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Try Before You Buy: Using Virtual Reality for Travel Planning

| AUTHOR | | ADVISOR: |
|---|---|---|
| Student number: | Name: | |
| 234902 | Ricardo Nunez San Juan | Elisabeth Lind Melbye |
| ..... | ..... | |

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# ABSTRACT

Technological innovations have been transforming the way we handle tourism. Virtual reality (VR), one of the most recent commercially available technologies, is an underexplored marketing opportunity for destination marketing organizations (DMOs) and for companies within the tourism industry. This emerging technology can help to build a closer relationship between DMOs and the traveler. Within this context, it is predicted that tourist may benefit from using VR applications in their travel planning phase, as they get the opportunity to pre-experience potential travel destinations, accommodations and other travel related activities before their actual trip. Virtual Reality can also serve DMOs to better promote travel destinations and services in an innovative way, rousing the travel intention in potential tourist. To explore this possibility, a survey based on the Technology Acceptance Model was used to collect data throughout a 43-item questionnaire that participants had to complete after a virtual travel experience to a preferred destination. The results revealed significant effects on the behavioral intention to use virtual reality for travel planning. Based on these results it is suggested that Virtual Reality technology is a useful and enjoyable tool that will ease the process of planning a trip and help make better informed decisions.

**Keywords**: Virtual reality, Technology acceptance, Travel Planning, Destination Marketing

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# FOREWORD

Virtual reality can be a game changing for the way we see tourism. Far from being a futuristic term as many still consider it, it is today's reality. Marketers and researchers really need to step up in their game and explore this niche in the industry that has been developing in the recent years. The reason why I decided to study this "phenomena" is because it involves two of my biggest passions: marketing and tourism.

Ever since I graduated from a BBA in Marketing and Management, I got quite upset about the misconception that society has about marketing, giving us a hashtag of vendors or salespersons. To me, marketing is much more than sales, it involves innovating and presenting a product or service in an unexpected way for the consumers to learn that they need it and want it in their life. Accordingly, virtual reality offers the tourism industry the challenge to be presented in an innovative way. VR offers a fun and a different approach to promote and present destinations or other industry related services and products, that will allow tourists to stay informed and subsequently make good decision on their future travel plans. The idea of this study, is to evidence that without complications, VR can ease the travel planning activities in many ways: from booking a simple flight and choosing the right hotel, to discover unvisited destinations.

Given these points, I would like to express my sincere gratitude to Elisabeth Lind Melbye, my master thesis advisor at the University of Stavanger, thank you for sharing with me some of your wisdom about the ways within the academic field. Also, I extend my gratitude to professor Carlos Natividad at Trinity University in San Antonio, Texas. Thank you very much for your disposition and all the kind and valuable advice in statistics.

And last, I dedicate this dissertation to my beloved mother Margarita (†), thank you very much for everything you ever did for me, and because with your recent decease I learned that "the show must go on". To my dad Recaredo, thank you for financing this Master's degree. To my sister, thank you so much for all the emotional support, for always believing and supporting my crazy ideas. Last, special thanks to the love of my life, Daniel, thank you for all the unconditional love. Thank you for all the support, for always holding up with me.

Stavanger, June 2017

Ricardo Núñez San Juan.

# CHAPTER 1: INTRODUCTION

Marketing in tourism is a fundamental element for every organization to keep up with the needs and wants of the consumers to be a leader in the market. Experts in this topic, find it useful to review consumers' travel and tourism needs to understand how to better build a customer-business relationship. While some researchers pay attention to the motivations behind planning a travel, others seek for different factors pushing up the travel and tourism industry.

Another important interest for the industry, is to learn how tourists make decisions about their travel purchase. When travelers are familiar with a holiday destination, it gives them confidence and thus, they keep repeating the purchase of such product. Therefore, we see a pattern for product loyalty as the tendency among travelers to return not only to their now traditional but also preferred destination; and/or if they purchase another holiday from the same tour operator (physical or online), we can call it a brand loyalty. But what about the less experienced holidaymakers? According to Holloway (2004), these travelers are often seeking as much information about destinations to select the best decision from a wide selection of choices. Furthermore, the personality of each person determines their decisions, easy going persons optimize their choice, and demanding personalities, consider less options and thus, they get better satisfied.

While in the past most tourism businesses used brochures and magazines to promote travelled related products, nowadays it is quite popular to promote traveling products and services throughout the internet. Presently, technology plays an important role in our lives, it is impossible to deny that individuals are more and more dependable of the technology that they own and from the technology that they are exposed to day by day. The hospitality and the

tourism industry, has taken advantage of technology in form of social media. They use this communication tool not only to advertise themselves, but to compete among each other. Yet, a few tourism organizations and businesses willing to lead the market have begun to incorporate virtual experience in destinations marketing and promotion.

A virtual experience can be achieved in different ways. It can be experienced as a virtual environment, augmented reality, virtual reality, etcetera. This study will focus only on Virtual Reality (VR) as the main provider of a virtual experience. Virtual reality (VR), has been one of the most recent commercially available technologies that seems to be a promising and remarkable marketing tool for DMOs. Being this technology eager to shift the way businesses market their products or services, it is important to understand what is underlying behind a VR experience.

Williams and Hobson (1995) suggested that far from what it might be believed, the term 'virtual reality' is by no means new. The virtual reality definition involved the creation of 3-D worlds within a combination of visual, audio and kinetic effects in which virtual reality users can see, hear and touch real-life images which make them believe they are "truly" experiencing the real thing (Williams & Hobson, 1995). Moreover, Cartwright (1994) and McClure (1994) who defined virtual reality as a multisensory experience that is computer-mediated, to bring people into dimensions that diverge from our own (as cited in Cheong, 1995). Also, it can be said that a virtual reality experience is best described by its ability to offer physical immersion and psychological presence (Gutierrez et al., 2008, as cited in D. Guttentag, 2015).

Nevertheless, Williams and Hobson (1995) believed in VR as a potential marketing tool that will revolutionize the promotion and selling of tourism, by offering tourist the ability to simulate interactive experiences of their planned trip. Similarly, Wan, Tsaur, Chiu, and Chiou (2007), emphasized that a virtual experience goes beyond being a simply information channel for the industry, it actually allows travelers to pre-experience their selected travel destinations. Also, Milman and Pizam (1995) study indicated that when consumers (travelers in this context) are well informed about a destination and thus, developed a positive impression about such a destination, they will be more easily enticed to visit that place (as cited in Wan et al., 2007).

This study supports the idea that with the help of VR, tourist will have the opportunity to sample the delights and have a feel of each destination's atmosphere before making their decision as to which destination to visit. In other words, if a person with the desire to travel has the chance to virtually explore any destination, for instance virtually visit Australia, Mexico, Norway, or any specific attraction, with this VR pre-experience opportunity, potential travelers will be in a better position to make an informed decision and initiate the travel arrangements. Even after the virtual experience, the images of the destination will remain in the tourists mind thus, creating a wish and provoking in the tourist the intention to visit such place in the future (Cheong, 1995).

Therefore, the proposed thesis statement is that virtual reality (VR) can be used in travel planning. Subsequently, it is proposed that using virtual reality will help in the decision-making process, providing rich and better information when planning and buying a holiday.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Virtual Reality

In the marketing literature, a virtual experience is defined as the psychological and emotional state that users will experience when they interact with products and brands in a 3D environment (Li et al., 2001, as cited in Gabisch & Gwebu, 2011). Virtual experiences can be achieved in different ways, such as virtual environment, augmented reality, virtual reality, etcetera. Our focus in this project is towards the use of "virtual reality".

It is believed that this term has its origins in the 1970s when Myron Kruger used the term to describe a theoretical approach to understand the human-computer interference (Williams & Hobson, 1995). Some scholars outlined it as a developing paradigm that redefined the relationship between humans and computers, providing a cyberspace that would give people simulated virtual bodies in virtual realities in a three-dimensional world (Walser, 1991). In other words, the illusionary 3-D worlds are generated by a combination of visual, audio and kinetic effects giving the VR users the sensation of seeing, hearing and touching real-life images believing that they are in fact experiencing the real thing (Williams & Hobson, 1995).

D. A. Guttentag (2010) also defined virtual reality as the use of a computer-generated 3D environment (also called virtual environment) in which users can navigate (move around and explore the environment) and possibly interact (move objects within the environment). Cheong (1995) supported that virtual reality was a revolutionary computer-mediated and sensory stimulated experience that enabled contact to dimensions that differed from our own. Furthermore, futurist author Donald R. Libey defined virtual reality in five ways, first as a profitable sensorial experience, second as a parallel or on-call universe, third as an alternative

reality, fourth as a fantasy and desire using all senses and last as any reality that people could desire (as cited in Ryan, 2001, p. 57).

Thus, virtual reality is a multifaceted technology that encompasses much more than simple consumer electronics and computer games. Although virtual reality is not true reality, in simple terms, it can be explained as a sensory-rich experience that originated its name because what the user is experiencing is virtually real (Ryan, 2001). While some scholars demand that a combination of visualization, immersion and interactivity are needed for an optimum degree of realism in the virtual reality experience (Cruz-Neira et al., 1994, as cited in Williams & Hobson, 1995, p. 424), others just focus on its capacity to provide 'physical immersion' and 'psychological presence' in a virtual experience (Disztinger, Schlögl, & Groth, 2017; Gutiérrez et al., 2008, as cited in D. A. Guttentag, 2010).

The visualization of a virtual experience can be accomplished by using a head mounted display (HMD) unit that are now available in the market in the form of goggles, glasses, and helmets (D. A. Guttentag, 2010). The HMD will give the virtual reality participants the capability of looking around in a full 360-degree angle and it will vary on stereoscopic vision, visual acuity, and perhaps the ability to see other participants (Cruz-Neira et al., 1994, as cited in Williams & Hobson, 1995).

Immersion indicates the magnitude to which a user is secluded from the actual real world, a factor than in virtual reality may influence the user's sense or feelings of presence. The sense of presence is then, the degree to which a participant in the virtual environment psychologically feels part of it, rather than being in the place in which the participant's body is physically located (D. A. Guttentag, 2010; Witmer & Singer, 1998). Moreover, immersion is

described by Witmer and Singer (1998) as a psychological condition that is portrayed by the subjective impression of being comprised, inserted in, and interacting with, an atmosphere or a location that delivers a constant flow of motivations and experiences.

At last, interactivity represents the degree of control that a user has over the virtual reality experience, this element include the kinetic effects and manipulators that gives each user the interaction and feeling of presence (Cruz-Neira et al., 1994, as cited in Williams & Hobson, 1995), although D. A. Guttentag (2010) believed that this element is optional and thus, it is more closely related with augmented reality.

### 2.1.1 Virtual Reality and The Tourism Industry

In the context of this manuscript, it is believed that virtual reality has the potential to transform the tourism industry. Indeed, the travel and tourism industry can use virtual reality as a powerful marketing instrument revolutionizing the promotion and selling of tourism and also by offering potential travelers the opportunity to experience previews of destinations and subsequently their respective attractions and facilities (Cheong, 1995; Williams & Hobson, 1995).

Virtual reality provides potential travelers with more richer (Berger et al., 2007), interactive information (Wan et al., 2007) than a simple brochure and/or a multimedia package, that limits its information and offers only short glances of a destination (Cheong, 1995). Yet again, having explored and virtually experienced what a destination offers, the potential traveler will stand in a better position to make an informed decision and initiate travel arrangements. And even if the virtual experience offered a different destination than the travelers first choice, the image of the destination that was experienced virtually will remain

still in the traveler memory and thus, can possibly create a desire to visit such destination in the future (Cheong, 1995).

Virtual reality in a "try before you buy" system will be not only cost effective but will also help marketers to customize destination and general travel projects to the needs of tourists (Heldal, 2007, as cited in Disztinger et al., 2017). For instance, Thomas Cook Group introduced in 2014 virtual reality technology to promote their products in selected stores in the UK, Germany and Belgium and later with a mobile application called "Holiday 360". Their content offers their clients with virtual 'taster' experiences of New York, Rhodes and Cyprus (Thomas Cook, 2014). In 2015, only a few months after launching the virtual reality experiences their promotion for New York boosted their revenue by 190 percent (Parker, 2015). Marco Ryan, Chief Innovation Officer at Thomas Cook stated that by virtual reality technologies will play a key role in how companies showcase their products to their customers. In fact, by allowing their customers to use the VR as an in-store shopping experience, they are becoming leaders in the travel industry and therefore, their customers will make an informed decision regarding their next holiday (Thomas Cook, 2014).

Another example is Expedia, the online world-wide known travel agency. Recently, they are treating potential tourists to a "try before you buy" experience, to select their hotel using a HMD. Within this experience, the tourist has the opportunity to be immerse in a hotel room where they are able to walk around, explore the room, check their balcony, etcetera. By offering this virtual experience, it is believed that tourist can reduce the risk of making a bad decision prior their booking. The company has shared their plans to expand this marketing plan soon (Beck, 2017).

In the past and perhaps still in the present time, academics believed that virtual reality could be a thread to the travel industry by becoming a substitute for actual travel (Cheong, 1995), however there is no evidence of it truly happening anytime soon (D. A. Guttentag, 2010). Nevertheless, in the case of this becoming a reality, it could be cheaper, convenient and no hassles will be involved in matter of visas procedures, booking travel packages, etcetera. In addition, virtual reality could also make traveling possible to those who are physically unable to move due to illness or reduced/limited physical mobility (Cheong, 1995). In a more realistic matter, including a virtual experience such as a virtual tour or panoramic photos on travel planning websites, can be beneficial to potential travelers suffering from travel anxiety, offering psychological relief (Lee & Oh, 2007).

### 2.1.2 Virtual Reality and Travel Planning

Not so long ago, the only source of information was what is known as traditional media. Advertising in forms of brochures, magazines, radio and television were exposed to consumers and potential travelers, showing only flat images of what could possibly be offered in their traveling experience. More recently, technologies have been developed in the attempt to solve tourists' unfamiliarity with a destination (Pantano & Corvello, 2014).

First with the internet and later with mobile technologies, the access to information became viral and the tourism industry knew how to take advantage of this. Apart from every brand and tourism company being present in the Web, online travel agencies became leaders in the booking process of flights and accommodations. Nowadays, virtual reality in comparison to traditional media, allows the tourists to explore each destination in great depth (Cheong, 1995) by providing information and 3-D images in form of interactive media.

As it has been stated before, virtual reality can provide richer information, helping possible travelers to experience the virtual destination and perceive a potential visit (Berger et al., 2007). According to Klein (1998), previous research has indicated that interactive media has the potential to change the consumer behavior on the pre-purchase and the ongoing consumer information search processes. Borrowing her input on the use of this kind of interactive media, it can be said that using virtual reality in the process of information search, will change the number and types of sources consulted and the distribution and weight of the information gathered will also be altered, resulting in a more effective way of travel planning that will eventually turn into a better decision making towards the actual travel.

Because technology can be considered in many ways a need in our daily life, potential tourist care more for information that gives them the opportunity to experience the destination rather than finding just objective facts about it (Cho & Fresenmaier, 2001, as cited in Y.-C. Huang, Backman, & Backman, 2010). However, most of the obtained information used to evaluate a destination is uncertain and lacks of objective criteria, such as the physical attributes (MacKay, 1995, ac cited in Cho, Wang, & Fesenmaier, 2002). These uncertainties have been addressed by Nelson (1970) as 'experiential attributes' since they can only be identified throughout experience (as cited in Cho et al., 2002).

