining H4a & H4b, can explain one dependent variable (DV, hereafter).

4.2.4.1 Simple Regression

The first hypothesis (H1) argues that a positive impact of the user's sense of immersion (IV) exists on the perception that the virtual environment resembles a real environment (verisimilitude - DV). Based on Table 4 some observations can be done. The proposed model is significant, i.e., immersiveness is a good predictor of the perceived similarity of the virtual environment with reality (F (1;76): 9.994; p: 0.002). Indeed, 10.50% of the variance in verisimilitude is explained by the immersiveness of a user (R^2 adjusted: 0.105). Participants' perceived similarity is 3.061 + 0.393 participants' immersiveness, serving as a predictor of the perceived verisimilitude of the virtual environment. In addition to the regression validation, the correlation that was performed between these two variables previously demonstrated the existence of a strong and positive relationship of these two variables (r: 0.341; p:0.002). Therefore, based on the results of the correlation, as well as the regression, the hypothesis that immersion has a positive impact on the verisimilitude of the virtual environment can be accepted (H1). In other words, the greater the sense of immersion, the greater the verisimilitude of the virtual environment.

Table 5 - ANOVA (H1)

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Regression	3.848	1	3.848	9.994	.002
Residual	29.259	76	.385		
Total	33.107	77			

DV: ***Verisimilitude***
IV: ***Immersiveness***

A second hypothesis (H3a) defends a negative impact of the verisimilitude of the virtual environment (IV) on the perception of risk (DV) linked to this virtual visit. The two variables are not correlated with each other, and the regression analysis further confirms that the variables are not related. The ANOVA table, as shown in Table 5, reveals that the model is not significant (F (1;76): 0.031; p: 0.860), indicating that the degree of realism in a virtual environment is not a reliable predictor of the perception of risk associated with the virtual environment. Furthermore, only 1.3% of the variance in risk perception associated with the virtual tour can be explained by the degree of realism of the virtual environment (R^2 adjusted: -0.013). Consequently, hypothesis H3a, which postulates that a higher level of realism in the environment leads to a lower perception of risk associated with virtual visits, must be rejected.

Table 6 - ANOVA (H3a)

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Regression	.031	1	.031	.031	.860
Residual	73.960	76	.973		
Total	73.990	77			

DV: ***Perceived Risk***

IV: ***Verisimilitude***

Following, a hypothesis (H3b) holds that there is a positive impact of the verisimilitude of the virtual environment (IV) on the perceived convenience (DV) of a virtual tour. From the ANOVA output, Table 6, the proposed model is significant, i.e., the verisimilitude of the virtual environment with the museum is a good predictor of the perceived convenience of a visit to this museum through a virtual environment compared to an actual visit. (F (1;76): 13.636; p:<0.001). Indeed, 14.10% of the variance in convenience is explained by the verisimilitude of the virtual environment (adjusted R^2: 0.141). The convenience felt by the participants is equal to 2.393 + 0.392*the fidelity of the place with reality, serving as a predictor of the perceived convenience of a visit through the virtual environment. In addition to the validation of the regression, the correlation performed between these two variables has already demonstrated the existence of a strong and positive relationship between these two variables (r: 0.390; p:<0.001). Therefore, based on the results of the correlation, as well as the regression, the hypothesis that the verisimilitude of the virtual environment has a positive impact on the perceived convenience of such a visit can be accepted (H3b). In other words, the greater the

impression that the virtual environment is real and not synthetic, the greater the perceived convenience of such a visit.

Table 7 - ANOVA (H3b)

	Sum of Squares	***df***	***Mean Square***	***F***	***Sig.***
Regression	5.075	1	5.075	13.636	<.001
Residual	28.283	76	.372		
Total	33.358	77			

DV: ***Convenience***

IV: ***Verisimilitude***

The hypothesis that the perception of risk (IV) associated with a virtual visit has a positive impact on visit intention (DV) was also tested further with a regression. Indeed, a strong link was already found when studying the correlation between the variables (r: 0.432; p<0.001), giving a first favourable lead to this hypothesis (H4a). The ANOVA of this regression, Table 7, only reinforces the idea of this relationship. The model is indeed significant (F (1;76): 17.473; p<0.001), i.e., the perception of risk linked to visiting the museum virtually is a good predictor of the future intention to visit or not to visit this museum. More specifically, 17.60% of the variance in a participant's intention to visit is explained by his or her perception of risk related to a visit in virtual reality (R^2 adjusted: 0.176). A future user intention to visit is equal to 2.235 + 0.50 * the perceived risk of virtual reality, serving as a predictor of the intention to physically visit the same museum. Therefore, the hypothesis that the lower the perception of risk, the lower the intention to visit can be confirmed. The hypothesis H4a is accepted.

Table 8 - ANOVA (H4a)

	Sum of Squares	***df***	***Mean Square***	***F***	***Sig.***
Regression	25.748	1	25.748	17.473	<.001
Residual	111.991	76	1.474		
Total	137.739	77			

DV: ***Visit Intention***

IV: ***Perceived Risk***

Finally, the convenience (IV) of a virtual reality tour would have a negative impact on the intention to visit (DV) this environment (H4b). A weak correlation was found when looking at the correlations between variables (r: -0.238; p:0.036), supporting this hypothesis. In order to investigate further, a regression was conducted, Table 9, and revealed that the model according to which the convenience that virtual reality offers during a visit does impact on the intentions to visit the same place is significant (F (1;76): 4.553; p:0.036). However, unlike other relationships, this one is weaker. In fact, only 4.4% of the variance in visit intentions is explained by the convenience that brings a virtual visit. This does not prevent us from confirming the hypothesis that when people find it more convenient to visit in virtual reality, their intention to visit decreases. H4b is accepted.

Table 9 - ANOVA (H4b)

	Sum of Squares	***df***	***Mean Square***	***F***	***Sig.***
Regression	7.786	1	7.786	4.553	.036
Residual	129.954	76	1.710		
Total	137.739	77			

DV: ***Visit Intention***

IV: ***Convenience***

4.2.4.2 Multiple Regression

In view of the results of the last simple linear regression, it is interesting in the context of this study to know whether the perception of risk and convenience linked to virtual reality together have an impact on visit intention. In order to verify this, a multiple regression was conducted. Based on the results, it is the perception of risk that most predicts the intention to visit, the coefficient for convenience is not significant (B: -0.209; p:0.354). It is therefore more interesting to look at them separately.

Chapter 5: Discussion

After analysing the data, it was feasible to provide mainly satisfying findings. These results confirmed the majority of the hypotheses that were established through the pre-existing literature. This chapter will offer some potential responses to the research question. Furthermore, it will seek to clarify any perplexing results and investigate alternate interpretations for them.

5.1 Role of Virtual Reality on Visit Intention

The primary goal of this thesis is to test and analyse the potential determining aspects of a virtual reality experience that influence visit intention in a detrimental way. The findings of this quantitative study give pertinent information on this issue in the context of museum visits. The study identified a few crucial factors that have a significant impact on the visit intention.

Firstly, as the experts pointed out, the level of immersion experienced during a virtual reality encounter plays a central role (Slater et al., 1997; Lee et al., 2002). The leisure and tourism field views immersive experiences as a means of escape, and they require a high level of immersion, as noted by Hudson et al. (2019). The results of the study showed that the more immersed an individual feels, the more they are convinced that the virtual environment resembles the reality they experience, addressed in H1. It backs up Cheong's (1995) and Blascovich et al.'s (2002) claim that a person who is completely absorbed will struggle to distinguish between the actual and virtual worlds. Adapted to the context of this study, the more the user feels immersed in the virtual environment of the museum, the more the museum seems to be realist and true to how it looks in Amsterdam (Netherlands). As Slater and Wilbur (1992) developed, the virtual body, here hands, may have contributed to increasing the level of immersion. Furthermore, the Anne Frank House uses virtual reality in a distinct way, using an immersive first-person narrative known as the 'virtual reality body-swap experience'. This technique allows the participant to experience the visit as if they were Anne Frank, to hear her thoughts as if they were their own. As a result, the participant's immersion is considerably affected (Shehade & Stylianou-Lambert, 2020). While this assumption has been accepted, it is important to note that immersion is highly subjective and unique to each individual (Witmer & Singer, 1998).

