Research Paper

Exploring the role of next-generation virtual technologies in destination marketing

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A R T I C L E   I N F O

A B S T R A C T

This study aims to investigate the impact of virtual reality experiences created with the newest generation of wearable devices on the intention to visit sites and attractions in a destination. To this end, the paper investigated whether the perceived visual appeal (PVA) of virtual reality and the emotional involvement (EI) of users had a positive impact on the behavioral intentions to visit a cultural heritage site in a destination. Data was collected from visitors via a survey at a destination in Naples (Italy). Study results revealed that the PVA of the virtual reality experience with wearable devices had a positive and significant effect on behavioral intentions towards the site featured in the virtual experience. Moreover, PVA had a positive effect on EI. This study is among the first to empirically investigate the influence of virtual reality experiences, enabled by the latest wearable devices, on destination visit intentions. Study results are relevant for destination marketing organizations seeking to develop effective technology-based marketing strategies that address the pre-visit, on-site and post-visit phase of the visitors' journey. The paper offers specific theoretical and managerial implications.

1. Introduction

The increasingly globalized and competitive tourist market has forced tourism destinations to implement innovative ways to attract visitors to their distinctive places and attractions (González-Rodríguez, Martínez Torres, & Toral, 2016; Pike & Page, 2014; Ritchie & Crouch, 2003; Rivera, Croes, & Zhong, 2016; UNWTO, 2011). In this regard, the use of modern technologies is crucial for destinations. The developments in information and communication technologies in the last two decades have significantly affected the marketing done by destination marketing organizations (DMOs), providing them with unprecedented opportunities and tools to attract and retain visitors (Buhalis & Law, 2008; Gretzel, Fesenmaier, Formica, & O'Leary, 2006; Law, Buhalis, & Cobanoglu, 2014; Law, Leung, & Buhalis, 2009; Li, Robinson, & Oriade, 2017; Neuhofer, Buhalis, & Ladkin, 2012, 2014, 2015). For instance, Neuhofer et al., (2012, 2014) reported a number of best practices of technology-enhanced destination marketing experiences. These examples illustrate how destinations increasingly use technologies for engaging and encouraging potential tourists to come to visit their sites and attractions.

DMOs worldwide now often use the Internet, social media, and virtual reality (VR) applications to allow potential tourists to virtually experience, explore and assess the destination before their physical visit. The use of these applications for destination marketing has been fueled by the rapid diffusion of portable devices such as tablets and smartphones and their prominent role in travel and tourism experiences (Oh, Lehto, & Park, 2009; Tung & Law, 2017; Tussyadiah, 2013; Wang & Fesenmaier, 2013; Wang, Xiang, & Fesenmaier, 2014). The development of a new stream of wearable devices, including head-mounted displays (HMDs), smartwatches, wristbands, and body-worn cameras, has become one of the major drivers of transformation of tourists' behavior and tourism experiences (Atembe, 2015; Jung, tom Dieck, Moorhouse, & tom Dieck, 2017; tom Dieck, Fountoulaki, & Jung, 2018; Tussyadiah, 2015; Tussyadiah, Jung, & tom Dieck, 2017). This trend highlights the increasing interest and effort in the development of smart tourism destinations through the integration of technological infrastructures and end-user devices for the enrichment and personalization of visitor experiences as well as improvement of residents' quality of life (Buhalis & Amaranggana, 2014, 2015; Wang & Li, 2013).

In this context, the newest generation of VR devices, such as Oculus Rift and Samsung Gear, represent cutting-edge tools for destination marketing efforts by allowing the creation of highly immersive and

realistic virtual experiences. Primarily used in the field of gaming and entertainment, the adoption of these devices is taking off in a variety of different fields, from learning and training to tourism and destination marketing. These advanced devices are expected to have a revolutionary impact on tourism experiences (Tussyadiah, 2014), including the pre-visit stage where awareness, interest and anticipation can be created in the tourist's mind (Jung et al., 2017; Neuhofer et al., 2012, 2015). However, this is a nascent area (Griffin et al., 2017) and empirical studies have not yet sufficiently explored how virtual experiences enabled by HMDs can affect travelers' behavioral intentions towards destination sites and attractions. Given this gap in the field, this study aims to investigate the role of 'next-generation' VR experiences with HMDs in the promotion of tourism destinations, based on the conceptual foundation of experiential marketing. An important stream of research has applied experiential marketing perspectives and constructs in the context of both tourism (e.g. Brent Ritchie, Wing Sun Tung, & Ritchie, 2011; Oh, Fiore, & Jeoung, 2007; Williams, 2006) and destination marketing (e.g. Buhalis, 2000; Hudson & Ritchie, 2009; Ye & Tussyadiah, 2011). Recent research on information technology in tourism has used experiential constructs to understand the use and impact of technologies (Chen & Lin, 2012; Chung, Han, & Joun, 2015; Kourouthanassis, Boletsis, Bardaki, & Chasanidou, 2015; Kuo, Chen, & Tseng, 2017; Melián-González & Bulchand-Gidumal, 2017), and more specifically of virtual technologies (Huang, Backman, & Backman, 2012; Huang, Backman, Backman, & Moore, 2013; Jung, tom Dieck, Lee, & Chung, 2016). This research emphasizes the potential of emotional and imaginative responses to virtual experiences in tourism marketing (Huang et al., 2013).