Moreover, Nelson's (1974, 1976, 1981) theory predicted that among other methods of information search, the word-of-mouth and advertising were cataloged as "experience goods", since consumers take less total search (time) because they are unable to gather valuable product information prior to use and therefore, they rely on the product experience that has been shared by others. Yet again, as technology advances, it is now possible to sample goods via free trial, or in this matter via virtually experience, prior to purchase a product (as cited in Klein, 1998).

In addition, testing a destination with a virtual reality experience, you can tell if what is advertise is true and will further satisfy your travel needs and motivations.

Disztinger et al. (2017) stressed that the virtual reality potential in tourism depends on the additional sensory and visual information offered to potential travelers. This characteristic is a revolutionary tool because most of the travel bookings are made on descriptive information that are given throughout media or social channels, nevertheless, a touristic service cannot be tested in advance, still virtual reality can offer richer information than what is normally found in traditional advertising methods (magazines, websites, etcetera.).

It has been learned that many purchasers use the internet to gather information on products and brands previous actual offline purchases (Venkatesan et al., 2007; Teltzrow et al., 2007; as cited in Gabisch & Gwebu, 2011). With the addition to virtual reality in this process, consumers can search for information, try products before purchasing. Consequently, these virtual environments are offering huge advantages over traditional advertising methods offline and online, through interactivity and brand experiences that lead to customer loyalty and sales (Gabisch & Gwebu, 2011).

Cheong (1995) stressed that with virtual reality, travel planners can have the opportunity to virtually proceed along the streets and analyze the layouts of a destination. Beyond that statement, planning a trip with this technological tools gives the opportunity to appreciate the services of hotels and restaurants, as well as the infrastructure promised to the tourists. In fact, it was believed that many countries would undoubtedly voice their concerns towards this kind of technology, but different destination management offices (DMO) support

virtual reality and have therefore invested considerably in 360-degrees advertising that is now available in the market, for example Australia.

That being said, it should not be expected that the impact of consumer use of interactive media on information search and purchase behavior will be the same across all the population (Klein, 1998). In fact, brochures have enough power to communicate and promote all the benefits and resources that a destination offers to potential tourists (Nicoletta & Servidio, 2012). However, as mentioned in Klein (1998), many studies in the past (Jacoby et al., 1976; Bettman and Kakkar, 1977; Brucks, 1985; Petty, Unnava and Strarhman, 1991) have concluded that the information presentation design affects the decision-making. In all, it can be said that by using virtual reality, the potential traveler will be provided with sufficient information and would therefore be able to create a virtually real anticipation of the destination that will be eventually visited.

### 2.1.3 Virtual Reality and Decision Making

The main reason of a brand having online presence is to persuade the consumer to make actual purchasing decisions. Because consumers in general understand that advertising is merely used to persuade and inform them, they seek to verify the authenticity of the given 'biased' information (Maute & Forrester, 1991). Therefore, when a potential traveler has learned via a virtual experience that the information presented in the virtual world and the actual information or ideal self-image is consistent within the real world, then the experience will lead to an actual purchase intention. (Gabisch & Gwebu, 2011).

Sirakaya and Woodside (2005) considered most of the tourism related purchases are considered high-involvement decisions because they comprise high costs. For example, when

planning a trip to another country, there is always a perceived high risk of making a bad decision, the amount of time invested searching for information is always high, and there are many monetary expenses. On the other hand, having a prior experience is considered low involvement decision with less perceived risk, giving a not deep information search and more confidence in the decision choice (Teare, 1992; Woodside, MacDonald, & Trappey, 1997; as cited in Sirakaya & Woodside, 2005). Hence, using virtual reality to explore a destination before your booking or purchase, will obviously lead to a little to non-risk involved in the decision making because you are trying or pre-experiencing what you will be paying for.

Previous studies have verified the correlation between a positive perceived destination image and decision making (Chen & Tsai, 2007; Sirgy & Su, 2000; Sönmez & Sirakaya, 2002; as cited in Nicoletta & Servidio, 2012). For instance, Cheong (1995) suggested that if a person who is interested in exploring an island destination would had the opportunity to virtually travel to different places within their interest, for example: The Virgin Islands, Jamaica, the Maldives, etcetera; these potential travelers who had access to this type of technology would made better informed decisions because they were exposed to rich information and had more realistic expectations of their future trip.

Studying a decision-making is also important because the tourism industry, has a unique feature: tourist will buy and consume a service in a different location from where they are originally located (Sirakaya, McLellan, & Uysal, 1996, as cited in Sirakaya & Woodside, 2005). As a result, this implicates the tourists in greatly information search (Wahab et al., 1976, as cited in Sirakaya & Woodside, 2005). Therefore, if one is using virtual reality for travel planning, the uncertainty of the purchase can be reduced.

### 2.1.4 Virtual Reality and Travel Motivations

Motivations are psychological factors that influence the tourist behavior. Reviews of the tourism literature showed that when a person makes the decision to travel, this is influenced by motives or reasons (Nicoletta & Servidio, 2012). Coates (1992) proposed that the main impact of virtual reality to the tourism industry is its ability to give experiences to the customer that will further increase the traveler's desire to visit a place (as cited in Cheong, 1995). Learning the motivations behind using virtual worlds is important for creating effective brand presence strategies (Sclosser, 2003; Smith et al., 2005; Kaltcheva and Weitz, 2006; Hemp, 2006; as cited in Gabisch & Gwebu, 2011), but also learning the motivations behind traveling will give a better panorama on which unique attributes should a 3D virtual environment provide to potential travelers to secure a decision to travel or a choice of a specific destination.

Because global competition is increasing significantly in the tourism industry and thus, the tourists' motivations and needs are ever-changing, communicating a positive image of the destinations should be a priority for tourism managers and destination marketing (Nicoletta & Servidio, 2012). Hence, destination marketers should extremely understand tourists' behavior while building strategies for creating more satisfying visiting experiences. By doing so, the tourism industry will respond efficiently to the customers' demands (Law et al., 2009, as cited in Pantano & Corvello, 2014). Thus, Pantano and Corvello (2014) proposed that it is necessary to learn to what extend new technologies will be well accepted for travel and tourism purposes.

## 2.2 The Technology Acceptance Model

Since the tourists' acceptance of virtual tours for supporting their choice on future traveling is still understudied (Pantano & Corvello, 2014), many academics have adapted the

Technology Acceptance Model to their own research when evaluating the tourists' behavior towards virtual reality. The Technology Acceptance Model (TAM) by Davis Jr (1986) has received substantial attention within the tourism research, for example studies by Kim, Park and Morrison (2008) used this model to explore the acceptance of mobile devices in the trip planning process. Also Huang, Backman, Backman and Moore (2013), used the model to test the applicability of 3D virtual worlds in travel and tourism marketing (as cited in Disztinger et al., 2017). Another example are Pantano and Corvello (2014) who used the Tam model to explain the intention to use virtual tours while deciding on touristic destinations. One of the most recent studies using TAM was done by Disztinger et al. (2017), which aimed to test the technology acceptance of virtual reality for travel planning.

Originally, the Technology Acceptance Model was developed to offer a theoretical foundation for a practical 'user acceptance testing' methodology that would assist system designers and implementers in the evaluation of proposed new systems prior to their implementation (Davis Jr, 1986). By systems, the author referred to the end-user systems that were defined as technology directly used to support work related activities in organizations. After all, these systems represented an important type of information systems. In addition, Davis Jr (1986) expressed that the characteristics of any developed system would affect the motivational response to the actual use or non-use of the actual systems. Behind the motivational model related to the system characteristics and the usefulness of it, information system users would typically require important resources when making decisions.

The Technology Acceptance Model theoretical rationale proceeds in several ways from the standard Fishbein (1967) model, providing a major conceptual basis for it. The two main constructs of the TAM are: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that

explains the Behavioral Intention to Use (BI) as a determinant of Actual System Use. Davis Jr (1986) defined perceived usefulness as the level to which a person considers that using a system would boost his job performance. Perceived ease of use is referred as the level to which a person considers that using a system requires a minimal effort to complete a task. Furthermore, Davis Jr (1986), hypothesized that perceived ease of use had a significant direct effect on perceived usefulness. According to the author, a system that is easy to use will increase the job performance of a person, with minimum physical and mental effort. Hence, the features of any developed system could indirectly influence usefulness by affecting ease of use.

In short, one of the reasons researchers find the TAM useful to predict and explain the user behavior and the acceptance of new technology applications is that this model has been validated in a wide variety of context. New technologies available in the marketplace, usually takes a major delay in time before they experience wide-scale acceptance (Disztinger et al., 2017). In this matter, this study applies the TAM to examine the use of virtual reality for travel planning purposes.

# CHAPTER 3: METHOD

In this section, the proposed research model and hypotheses that will be used to answer the proposed research questions are presented. Also, the design of the study, the sample, the data collection, the measurements applied and the data analysis will be discussed.

**RQ**: Can VR technologies influence the travel decision making of potential tourists?

Due to the research topic being understudied in the same or in a similar context, this study model comprises two parts, (1) to test the technology acceptance of virtual reality in the context of travel planning, and (2) to analyze these effects in the travel related decision's making. Therefore, it should be noted that to satisfy the first part of this model, a replication of a published conference paper by Disztinger et al. (2017) was done, in which the research question is as follows:

**RQ**: *"Which influencing factors constitute the acceptance of VR technologies in the context of travel planning?"* (p. 256).

## 3.1 Research Model and Hypotheses

The first proposed model is a modified and extended version of the original TAM by Davis (1986). It was obtained from the work of Disztinger et al. (2017), who added the following independent variables: Perceived Enjoyment (PENJ), Interest (INT), Personal Innovativeness (PI), Accessibility (ACC), Skepticism (SKE), Technology Anxiety (ANX), and Perceived Immersion (PIM).

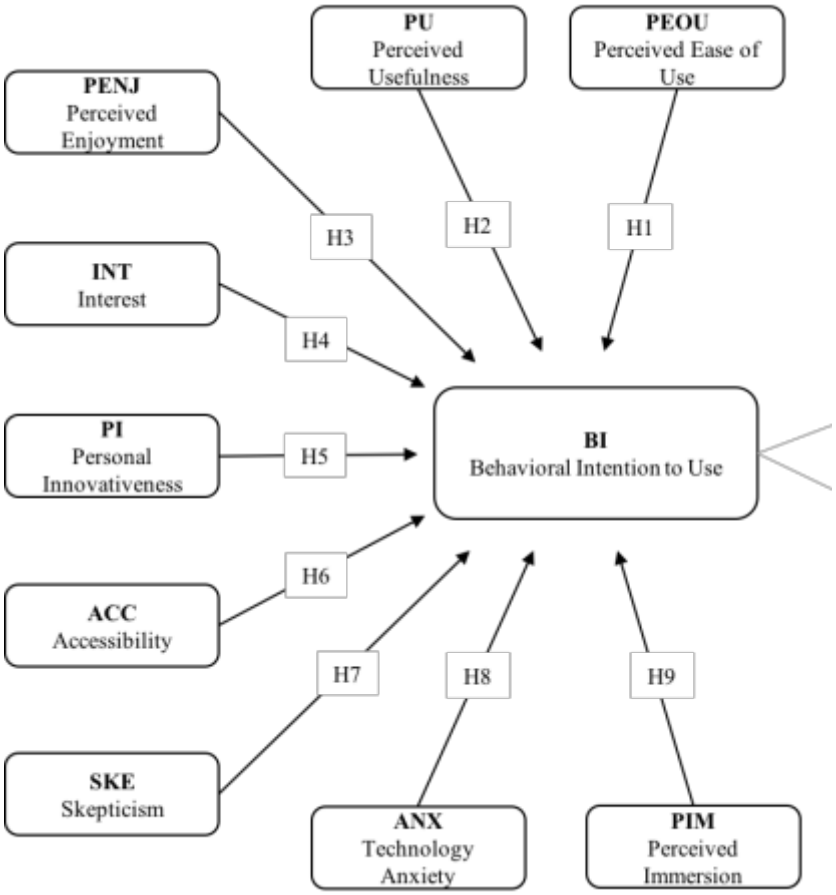


Figure 1. Proposed model by Disztinger et al. (2017).

From this model, the replicated study originated nine hypotheses that aimed to test the travelers' technology acceptance of virtual reality for travel planning. Thus, the study begins with the two main hypotheses that are the core of the whole TAM model.

**H1**: Perceived Ease of Use (PEOU) positively influences the Behavioral Intention to Use (BI) virtual reality for travel planning.

By developing this hypothesis, a direct relationship between perceived ease of use and intentions is assumed. Hence, in the context of this study, it is predicted that perceived ease of use (PEOU) is taken to imply the level to which a person believes that using virtual reality for

travel planning will be free from effort. Previous studies have already validated this relationship, for example in Davis Jr (1986), and Casaló et al. (2010), Castañeda, Frías and Rodríguez (2009), Huh et al. (2009) (as cited in Ayeh, Au, & Law, 2013, p. 133).

**H2**: Perceived Usefulness (PU) positively influences Behavioral Intention to Use (BI) virtual reality for travel planning.

Perceived usefulness as it has been defined already in the previous chapter, is the other core construct presented by Davis Jr (1986) . According to Ayeh et al. (2013), the common belief is that individuals build up their intentions toward behaviors they consider useful, regardless of any positive or negative feelings they might have toward the behavior. Therefore, for the potential travelers in search of travel information, will use virtual reality technology in their travel planning phase if they consider it useful for completing this task. Previous studies have also validated this relationship.

**H3**: Perceived Enjoyment (PENJ) positively influences Behavioral intention to Use (BI) virtual reality for travel planning.

By perceived enjoyment, it is meant the level to which a system is observed as enjoyable (Disztinger et al., 2017). Thus, within this hypothesis, it can be said that potential travelers should enjoy the act of searching for information, viewing the destination advertised photos and videos. The level of enjoyment and fun experienced by them using virtual reality technologies for travel planning is valued as a strong effect in the behavioral intention to use such technology. Further, Disztinger et al. (2017) argued that this variable was included in the model because the use of a virtual reality system for an prolonged period was questioned.

**H4**: Interest (INT) positively influences Behavioral intention to Use (BI) virtual reality for travel planning.

According to Disztinger et al. (2017), this construct was added to the TAM in previous studies by Romm-Livermore (2012) and Soesanto (2013). With this hypothesis, it is said that people general interest in technology will have a positive effect in the behavioral intention to use virtual reality for travel planning. Although, Kothgassner et al. (2013) states that this construct also aimed to measure an person technical knowledge.

**H5**: Personal Innovativeness (PI) positively influences Behavioral intention to Use (BI) virtual reality for travel planning.

With personal innovativeness, it is referred to an individual disposition to try new technologies. It is considered that personal innovativeness has a positive effect on the behavioral intention to use virtual reality for travel planning. According to Disztinger et al. (2017), such effect has been confirmed by different studies. Karahanna, Straub, & Chervany (1999), explained that individuals who favor innovation end up being early technology adapters and only think about a new technology (as cited in Chung, Han, & Joun, 2015).

**H6**: Accessibility (ACC) positively influences Behavioral intention to Use (BI) virtual reality for travel planning.

In the study to be replicated, accessibility is added to this model because easy accessibility to this kind of technology may support the intention to use it, whereas access

barriers can negatively influence the adoption of such technology. Accessibility can be also applicable to physical accessibility and information accessibility. One referring to the physical access to a system, while the other refers to the ability to fetch the information wanted or needed from the system (Karahanna and Limayem, 2000, as cited in Disztinger et al., 2017).