In addition, research has shown that familiarity with the technology is an important factor in experiencing a sense of immersion. Specifically, navigating a virtual museum requires familiarity with the joysticks, including their buttons and manipulations. People who are less comfortable with these joysticks may need frequent intervention during their virtual visit, as they may become disoriented and not know what to do next. Unfortunately, such interventions can disrupt the user's immersion and force them to disconnect from the virtual experience, thus halting the development of their sense of immersion. When examining the data, it was found that participants consistently rated the realism of the virtual environment very positively. Instead, the degree of immersion varied from participant to participant. Contrary to popular belief, the lack of physical movement required to navigate virtual environments does not reduce the sense of immersion, at least not in this study. The ideal configuration for this simulated setting would be a motionless state. In this scenario, to navigate through a space, the user would simply walk in one spot, allowing for the visual perception and internal sense of movement to align, as proven by Slater and Wilbur's research in 1997. In fact, it may even reduce the likelihood of participants suffering from cyber-malaise. Physical movement may obviously improve immersion and presence in virtual settings, but it is not the sole factor. Visual and aural input, for example, might assist compensate for the lack of bodily movement and generate a sensation of immersion (Barfield et al., 1995). Furthermore, regardless of physical mobility, the level of interaction that was possible in the museum, engagement, and realism inherent in the virtual world can influence the feeling of presence and hence immersion (Ida et al., 2023). Another aspect that may provide more

information is the level of interest a person has in the subject of the museum. The subject is powerful and can evoke strong emotions, positively or negatively. Those with a strong interest in the subject are likely to find the experience more immersive (Lee et al., 2019).

However, whether or not an individual has visited the museum in real life before participating in the experience, does not affect their perception of the realism of the virtual environment of the museum, addressed in H2. This contradicts what Tussyadiah et al. (2017) claim, namely that the attitude toward the virtual world is conditioned by past experience in that real area, at least in terms of its realism. This can be attributed to the fact that the sample used for this study does not include a true representation of people who have visited the museum. It should be noted that only eight people versus seventy had visited the museum in the years prior to the experiment. The addition of a temporal qualifier, such as "in the last two years", would have been intriguing, as some people who have visited the museum in person do not fully remember it.

To continue, the strong focus on virtual reality that stems from its potential to allow people to explore the world without any associated risks (Lallart et al., 2014). In analysing the results of this research, it is clear that there is no correlation between the authenticity of a virtual environment and the perceived level of risk associated with virtual reality (H3a). This is an unexpected result, given that virtual reality has already demonstrated its ability to mitigate risk; however, the realism of the virtual environment does not appear to have a direct impact, although it may still play a role in a more indirect way. In other words, although the risk associated with this virtual visit was considered to be lower, although the environment was very realistic for the majority of people, this is not directly related. Although the realism of the virtual environment does not guarantee a reduction in risk perception, virtual reality does. The results of a survey conducted during a study on the impact of virtual reality on tourism support the findings of this study. The survey revealed that both the general public and virtual reality experts consider the elimination of risks associated with typical holidays to be insignificant (Sussmann & Vanhegan, 2000).

Although verisimilitude of the virtual environment may not directly influence risk perception, it is clear that an individual's perception of risk can have a significant impact on their willingness to visit (H4a). According to the data, a decrease in risk perception associated with a virtual visit led to a corresponding decrease in intentions to visit the destination, which in this case was a museum. According to Kozak et al (2007), it has been established that high levels of risk associated with travel can discourage people from making the decision to travel. However, this study also shows that the reverse is true. In other words, if the risk is perceived as low during a virtual visit, the willingness to take the risk of physically visiting the place is also low because the risk is considered higher than the virtual risk. The study found a significant association between perceived risk and the convenience of virtual tours. This finding highlights the possibility to further exploring this relationship in future research. When considering the use of virtual reality as a promotional tool for travel destinations, it is important to consider all perspectives. On the one hand, virtual reality can mitigate the risk associated with making a decision based on an intangible service (Huang et al., 2013). However, it is possible that this reduction in risk will deter potential tourists from actually visiting the destination. It is important to note that this thesis focuses only on a museum visit and not on a complete travel experience, which includes accommodation and dining options for example.

The verisimilitude proves to be related to the perception of the convenience associated with a virtual visit. In fact, the more the environment is looking real, the more convenient the visit seems to be (H3b). Travel reasons, expenses, and convenience, in particular, influence a potential tourist's decision-making process. Travel expenses encompass both economic and risk costs, while travel convenience includes both time and space convenience (Zhang et al., 2022). The results of this research might have been even more compelling if it had been conducted during a health crisis. Tourists' needs

for convenience, time savings, cost reduction and risk mitigation have made virtual tourism an essential alternative in times of crisis (Zhang et al., 2022). The virtual museum has the advantage of being interactive and widely accessible, as it can be accessed from anywhere and at any time. Its accessibility is not limited by any geographical or temporal constraints (Terrisse, 2013). For this particular study, it is clear that the convenience of visiting in virtual reality is enhanced when the experience is successful and complete, commensurate with what the museum can offer. It is not interesting to have the possibility of visiting the museum anywhere at any time if the experience is not optimum. Assuming that everyone had access to an affordable headset at home was a prerequisite when considering the convenience of virtual tours. Without this assumption, the responses regarding convenience could have yielded very different results.

Furthermore, convenience, like the perception of risk linked to the virtual visit, has an impact on the intention to visit. Indeed, it was found that the advantage of being able to visit the museum alone, at anytime, anywhere, influenced people not to visit the museum (H4b). It supported the result of the survey of Sussman & Vanghegan (2000) where ease and convenience were ranked as the fifth best features of virtual reality tour by the general public. It should be emphasised, however, that the relationship between convenience and visit intention was lighter than the relationship between perceived risk and visit intention. Risk appears to be the most essential component in understanding intention, and this was found to be connected to convenience. It could be interesting to look into this in this route rather than the one followed by this study. All of these data emphasise the importance of understanding that, while visit intention is declining, this does not imply that the intention has vanished.

Chapter 6: Conclusion

In the final chapter, there will be a concise overview of the research as a whole (section 6.1). Then, the practical implications of the study (section 6.2) and its theoretical implications (section 6.3) will be highlighted. Finally, limitations and recommendations for future research will be discussed (section 6.4).

6.1 Short Summary

The purpose of this research is to examine how a virtual reality museum experience affects future intentions to visit the physical museum. Despite the widespread belief that this technology is beneficial to the tourism industry, this study aims to re-evaluate the notion of virtual reality. Specifically, the research investigates the potential of this technology to completely replace the physical museum experience.

A quantitative research study was carried out in order to have a thorough grasp of the issue. An experimental design was developed, and approximately more than seventy-five people used a virtual reality headset (Quest 2) to visit the Anne Frank House in Amsterdam (Netherlands). No preconditions were put on the participants to ensure the most varied and inclusive population possible (convenience sampling). Following the virtual tour, an online survey was requested to be completed in order to collect the data required to analyse the hypotheses formulated from the current literature. Some interesting findings were found after a thorough study of the data gathered during this experiment.

First, the extent to which an individual is immersed in a virtual environment can have a considerable impact on their perception of its authenticity. As immersion increases, so does the sense of realism and naturalness experience by the user. The idea that a prior visit to the museum could have adverse effects on an individual's ability to perceive the realism of a virtual environment is legitimate. It is reasonable to assume that those who have visited the physical space can make accurate comparisons between the two, given their familiarity with the former. Unfortunately, despite efforts there was no connection between the participant's prior museum visits and the virtual environment's realistic thinking.