The current study builds on this literature to investigate the impact of virtual reality experiences created with the newest generation of wearable devices on visit intentions. It researches VR experiences involving a virtual depiction (3D trailer) of a real tourism site in order to provide a better conceptualization of the role of VR experiences in shaping intentions toward actual visitation (Tussyadiah, Wang, & Jia, 2017). Particularly, this study investigated whether the perceived visual appeal of virtual reality experiences with HMDs and the emotional involvement of users had a positive impact on the behavioral intentions to visit a cultural heritage site at the destination. These two experiential factors reflect the potential effect of next-generation VR technologies on the core components of (virtual) destination image (Cho, Wang, & Fesenmeier, 2002; Griffin et al., 2017; Hyun & O'Keefe, 2012), notably the cognitive or perceptual component and the affective or emotional component, and the resultant impact on users' intention to positively engage with the destination.

2. Literature review

2.1. Technology-based marketing of tourism destinations: The potential of virtual reality

In the context of tourism, new technologies have affected the innovation of products, services, processes, and management (Hjalager, 2010). New technologies have also changed the way in which tourism providers create and offer tourism experiences and the way in which tourists perceive and experience destinations (Huang, Backman, Backman, & Chang, 2016). In particular, new technologies have the ability to facilitate the encounters among tourists and destinations, extend the experiential process in time and space, and improve the value co-creation with all the stakeholders involved in the sector (Chen, Kerr, Chou, & Ang, 2017; Neuhofer et al., 2014). New technologies, especially mobile technologies, allow tourists to be involved at the same time in both real and virtual experiences. This occurs during all three phases of the traveling process: pre-visit, on-site/during the trip, and post-visit (Neuhofer et al., 2012). The pre-visit phase represents a crucial moment in the overall experience process, since in this phase tourists develop their expectations about the visit and activate their

decision-making process. In this anticipatory phase, new technologies have an important role to play as tourism providers and destination organizations can promote their products and sites in innovative and more effective ways. The technological tools that are most used to promote destinations and tourism products are websites and social media (Neuhofer et al., 2012, 2014). These technologies are used to collect information and enhance social interactions with other users interested in tourist destinations (Sigala, 2009).

Tourism organizations can use augmented reality (AR) to attract new flows of visitors and enhance their experiences at destinations. The potential of AR to enhance the provision of information about destinations and create enjoyable and interactive experiences for tourists has been discussed and showcased in many studies (Chung et al., 2015; Han, tom Dieck, & Jung, 2017; Jung, Chung, & Leue, 2015; Kourouthanassis et al., 2015; Leue, Jung, & tom Dieck, 2015; tom Dieck et al., 2018; Tscheu & Buhalis, 2016). More recent studies on AR have explored its value and adoption in cultural heritage tourism (Cranmer, tom Dieck, & Jung, 2018; Han et al., 2017; Jung, Lee, Chung, & tom Dieck, 2018; tom Dieck & Jung, 2017; Tscheu & Buhalis, 2016), while others have explored wearable AR applications (Leue et al., 2015; tom Dieck, Jung, & tom Dieck, 2016; tom Dieck, Jung, & Han, 2016).