**H7**: Skepticism (SKE) negatively influences Behavioral intention to Use (BI) virtual reality for travel planning.

By adding skepticism in this model, it is intended to measure whether a person judges the technology to be risky, dangerous and disadvantageous (Disztinger et al., 2017; Kothgassner et al., 2013). Thus, if a person believes that using virtual reality will yield in harm, there will not be an intention to use it, as it will be when an individual perceives technology as an advantage in accomplishing their tasks.

**H8**: Technology Anxiety (ANX) negatively influences Behavioral intention to Use (BI) virtual reality for travel planning.

Technology Anxiety covers the evoking of anxious or emotional responses using technologies in general (Heerink, Kröse, Evers & Wielinga, 2010, as cited in (Kothgassner et al., 2013). It detects whether a person is generally overwhelmed by all kinds of technical devices, or if it is just afraid to make a mistake in the use of technologies. According to Disztinger et al. (2017), this construct has been used in previous studies (i.e. Brown, 2002; Simonson, Maurer, Montag-Torardi, & Whitaker, 1987; Lee et al., 2003).

**H9**: Perceived immersion (PIM) positively influences Behavioral intention to Use (BI) virtual reality for travel planning.

This is a peculiar construct added in this model and therefore, it should be treated exclusively in the context of virtual reality technology. As it was discussed in the literature review, immersion is the psychological capacity of being transported into a different environment to witness a vivid experience. The better the immersion is perceived by the virtual reality users, the increase chances of accepting this technology for travel planning (Disztinger et al., 2017; Kothgassner et al., 2013).

In addition to the nine hypotheses already discussed, two more hypotheses are added in this study to complete the proposed model. With this, it is aimed to observe the effects using virtual reality for travel planning in the travel related decision making (DMK). Figure 2 is a framework representation of the complete proposed model. Therefore:

**H10**: Perceived Usefulness (PU) of using virtual reality for travel planning positively influences Decision Making (DMK).

Travel decisions are in part, influenced by the expected quality and overall benefits that a tourist recognizes during its prior-purchase evaluation (Gardiner, King, & Grace, 2013). Since with virtual reality, one gets to pre-experience with images, videos or interactive media what an interested destination offers, with this hypothesis, it is proposed that an individual perceived usefulness of virtual reality will help in the decision-making process.

**H11**: The overall, Behavioral Intention to Use (BI) virtual reality for travel planning positively influences the Decision Making (DMK).

According to Fishbein (1963), a consumer intention is a function of added beliefs or perceptions about an object (as cited in Gardiner et al., 2013). Moreover, if an individual shows a positive behavioral intention of using virtual reality for travel planning, this behavior will also influence the travel related decisions. Therefore, if a person uses virtual reality as a motivation to travel to a destination, the exposed marketing promotion will serve as an influencing tool that can influence a traveler decision making (Chung et al., 2015).

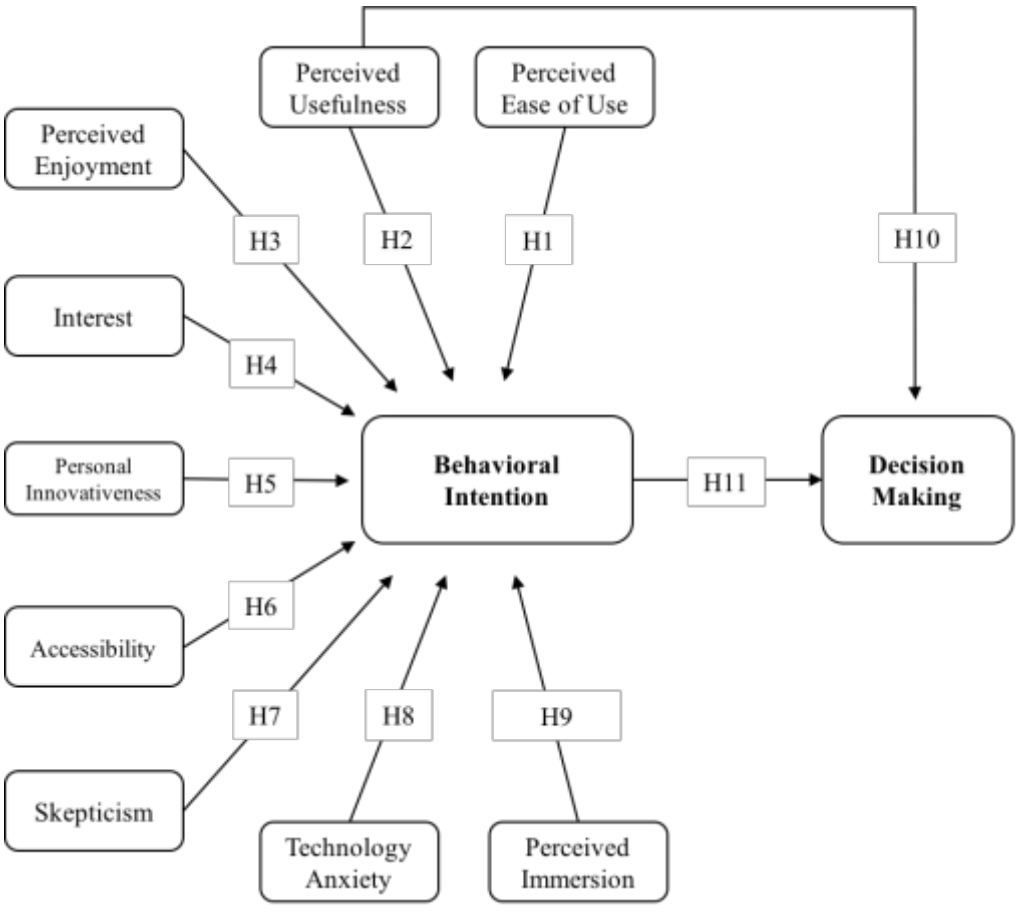


Figure 2: Proposed Research Model for this thesis

## 3.2 Sample

First, it is important to mention that the sample selection was random. In previous similar studies, researchers have used online databases, online surveys, users of virtual communities, and technical savvies individuals, that possibly made their data biased. As a matter of fact, the original study by Disztinger et al. (2017) participants were members of Virtual Reality communities forums on Reddit and Facebook, aiming to test only individuals whose knowledge and interest for technology and/or virtual reality was evident. In contrast, this study surveyed participants face-to-face, by randomly asking people if they were interested in trying the virtual reality experience and in completing the survey, it was unknown whether they were technology friendly or not.

Second, to get more valid data and because the target population of this study are potential travelers, it was decided to include such group in this study. Hence, cruise travelers visiting Stavanger were invited to participate in this virtual reality experience and to complete the survey questionnaire for more data collection. Cruise travelers were chosen because usually they wander around the city center, exploring the pier nearby area. Also, a short visit to the city airport was considered, however, an airport environment is usually rushed by the travelers limited time to catch their flights. In addition, friends, coworkers and family members were asked to participate in this study.

Third, no age limits or requirements were established prior administrating this survey, to reiterate, it was open to test the general population. This decision was taken because it is important to analyze the technology acceptance of virtual reality in different age groups. Perhaps older people would be more hesitant to test it rather than younger generations that are used and exposed to technology every day.

## 3.3 Data Collection

To collect all the necessary data to test the proposed hypotheses, participants were first exposed to a virtual reality experience, followed by a questionnaire survey.

Using a cellphone with a large screen resolution to improve the quality of the images and a Google Cardboard head-mounted display (HMD), the virtual reality experience began by presenting travel destinations videos. The mobile applications for travel planning used were Holiday360 by Thomas Cook, Aeromexico VR, and other 360°/VR videos with travel destination content on YouTube. The participants had the opportunity to choose a preferred and potential travel destination footage and after their virtual experience, they were asked to respond a questionnaire survey that included pertinent questions to test the suggested hypotheses.

Once the virtual reality experience was over, the participants had to take off the HMD to answer the survey. In this step, they got asked if they preferred the questionnaire in English, Norwegian or Spanish. Then, the same cellphone used in their "virtual trip" was used to present the questionnaire in a Google Form format to expedite the answering process. It was easier to tap a selection other than filling out a paper form. In total, 3 different cellphones were used for the data collection. Occasionally, an iPad was also employed so the participants could answer the questionnaire and the other three cellphones would be free to keep collecting data.

A simple Google Cardboard head-mounted display (HMD) was selected to be right for this study. It was essential that the population become aware that using a HDM to experience virtual reality does not necessary demands expensive technology such as the Samsung Gear or

the Oculus HMD. In fact, by using their own cellphone and buying a Google Cardboard, individuals can get immediate access to travel planning media without investing more than the equivalent to 100.- NOK.

## 3.4 Measurement

Being this an exploratory study, it follows a quantitative approach to data collection and analysis. The survey instrument used in this study contained 43 item questions, all of which used a Five-Point-Likert scale. The following values were given to the scale: "1 = Strongly Disagree", "2 = Disagree", "3 = Neutral", "4 = Agree" and "5 = Strongly Agree".

The first 36 questions were obtained from Disztinger et al. (2017), and they are founded on the Technology Usage Inventory (TUI) from Kothgassner et al. (2013). These questions contain multi-item measures of perceived ease of use, perceived usefulness, behavioral intention, perceived enjoyment, interest, personal innovativeness, accessibility, skepticism, technology anxiety and perceived immersion. Within these (previously validated) items it was aimed to test hypotheses H1 to H9. The last 7 questions were adapted from the work of Chung et al. (2015) and Driescher et al. (2017). These last includes multi-item measures of travel intention and decision making aimed to test hypotheses H10 and H11.

A pretest was conducted before the full administration of the survey, with the purpose of identifying issues with the questionnaire, such as confusing questions. With this short evaluation, it was concluded that before completing the survey, a brief introduction to clarify the purpose of the study should be made and the term 'system' should be also explained to the participants. Within this study, the term system is described as a 360°/VR system.

In addition to the main 43-item questionnaire, the participants were asked to provide some demographic information such as gender, age, nationality, travel frequency and travel motivation. Also, to make this survey more general and include more than just English speakers, the questionnaire was translated from English to Norwegian and Spanish. A native Norwegian helped with the translation. Then, the translated questionnaire was shared with bilingual Norwegians to catch misunderstanding errors prior to the data collection. Being myself Mexican and therefore a native Spanish speaker, I translated the questions to Spanish. The same procedure was made with another bilingual Spanish-English person, to ensure the proper translation and minimize errors. The translated surveys can be read also in Appendix 1.

One of the items in the questionnaire measuring perceive ease of use (PEOU3) had to be reverse coded. By reversing the code in this item, the new values for the question ranked from "1= Strongly Agree" to "5 Strongly Disagree". This action was done because the question itself is presented in a negative worded format: "I think technology is complicated to use", in comparison to the other two items measuring the same variable: "Learning to operate the system was easy for me" and "Overall, I find the system easy to use".

Another key point on the data measurement instrument is that, even though the scales used in this study have been previously validated before, in this research they have been treated to reliability and validity once more.

## 3.5 Data Analysis

The data analysis was made using Partial Least Squares (PLS) regressions, for which the software SmartPLS (Ringle et al., 2015) was used. Structural Equation Modeling (SEM) is considered a second-generation multivariate data analysis method frequently employed in

marketing research (Wong, 2013). Consequently, Partial Least Squares (PLS) is a soft modeling approach to SEM. Wong (2013) stressed that by using this analysis method, marketers can visually observe the relationships that exist between the variables of interest, that will help them to prioritize their resources to best assist or satisfy their customers.

According to Chin (2010), PLS has been lately considered by scholars because it provides an unambiguous model specification and interpretation (as cited by Gabisch & Gwebu, 2011, p. 310). Further, Chin (1998) indicated that often in behavioral studies non-normal distributed data appears and the PLS analysis accommodates (as cited in Gardiner et al., 2013).

After performing a preliminary data analysis, it was decided to delete three scale items measuring travel intentions. The internal reliability test for these items, presented Cronbach's alpha (α) values lower than 0.7 which is the stipulated threshold for this test. According to the results output, deleting any item within the construct would not make a significant impact on the already presented Cronbach's alpha (α) value. This construct was added to the survey questionnaire because it was intended to include the effects of using virtual reality in the actual travel intentions. Nevertheless, the proposed model did not include this hypothesis. The full survey can be read in Appendix 1.

## 3.6 Results

In total, 215 subjects took part in the study. However, 2 observations were eliminated from the final data for reasons such as incomplete responses, changing the number of observations from n= 215 to n=213. Then, of the 213 sample respondents, 53.1% were females and 46.9% were males. The predominant respondent's age was distributed in between two groups: 35 to 44 years old (36.6%), and 25 to 34 years old (33.85), followed by 45 to 54 years

old (17.8%), 18 to 24 years old (8%) and older than 55 (3.8%). In addition, 31.9% of the respondents were Norwegian nationals, 24.9% from the UK, 22.5% from Spain, 16% from the USA, 2.3% from France, 1.4% from Netherlands and 0.9% from China.

Also, to learn more about the potential use of the virtual reality in their travel planning, the respondents were asked about their travel frequency. Results showed that 68.5% travel in between 1 and 3 times per year, 23% said they travel at least once a year, while 8.5% of the respondents manifested to travel more than 3 times a year. Regarding their travel motivation, 48.4% expressed that novelty (to experience something new or travel somewhere they've never been) is their main travel motivation, compared to 32.9% seeking relaxation and the remaining 18.8% justified their travel to get away from the daily routine. The participants' demographic characteristics has been summarized in Table 1 located at the end of this chapter.

### 3.6.1 Factor Analysis

A confirmatory factor analysis was made to examine the composite reliability of the factors for each construct and to assess the convergent and discriminant validity, as it has made in prior similar studies (i.e. Y.-C. Huang et al., 2010). The data (n = 213) was examined for normality by inspecting skewness and kurtosis. The skewness value tells about the symmetry of the distribution, while the kurtosis tells about the peakedness of the distribution. When a study has perfectly normal distribution, the obtained skewness and kurtosis value will be 0, but this effect is uncommon in the social sciences (Pallant, 2007). Although most of the values were within the standard ranges (i.e. ±2.00) and normally distributed, there was three items that reported above 2.00 kurtosis values. Nevertheless, as mentioned earlier, the PLS analysis usually accommodates non-normality distributed data (Chin, 1998, as cited in Gardiner et al., 2013).

In the factor analysis, the factor loadings for 4 items ranked low. These items are PEOU3 (0.681), PU2 (0.626), SKE3 (0.592) and PIM4 (0.610). Thus, it was decided to delete these items from their respective constructs and recalculate the values. These values can be observed in the Appendix 2. The new factor loadings can be observed in Table 2.

To check the reliability and validity of the measurement model, Henseler et al. (2009) suggested that in addition to a Cronbach's alpha observation, the Composite Reliability ($\rho_c$) should be used as a different method to examine the internal consistency within a construct, as Cronbach's alpha underestimates the internal consistency reliability of latent variables (as cited in Ayeh et al., 2013, p. 138). Thus, the model internal consistency was measured using Cronbach's alpha ($\alpha$), composite reliability ($\rho_c$) and average variance extracted (AVE).

Regarding the Cronbach's alpha ($\alpha$), the values of the model constructs range from 0.756 (accessibility) to 0.937 (interest). For a scale to be considered reliable, the alpha ($\alpha$) values must be greater than 0.7. The values for the composite reliability ($\rho_c$) of the model constructs range from 0.858 (accessibility) to 0.955 (interest). For a scale to be considered reliable, the composite reliability ($\rho_c$) values must be greater than 0.7, but if it is an exploratory research, 0.6 or higher is acceptable (Bagozzi and Yi, 1988, as cited in Wong, 2013). Based on the results from these analysis, all constructs in this scale exceeded the stipulated thresholds.