Virtual reality is frequently commended for its usefulness when it comes to touring a museum. With the help of this technology, people may visit the museum whenever they want without having to worry about crowds getting in the way of their taking a calm, in-depth look at each exhibit. This is especially advantageous for this museum, which is renowned for having a large number of tourists and long waits at the entry. This study confirms this positive relationship between the use of virtual reality tour and the perceived convenience of such a tour. Thanks to this characteristic, it can even persuade individuals to give up visiting the museum in question. This is because visiting intentions are strongly influenced by the ease and convenience of the visit. In essence, if the user perceives that the virtual museum visit offers more practical benefits than the physical visit, this may have an adverse effect on their desire to visit the museum in the future.

With regard to the intention to visit, the perceived risk plays a crucial role. It has been observed that the perceived risk of a virtual visit is much lower than that of a physical visit. Therefore, the intention to visit is also impacted accordingly. If we compare the perceived risk of a virtual visit to a physical visit, the former poses much less risk, and therefore the intention to visit is also lower. However, the realism of the virtual environment does not seem to contribute to the perception of this risk, i.e., by making it weaker.

6.2 Managerial implications of the study

Marketers of experiential products, including tourism, can gain valuable insights from this research. Although it may seem counter-intuitive, using virtual reality as a promotional tool for a museum is not an effective strategy. This is because potential visitors may consider the experience less risky and more comfortable than the actual visit to the museum, resulting in a decrease in their intention to visit. However, this same effect has not been observed when promoting a destination rather than a tourist attraction. On the contrary, numerous studies have demonstrated the effectiveness of virtual reality in promoting a destination. As such, marketers should carefully consider the type of experience they wish to promote in order to achieve the desired outcome. To do this, they can refer to the taxonomy of experience types developed in the literature.

In addition, Deng et al (2019) have highlighted the role of prospect characteristics, notably their enduring involvement. Therefore, the marketer should be aware of that level of involvement (low versus high) when promoting an experiential product, such as museum.

Finally, it provides a lead for the virtual reality designer. This study allows them to better understand the functional and design requirements for an optimal experience.

6.3 Theoretical implications of the study

Analysis of the data collected has indeed shown that virtual reality can be more than just a promotional tool. Numerous studies, including those by Guttentag in 2010 and Tussyadiah et al. in 2017, have confirmed that virtual reality presents an unprecedented opportunity. The empirical study by Keumala et al. (2022) focused only on the factors of perceived usefulness and perceived ease of use and found a positive influence of a virtual tour on visit intentions. However, this study takes a broader perspective by further investigating the impact of virtual tours on visit intentions. Indeed, other variables were added such as perceived risk and convenience related to a virtual tour.

When evaluating a virtual reality experience, telepresence is a common measure. A research study by Deng et al (2019) found that interactive and realistic virtual experiences resulted in less desire to 'consume' when visiting an art gallery compared to a non-immersive web experience. This study introduces an avenue for exploring the influence of immersion on the perception of similarity rather than presence. The use of a virtual reality headset allowed this variable to be included more accurately. However, it would be interesting to replicate their studies with more immersive tools, such as a virtual reality headset, and compare the results to previous studies. As they have shown, we confirm one of their findings that the 'consumption' motive is less prevalent for a museum than for a destination. In fact, in the case of leisure travel, the intention to visit tends to increase more often than it decreases after virtually experiencing the destination (Deng et al., 2019). Although, like their research, the study also illustrates that 'consumption' intention can decline in the context of a museum, in particular.

However, according to Deng et al. (2019), the detrimental effect of virtual reality is temporary and should be researched further. It would be interesting to incorporate the function of memory in virtual tour outcomes into this model.

Moreover, building upon the literature on the advantage of virtual reality technology, this research highlights the detrimental effects of those advantages on future visit intention. In fact, future intention to visit is determined by the convenience and risk reduction offered by virtual reality. To fully understand the potential of this ground-breaking technology, scholars and practitioners must focus on exploring the impact of virtual reality on audience perceptions and identifying the factors that influence their experiences within virtual environments.

6.4 Limitations and Suggestions for Future Research

First, the investigation concentrated solely on the virtual tour provided by the Anne Frank House. As a result, future research might benefit from acquiring data from other virtual reality museums. It is critical to recognise that the various virtual reality museum apps differ in terms of functionality and design. The selected museum is one that emits a significant amount of emotion, which distinguishes it from an art exhibition museum. It is difficult to experience the same sensations when accessing the Annex virtually as when visiting it in person.

It would be advantageous to expand the sample's size in order to make it more complete and inclusive. The present sample size for this study is insufficient since it is predominantly female (80%). Furthermore, it is critical to have an equal sample of individuals who have and have not visited the museum. As a result, the findings of this study cannot be implemented on an extensive scale. It should also be mentioned that the study was only done in Belgium. Therefore, for a subject where cultural disparities in technological acceptability and implementation are significant, a comparative study of different cultures might give significant knowledge to deliver more relevant information.

Furthermore, the experiment took place in different rooms, with some participants having the advantage of a quiet, noise-free space but with a limited area that revealed the limitations of the headphones and disrupted the experiment. Meanwhile, others were fortunate to have a larger area but with less quiet due to people conversing in the corridors or working outside. Ideally, all participants should have been in identical conditions, as multiple uncontrollable variables here could have disrupted their sense of immersion.

The factors chosen by the study to determine visit intentions were risk and convenience. However, it would be very interesting to examine whether other factors have more influence in a virtual reality context. For example, the phase of the life cycle of a tourist attraction according to Butler's model could be taken into account. However, the significance of memory, which would need a two-stage gathering procedure, is a significant element that should also be considered.

The main constraint of this research is the reliability of the measurement tools used. For a number of factors such as convenience and immersion, Cronbach's Alphas did not meet acceptable standards. As a result, the variables in question should have been completely eliminated, resulting in the loss of the basic meaning of the established model, which was therefore not done. Interestingly, the items were meticulously selected on the basis of pre-established healthy scales reviewed in other publications. The low alpha's can be attributed to a small sample size or too few questions being asked to adequately measure the variable in question.

Appendices

Appendix A

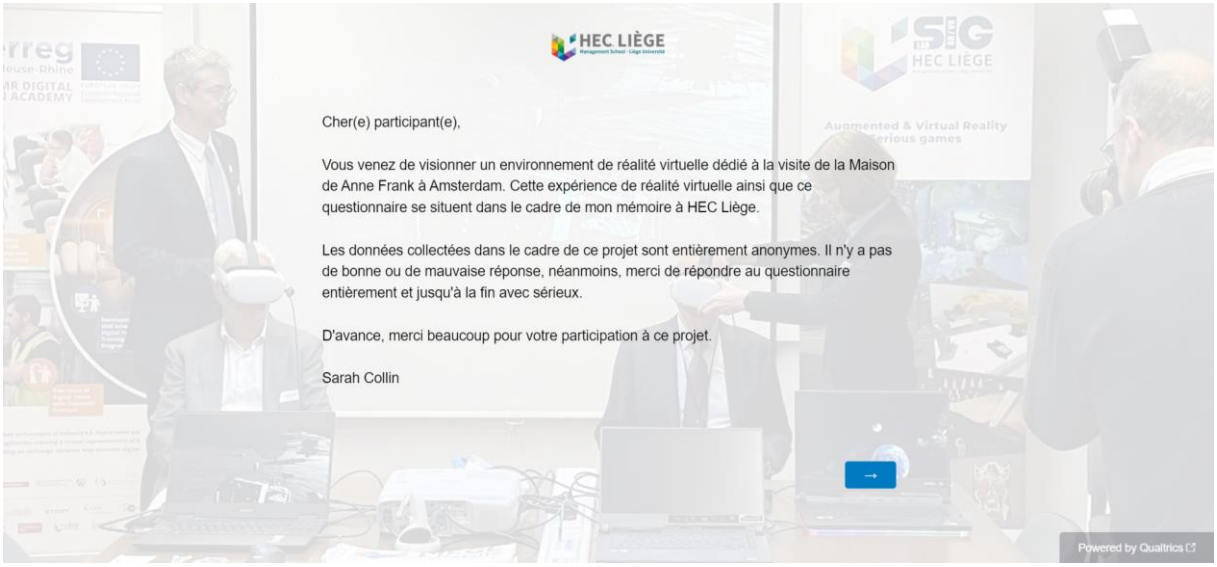
Virtual Reality tour of the Anne Frank House.