In parallel, VR has emerged as a powerful tool for destination marketing. In one of the first studies addressing VR implications for tourism, Williams and Hobson (1995) anticipated its revolutionary effects on the promotion and selling of tourism products. Over the last two decades, several studies highlighted the benefits of VR for promoting tourism products, services and places (Berger et al., 2007; Chen & Lin, 2012; Guttentag, 2010; Huang et al., 2013, 2016; Wan, Tsaur, Chiu, & Chiou, 2007; Williams, 2006). VR can support destination marketers in the creation of memorable experiences to be integrated into their communication strategies and in assisting tourists' information-search and decision-making (Cho et al., 2002; Griffin et al., 2017; Huang et al., 2016; Jung et al., 2017; Tussyadiah & Wang, 2017; Williams, 2006). According to Cho et al. (2002), the usefulness of virtual tour experiences for destination marketing lies in the ability of potential visitors to evaluate the value of the actual experience more accurately. More specifically, they report on the effects of these tools on tourism marketing in the following areas: search ability of experiential attributes, efficiency of visual information search, destination image, confidence of expectation and satisfaction with actual travel experience.

Huang et al. (2013) highlighted numerous potential benefits of virtual worlds. Virtual worlds have been defined as 'persistent virtual environments in which people experience others as being there with them and where they can interact with them' (Schroeder, 2008, p. 2). As clarified by Schroeder (2008, p. 2), the difference between virtual reality or virtual environments and virtual worlds is that the latter refers to persistent online social spaces. In particular, virtual worlds are 'ongoing virtual environments that people experience over time and that have large populations, which individuals share with others as a world for social interaction'. Huang et al. (2013) study focused specifically on the advantages of the virtual world Second Life for tourism marketing, including the potential to provide information and entertainment to users through a virtual environment along with engaging experiences and a platform for global interaction. To achieve these advantages, many destinations invested in virtual worlds as an innovative platform for promotion, communication and attracting potential visitors (Huang et al., 2012).

Studies on VR have also emphasized its potential for promoting cultural heritage and arts from a tourism perspective (Chen, Pan, & Zhang, 2012; Jung et al., 2016; Jung et al., 2017; Pantano & Corvello, 2014; Pantano & Servidio, 2011; Pantano, 2011). As noted by Pantano and Corvello (2014), new virtual tools improve the combination of entertainment and education and offer interactive, enjoyable environments that support tourists in choosing destinations and tourism operators in attracting larger tourism flows. Moreover, VR is particularly

suitable for enhancing the delivery of content and engaging experiences for those cultural heritage sites that can be difficult to access by visitors and/or threatened by public access (Guttentag, 2010; Jung et al., 2016; Jung & tom Dieck, 2017).

In particular, unlike AR, where digital content is superimposed into users' real environment, VR experiences are characterized by the capacity to provide physical immersion and psychological presence of users in a virtual environment (Gutiérrez, Vexo, & Thalmann, 2008). Specifically, VR is referred to as the 'use of a computer-generated 3D environment that one can navigate and possibly interact with, resulting in real-time simulation of one or more of the user's five senses' (Guttentag, 2010, p. 638). Virtual environments are displayed to users through visual output devices, from the simplest computer or television screens to more advanced HMDs, which may come in the form of a helmet, goggles, or glasses, and display virtual imagery just in front of the user's eyes. In this regard, the visual element of VR environments is crucial and 3D images must be high quality to ensure positive virtual experiences (Guttentag, 2010). 3D images with correct textures, shadows, transparencies and lights can make the destination and site more attractive to visit and improve the overall tourism experiences in the pre-visit phase.

The development of advanced and high-performing VR wearable devices is likely to positively influence the use of this technology for enhancing the overall tourist experiences, including the pre-visit stage where awareness, interest and anticipation develop in the tourists' mind (Neuhofer et al., 2012, 2015). HMDs, such as Oculus Rift and Samsung Gear, represent cutting-edge tools for creating highly immersive and interactive experiences with unprecedented opportunities for the marketing of destinations. These stereoscopic 3D displays mounted on people's heads create realistic virtual environments exploiting both 3D graphics and 3D imaging. Through HMDs, tourists can be fully immersed inside a virtual environment, freely moving inside rooms or sites and possibly interacting with them (Fineschi & Pozzebon, 2015). Given their potential, these tools can be increasingly utilized by cultural and historical sites and attractions, including museums (Fineschi & Pozzebon, 2015; Leue et al., 2015; Webel, Olbrich, Franke, & Keil, 2013).