Ayeh et al. (2013) stressed that researchers must observe the average variance extracted (AVE) to check for convergent validity. AVE values of 0.5 and higher imply that the latent construct explains more than half of its indicators' variance (Bagozzi and Yi, 1988, as cited in Wong, 2013, p. 21). The AVE of this model constructs ranged from 0.669 (accessibility) to

0.842 (interest), exceeding the minimum threshold. Hence, convergent validity for the constructs was confirmed. A summary of the factor loadings and reliability is also presented in Table 2.

To check for the discriminant validity of the eleven constructs, the principle of Fornell and Larcker (1981). According to Chin (1998), the item loadings to construct correlations must be larger than its loading on any other constructs (Chung et al., 2015). As shown in Table 3, the factor analysis indicated that each of the items loaded greater on their corresponding latent variables and less on the others. It is also proposed that statistically, the square root of AVE of each latent variable must be higher than the correlations between the latent variables (as cited in Wong, 2013, p. 21). The correlation matrix of the latent constructs and the square root of the AVEs are presented in Table 4. Accordingly, a high discriminant validity can be assumed with respect to all the constructs in this analysis.

### 3.6.2 Structural Model

At this stage, the structural part of the model was evaluated. According to Sanchez (2013), in PLS algorithm, the quality of the structural model is evaluated by analyzing the variance explained ($R^2$). Thus, the analysis reveals that the independent variables of PEOU, PU, PENJ, INT, PI, ACC, SKE, ANX, and PIM explain 70.5% of the variance in BI, the behavioral intention to use virtual reality for travel planning. Under the PLS standards, the value for $R^2 = 0.705$ ($R^2 > 0.50$) can be considered outstanding. Having this strong value, it is implied that virtual reality technologies will be accepted for travel planning.

Moreover, PU and BI explain 20.1% of the variance in DMK, the decision making induced by using virtual reality. Even though the $R^2$ value is small ($R^2 = 0.201$), it is suggesting

that the perceived usefulness and the behavioral intention to use virtual reality for travel planning can influence (in a small part) some travel related decisions. The small value is to an extend significant because according to the decision-making literature, travel decisions are mostly influenced by the perceived monetary costs of the travel experience (Gardiner et al., 2013).

In addition to the evaluation of variance explained ($R^2$) as a principle of predictive accuracy, the Stone-Geisser's $Q^2$ value (Stone, 1974; Geisser, 1974) was calculated as a criterion of predictive relevance. The blindfolding procedure was used to calculate the cross-validated redundancy measure ($Q^2$). According to Chin (1998), $Q^2$ values above zero indicates that the exogenous constructs has predictive relevance for the endogenous construct (BI) (as cited in Ayeh et al., 2013; Hair Jr & Hult, 2016). Although the terms exogenous and endogenous constructs are mostly used in econometrics, they are occasionally used in linear regressions. An exogenous construct in this context, is referred as the independent variables ($x$) in the model. In this analysis, the $Q^2 = 0.51$ demonstrates high predictive power for BI and $Q^2 = 0.13$ demonstrate predictive power for DMK.

To estimate the significance of the path coefficients, a bootstrap resampling analysis of 500 resamples was performed. Because PLS-PM does not lay on any distributional suppositions, resampling procedures such as bootstrap, are employed to acquire data about the variability of the parameter estimations (Sanchez, 2013). The results presented in Figure 3 indicate that 7 out of the 11 proposed hypotheses displayed statistically significant values. The results showed that PU positively influences BI ($\beta = 0.352$, $t = 1.445$, $p < 0.05$) and DMK ($\beta = 0.289$, $t = 2.963$, $p < 0.05$), indicating significant support for Hypotheses 2 and 10. The constructs PENJ ($\beta = 0.351$, $t = 3.815$, $p < 0.05$) and PIM ($\beta = 0.097$, $t = 2.229$, $p < 0.05$) are

also significant associated to the behavioral intention (BI) to use virtual reality for travel planning, supporting Hypotheses 3 and 9. Hypothesis 7 is likewise supported, since SKE showed a significant negative influence BI ($\beta$ = -0.191, t = 2.876, $p < 0.05$). The overall behavioral intention (BI) to use VR for travel planning and the travel decision-making (DMK) are also significantly associated ($\beta$ = 0.191, t = 2.126, $p < 0.05$), supporting Hypothesis 11.

Unexpectedly, technology anxiety (ANX) revealed a significant positive relationship to BI ($\beta$ = 0.237, t = 3.474, $p < 0.05$), contrary to what it was hypothesized, thus Hypothesis 8 is not supported. Moreover, the coefficient path for variables PEOU, INT, and PI, were not significant (Hypotheses 1, 4, and 5 were not supported). Finally, the results did not support Hypothesis 6, the remaining variable of ACC indicated a negative effect on BI. A summary of the hypothesis testing results is presented in Table 5.

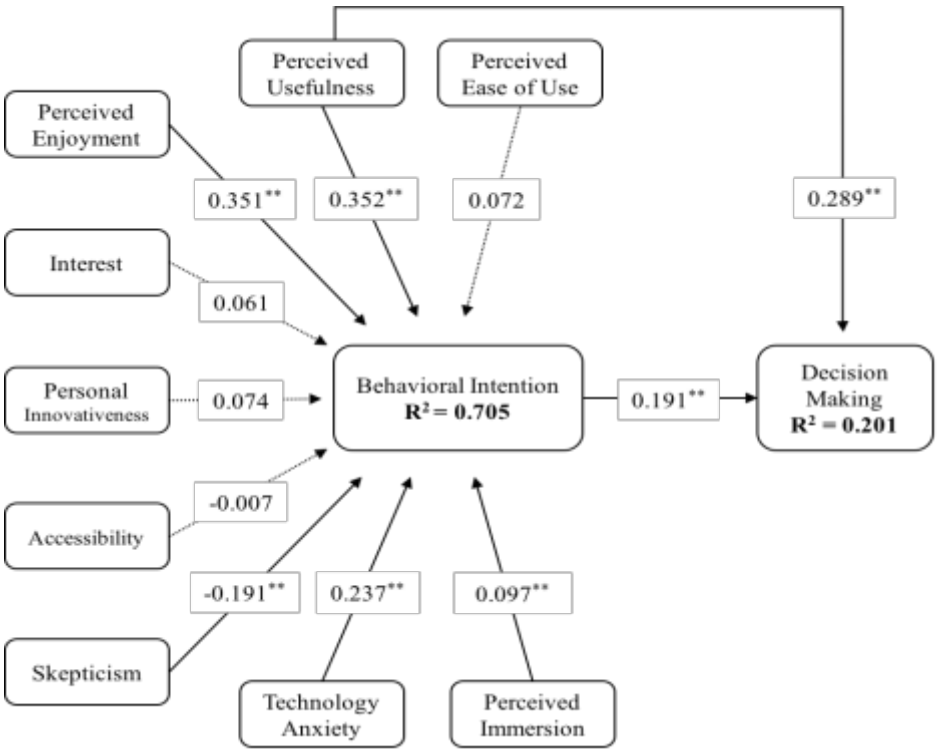


Figure 3: Structural model of testing proposed hypotheses.
*Note*: **Significant at $p < 0.05$ and (·····) dash line indicates insignificant path.

Table 1
Respondents Profile

| Profile Category | | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Female | 113 | 53.1 |
| | Male | 100 | 46.9 |
| Age | 18 - 24 years old | 17 | 8 |
| | 25 - 34 years old | 72 | 33.8 |
| | 35 - 44 years old | 78 | 36.6 |
| | 45 - 54 years old | 38 | 17.8 |
| | 55+ years old | 8 | 3.8 |
| Nationality | Norway | 68 | 31.9 |
| | UK | 53 | 24.9 |
| | Spain | 48 | 22.5 |
| | USA | 34 | 16 |
| | China | 2 | 0.9 |
| | France | 5 | 2.3 |
| | Netherlands | 3 | 1.4 |
| Travel Frequency | Once a year | 49 | 23 |
| | 1 - 3 times per year | 146 | 68.5 |
| | 3 - 5 times per year | 18 | 8.5 |
| Travel Motivation | Novelty | 103 | 48.4 |
| | Relaxation | 70 | 32.9 |
| | To get away from daily routine | 40 | 18.8 |

*Note: n=213*
*Source: Own elaboration from SmartPLS output.*

Table 2
Factor loadings for individual items

| Construct | Item | Factor Loading | Indicator Reliability | Cronbach's Alpha (α) | Composite Reliability | AVE |
|---|---|---|---|---|---|---|
| Perceive Ease of Use | PEOU1 | 0.908 | 0.824 | 0.789 | 0.905 | 0.826 |
| | PEOU2 | 0.910 | 0.828 | | | |
| Perceived Usefulness | PU1 | 0.918 | 0.843 | 0.797 | 0.880 | 0.711 |
| | PU3 | 0.803 | 0.645 | | | |
| | PU4 | 0.804 | 0.646 | | | |
| Behavioral Intention | BI1 | 0.871 | 0.759 | 0.861 | 0.915 | 0.783 |
| | BI2 | 0.901 | 0.812 | | | |
| | BI3 | 0.882 | 0.778 | | | |
| Perceived Enjoyment | PENJ1 | 0.951 | 0.905 | 0.899 | 0.937 | 0.833 |
| | PENJ2 | 0.867 | 0.752 | | | |
| | PENJ3 | 0.918 | 0.843 | | | |
| Interest | INT1 | 0.901 | 0.812 | 0.937 | 0.955 | 0.842 |
| | INT2 | 0.929 | 0.863 | | | |
| | INT3 | 0.936 | 0.876 | | | |
| | INT4 | 0.904 | 0.817 | | | |
| Personal Innovativeness | PI1 | 0.913 | 0.834 | 0.922 | 0.945 | 0.811 |
| | PI2 | 0.868 | 0.753 | | | |
| | PI3 | 0.945 | 0.893 | | | |
| | PI4 | 0.873 | 0.763 | | | |
| Accessibility | ACC1 | 0.832 | 0.692 | 0.756 | 0.858 | 0.669 |
| | ACC2 | 0.860 | 0.740 | | | |
| | ACC3 | 0.759 | 0.576 | | | |
| Skepticism | SKE1 | 0.817 | 0.667 | 0.804 | 0.883 | 0.717 |
| | SKE2 | 0.922 | 0.850 | | | |
| | SKE4 | 0.795 | 0.632 | | | |
| Technology Anxiety | ANX1 | 0.851 | 0.725 | 0.892 | 0.921 | 0.746 |
| | ANX2 | 0.915 | 0.837 | | | |
| | ANX3 | 0.844 | 0.712 | | | |
| | ANX4 | 0.843 | 0.710 | | | |
| Perceived Immersion | PIM1 | 0.931 | 0.867 | 0.892 | 0.933 | 0.823 |
| | PIM2 | 0.887 | 0.787 | | | |
| | PIM3 | 0.904 | 0.817 | | | |
| Decision Making | DMK1 | 0.911 | 0.830 | 0.904 | 0.932 | 0.775 |
| | DMK2 | 0.935 | 0.874 | | | |
| | DMK3 | 0.783 | 0.613 | | | |
| | DMK4 | 0.883 | 0.780 | | | |

Note: All loadings are significant at $p<0.001$
*Source: Own elaboration from Smartpls output*

Table 3
Latent Variable Cross Loadings

| | BI | PEOU | PU | PENJ | INT | PI | ACC | SKE | ANX | PIM | DMK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BI1 | **0.871** | 0.596 | 0.589 | 0.599 | 0.486 | 0.492 | 0.425 | 0.424 | 0.471 | 0.446 | 0.374 |
| BI2 | **0.901** | 0.465 | 0.738 | 0.738 | 0.467 | 0.493 | 0.334 | 0.374 | 0.424 | 0.402 | 0.382 |
| BI3 | **0.882** | 0.460 | 0.601 | 0.664 | 0.448 | 0.479 | 0.328 | 0.405 | 0.410 | 0.310 | 0.308 |
| PEOU1 | 0.524 | **0.910** | 0.429 | 0.530 | 0.498 | 0.517 | 0.339 | 0.566 | 0.616 | 0.276 | 0.429 |
| PEOU2 | 0.519 | **0.908** | 0.378 | 0.511 | 0.420 | 0.445 | 0.404 | 0.540 | 0.602 | 0.384 | 0.458 |
| PU1 | 0.738 | 0.514 | **0.918** | 0.695 | 0.428 | 0.411 | 0.442 | 0.377 | 0.343 | 0.347 | 0.393 |
| PU3 | 0.490 | 0.156 | **0.803** | 0.446 | 0.285 | 0.252 | 0.320 | 0.206 | 0.234 | 0.250 | 0.291 |
| PU4 | 0.579 | 0.393 | **0.804** | 0.607 | 0.302 | 0.344 | 0.310 | 0.247 | 0.177 | 0.362 | 0.389 |
| PENJ1 | 0.702 | 0.568 | 0.640 | **0.951** | 0.519 | 0.549 | 0.329 | 0.519 | 0.464 | 0.292 | 0.359 |
| PENJ2 | 0.633 | 0.478 | 0.556 | **0.867** | 0.515 | 0.593 | 0.367 | 0.562 | 0.372 | 0.285 | 0.403 |
| PENJ3 | 0.726 | 0.520 | 0.724 | **0.918** | 0.507 | 0.518 | 0.382 | 0.439 | 0.423 | 0.374 | 0.402 |
| INT1 | 0.514 | 0.523 | 0.416 | 0.539 | **0.901** | 0.583 | 0.294 | 0.342 | 0.398 | 0.234 | 0.316 |
| INT2 | 0.458 | 0.425 | 0.372 | 0.504 | **0.929** | 0.567 | 0.265 | 0.439 | 0.406 | 0.263 | 0.363 |
| INT3 | 0.432 | 0.428 | 0.345 | 0.476 | **0.936** | 0.575 | 0.258 | 0.396 | 0.383 | 0.231 | 0.348 |
| INT4 | 0.522 | 0.466 | 0.361 | 0.533 | **0.904** | 0.646 | 0.304 | 0.406 | 0.361 | 0.263 | 0.284 |
| PI1 | 0.521 | 0.494 | 0.425 | 0.600 | 0.624 | **0.913** | 0.331 | 0.426 | 0.423 | 0.307 | 0.382 |
| PI2 | 0.529 | 0.476 | 0.362 | 0.540 | 0.608 | **0.868** | 0.254 | 0.424 | 0.409 | 0.322 | 0.288 |
| PI3 | 0.512 | 0.506 | 0.414 | 0.555 | 0.585 | **0.945** | 0.299 | 0.426 | 0.380 | 0.309 | 0.321 |
| PI4 | 0.409 | 0.422 | 0.240 | 0.463 | 0.504 | **0.873** | 0.321 | 0.425 | 0.352 | 0.336 | 0.318 |
| ACC1 | 0.303 | 0.256 | 0.369 | 0.304 | 0.208 | 0.236 | **0.832** | 0.248 | 0.195 | 0.269 | 0.298 |
| ACC2 | 0.403 | 0.420 | 0.374 | 0.358 | 0.323 | 0.307 | **0.860** | 0.381 | 0.382 | 0.404 | 0.463 |
| ACC3 | 0.281 | 0.301 | 0.310 | 0.296 | 0.201 | 0.267 | **0.759** | 0.255 | 0.256 | 0.405 | 0.378 |
| SKE1 | 0.311 | 0.480 | 0.238 | 0.354 | 0.282 | 0.394 | 0.380 | **0.817** | 0.626 | 0.405 | 0.390 |
| SKE2 | 0.484 | 0.522 | 0.320 | 0.575 | 0.446 | 0.488 | 0.290 | **0.922** | 0.686 | 0.298 | 0.412 |
| SKE4 | 0.317 | 0.560 | 0.296 | 0.432 | 0.336 | 0.286 | 0.295 | **0.795** | 0.772 | 0.285 | 0.390 |
| ANX1 | 0.294 | 0.529 | 0.200 | 0.304 | 0.254 | 0.278 | 0.309 | 0.672 | **0.851** | 0.299 | 0.377 |
| ANX2 | 0.537 | 0.624 | 0.286 | 0.436 | 0.396 | 0.434 | 0.333 | 0.784 | **0.915** | 0.375 | 0.381 |
| ANX3 | 0.285 | 0.611 | 0.214 | 0.324 | 0.252 | 0.262 | 0.330 | 0.660 | **0.844** | 0.296 | 0.395 |
| ANX4 | 0.473 | 0.552 | 0.310 | 0.468 | 0.472 | 0.451 | 0.255 | 0.659 | **0.843** | 0.335 | 0.330 |
| PIM1 | 0.401 | 0.320 | 0.348 | 0.348 | 0.285 | 0.356 | 0.378 | 0.381 | 0.365 | **0.931** | 0.561 |
| PIM2 | 0.412 | 0.370 | 0.353 | 0.256 | 0.227 | 0.282 | 0.382 | 0.291 | 0.419 | **0.887** | 0.460 |
| PIM3 | 0.380 | 0.295 | 0.341 | 0.349 | 0.225 | 0.322 | 0.444 | 0.360 | 0.257 | **0.904** | 0.652 |
| DMK1 | 0.457 | 0.507 | 0.481 | 0.499 | 0.390 | 0.379 | 0.429 | 0.416 | 0.396 | 0.561 | **0.911** |
| DMK2 | 0.362 | 0.434 | 0.395 | 0.377 | 0.295 | 0.332 | 0.447 | 0.430 | 0.392 | 0.560 | **0.935** |
| DMK3 | 0.206 | 0.320 | 0.256 | 0.241 | 0.214 | 0.198 | 0.389 | 0.343 | 0.314 | 0.473 | **0.783** |
| DMK4 | 0.316 | 0.410 | 0.309 | 0.298 | 0.306 | 0.325 | 0.397 | 0.451 | 0.375 | 0.555 | **0.883** |