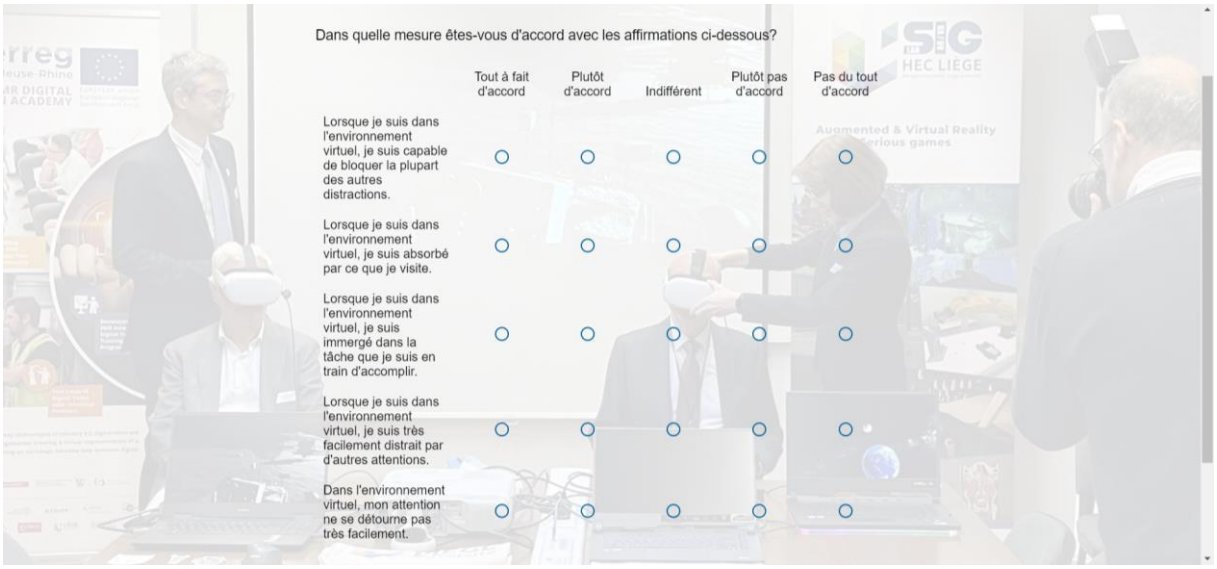
Access the video of the Anne Frank House in Virtual Reality:

Meta Quest. (2019, December 13). *Oculus VR for Good: Anne Frank House*. [Video]. YouTube. https://www.youtube.com/watch?v=8jTHEwPmApY

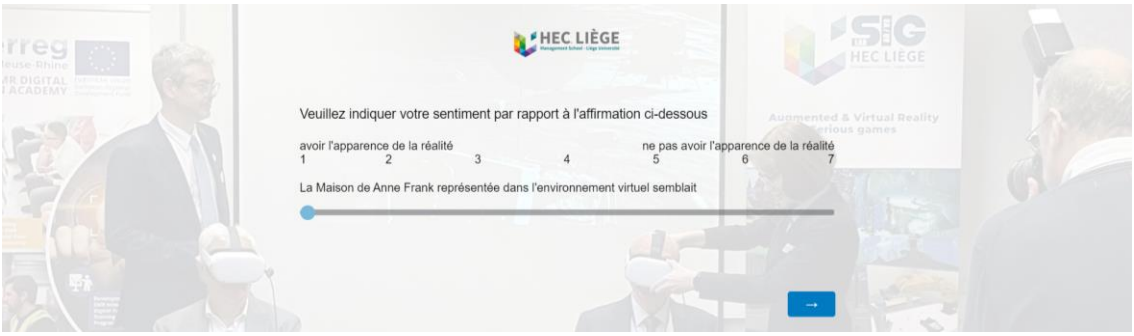
Appendix B

Questionnaire used for the study (Page 1/5)

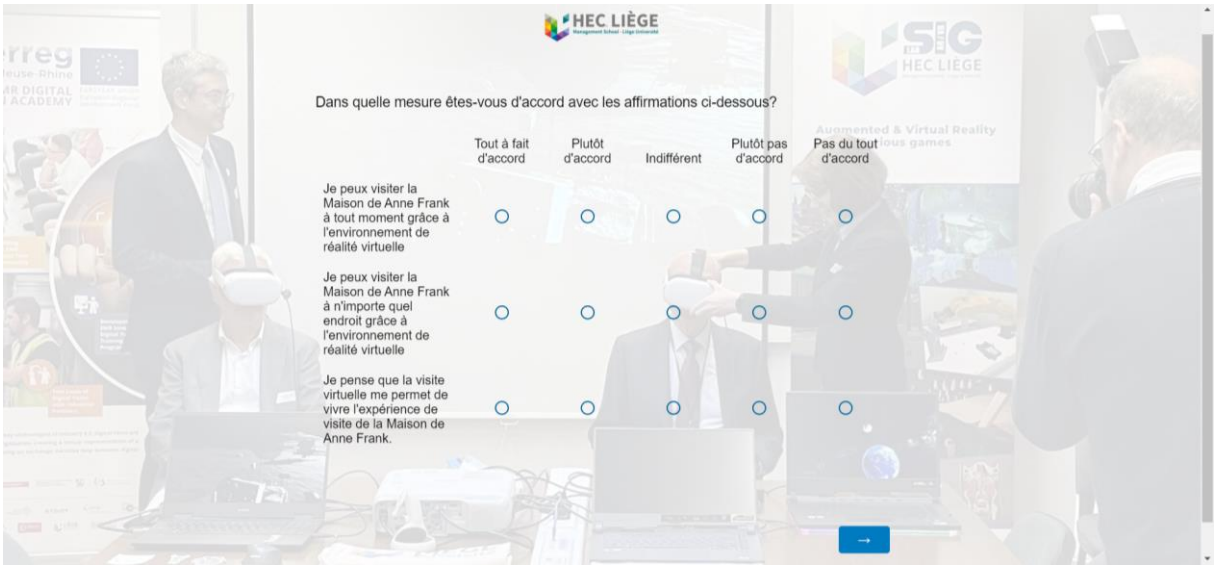


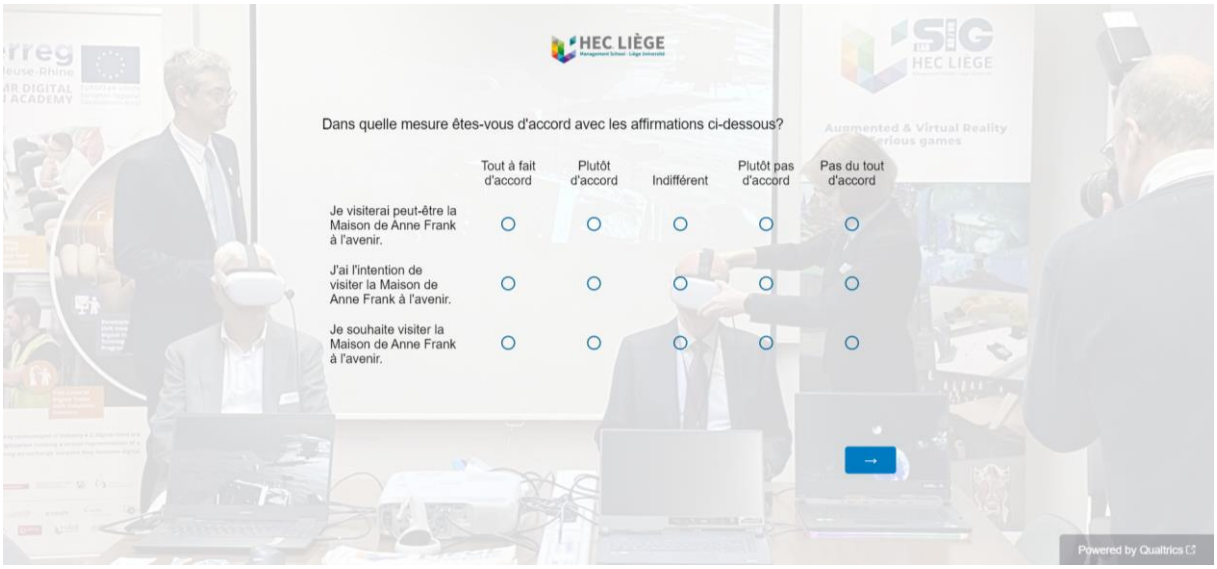


Questionnaire used for the study (Page 2/5)

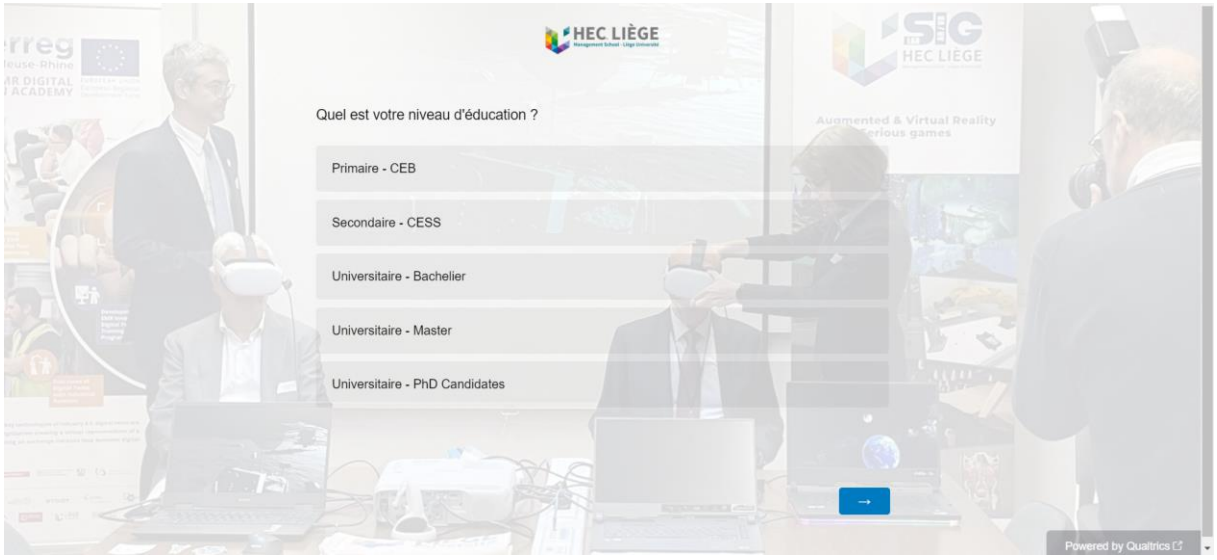


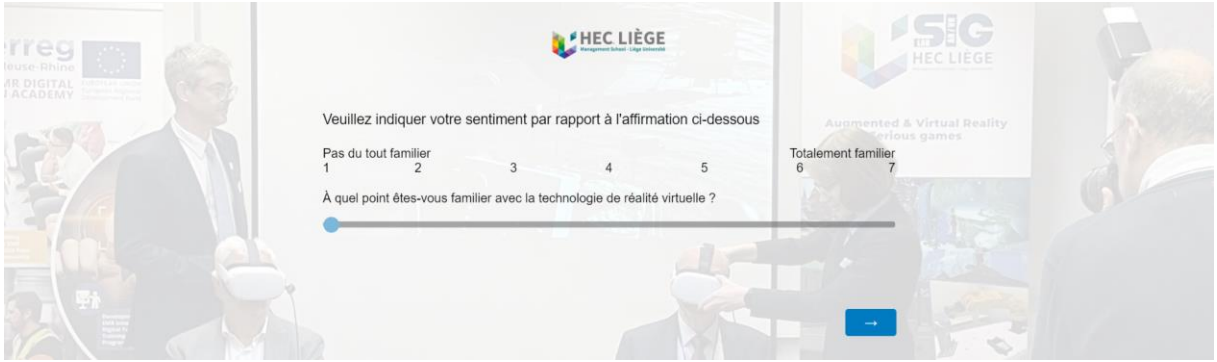
Questionnaire used for the study (Page 3/5)





Questionnaire used for the study (Page 4/5)





Questionnaire used for the study (Page 5/5)

Appendix C

Test for Normality of the items of the variables

		Kolmogorov-Smirnov*			Shapiro-Wilk		
Variables	Items	Statistics	df	Sig.	Statistics	df	Sig.
Immersiveness	Im1	.316	78	<.001	.704	78	<.001
	Im2	.406	78	<.001	.612	78	<.001
	Im3	.427	78	<.001	.619	78	<.001
	Im4	.339	78	<.001	.815	78	<.001
	Im5	.332	78	<.001	.808	78	<.001
Versimilitude Virtual Environment	Ps1	.295	78	<.001	.731	78	<.001
	Ps2	.347	78	<.001	.655	78	<.001
	Ps3	.282	78	<.001	.730	78	<.001
Perceived Risk	PR1	.254	78	<.001	.860	78	<.001
	PR2	.345	78	<.001	.719	78	<.001
	PR3	.249	78	<.001	.807	78	<.001
Convenience	PC1	.336	78	<.001	.679	78	<.001
	PC2	.305	78	<.001	.723	78	<.001
	PC3	.299	78	<.001	.778	78	<.001
Visit Intention	VI1	.256	78	<.001	.828	78	<.001
	VI2	.196	78	<.001	.864	78	<.001
	VI3	.198	78	<.001	.850	78	<.001

*. Lilliefors Significantce Correction

Appendix D

Values of Skewness & Kurtosis for the items of the variables

Variables	Items	Skewness	Kurtosis
Immersiveness	Im1	-1.354	2.228
	Im2	-.541	-1.753
	Im3	-1.036	-.201
	Im4	-.787	-.372
	Im5	-.863	-.255
Versimilitude Virtual Environment	Ps1	2.035	5.087
	Ps2	1.878	3.066
	Ps3	1.727	4.163
Perceived Risk	PR1	.704	-.293
	PR2	1.356	.880
	PR3	1.084	.748
Convenience	PC1	-1.653	2.755
	PC2	-1.389	1.516
	PC3	-.973	-.282
Visit Intention	VI1	-.676	-.859
	VI2	-.067	-1.389
	VI3	-.282	-1.412

Appendix E

Test for Reliability of the items of the variables – Cronbach's Alpha

Variables	Items	Cronbach 's Alpha	With item removed	
Immersiveness	Im1 Im2 Im3 Im4 Im5	.677		
Versimilitude Virtual Environment	Ps1 Ps2 Ps3	.798		
Perceived Risk	PR1 PR2 PR3	.720	.844	item 2 deleted
Convenience	PC1 PC2 PC3	.414		
Visit Intention	VI1 VI2 VI3	.953	.964	item 1 deleted

Appendix F_1

Correlation scale « Immersiveness »

		Im1	***Im2***	***Im3***	***Im4***	***Im5***
Im1	Pearson Correlation	1				
	P-value					
Im2	Pearson Correlation	**.444**	1			
	P-value	<.001				
Im3	Pearson Correlation	**.378**	**.337**	1		
	P-value	<.001	.003			
Im4	Pearson Correlation	**.445**	***.284***	***.253***	1	
	P-value	<.001	.012	.025		
Im5	Pearson Correlation	**.360**	.106	***.234***	**.434**	1
	P-value	.001	.354	.039	<.001	

Appendix F_2

Correlation scale « Verisimilitude »