*Source: Own Elaboration from Smartpls output*

Table 4

Correlations for the constructs and the square root of AVE.

| | BI | PEOU | PU | PENJ | INT | PI | ACC | SKE | ANX | PIM | DMK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Behavioral Intention | **0.885** | | | | | | | | | | |
| Ease of use | 0.574 | **0.909** | | | | | | | | | |
| Usefulness | 0.728 | 0.444 | **0.843** | | | | | | | | |
| Enjoyment | 0.754 | 0.573 | 0.705 | **0.913** | | | | | | | |
| Interest | 0.529 | 0.505 | 0.409 | 0.562 | **0.918** | | | | | | |
| Innovativeness | 0.552 | 0.530 | 0.407 | 0.604 | 0.649 | **0.901** | | | | | |
| Accessibility | 0.410 | 0.408 | 0.430 | 0.393 | 0.308 | 0.333 | **0.818** | | | | |
| Skepticism | 0.453 | 0.608 | 0.339 | 0.552 | 0.431 | 0.472 | 0.370 | **0.847** | | | |
| Anxiety | 0.493 | 0.671 | 0.304 | 0.461 | 0.422 | 0.436 | 0.351 | 0.810 | **0.864** | | |
| Immersion | 0.439 | 0.363 | 0.383 | 0.349 | 0.271 | 0.353 | 0.441 | 0.379 | 0.385 | **0.907** | |
| Decision Making | 0.402 | 0.488 | 0.429 | 0.424 | 0.355 | 0.364 | 0.472 | 0.467 | 0.423 | 0.612 | **0.880** |

*Note:* The number in **BOLD** is the square root of AVE. The off-diagonal numbers are the correlations between factors.

*Source: Own Elaboration from Smartpls output*

Table 5

Results of Hypothesis testing.

| | Hypotheses | β | t-Value | P-Value | Collinearity Statistics | |
|---|---|---|---|---|---|---|
| | | | | | Tolerance | VIF |
| H1 | Ease of use → Behavioral Intention | 0.072 | 1.445 | 0.149 | 0.428 | 2.33 |
| H2 | Usefulness → Behavioral Intention | 0.352 | 5.252 | 0.000** | 0.449 | 2.23 |
| H3 | Enjoyment → Behavioral Intention | 0.351 | 3.815 | 0.000** | 0.321 | 3.11 |
| H4 | Interest → Behavioral Intention | 0.061 | 1.344 | 0.179 | 0.516 | 1.94 |
| H5 | Innovativeness → Behavioral Intention | 0.074 | 1.445 | 0.149 | 0.465 | 2.15 |
| H6 | Accessibility → Behavioral Intention | -0.007 | 0.273 | 0.785 | 0.686 | 1.46 |
| H7 | Skepticism → Behavioral Intention | -0.191 | 2.876 | 0.004** | 0.297 | 3.37 |
| H8 | Anxiety → Behavioral Intention | 0.237 | 3.474 | 0.001** | 0.285 | 3.51 |
| H9 | Immersion → Behavioral Intention | 0.097 | 2.229 | 0.026** | 0.701 | 1.43 |
| H10 | Usefulness → Decision Making | 0.289 | 2.963 | 0.003** | 0.470 | 2.13 |
| H11 | Behavioral Intention → Decision Making | 0.191 | 2.126 | 0.034** | 0.470 | 2.13 |

*Note:* **Significant at $p<0.05$. The gray shadowed area, indicates the hypotheses that are supported.

*Source: Own elaboration from Smartpls output*

## 3.7 Discussion

This study serves as an empirical attempt to investigate the travelers' intention to use virtual reality in travel planning. The purpose behind this study is to demonstrate that DMOs and tourism companies in general can promote tourism in a more innovative way rather than by old-fashioned media. Equally important, it aimed to demonstrate that travel planning and travel decisions can be eased with the help of virtual reality technologies. Through a survey based on (TAM) technology acceptance and the subsequent structural equation modeling using a PLS estimation, the important factors that lead to tourist acceptance of using VR in their travel planning phase are identified and discussed in this section.

This study replicated the TAM model adapted in Disztinger et al. (2017), where new factors were tested. Comparing the results with their work, this study revealed several interesting findings. First, the results revealed that perceived usefulness is positively related to the behavioral intention to use the virtual reality for travel planning. While in this study the PU factor is the strongest predictor on BI, in the original study PU resulted to be the fourth ranked predictor on BI. However, the findings indicate that the content elements such as 360° media, pictures or other 3-D images can enhance the consumers pre-experience of a destination, contributing to future travel plans (Y. C. Huang, Backman, Backman, & Chang, 2016).

Second, the perceived enjoyment in using virtual reality technologies also revealed a positive effect on the behavioral intention to use the virtual reality for travel planning. In other words, the results in this study support that the more fun individuals have while using a virtual reality system, the higher their intention to use it. This effect has been observed before, and this finding align with the results of the original study. According to Heijden (2004) and

Haugstevedt and Krogstie (2012), the intention to use a system devoted to pleasure is to a great extend influenced by the enjoyment level it makes (as cited in Disztinger et al., 2017).

Third, the perceived immersion was found to be a valid predictor of the behavioral intention to use virtual reality in travel planning. This supports what Disztinger et al. (2017) has found before. With the examined data, it is suggested that the quality of the immersion given in a virtual reality experience, increases the intention to use such technology and consequently, the acceptance of this technology for travel planning. This research reveals the importance of psychological immersion; therefore, using virtual reality, marketers must develop different activities that will help travel planners to pre-experience characteristics and/or the atmosphere of the destination.

Fourth, the original study discarded in their final model the variables of skepticism and technology anxiety. The findings of this version validated that (technology) skepticism does not influence the behavioral intention to use virtual reality for travel planning. This finding revealed that people doesn't consider VR technology to be dangerous or associated to a certain risk, just as it had been hypothesized. Surprisingly, technology anxiety showed a positive influence on the behavioral intention to use virtual reality for travel planning. This finding can be treated in two manners because, (1) the items measuring technology anxiety were not direct measuring anxiety derived from VR technologies, and (2) the questions referred to people fearing "making a mistake when using a technical device". Thus, technological anxiety can be counteracted if marketers share a "how to use it" demonstration to ease the use of it.

Fifth, neither studies validated the relationship of perceived ease of use on the behavioral intention to use VR for travel planning. In this study, PEOU (mean = 4.43) was

highly correlated to skepticism ($\gamma = 0.608$, $p < 0.05$) and anxiety ($\gamma = 0.671$, $p < 0.05$). The correlations are shown positive because the values of the variables SKE and ANX were recoded. Nevertheless, this can be understood as the easiest to use the VR technology, the less anxiety or skepticism people will show. Although the results on PEOU showed a positive but not significant effect on BI, this explains that regardless of the system being easy to use or not, people will still accept virtual reality for travel planning.

Sixth, the model of Disztinger et al. (2017) merged technology interest and personal innovativeness as one single variable, while this study kept each variable as a different construct. Their work revealed that general technology interest was their strongest predictor on BI. In other words, the authors argued that (1) virtual reality is treated as futuristic, and (2) that 'nerdiness' is needed to accept VR for travel planning. Anyhow, the findings in this study are not significant to suggest that interest and innovativeness influence the behavioral intention to use virtual reality for travel planning. In other words, this study can just suppose that for people to accept and use virtual reality for travel planning, prior interest in technology is not needed.

Last, this study also expanded the understanding of TAM-related studies in the context of travel planning by incorporating the constructs of travel related Decision-making (DMK). With this matter, the perceived usefulness of virtual reality for travel planning revealed significant effects on travel decision-making. Likewise, the factors influencing the behavioral intention to use virtual reality for travel planning also revealed a positive and significant influence on the travel decision-making. These findings reinforced what has been proposed earlier, that the virtual pre-experience that potential travelers are exposed to, does influence their decisions (Gardiner et al., 2013). Thus, destination marketers need to consider new strategies such as virtual reality, that will provide potential visitors with the essential

information presented in an innovative way, because that can impact (part of) their decisions prior booking a holiday (Chung et al., 2015).

### 3.7.1 Literature contribution

This study contributes to the literature by identifying singular factors that influence the technology acceptance of virtual reality for travel planning. Although this effects have been recently studied by Disztinger et al. (2017), the results in this research differ in part to their contribution. In that study, the strongest predictor of the behavioral intention to use virtual reality for travel planning was general technology interest. What is more peculiar about their findings, is that their sample was obtained from online groups whose members not only share their interest in VR, but they already had access to VR systems and perhaps owned already a VR-HMD.

As it has been discussed already, contrary to what it is revealed in their study, the findings from this version reveals that the strongest predictor of the behavioral intention to use virtual reality for travel planning is the perceived usefulness of such technology. Another remarkable difference between the two analyzed studies, is that this research looked after a generalized sample to avoid biased responses by surveying only technology savvies. Also, based on the study targeting the tourism industry, some of our sampling included tourist. It can be argued that if someone is to use virtual reality in their future travel plans, that will be the actual tourists.

In addition, this study contributes to the literature by demonstrating that using virtual reality can influence to an extent, the travel related decisions. Being virtual reality an understudied niche in the tourism literature, it is possible that some parallel studies are

happening or are even ready to be published soon. However, there is no evidence of a study proving the same hypotheses related to VR and decision making, at least not in the same context.

# CHAPTER 4: CONCLUSION

This study aimed to expose (1) the technology acceptance of virtual reality for travel planning, and (2) that virtual reality can help to make better informed travel related decisions. Based on the results discussed in the data analysis section, it can be said that people find virtual reality useful and a fun system to plan their trips, and that the images presented in the virtual reality are a useful tool that can influence a person decision making.

This study also had a few limitations. First, the limited number of devices to conduct the data collection. It would of be nicer to have had more devices available, not only to expedite the data collection process, but also to perform a laboratory experiment with all the participants. Second, the measurement instrument contained constructs that are focus on general technology acceptance. Because this study was in part replicating a published research, it was essential to use the same survey questionnaire to compare results. However, it can be interesting to run a similar study with a different theoretical model other than the TAM. Third, there is limited literature review available in the context of virtual reality for travel planning. On the one hand, there is the excuse of this topic being "new". On the other hand, this topic is an unwanted challenge for researchers who hesitate to expand their research field. Nonetheless, the topic cannot be treated as new, when the literature showed interest in it since the 90s.

Then, to expand the literature files in this topic, it is suggested a qualitative study in which focus groups and interviews can be taken into consideration. In the same way, it is suggested to study this phenomena from a corporate/business level. As it has been discussed, using VR can benefit DMOs and the tourism industry in general. It will be interesting to discuss why are companies investing tremendous amount of money in this kind marketing and then to

understand why are still companies doubting about the positive effects of this technology advantages. Another suggested study can be a comparison between VR media and traditional media, and the effects of these marketing in the travel intention and decisions. Additionally, a study measuring the effects of virtual reality in people travel motivations, might be interesting.

From the available literature, it can be concluded that with virtual reality, DMOs can generate rich information about their managed destinations, and the tourism industry can compete among each other with better services or products. Also, the tourists themselves, must learn that they can pre-experience any kind of services that they will experience in their next trip, and make a well-informed decision. Studies like this thesis, are a good basis for marketers and for the tourism industry managers to appreciate how this tool will improve their business and their relationship with the tourists. This can be a win-win situation for both parts.

Subsequently, it has been also demonstrated that a few tourism companies (i.e. Thomas Cook, Expedia) are already implementing a "try-before-you-buy" system, in which VR is used to pre-experience what tourist are about to book. This study worked its data collection using mobile applications released by travel companies offering such trial services before bookings are done. However, there should be an awareness campaign to teach potential travelers everything they can do with virtual reality. Just as it was mentioned in the foreword section of this thesis, the idea of this study, is to evidence that without complications, VR can ease the travel planning activities in many ways: from booking a simple flight and choosing the right hotel, to discover unvisited destinations.

YES! Virtual reality involves technology, but the kind of equipment that we do not call "technology" anymore. A virtual experience can be accessible by using a cellphone and the

cheapest Head-Mounted display (HMD) such as the Google cardboard that are commercially available in most electronic stores. Therefore, if we already accepted and learned that we need social media and a cellphone in our daily life, it will be just a matter of time for people to start using VR for travel planning. To conclude, it has been proven that people do accept this kind of technological systems and that VR can be enjoyable and useful for travel planning.

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# APPENDIX 1. SURVEY QUESTIONNAIRE

## TRYING VIRTUAL REALITY SURVEY

For each of the statements below, select the response that best characterizes how you feel about the statement, where 1= Strongly Disagree, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree, and 5 = Strongly Agree

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| Learning to operate the system was easy for me | 1 | 2 | 3 | 4 | 5 |
| Overall, I find the system easy to use | 1 | 2 | 3 | 4 | 5 |
| I think this technology is complicated to use | 1 | 2 | 3 | 4 | 5 |
| Using this technology would make travel planning more comfortable | 1 | 2 | 3 | 4 | 5 |
| This technology would help me making the task of travel planning more convenient | 1 | 2 | 3 | 4 | 5 |
| I find the system useful for travel planning task | 1 | 2 | 3 | 4 | 5 |
| This technology would support me in planning my future travels | 1 | 2 | 3 | 4 | 5 |
| Given that I have access to the system, I intent to buy it | 1 | 2 | 3 | 4 | 5 |
| Assuming I have access to the system, I intent to use it | 1 | 2 | 3 | 4 | 5 |
| I would recommend such a system to my friends | 1 | 2 | 3 | 4 | 5 |
| I find using the system enjoyable | 1 | 2 | 3 | 4 | 5 |
| I have fun using the system | 1 | 2 | 3 | 4 | 5 |
| The actual process of using the system is pleasant | 1 | 2 | 3 | 4 | 5 |
| Throughout my life, I have acquired a high level of technical knowledge | 1 | 2 | 3 | 4 | 5 |
| I inform myself when a new device is launched | 1 | 2 | 3 | 4 | 5 |
| I always try to stay up-to-date with the latest technology trends | 1 | 2 | 3 | 4 | 5 |
| I keep myself informed about technological advances | 1 | 2 | 3 | 4 | 5 |
| I'm curious about using computer-based technologies such as VR technology | 1 | 2 | 3 | 4 | 5 |
| I had already earlier an interest in computer-based technologies such as VR systems | 1 | 2 | 3 | 4 | 5 |
| I am eager to learn more about computer-based methods, such as VR technology | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I've always been interested in computer-based technologies such as the VR technology | 1 | 2 | 3 | 4 | 5 |
| I think that almost everyone can afford this technology | 1 | 2 | 3 | 4 | 5 |
| I think this technology is basically accessible to everyone | 1 | 2 | 3 | 4 | 5 |
| I think it is easy to acquire this technology | 1 | 2 | 3 | 4 | 5 |
| I think the using this technology is associated with a certain risk | 1 | 2 | 3 | 4 | 5 |
| I think that this technology might be dangerous for me | 1 | 2 | 3 | 4 | 5 |
| This technology would interfere with my daily routine | 1 | 2 | 3 | 4 | 5 |
| Using this technology would bring more disadvantages than advantage for me | 1 | 2 | 3 | 4 | 5 |
| I often worry about being overwhelmed by new technology | 1 | 2 | 3 | 4 | 5 |
| I am distrustful of new technical devices | 1 | 2 | 3 | 4 | 5 |
| I find it hard to trust technical devices | 1 | 2 | 3 | 4 | 5 |
| The idea of making a mistake when using a technical device scares me | 1 | 2 | 3 | 4 | 5 |
| In the virtual experience, I could for a moment let go of my real-world problems | 1 | 2 | 3 | 4 | 5 |
| During the virtual simulation, I forgot the world around me | 1 | 2 | 3 | 4 | 5 |
| During the virtual simulation, I had the feeling I would truly experience the simulation | 1 | 2 | 3 | 4 | 5 |
| During the virtual simulation, I felt like being in another world | 1 | 2 | 3 | 4 | 5 |
| After the virtual tour, I intent to visit the place in person | 1 | 2 | 3 | 4 | 5 |
| After the virtual tour, I intend to visit the place in the future | 1 | 2 | 3 | 4 | 5 |
| After the virtual tour, I want to find out more information about the place | 1 | 2 | 3 | 4 | 5 |
| While experiencing the virtual tour, I experienced the atmosphere of the place | 1 | 2 | 3 | 4 | 5 |
| After experiencing the virtual tour, I am in a better position to decide whether I want to travel or not to the place | 1 | 2 | 3 | 4 | 5 |
| After experiencing the virtual tour, I have realistic expectations of a future visit in my head | 1 | 2 | 3 | 4 | 5 |
| After experiencing the virtual tour, my desire to visit the destination is stronger | 1 | 2 | 3 | 4 | 5 |

**Last, please tell us about yourself.**

| **What is your age?** | **What is your gender?** | **What is your MAIN travel motivation?** |
|---|---|---|
| ☐ Younger than 18 years<br>☐ 18 – 25 years old<br>☐ 25 – 35 years old<br>☐ 35 – 45 years old<br>☐ 45 – 55 years old<br>☐ Older than 55 years | ☐ Female<br>☐ Male<br><br>**How often do you travel?**<br><br>☐ Once a year<br>☐ Between 1 and 3 times a year<br>☐ More than 3 times a year | ☐ Novelty (to experience something new, travel somewhere you have never been)<br>☐ Relaxation<br>☐ To get away from the daily routine<br><br>**What is your Nationality?** |

**Thank you very much!**

# TESTING AV VR

For hvert av uttalelsene nedenfor, velg svaret som best karakteriserer hvordan du føler om setningen, 1= Veldig Uenig 2 = Uenig, 3 =Nøytral, 4 = Enig, og 5 = Veldig Enig

| Setningen | Veldig Uenig | Uenig | Nøytral | Enig | Veldig Enig |
|---|---|---|---|---|---|
| Det var lett å lære hvordan man skulle bruke systemet | 1 | 2 | 3 | 4 | 5 |
| Det var lett å bruke systemet | 1 | 2 | 3 | 4 | 5 |
| Jeg syns denne teknologien er vanskelig å bruke | 1 | 2 | 3 | 4 | 5 |
| Ved bruk av denne teknologi, vil det være enklere å planlegge reiser | 1 | 2 | 3 | 4 | 5 |
| Denne teknologien kommer til å hjelpe meg ved å gjøre reiseplanlegging enklere | 1 | 2 | 3 | 4 | 5 |
| Dette systemet er nyttig for reiseplanlegging | 1 | 2 | 3 | 4 | 5 |
| Denne teknologien kommer til å hjelpe meg i fremtidig reiseplanlegging | 1 | 2 | 3 | 4 | 5 |
| Hvis jeg har tilgang til et slikt system, kan jeg tenke meg å kjøpe dette. | 1 | 2 | 3 | 4 | 5 |
| Hvis jeg har tilgang til dette systemet, kommer jeg til å bruke det | 1 | 2 | 3 | 4 | 5 |
| Jeg vil anbefale et slikt system til mine venner | 1 | 2 | 3 | 4 | 5 |
| Jeg synes det er gøy å bruke dette systemet | 1 | 2 | 3 | 4 | 5 |
| Jeg har det gøy når jeg bruker dette systemet | 1 | 2 | 3 | 4 | 5 |
| Den aktuelle prosessen ved å bruke systemet er hyggelig | 1 | 2 | 3 | 4 | 5 |
| Gjennom livet har jeg tjent meg selv et høyt nivå av teknologisk forståelse | 1 | 2 | 3 | 4 | 5 |
| Jeg er oppmerksom når nye teknologiske ting blir lansert | 1 | 2 | 3 | 4 | 5 |
| Jeg prøver alltid å holde følge med de nyeste teknologiske trender | 1 | 2 | 3 | 4 | 5 |
| Jeg holder meg oppdatert på teknologiske nyvinninger | 1 | 2 | 3 | 4 | 5 |
| Jeg er nysgjerrig på bruk av data relatert teknologi slik som VR teknologi | 1 | 2 | 3 | 4 | 5 |
| Jeg har allerede en interesse for data relatert teknologi, Slik som VR systemet | 1 | 2 | 3 | 4 | 5 |
| Jeg har lyst til å lære mer om data basert teknologi, slik som VR teknologi | 1 | 2 | 3 | 4 | 5 |
| Jeg har alltid vært interessert i data basert teknologi, slik som VR teknologi | 1 | 2 | 3 | 4 | 5 |
| Jeg tror alle kan ha råd til å bruke denne teknologien | 1 | 2 | 3 | 4 | 5 |
| Jeg tror denne teknologi er tilgjengelig for alle | 1 | 2 | 3 | 4 | 5 |
| Jeg tror det er lett å få tak i denne slags teknologi | 1 | 2 | 3 | 4 | 5 |
| Jeg tror bruken av denne teknologi kan komme med en viss fare | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Jeg tror at denne teknologi kanskje kan være farlig for meg | 1 | 2 | 3 | 4 | 5 |
| Denne teknologi kommer til å ødelegge min daglige rutine | 1 | 2 | 3 | 4 | 5 |
| Bruk av denne teknologi vil ha flere ulemper enn fordeler for meg | 1 | 2 | 3 | 4 | 5 |
| Jeg uroer meg ofte for at jeg skal bli overveldet av ny teknologi | 1 | 2 | 3 | 4 | 5 |
| Jeg stoler ikke på nye teknologiske enheter | 1 | 2 | 3 | 4 | 5 |
| Det er vanskelig å stole på teknologiske enheter | 1 | 2 | 3 | 4 | 5 |
| Idéen av å gjøre en feil når jeg bruker en teknologisk enhet skremmer meg | 1 | 2 | 3 | 4 | 5 |
| I den virtuelle simulasjon kan jeg for et lite øyeblikk slippe tak på mine problemer i den virkelige verden | 1 | 2 | 3 | 4 | 5 |
| Under den virtuelle simulasjonen, glemmer jeg verden rundt meg | 1 | 2 | 3 | 4 | 5 |
| Under den virtuelle simulasjonen, hadde jeg følelsen av at jeg virkelig følte simulasjonen | 1 | 2 | 3 | 4 | 5 |
| Under den virtuelle simulasjonen, følte jeg at jeg var i en annen verden | 1 | 2 | 3 | 4 | 5 |
| Etter den virtuelle turen, fattet jeg selv prøve for å reise til denne plassen | 1 | 2 | 3 | 4 | 5 |
| Etter den virtuelle turen, vil jeg prøve å besøke denne plassen i fremtiden | 1 | 2 | 3 | 4 | 5 |
| Etter den virtuelle turen, har jeg lyst å finne mer informasjon om denne plassen | 1 | 2 | 3 | 4 | 5 |
| Mens jeg er på den virtuelle turen, opplever jeg atmosfæren på selve plassen | 1 | 2 | 3 | 4 | 5 |
| Etter å ha opplevd denne virtuelle turen, er jeg i en bedre posisjon til å bestemme om jeg har lyst til å dra til denne plassen eller ikke | 1 | 2 | 3 | 4 | 5 |
| Etter å ha opplevd denne virtuelle turen, har jeg realistiske forventninger om reise til denne plassen i mine tanker | 1 | 2 | 3 | 4 | 5 |
| Etter å h opplevd denne virtuelle turen, har jeg et sterkere ønske om å besøke denne destinasjonen | 1 | 2 | 3 | 4 | 5 |

## Fortell oss om deg

**Hvor gammel er du?**

☐ 18 og under
☐ 18 – 25 år
☐ 25 – 35 år
☐ 35 – 45 år
☐ 45 – 55 år
☐ Over 55 år

**Kjønn?**

☐ Kvinne
☐ Mann

**Hvor ofte reise du?**

☐ 1 gang i året
☐ 1 – 3 ganger i året
☐ Mer enn 3 ganger i året

**Hva er din motivasjon for å reise?**

☐ For å utforske
☐ Slappe av
☐ For å komme meg vekk fra min daglige rutine

**Hvilket land er du fra?**

_____

## Takk for hjelpen!

# PROBANDO LA REALIDAD VIRTUAL

Por favor seleccione la respuesta que mejor describa como se siente en relación a la pregunta o enunciado.
1= Totalmente en desacuerdo, 2 = Desacuerdo, 3 =Neutral 4 = De Acuerdo, y 5 = Totalmente de acuerdo

| **Enunciado** | Total Des-acuerdo | Des-acuerdo | Neutral | Acuerdo | Total Acuerdo |
|---|---|---|---|---|---|
| Aprender a operar el sistema me fue fácil | 1 | 2 | 3 | 4 | 5 |
| En general, usar el sistema me fue fácil | 1 | 2 | 3 | 4 | 5 |
| Considero que esta tecnología es complicada de usar | 1 | 2 | 3 | 4 | 5 |
| Usar esta tecnología para planear futuros viajes es cómodo/a | 1 | 2 | 3 | 4 | 5 |
| Usar esta tecnología para planear futuros viajes resultará conveniente | 1 | 2 | 3 | 4 | 5 |
| El sistema puede ser útil para planear viajes | 1 | 2 | 3 | 4 | 5 |
| Esta tecnología puede ser de gran ayuda/apoyo para planear viajes | 1 | 2 | 3 | 4 | 5 |
| Dado el acceso a esta tecnología, tengo la intención de comprar googles de 3D. | 1 | 2 | 3 | 4 | 5 |
| Dado el acceso a esta tecnología, tengo la intención de usarla | 1 | 2 | 3 | 4 | 5 |
| Recomendaría usar esta tecnología a mis conocidos, amigos o familiares. | 1 | 2 | 3 | 4 | 5 |
| Disfruto al usar la tecnología de realidad virtual | 1 | 2 | 3 | 4 | 5 |
| Me divierto usando la tecnología de realidad virtual | 1 | 2 | 3 | 4 | 5 |
| El usar la tecnología de realidad virtual es agradable | 1 | 2 | 3 | 4 | 5 |
| A lo largo de mi vida, he adquirido experiencia en diferentes equipos tecnológicos | 1 | 2 | 3 | 4 | 5 |
| Me informo de cuando nuevos equipos tecnológicos son lanzados al mercado | 1 | 2 | 3 | 4 | 5 |
| Siempre trato de estar actualizado con las nuevas tendencias tecnológicas/electrónicas | 1 | 2 | 3 | 4 | 5 |
| Me mantengo informado de los avances tecnológicos | 1 | 2 | 3 | 4 | 5 |
| Me da curiosidad por usar tecnología en computación como la realidad virtual. | 1 | 2 | 3 | 4 | 5 |
| Ya tenía interés previo en tecnología en computación como la realidad virtual | 1 | 2 | 3 | 4 | 5 |
| Soy entusiasta en aprender sobre tecnología en computación como la realidad virtual | 1 | 2 | 3 | 4 | 5 |
| Siempre he tenido interés en tecnología computacional como la realidad virtual | 1 | 2 | 3 | 4 | 5 |
| Considero que casi la mayoría puede darse "el lujo" de comprar este tipo de tecnología | 1 | 2 | 3 | 4 | 5 |
| Considero que este tipo de tecnología es básicamente accesible para todos | 1 | 2 | 3 | 4 | 5 |
| Considero que es muy fácil obtener este tipo de herramientas tecnológicas | 1 | 2 | 3 | 4 | 5 |
| Considero que este tipo de tecnología trae consigo un riesgo | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Considero que este tipo de tecnología puede ser de peligro para mi | 1 | 2 | 3 | 4 | 5 |
| Este tipo de tecnología interrumpe con mi vida cotidiana | 1 | 2 | 3 | 4 | 5 |
| Usar este tipo de tecnología trae más desventajas que ventajas | 1 | 2 | 3 | 4 | 5 |
| Me preocupa el sentirme agobiado con este tipo de tecnología | 1 | 2 | 3 | 4 | 5 |
| No confio en este tipo de herramientas tecnológicas | 1 | 2 | 3 | 4 | 5 |
| Considero difícil el confiar en este tipo de tecnología | 1 | 2 | 3 | 4 | 5 |
| Me aterra la idea de cometer un error al usar este tipo de herramientas tecnológicas | 1 | 2 | 3 | 4 | 5 |
| Durante la experiencia virtual, por un momento me olvido de mis problemas | 1 | 2 | 3 | 4 | 5 |
| Durante la experiencia virtual, olvido lo que pasa a mi alrededor | 1 | 2 | 3 | 4 | 5 |
| Durante la experiencia virtual, tengo la sensación de estar presente en la simulación virtual. | 1 | 2 | 3 | 4 | 5 |
| Durante la experiencia virtual, me siento en otro mundo | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, tengo la intención de visitar el destino/lugar en persona | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, tengo la intención de visitar el destino/lugar en un futuro | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, deseo obtener más información acerca del destino/lugar "visitado" | 1 | 2 | 3 | 4 | 5 |
| Durante la experiencia virtual, puedo degustar el ambiente del lugar "visitado" | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, me encuentro en una mejor posición de decidir si quiero o no viajar al destino/lugar "visitado" | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, tengo una mejor imagen de que esperar al visitar el destino/lugar | 1 | 2 | 3 | 4 | 5 |
| Después de la experiencia virtual, mis deseos por visitar el lugar son más grandes | 1 | 2 | 3 | 4 | 5 |