		Ps1	***Ps2***	***Ps3***
Ps1	Pearson Correlation	1		
	P-value			
Ps2	Pearson Correlation	**.617**	1	
	P-value	<.001		
Ps3	Pearson Correlation	**.476**	**.671**	1
	P-value	<.001	<.001	

Appendix F_3

Correlation scale « Perceived Risk »

		PR1	***PR3***
PR1	Pearson Correlation	1	
	P-value		
PR3	Pearson Correlation	**.731**	1
	P-value	<.001	

Appendix F_4

Correlation scale « Convenience »

		PC1	***PC2***	***PC3***
PC1	Pearson Correlation	1		
	P-value			
PC2	Pearson Correlation	.173	1	
	P-value	.129		
PC3	Pearson Correlation	***.260***	.168	1
	P-value	.021	.141	

Appendix F_5

Correlation scale « Visit Intention »

		VI1	***VI2***	***VI3***
VI1	Pearson Correlation	1		
	P-value			
VI2	Pearson Correlation	**.857**	1	
	P-value	<.001		
VI3	Pearson Correlation	**.828**	**.934**	1
	P-value	<.001	<.001	

Appendix G

Confirmatory Factor Analysis

Variables	Items	Factor Loadings
Immersiveness [Factor 3]	Im1	.600
	Im2	.712
	Im3	.758
	Im4	.289
	Im5	.108
Versimilitude Virtual Environment [Factor 2]	Ps1	.805
	Ps2	.869
	Ps3	.791
Perceived Risk [Factor 4]	PR1	.681
	PR2	.516
	PR3	.797
Convenience [Factor 5]	PC1	.494
	PC2	<0.10
	PC3	.139
Visit Intention [Factor 1]	VI1	.896
	VI2	.950
	VI3	.941

Bibliography

Agarwal, R., & Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly*, *24*(4), 665. https://doi.org/10.2307/3250951

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, *84*(5), 888–918. https://doi.org/10.1037/0033-2909.84.5.888

Akhtar, N., Khan, N., Mahroof Khan, M., Ashraf, S., Hashmi, M. S., Khan, M. M., & Hishan, S. S. (2021). Post-COVID 19 Tourism: Will Digital Tourism Replace Mass Tourism? *Sustainability*, *13*(10), 5352. https://doi.org/10.3390/su13105352

Anthes, C., García-Hernández, R. J., Wiedemann, M., & Kranzlmüller, D. (2016, March). State of the art of virtual reality technology. In *2016 IEEE aerospace conference* (pp. 1-19). IEEE.

Bagozzi, R. P. (1981). Attitudes, intentions, and behavior: A test of some key hypotheses. *Journal of Personality and Social Psychology*, *41*(4), 607–627. https://doi.org/10.1037/0022-3514.41.4.607

Baños, R. M., Botella, C., Alcañiz, M., Liaño, V., Guerrero, B., & Rey, B. (2004). Immersion and Emotion: Their Impact on the Sense of Presence. *CyberPsychology & Behavior*, *7*(6), 734–741. https://doi.org/10.1089/cpb.2004.7.734

Barnes, S. (2016). Understanding Virtual Reality in Marketing: Nature, Implications and Potential. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2909100

Bessa, M., Coelho, A., Narciso, D., Luís Soares Barbosa, & José Vasconcelos-Raposo. (2016). *Does 3D 360 video enhance user's VR experience?* https://doi.org/10.1145/2998626.2998669

Biocca, F., Kim, J., & Choi, Y. (2001). Visual touch in virtual environments: An exploratory study of

presence, multimodal interfaces, and cross-modal sensory illusions. *Presence: Teleoperators & Virtual Environments*, *10*(3), 247-265.

Blascovich, J., Loomis, J., Beall, A. C., Swinth, K. R., Hoyt, C. L., & Bailenson, J. N. (2002). Immersive virtual environment technology as a methodological tool for social psychology. *Psychological Inquiry*, *13*(2), 103–124. https://doi.org/10.1207/s15327965pli1302_01

Bogicevic, V., Seo, S., Kandampully, J. A., Liu, S. Q., & Rudd, N. A. (2019). Virtual reality presence as a preamble of tourism experience: The role of mental imagery. *Tourism Management*, *74*, 55–64. https://doi.org/10.1016/j.tourman.2019.02.009

Boyd, D. E., & Koles, B. (2019). An Introduction to the Special Issue "Virtual Reality in Marketing": Definition, Theory and Practice. *Journal of Business Research*, *100*, 441–444. https://doi.org/10.1016/j.jbusres.2019.04.023

Burdea, G. C., & Coiffet, P. (2003). *Virtual reality technology*. John Wiley & Sons.

Burke, R. (1996). Conceptual indexing and active retrieval of video for interactive learning environments. *Knowledge-Based Systems*, *9*(8), 491-499.

Butler, R. W. (1980). The concept of a tourist area cycle of evolution: Implications for management of resources. *The Canadian Geographer/Le Géographe Canadien*, *24*(1), 5–12. https://doi.org/10.1111/j.1541-0064.1980.tb00970.x

Byrne, B. M. (2010). *Structural Equation Modeling with AMOS : Basic Concepts, Applications, and Programming.* Routledge, Taylor & Francis Group.

Cheong, R. (1995). The virtual threat to travel and tourism. *Tourism Management*, *16*(6), 417–422. https://doi.org/10.1016/0261-5177(95)00049-t

Chung, N., Han, H., & Joun, Y. (2015). Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site. *Computers in Human Behavior*, *50*, 588–599. https://doi.org/10.1016/j.chb.2015.02.068

Cooper, C., Fletcher, J., Gilbert, D., Fyall, A., & Wanhill, S. (2005). Tourism: Principles and practice. Pearson education.

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological methods*, *1*(1), 16.

Darnall, B., Norris, T., Ostrovsky, A., & Sparks, C. (2023, March 11). *VR to treat the Universal Human Experience of Pain* [In-Person]. SXSW 2023. https://schedule.sxsw.com/2023/events/PP126572

Deng, X., Unnava, H. R., & Lee, H. (2019). "Too true to be good?" when virtual reality decreases interest in actual reality. *Journal of Business Research*, *100*, 561–570. https://doi.org/10.1016/j.jbusres.2018.11.008

Dinh, H. Q., Walker, N., Hodges, L. F., Song, C., & Kobayashi, A. (1999, March). Evaluating the importance of multi-sensory input on memory and the sense of presence in virtual environments. In *Proceedings IEEE Virtual Reality (Cat. No. 99CB36316)* (pp. 222-228). IEEE.

Barfield, W., Zeltzer, D., Sheridan, T., & Slater, M. (1995). Presence and performance within virtual environments. *Virtual environments and advanced interface design*, 473-513.

Escouflaire, G. (2018, September 17). *Immersion 3D et collections 2.0 : quand les musées se réinventent à l'heure du digital*. ELLE.be. https://www.elle.be/fr/233539-quand-les-musees-se-reinventent-a-lheure-du-digital.html

Felnhofer, A., Kothgassner, O. D., Hauk, N., Beutl, L., Hlavacs, H., & Kryspin-Exner, I. (2014). Physical and social presence in collaborative virtual environments: Exploring age and gender differences with respect to empathy. *Computers in Human Behavior*, *31*, 272–279. https://doi.org/10.1016/j.chb.2013.10.045

Foxlin, E. (2002). Motion tracking requirements and technologies. *Handbook of virtual environment technology*, *8*(2002), 163-210.

Frochot, I., & Morrison, A. M. (2000). Benefit segmentation: A review of its applications to travel and tourism research. Journal of Travel & Tourism Marketing, 9(4), 21-45.

Griffin, T., Giberson, J., Lee, S. H. M., Guttentag, D., Kandaurova, M., Sergueeva, K., & Dimanche, F.

(2017). Virtual reality and implications for destination marketing.

Grüter, M., & Myrach, T. (2012). Understanding virtual experience and telepresence-a review and synthesis of literature. Proceeding from European conference on information systems (ECIS).

Guerra, J. P., Pinto, M. M., & Beato, C. (2015). Virtual reality-shows a new vision for tourism andheritage. European Scientific Journal, 11(9), 49–54.