## ¡Cuéntenos sobre usted!

| | | |
|---|---|---|
| **¿Cuál es su edad?**<br><br>☐ Menor de 18 años<br>☐ 18 – 25 años<br>☐ 25 – 35 años<br>☐ 35 – 45 años<br>☐ 45 – 55 años<br>☐ Mayor de 55 años | **¿Cuál es su sexo?**<br><br>☐ Femenino<br>☐ Masculino<br><br>**¿Con qué frecuencia viaja?**<br><br>☐ 1 vez por año<br>☐ 1 – 3 veces por año<br>☐ Más de 3 veces por año | **¿Cuál es su principal motivación para viajar?**<br><br>☐ Para experimentar o conocer un destino nuevo<br>☐ Para relajarse<br>☐ Para escapar de su rutina diaria<br><br>**¿Cuál es su nacionalidad?**<br><br>_____ |

## ¡Gracias por su ayuda!

# APPENDIX 2: FACTOR LOADINGS BEFORE ITEM DELETION

**Table 2**: Factor Analysis Results

| Construct | Item | Factor Loading | Cronbach's Alpha (α) | Composite Reliability ($\rho_c$) | AVE |
|---|---|---|---|---|---|
| Perceive Ease of Use | PEOU1 | 0.866 | 0.736 | 0.851 | 0.658 |
| | PEOU2 | 0.870 | | | |
| | PEOU3r | 0.681 | | | |
| Perceived Usefulness | PU1 | 0.890 | 0.802 | 0.866 | 0.622 |
| | PU2 | 0.626 | | | |
| | PU3 | 0.812 | | | |
| | PU4 | 0.803 | | | |
| Behavioral Intention | BI1 | 0.870 | 0.861 | 0.915 | 0.783 |
| | BI2 | 0.902 | | | |
| | BI3 | 0.881 | | | |
| Perceived Enjoyment | PENJ1 | 0.951 | 0.899 | 0.937 | 0.833 |
| | PENJ2 | 0.867 | | | |
| | PENJ3 | 0.918 | | | |
| Interest | INT1 | 0.901 | 0.937 | 0.955 | 0.842 |
| | INT2 | 0.929 | | | |
| | INT3 | 0.936 | | | |
| | INT4 | 0.904 | | | |
| Personal Innovativeness | PI1 | 0.913 | 0.922 | 0.945 | 0.811 |
| | PI2 | 0.868 | | | |
| | PI3 | 0.945 | | | |
| | PI4 | 0.873 | | | |
| Accessibility | ACC1 | 0.820 | 0.756 | 0.858 | 0.669 |
| | ACC2 | 0.875 | | | |
| | ACC3 | 0.592 | | | |
| Skepticism | SKE1 | 0.810 | 0.793 | 0.864 | 0.618 |
| | SKE2 | 0.875 | | | |
| | SKE3 | 0.592 | | | |
| | SKE4 | 0.810 | | | |
| Technology Anxiety | ANX1 | 0.851 | 0.892 | 0.921 | 0.746 |
| | ANX2 | 0.915 | | | |
| | ANX3 | 0.844 | | | |
| | ANX4 | 0.843 | | | |
| Perceived Immersion | PIM1 | 0.873 | 0.806 | 0.876 | 0.642 |
| | PIM2 | 0.848 | | | |
| | PIM3 | 0.847 | | | |
| | PIM4 | 0.610 | | | |
| Decision Making | DMK1 | 0.910 | 0.904 | 0.932 | 0.775 |
| | DMK2 | 0.935 | | | |
| | DMK3 | 0.787 | | | |
| | DMK4 | 0.882 | | | |

Note: All loadings are significant at $p < 0.001$

# APPENDIX 3: THE ORGINAL STUDY BY Disztinger et al. (2017)

A copy of this conference paper was ordered using the University of Stavanger library system. The physical copy obtained was scanned and attached to this file for merely academic purposes (this master thesis).

# Technology Acceptance of Virtual Reality for Travel Planning

**Peter Disztinger, Stephan Schlögl and Aleksander Groth**

**Abstract** The appearance of affordable hardware has made Virtual Reality (VR) one of 2015s most discussed electronic consumer devices. Its technological power lies in its intensity and the simulated realism it is able to provide. Although gaming is the main driver behind current developments, other domains may benefit as well. Tourism and destination management in particular can be considered for application. Within this context, this technology would not only allow for a more realistic pre-experience of potential destinations, but also enable tourism providers with novel ways of promoting their services to prospective tourists. In order to estimate the potential of VR in tourism, a survey based on the Technology Acceptance Model, has been conducted. After virtually travelling to a selected destination, participants had to complete a 36-item questionnaire. Results indicate significant effects of *Perceived Immersion*, *Interest*, *Perceived Enjoyment* and *Perceived Usefulness* on the *Intention to Use* VR technology for travel planning.

**Keywords** Virtual reality · Technology acceptance · Travel planning · Destination management

## 1 Introduction

Tourism areas around the globe have always been facing similar challenges when promoting their destination—prospective visitors have to be convinced to visit a destination and its attractions from afar. In recent years, however, the role

P. Disztinger · S. Schlögl (✉) · A. Groth
Interaction Lab Department Management, Communication & IT (MCiT),
MCI Management Center Innsbruck, Innsbruck, Austria
e-mail: stephan.schloegl@mci.edu

P. Disztinger
e-mail: p.disztinger@mci4me.at

A. Groth
e-mail: aleksander.groth@mci.edu



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technology plays in this process has significantly changed. In particular, the rapid dissemination of the Internet has had a fundamental impact on how travellers plan and book trips (Buhalis & Law, 2008). This effect has further intensified through the growing emergence of Social Media and Web 2.0 applications to the point that people today actively influence the reputation and standing of a destination by publicly posting relevant reviews, videos and photos (Boyd & Ellison, 2007). Yet, even with this rather technology-oriented destination marketing, competition between destinations is high and so marketers continuously search for new, more emotional and immersive ways of promoting their products (Hays, Page, & Buhalis, 2013). Virtual Reality (VR) may be seen as one such technology that has the potential to significantly change the way Destination Management Offices (DMO) advertise their region. Head Mounted Displays (HMD), transport the wearer into an 'artificial world' where he/she is able to interact with and experience digital content at a different level of immersion (Fox, Arena, & Bailenson, 2009). HMDs are designed to isolate the user from outside influences. This enhances the perception of presence in a virtual environment and intensifies the experience. For Facebook founder and CEO Mark Zuckerberg VR is thus "the next major computing and communication platform after phones".[1] This prediction led him to invest two billion US Dollars in Oculus VR, a company known for their high-end virtual reality headset called *Rift*. A different approach is pursued by Google, who released a design for a phone holder which transforms ordinary smartphones into VR headsets called *Google Cardboard*.[2]

Although VR may be considered a potential new marketing channel, its acceptance within the tourism domain is barely explored. So far the literature defines this unorthodox way of sampling a potential product as experimental marketing. That is, rather than looking at a destination through traditional advertising media (e.g. print or electronic catalogues) consumers can actually dive in, i.e. feel and experience, rather than just look at pictures. Consequently, travel agencies are able to address customer needs better and more directly. Given the novelty and immersion of this experience, the effect is particularly strong. In addition, people are unfamiliar to these types of experiences and thus have not built up resistances against marketing stimuli through VR interfaces (Pine & Gilmore, 2011). However, as with all new technologies, VR may only be successful when it is widely accepted. While this type of technology acceptance for VR applications has been researched in the educational and medical sector (e.g. Kothgassner et al., 2012; Bertrand & Bouchard, 2008), studies on VR for travelling or tourism are scarce, mainly focusing on augmented or mixed reality applications (e.g. Haugstvedt & Krogstie, 2012; Lee, Chung, & Jung 2015). Hence this study explores the following research quest: "Which influencing factors constitute the acceptance of VR technologies in the context of travel planning?"

[1]See Zuckerberg (2015).

[2]See Simonite (2015).

## 2 Related Work

VR generally refers to artificial, digital worlds in which users can interact and navigate. A VR system usually provides a real-time, viewer-centred head-tracking perspective with a large angle of view, interactive controls, and a binocular display (Cruz-Neira, Sandin, & DeFanti, 1993; Steuer, 1992). The users' movements are tracked and their surroundings are digitally rendered and visualized, according to these movements (Fox et al., 2009). The competing term Virtual Environment (VE) has a somewhat similar but more inclusive definition, which encompasses not only visual stimuli but also sound, touch, and smell (Cruz-Neira et al., 1993). The main goal of VR is to create an illusion of being in a believable environment where users interact efficiently in performing specific tasks. Two main factors are necessary to provide a VR experience: (1) physical immersion and (2) psychological presence. Physical immersion refers to the degree to which a user is isolated from reality. Additional stimuli, such as 3D-sound, increase the perceived sensation of immersion (Gutiérrez, Vexo, & Thalmann, 2008). Psychological presence refers to the sensation of being in a VE rather than in the place the user's physical body is actually located (Sanchez-Vives & Slater, 2005). The user gains the sensation of being in the VR and immerses into this new world. His/her attention shifts to the new reality and is therefore encapsulated from external stimuli and effects. In the literature this is often characterized as transportation. Users tend to feel immersed in a VR when they report the sensation of arriving in the artificial world (Schuemie et al., 2001). Presence therefore describes—on a subjective level—the extent to which the user is feeling present in the VE.

### *2.1 Virtual Reality in Tourism*

As mentioned earlier, VR may significantly impact the tourism marketing sector. Sussmann and Vanhegan (2000) particularly refer to the possibility of creating new (virtual) touristic areas incorporated in online-communities to help with the travel planning process and consequently co-create future tourism destinations. VR technology could support future visitors by letting them experience what is not yet there. This sort of crowd testing is, according to the authors, not only cost effective but also helps tailor projects to the needs of tourists (Heldal, 2007). The concept of replacing the act of physical travelling through VR is also mentioned in many studies but there is no evidence of it becoming reality any time soon (Guttentag, 2010).

The potential of VR in tourism lies in its ability to provide additional sensory and visual information to prospective tourists. This characteristic has special significance in the tourism domain as most tourism products are defined as confidence

goods. A touristic service may not be tested in advance; hence customers rely in their booking decision solely on the descriptive information they receive through media or social channels. Within this complex decision process, VR can help by providing richer information. Users can travel to the virtual surrogate destination and perceive/sense a potential visit (Berger et al., 2007). Cheong (1995) studied persons planning to travel to an island and therefore virtually visiting different places that fit their interest; such as the Seychelles, the Virgin Islands, Jamaica, the Maldives, etc. People with access to this type of technology made more informed decisions due to the richness of the available information and also had more realistic expectations of their future journey. This may lead to a more satisfactory vacation for the tourist (Cheong, 1995; Williams & Hobson, 1995) and increase success for the destination (Berger et al., 2007).

There have been applications of VR with the aim to attract tourists for over a decade. These implementations are built upon virtual tours on websites and basically consist of simple panoramic or 360° photographs or videos. They already provide a better and richer information experience than traditional brochures, catalogues, or websites and consequently offer significant advantages for prospective tourists (Cho, Wang, & Fesenmaier, 2002). Many studies advocate the use of such interactive features (Fotakis & Economides, 2008; Wan, Tsaur, Chiu, & Chiou, 2007). Lee and Oh (2007) found that incorporating a virtual tour or panoramic photos offers psychological relief to people suffering from travel anxiety, and Thomas and Care (2005) showed that a virtual tour increases the interest in visiting a museum physically.

In cooperation with Samsung, the Marriot Hotel Group provided a so-called *VRoom Service* in selected hotel rooms. These rooms were equipped with a VR Kit, including a Samsung VR HMD, a Samsung Galaxy Smartphone, and an exclusively tailored application based on Samsung's *Milk* framework. Guests in these rooms had the opportunity to follow the adventures of three world-travellers from the Andres Mountains to a market in Beijing over to an ice-cream shop in Rwanda.[3] The combination of storytelling and VR experience led to a huge success: approx. 500 million social media impressions and over 300 million PR impressions.[4] The Thomas Cook Group already uses VR technology to promote their products in ten selected stores in the U.K., Germany and Belgium through try-before-you-buy tours. Their promotion for New York boosted their revenue by 190 percent.[5]

[3]Marriott Hotels' Samsung Gear VR postcards are little works of art disguised as adverts. Retrieved from http://www.t3.com/news/marriott-hotels-samsung-gear-vr-postcards-are-little-works-of-art-disguised-as-adverts.

[4]See Framestore Studio (2015)

[5]How Oculus and Cardboard Are Going to Rock the Travel Industry. Retrieved from http://www.bloomberg.com/news/articles/2015-06-19/how-oculus-and-cardboard-are-going-to-rock-the-travel-industry.

### 2.2 Technology Acceptance Model (TAM)

Through understanding *acceptance* as a positive reception of an idea, not only as reactive tolerance but more in the sense of active willingness, it stands as a complex interaction of cognitive and emotional processes, which leads to adoption (or rejection) of an innovation (Königstorfer & Gröppel-Klein, 2008). When measuring user acceptance, the *Technology Acceptance Model* (TAM) by Davis (1986) is one of the most applied models due to its straight forward and context-independent applicability. In its purest form TAM uses the two core constructs *Perceived Usefulness (PU)* and *Perceived Ease of Use (PEOU)* to explain *Behavioural Intention to Use (BI)* as a predecessor of *Actual System Use* or success of an information system. Various meta-analyses by King and He (2006), Lee, Kozar and Larsen (2003) and Legris, Ingham and Collerette (2003) could confirm the robustness, parsimony, and universal applicability of this approach. Also in tourism research, TAM has received considerable attention. Kim, Park and Morrison (2008) used the model to explore the willingness of adopting mobile devices in the trip planning process, and a study by Huang, Backman, Backman and Moore (2013) employed TAM in order to test the applicability of 3D virtual worlds in travel and tourism marketing.

## 3 Methodology

In order to expand previous work on technology acceptance, this study aims to understand the acceptance of VR technology as a suitable medium for travel planning. Davis' (1986) core constructs used in TAM, i.e. *PEOU* and *PU*, were applied in order to build the core basis of our research model. Davis' *Attitude toward Using* has, however, been omitted as an independent variable, as all participants actually used VR technology before. The study was set up and conducted employing a quantitative research methodology, testing and validating a number of hypotheses (Veal, 1997).

### 3.1 Proposed Research Design

Starting with Davis' (1986) original TAM core variables, the following two hypotheses act as a base for our research design:

H1: *Perceived Ease of Use (PEOU)* positively influences *Behavioural Intention to use (BI)* VR technology for travel planning.

H2: *Perceived Usefulness (PU)* positively influences *Behavioural Intention to use (BI)* VR technology for travel planning.