GutiérrezM. A., Thalmann, D., & Frédéric Vexo. (2008). *Stepping into virtual reality*. Springer.

Guttentag, D. (2020). Virtual Reality and the End of Tourism? A Substitution Acceptance Model. *Handbook of E-Tourism*, 1–19. https://doi.org/10.1007/978-3-030-05324-6_113-1

Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism Management*, *31*(5), 637–651. https://doi.org/10.1016/j.tourman.2009.07.003

Haans, A., & IJsselsteijn, W. A. (2012). Embodiment and telepresence: Toward a comprehensive theoretical framework. *Interacting with Computers*, *24*(4), 211-218.

Hair, J. F., Black, W. C., & Babin, B. J. (2010). *Multivariate data analysis*. Cengage Learning Emea. Copyright.

Hasa. (2016, June 30). *Difference Between Travel and Tourism | Comparison of Meaning, Usage*. Pediaa.com. https://pediaa.com/difference-between-travel-and-tourism/

Helmick, R. (1995). Virtues of verisimilitude in design and art. *Computers & Graphics*, *19*(4), 505–507. https://doi.org/10.1016/0097-8493(95)00027-a

Horng, J.-S., Liu, C.-H., Chou, H.-Y., & Tsai, C.-Y. (2012). Understanding the impact of culinary brand equity and destination familiarity on travel intentions. *Tourism Management*, *33*(4), 815–824. https://doi.org/10.1016/j.tourman.2011.09.004

Huang, Y.-C., Backman, S. J., Backman, K. F., & Moore, D. (2013). Exploring user acceptance of 3D virtual worlds in travel and tourism marketing. *Tourism Management*, *36*, 490–501. https://doi.org/10.1016/j.tourman.2012.09.009

Hudson, S., Matson-Barkat, S., Pallamin, N., & Jegou, G. (2019). With or without you? Interaction and immersion in a virtual reality experience. *Journal of Business Research*, *100*, 459–468.

https://doi.org/10.1016/j.jbusres.2018.10.062

Hurikat. (n.d.). *Quand visiter la Maison Anne Frank à Amsterdam*. Hurikat. Retrieved May 9, 2023, from https://www.jaimeattendre.com/musees-monuments/maison-anne-frank/visiter-maison-anne-frank

Iachini, T., Maffei, L., Masullo, M., Senese, V. P., Rapuano, M., Pascale, A., Sorrentino, F., & Ruggiero, G. (2018). The experience of virtual reality: are individual differences in mental imagery associated with sense of presence? *Cognitive Processing*, *20*(3), 291–298. https://doi.org/10.1007/s10339-018-0897-y

Ida, H., Fukuhara, K., Mohapatra, S., & Sekiguchi, H. (2023). *Editorial: Perceptual Motor Control in the Virtual Environment and Its Implications in the Real World*. *5*. https://doi.org/10.3389/fspor.2023.1138516

IJsselsteijn, W. A., de Ridder, H., Freeman, J., & Avons, S. E. (2000). Presence: Concept, determinants and measurement. *Human Vision and Electronic Imaging V*, *3959*, 520–529. https://doi.org/10.1117/12.387188

Jung, T., tom Dieck, M. C., Lee, H., & Chung, N. (2016). Effects of Virtual Reality and Augmented Reality on Visitor Experiences in Museum. *Information and Communication Technologies in Tourism 2016*, 621–635. https://doi.org/10.1007/978-3-319-28231-2_45

Kang, M., & Gretzel, U. (2012). Effects of podcast tours on tourist experiences in a national park.Tourism Management, 33(2), 440–455.

Kannan, P. K., & Li, H. A. (2017). Digital marketing: a framework, Review and Research Agenda. *International Journal of Research in Marketing*, *34*(1), 22–45.

Kerstetter, D., & Cho, M.-H. (2004). Prior knowledge, credibility and information search. *Annals of Tourism Research*, *31*(4), 961–985. https://doi.org/10.1016/j.annals.2004.04.002

Keumala, S., Darmawan, H., & Sopian, T. (2022). INFLUENCE OF VIRTUAL TOUR ON VISIT INTENTION IN NATIONAL MUSEUM OF INDONESIA. *International Journal of Sustainable Competitiveness in Tourism*, *1*(01), 12–22. https://doi.org/10.34013/ijscot.v1i01.770

Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision support systems*, *44*(2), 544-564. QUESTIONNAIRE - PERCEIVED RISKS

Kozak, M., Crotts, J. C., & Law, R. (2007). The impact of the perception of risk on international travellers. *International Journal of Tourism Research*, *9*(4), 233–242. https://doi.org/10.1002/jtr.607

Lallart, E., Voisin, C., & Jouvent, R. (2014). La réalité virtuelle : un outil de réalisme. *Psychologie Clinique*, *1*(37), 82–90. https://doi.org/10.1051/psyc/201437082

Lam, T., & Hsu, C. H. C. (2004). Theory of Planned Behavior: Potential Travelers from China. *Journal of Hospitality & Tourism Research*, *28*(4), 463–482. https://doi.org/10.1177/1096348004267515

Lee, H., Jung, T. H., tom Dieck, M. Claudia., & Chung, N. (2019). Experiencing immersive virtual reality in museums. *Information & Management*, *57*(5), 103229. https://doi.org/10.1016/j.im.2019.103229

Lee, K. M. (2002). Social responses to synthesized speech: Theory and application. Stanford, CA:Stanford University.

Li, W., Long, R., Chen, H., & Geng, J. (2017). A review of factors influencing consumer intentions to adopt battery electric vehicles. *Renewable and Sustainable Energy Reviews*, *78*, 318–328. https://doi.org/10.1016/j.rser.2017.04.076

Ling, Y., Nefs, H. T., Brinkman, W.-P., Qu, C., & Heynderickx, I. (2013). The relationship between individual characteristics and experienced presence. *Computers in Human Behavior*, *29*(4), 1519–1530. https://doi.org/10.1016/j.chb.2012.12.010

Lo, W. H., & Cheng, K. L. B. (2020). Does virtual reality attract visitors? The mediating effect of presence on consumer response in virtual reality tourism advertising. *Information Technology & Tourism*, *22*(4), 537–562. https://doi.org/10.1007/s40558-020-00190-2

Magalhães, M., Melo, M., Bessa, M., & Coelho, A. F. (2021). The Relationship Between Cybersickness, Sense of Presence, and the Users' Expectancy and Perceived Similarity Between Virtual and

Real Places. *IEEE Access*, *9*, 79685-79694. QUESTIONAIRE - PERCEIVED SIMILARITYPas celui là utiliser dans le questionnaire, voir si je peux l'utiliser autre part.

Magalhaes, M., Melo, M., Coelho, A., & Bessa, M. (2019, November). Age and level of education impact on expectancy and perceived similarity between virtual and real touristic environments. In *2019 International Conference on Graphics and Interaction (ICGI)* (pp. 94-100). IEEE.

Malhotra, N. K., Birks, D. F., & Nunan, D. (2017). *Marketing research: an applied approach* (5th ed.). Pearson.

Marchiori, E., & Cantoni, L. (2015). The role of prior experience in the perception of a tourism destination in user-generated content. *Journal of Destination Marketing & Management*, *4*(3), 194–201. https://doi.org/10.1016/j.jdmm.2015.06.001

Merkx, C., & Nawijn, J. (2021). Virtual reality tourism experiences: Addiction and isolation. Tourism Management, 87, 104394.

Meta Quest. (2019, December 13). *OculusVR for Good: Anne Frank House*. [Video]. YouTube. https://www.youtube.com/watch?v=8jTHEwPmApY

Middleton, V.T.C., & Clarke, J.R. (2001). Marketing in Travel and Tourism (3rd ed.). Routledge. https://doi.org/10.4324/9780080511108

Milgram, P., Takemura, H., Utsumi, A., & Kishino, F. (1995, December). Augmented reality:A class of displays on the reality-virtuality continuum. In Telemanipulator and telepresencetechnologies (Vol. 2351, pp. 282-292). International Society for Optics and Photonics.