Building upon more of the above mentioned previous work, this core model is further modified and extended by adding the following independent variables (Fig. 1): *Perceived Enjoyment (PENJ)*, *Interest (INT)*, *Personal Innovativeness (PI)*, *Accessibility (ACC)*, *Skepticism (SKE)*, *Technology Anxiety (ANX)*, and *Perceived Immersion (PIM)*.

Within the technology acceptance literature, *Perceived Enjoyment (PENJ)* is defined as the extent to which a system or service is perceived to be enjoyable. Much of the early work in this area has been conducted in computer gaming (Davis, Bagozzi, & Warshaw, 1992). In the past decade, however, *PENJ* has gained attention in information systems research, covering a variety of application domains such as computer usage, Internet usage, e-learning, online shopping, and instant messaging services (Ayeh, Au, & Law, 2013). For utilitarian systems, *PENJ* has been found to be the weaker predecessor to user acceptance in comparison to *PEOU* and *PU* (Venkatesh & Davis, 2000). These systems are designed to provide mainly instrumental value to the user. For hedonic systems, on the other hand, the main objective is to encourage prolonged use. Within this context, a strong effect of *PENJ* has been observed (van der Heijden, 2004), confirming that it is important for fun-oriented system to be enjoyable. Thus, following Holsapple and Wu's (2007) categorization of VR being a hedonic rather than a utilitarian technology, the following hypothesis is proposed:

H3: *Perceived Enjoyment (PENJ)* positively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

General *Interest (INT)* in technology is also said to positively influence the intention to use. This construct has been applied as an extended TAM construct in the studies of Romm-Livermore (2012) as well as Soesanto (2013). Within tourism,

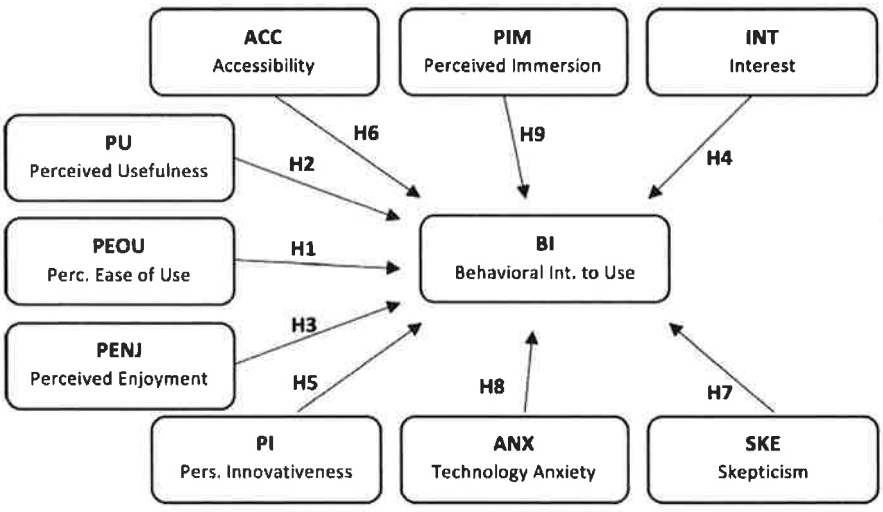


**Fig. 1** Proposed research model

Freidl (2006) included *INT* in order to test the acceptance of new technologies in hotel rooms. Therefore the following hypothesis is proposed:

H4: *Interest (INT)* positively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

Agarwal and Prasad (1998) consider *Personal Innovativeness (PI)* as a user's willingness to try new technologies. *PI* is considered a personal trait derived from Roger's Diffusion of Innovations Theory (2003). A positive effect of *PI* on *BI* in a VR related context has been observed by Yusoff, Zaman and Ahmad (2011). Raaij and Schepers (2008) were able to confirm the same effect for virtual learning environments in China. Hence, the following hypothesis is proposed:

H5: *Personal Innovativeness (PI)* positively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

*Accessibility (ACC)* refers to whether a technology is perceived easy to obtain and affordable (Kothgassner et al., 2012). Karahanna and Limayem (2000) distinguish between physical accessibility and information accessibility. The first referring to the extent to which one has physical access to the system, the latter to the ability to retrieve the desired information form the system. Perceived access barriers might negatively influence the adoption of a technology, whereas easy accessibility may support the intention to use. Hence, the following hypothesis is proposed:

H6: *Accessibility (ACC)* positively influences the *Behavioural Intention to Use (BI)* VR technology for travel planning.

*Skepticism (SKE)* assesses whether a technology is perceived risky, harmful or disadvantageous. Distrust or skepticism is not widely applied in acceptance research. Nevertheless, Kornwachs and Renn (2011) as well as Kothgassner et al. (2012) include SKE in their information system studies. Although, it is more common to use trust as the positive equivalent (e.g. Gefen, Karahanna, & Straub, 2003; Jacques, Garger, Brown, & Deale, 2009; Alsajjan and Dennis, 2010) due to the physical invasiveness of VR it is proposed that:

H7: *Skepticism (SKE)* negatively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

According to Brown (2002) *Technology Anxiety (ANX)* evokes anxious and emotional reactions when using technology. It is also defined as one's fear of using technology (Simonson, Maurer, Montag-Torardi, & Whitaker, 1987). The construct has been widely used in acceptance studies, (Lee et al., 2003) also leading to its integration to the 3rd iteration of TAM, i.e. TAM3 (Venkatesh & Bala, 2008). Hence, it is proposed that:

H8: *Technology Anxiety (ANX)* negatively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

*Perceived Immersion (PIM)* is a characteristic unique to VR and closely related to technology use. It describes the extent to which a computer interface is capable of transporting an inclusive, surrounding and vivid experience. This definition is often criticized as it implies that every user is experiencing immersion the same way and with the same intensity (Schmidt et al., 2013). However, studies by Jennett et al. (2008) and Witmer and Singer (1998) have shown that individuals differ in their perception of immersion, even if they use the same technology. Consequently, *PIM* is defined as an individual's ability to fully engage in a virtual environment. Thus, following Kothgassner et al.'s (2012) argument that the degree of immersion into VR increases acceptance of the technology, it is proposed that:

H9: *Perceived Immersion (PIM)* positively influences *Behavioural Intention to Use (BI)* VR technology for travel planning.

## 3.2 Study and Questionnaire Design

In order to investigate the above proposed hypotheses, a mobile VR app focusing on travel planning has been utilized. First, a number of different apps were compared and evaluated based on their availability, content richness, trustworthiness, universality, subjective immersion as well as their professionalism. Three potential apps qualified, of which *Google Street View*[6] was selected as the most suitable. Next, a questionnaire survey was designed, which incorporated the relevant question sets to test the above established hypotheses (cf. Table 1).

The Technology Usage Inventory (TUI) (Kothgassner et al., 2012) has been used as a foundation. It was extended with additional (previously validated) items, all of which used a Seven-Point-Likert scale ranging from "fully disagree" to "fully agree". In addition, participants had to provide some demographic information such as age, country of origin and the VR device they used to try *Google Street View*. The survey, together with some instructions on how to install and use the app with various devices (i.e. Google Cardboard, HTC Vive, Oculus Rift), was posted on Reddit in the appropriate VR and subreddits for travelling, on various related Facebook groups, and VR community forums.

Before completing the survey, participants were asked to use *Google Street View* on their device and virtually visit a potential holiday destination. While a number of inspirational targets were given (e.g. Christ the Redeemer statue in Rio de Janeiro, the Maldives, or the Empire State Building in New York City) participants were not limited in their choice of destination nor the amount of time they could spend inside the VR, before eventually completing the survey.

[6]Google Street View: https://www.google.com/streetview/apps/.

**Table 1** Questionnaire items and corresponding constructs

| Construct | Statement |
|---|---|
| PEOU | PEOU1: Learning to operate the system was easy for me |
| | PEOU2: Overall, I find the system easy to use |
| | PEOU3: I think this technology is complicated to use |
| PU | PU1: Using this technology would make travel planning more comfortable |
| | PU2: This technology would help me making the task of travel planning more convenient |
| | PU3: I find the system useful for travel planning tasks |
| | PU4: This technology would support me in planning my future travels |
| BI | BI1: Given that I have access to the system, I intent to buy it |
| | BI2: Assuming I have access to the system, I intent to use it |
| | BI3: I would recommend such a system to my friends |
| PENJ | PENJ1: I find using the system enjoyable |
| | PENJ2: I have fun using the system |
| | PENJ3: The actual process of using the system is pleasant |
| INT | INT1: Throughout my life I have acquired a high level of technical knowledge |
| | INT2: I inform myself when a new device is launched |
| | INT3: I always try to stay up-to-date with the latest technology trends |
| | INT4: I keep myself informed about technological advances |
| PI | PI1: I'm curious about using computer-based technologies such as VR technology |
| | PI2: I had already earlier an interest in computer-based technologies such as VR systems |
| | PI3: I am eager to learn more about computer-based methods, such as VR technology |
| | PI4: I've always been interested in computer-based technologies such as the VR technology |
| ACC | ACC1: I think that almost everyone can afford this technology |
| | ACC2: I think this technology is basically accessible to everyone |
| | ACC3: I think it is easy to acquire this technology |
| SKE | SKE1: I think the using this technology is associated with a certain risk |
| | SKE2: I think that this technology might be dangerous for me |
| | SKE3: This technology would interfere with my daily routine |
| | SKE4: Using this technology would bring more disadvantages than advantages for me |
| ANX | ANX1: I often worry about being overwhelmed by new technology |
| | ANX2: I am distrustful of new technical devices |
| | ANX3: I find it hard to trust technical devices |
| | ANX4: The idea of making a mistake when using a technical device scares me |
| PIM | PIM1: In the virtual simulation I could for a moment let go of my real world problems |
| | PIM2: During the virtual simulation, I forgot the world around me |
| | PIM3: During the virtual simulation, I had the feeling I would truly experience the situation |
| | PIM4: During the virtual simulation, I felt like being in another world |

# 4 Results

Participants from 29 different countries completed a total of 148 valid questionnaires. The United States accounted for most respondents, followed by Austria, Germany and the UK. Most respondents were male (83.1%) and between 14 and 72 years old; 60% of respondents were less than 30 years of age.

## *4.1 Reliability, Principle Factors, and Regression*

SPSS was used to calculate *Cronbach's alphas* for the proposed constructs. All values were above 0.6, with the lowest reliability found in *SKE* (0.644) and the highest in *INT* (0.939). In order to test if the data reflects the model structure, a *Principle Factor Analysis* was conducted. Results from the Kaiser-Meyer-Olkin (KMO) test measuring sampling adequacy showed a low diffusion in the correlation pattern (KMO value = 0.873). The following primal component analysis identified eight factors that exhibited an *Initial Eigenvalue* > *1*. In combination, these factors were able to explain 71.818% of the total data variance. Using a *Promax* rotation to generate a component matrix, the *SKE* items did not load to any of the identified eight factors and the *PI* and *INT* items did load to the same factor. Consequently, *SKE* items were omitted from further analysis and *PI* and *INT* were merged into one single factor called *INT*. This also led to the rejection of hypotheses H5 and H7 as they were concerned with those now oppressed variable constructs.

Focusing on the exploration of the remaining constructs a linear regression analysis was conducted. First, an ANOVA of the individual constructs aimed at highlighting the relationship between the different components and the dependent variable. Results showed that except for *ANX* all constructs exhibited a direct significant influence on *BI* ($p < 0.05$). Next, in order to evaluate the fit of the model, a multiple linear regression analysis was performed (Fig. 2). The resulting $R^2$ explains 53.6% of the total variance of *BI* by combining all seven factors. The Adjusted $R^2$ of 0.512 furthermore highlights a high cross-validity, supporting the overall generalizability of this result (Field, 2013). Looking at the analysis in more detail, *ACC* and *PEOU* show no significant effect on *BI*. Consequently, hypotheses H1, H6 and H8 were rejected. Yet all remaining hypotheses, i.e. H2, H3, H4 and H9 are supported by the data. In particular *INT* ($\beta = 0.378$) *and PENJ* ($\beta = 0.305$) show strong effects on *BI*.

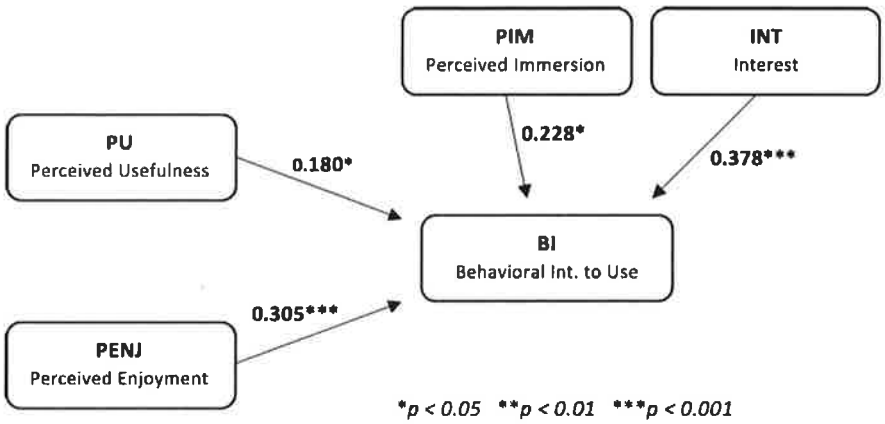


**Fig. 2** Final research model with empirical results

## 5 Concluding Remarks, Limitations and Future Directions

The purpose of Davis' work (1986) was to measure and confirm new predictors for *Perceived Usefulness (PU)* and *Perceived Ease of Use (PEOU)*. Even though the initial momentum was to understand and explain the acceptance of IT systems in the work place, his model has been applied in a wide range of fields. For this study, TAM was adapted to VR and travel planning. Our data confirms the relationship between *PU* and *BI*. Evidence for a direct significant effect of *PEOU* on BI was, however, not provided, although *PEOU* was generally high rated (*mean = 6.19*). A reason may be the rather low interaction time participants had with the actual device. Once set up the HMD works hassle-free rendering usability to be less of an issue. *Enjoyment* (i.e. *PENJ*) on the other hand was found to be a good predictor for *BI*. Results support what van der Heijden (2004) and Haugstvedt and Krogstie (2012) have already observed before: intention to use a hedonistic system is heavily influenced by the enjoyment level it produces. Thus, the more fun it is, the higher is one's intention to use it. The strongest predictor of *BI* and subsequently for the postulated acceptance of VR systems was found in the general interest (*INT*) one has in said technology. Here it seems that VR technology is still considered futuristic, for which a certain 'nerdiness' is required in order for it to be accepted. Finally, *Perceived Immersion (PIM)* was found to be a valid predictor for *BI*. Data suggests that the intensity of the immersion also increases the intention to use and consequently the acceptance of the system. In summary, one may argue that VR technology, although significantly improved, is still a (small) step away from mass-market acceptance. Additional improvements regarding its usefulness and enjoyment factor as well as technical upgrades with respect to technology immersion could, however, clear the path to success.

Some limitations of the presented research have to be considered. First, the study has been conducted quantitatively and remotely by participants without supervision. A qualitative setting in an experimental format could share additional valuable insights towards the experience of such technology. Second, only one application (i.e. *Google Street View*) has been used, which was not necessarily produced for marketing destinations but rather for navigation. Third, the majority of respondents owned a personal VR device so that a positive attitude towards VR was already given. A less technology aware response group may have led to a different, less optimistic result.

Future work aims at tackling mentioned limitations. An already planned experimental study setting should generate additional qualitative feedback with respect to the planning experience. Here it is also planned to use and compare different VR applications. Finally, an expansion towards different target groups should highlight potential differences from an end user perspective.

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