Miller, D. W., Stoica, M., & Kilic, O. (2017). Modeling Consumer Responses to a Vignette Television Commercial Drama for a Vacation Resort. *Services Marketing Quarterly*, *38*(1), 1–14. https://doi.org/10.1080/15332969.2017.1271195

Ozturk, A. B., Bilgihan, A., Nusair, K., & Okumus, F. (2016). What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use, and

perceived convenience. *International Journal of Information Management*, *36*(6), 1350–1359. https://doi.org/10.1016/j.ijinfomgt.2016.04.005

Pillai, A. (2021, May 21). *Virtual tourism can rebuild travel for a post-pandemic world*. World Economic Forum. https://www.weforum.org/agenda/2021/05/covid-19-travel-tourism-virtual-reality/

Plötz, P., Schneider, U., Globisch, J., & Dütschke, E. (2014). Who will buy electric vehicles? Identifying early adopters in Germany. *Transportation Research Part A: Policy and Practice*, *67*, 96–109. https://doi.org/10.1016/j.tra.2014.06.006

Reiners, D., Stricker, D., Klinker, G., & Müller, S. (1999, November). Augmented reality for construction tasks: Doorlock assembly. In *International workshop on Augmented Reality: Placing Artificial Objects in Real Scenes* (pp. 31-46).

Rogers, S. (2020, March 18). *How Virtual Reality Could Help The Travel & Tourism Industry In The Aftermath Of The Coronavirus Outbreak*. Forbes. https://www.forbes.com/sites/solrogers/2020/03/18/virtual-reality-and-tourism-whats-already-happening-is-it-the-future/

Sacau, A., Laarni, J., & Hartmann, T. (2008). Influence of individual factors on presence. *Computers in Human Behavior*, *24*(5), 2255–2273. https://doi.org/10.1016/j.chb.2007.11.001

Sadamali Jayawardena, N., Thaichon, P., Quach, S., Razzaq, A., & Behl, A. (2023). "The persuasion effects of virtual reality (VR) and augmented reality (AR) video advertisements: A conceptual review." *Journal of Business Research*, *160*, 113739. https://doi.org/10.1016/j.jbusres.2023.113739

Shehade, M., & Stylianou-Lambert, T. (2020). Virtual Reality in Museums: Exploring the Experiences of Museum Professionals. *Applied Sciences*, *10*(11), 4031. https://doi.org/10.3390/app10114031

Skarbez, R., Smith, M., & Whitton, M. C. (2021). Revisiting Milgram and Kishino's Reality-Virtuality Continuum. *Frontiers in Virtual Reality*, *2*. https://doi.org/10.3389/frvir.2021.647997

Slater, M., & Wilbur, S. (1997). A Framework for Immersive Virtual Environments (FIVE): Speculations on the Role of Presence in Virtual Environments. *Presence: Teleoperators and Virtual Environments*, *6*(6), 603–616. https://doi.org/10.1162/pres.1997.6.6.603

SPSS. (2023). *Analyse en composantes principales* |. Usherbrooke.ca. https://spss.espaceweb.usherbrooke.ca/analyse-en-composantes-principales-2/

Sussmann, S., & Vanhegan, H. (2000). Virtual Reality and the Tourism Product Substitution or Complement? *ECIS 2000 Proceedings*. https://aisel.aisnet.org/ecis2000/117

Tepper, O. M., Rudy, H. L., Lefkowitz, A., Weimer, K. A., Marks, S. M., Stern, C. S., & Garfein, E. S. (2017). Mixed reality with HoloLens: where virtual reality meets augmented reality in the operating room. *Plastic and reconstructive surgery*, *140*(5), 1066-1070.

Terrisse, M. (2013). Musées et visites virtuelles : évolutions et possibilités de développement. *Muséologies : Les Cahiers d'Études Supérieures*, *6*(2), 15–32. https://doi.org/10.7202/1018927ar

The Tourism Society (1979). Handbook and Members List. The TourismSociety.

Tinsley, H. E. A., & Eldredge, B. D. (1995). Psychological benefits of leisure participation: A taxonomy of leisure activities based on their need-gratifying properties. *Journal of Counseling Psychology*, *42*(2), 123–132. https://doi.org/10.1037/0022-0167.42.2.123

Tussyadiah, I. P., Wang, D., & Jia, C. (2017). Virtual Reality and Attitudes Toward Tourism Destinations. *Information and Communication Technologies in Tourism 2017*, 229–239. https://doi.org/10.1007/978-3-319-51168-9_17

Vérifier la normalité des données. (n.d.). Www.biostat.ulg.ac.be. Retrieved May 16, 2023, from http://www.biostat.ulg.ac.be/pages/Site_r/Normalite.html

Vince, J. (2004). *Introduction to virtual reality*. Springer Science & Business Media.

Wagler, A., & Hanus, M. D. (2018). Comparing Virtual Reality Tourism to Real-Life Experience: Effects of Presence and Engagement on Attitude and Enjoyment. *Communication Research Reports*, *35*(5), 456–464. https://doi.org/10.1080/08824096.2018.1525350

Weech, S., Kenny, S., & Barnett-Cowan, M. (2019). Presence and Cybersickness in Virtual Reality Are Negatively Related: A Review. *Frontiers in Psychology*, *10*, 158. https://doi.org/10.3389/fpsyg.2019.00158

Williams, P., & Hobson, J. P. (1995). Virtual reality and tourism: fact or fantasy? *Tourism Management*, *16*(6), 423–427. https://doi.org/10.1016/0261-5177(95)00050-x

Wilson, K. (1998). Marketconfusion in tourism economic analyses. Annals of Tourism Research, 25(4), 803-817.

Witmer, B. G., & Singer, M. J. (1998). Measuring Presence in Virtual Environments: A Presence Questionnaire. *Presence: Teleoperators and Virtual Environments*, *7*(3), 225–240. https://doi.org/10.1162/105474698565686

World Tourism Organization (WTO) (1992). Presentation on TourismTrends to 2000 and Beyond. WTO.

Yoon, C., & Kim, S. (2007). Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN. *Electronic Commerce Research and Applications*, *6*(1), 102–112. https://doi.org/10.1016/j.elerap.2006.06.009

Zhang, S.-N., Li, Y.-Q., Ruan, W.-Q., & Liu, C.-H. (2022). Would you enjoy virtual travel? The characteristics and causes of virtual tourists' sentiment under the influence of the COVID-19 pandemic. *Tourism Management*, *88*, 104429. https://doi.org/10.1016/j.tourman.2021.104429

Executive Summary

This research study aimed to investigate the impact of a virtual reality museum tour on individuals' future intention to visit the physical museum. The study aimed to challenge the widely held belief that virtual reality technology is beneficial for the tourism industry and to explore its potential to replace the physical museum visit. A quantitative research design was used, and an experimental study was conducted using a virtual reality headset to visit the Anne Frank House museum in Amsterdam (Netherlands). After the virtual tour, an online survey was conducted to collect the data required to analyse the hypotheses formulated from the literature. The study suggests that immersion in a virtual environment has a considerable impact on the user's perception of authenticity, and the perceived realism increased as the immersion level increased. The study suggests that a prior Anne Frank House museum visit does not impact the user's ability to perceive the realism of the virtual environment. The study also suggests that virtual reality tour facilitates individuals to visit the museum whenever they want, without worrying about crowds and long queues at the entry, and this positively impacts their perceived convenience of such tours. However, the study also highlights that the perceived convenience of virtual tours could negatively impact individuals' future intention to visit the physical museum. The study also suggests that the perceived risk of a virtual visit is lower than that of a physical visit, and this impacts individuals' intention to visit accordingly. Overall, the study provides valuable insights into the impact of virtual reality on museum visits and highlights the need for further research to fully understand the potential of this technology. This study finishes with an overview of the important implications and limits of this research.

Word Count : 17,287