2.2. VR influence on destination visit intentions

Building on the increasing use of VR or VR-type related technologies (e.g. virtual tours) in travel and tourism, previous studies investigated tourists' acceptance of VR (Chung et al., 2015; Disztinger, Schögl, & Groth, 2017; Jung et al., 2015; Pantano & Corvello, 2014) and its influence on behavioral intentions in different tourism settings (Chen & Lin, 2012; Huang et al., 2012, 2013, 2016; Jung et al., 2016; Pantano & Corvello, 2014). Many of these studies apply the experiential marketing view (Schmitt, 1999; Williams, 2006) in order to assess the value and critical factors of VR applications for the marketing of sites and attractions and its impact on behavioral intentions. Chen and Lin (2012) provided evidence of the performance of a 3D tour itinerary promotion, even though without interaction and navigation this tool is not really VR. Their study set up a foundation for a relationship model of experience marketing, customer satisfaction and behavioral intentions after viewing a 3D tour itinerary promotion. Particularly, this study revealed the positive impact of five major dimensions of experience marketing (sense, feel, think, act, and related experience), with the feel experience and the think experience as key dimensions for raising the quality and effectiveness of the 3D tour itinerary promotion.

Hyun and O'Keefe (2012) produced a model of virtual destination image formation, based on the concept of telepresence. They defined virtual destination image as 'a virtual overall or total impression that is formed as a result of the interaction between virtual cognitive and affective components that individuals hold in a mediated environment by

experiencing the level of telepresence determined by information typology' (p. 30). Their study built on the fundamental three-construct model of destination image formation (Baloglu & McCleary, 1999; Gartner, 1993), suggesting that both cognitive or perceptual images (cognition) and affective or emotional images (affect) directly influence conation - the intention to act based upon the image (i.e. the intention to positively engage with the destination). In their study, telepresence (i.e. the feeling of being there) arose from the use of web-mediated virtual information on the destination, including 3D virtual tours, and was found to have a positive influence on virtual cognitive image. Moreover, the virtual cognitive image influenced the formation of the virtual affective image, which in turn affected the intentions of users.

Huang et al. (2012) examined the influence of virtual experiences in Second Life on people's destination choice by investigating the constructs of flow and involvement. Their results demonstrated that the achievement of flow experiences in a 3D virtual world motivates the acquisition of more information and the intention to visit the real-world destination. The authors found that the quality of engagement and pleasant virtual experiences are influenced by customers' skills, their perception of interactivity, and presence in the virtual world. Further, their results showed that flow experience mediated the relationship between involvement and behavioral intentions. In a subsequent study, Huang et al. (2013) used the Technology Acceptance Model (TAM) and Hedonic Theory to identify relevant factors that motivate people to engage in a virtual tourism site and to develop interest about future travels. Their study revealed that perceived ease of use and perceived usefulness have a direct and positive relationship with behavioral intentions. Moreover, their study indicated that the hedonic experience of positive emotions, emotional involvement, and flow have a positive and significant influence on behavioral intentions. This is in line with previous research highlighting the importance of emotional experiences as influencers of tourist motivation in the pre-visit stage (Prayag, Hosany, & Odeh, 2013) and as a key factor for successful film-induced tourism experiences as a vehicle for destination marketing (Gursoy, Chen, & Chi, 2014; Hahm & Wang, 2011; Kim, 2012; Shao, Li, Morrison, & Wu, 2016).

With the launch of 'next-generation' VR devices and forecasts of rapid progression in their adoption for consumer use worldwide (Gartner, Inc, 2016), increasing attention has been recently devoted to their acceptance (Disztinger et al., 2017; Gibson & O'Rawe, 2018), their use by tourists (Rincon, Tommasini, Rainoldi, & Egger, 2017; Tussyadiah, 2014) and their impact on tourists' behavioral intentions. In particular, the influence of VR experiences with HMDs on the decision to visit a destination is a growing issue of interest, given the considerable marketing opportunities available from offering potential visitors a 'try-before-you-buy' experience of the destination (Graham, 2016).

Jung et al. (2016) examined the effects of mixed environments, combining both AR and VR with wearable devices on visitor experiences in museums and revisit intentions. Their results revealed that social presence is a strong predictor of experience with regard to the four realms as defined by Pine and Gilmore (1998), namely education, esthetics, entertainment, and escape. Furthermore, their work revealed that, except for esthetic experience, all of the experience dimensions have a significant influence on visitor experience, which consequently induced tourists' intentions to revisit the attraction. Tussyadiah et al. (2017) investigated VR experiences involving virtual walkthroughs of actual tourism destinations using VR devices and their impact on attitudes towards tourism destinations. Their study contributed to a better understanding of spatial presence, its determinants, and its consequences on user attitudes in experiences involving depictions of real tourism destinations. Importantly, they found that a higher sense of spatial presence led to stronger interest and liking towards the destinations.

Jung et al. (2017) qualitatively explored tourists' experience of VR 360-degree content filmed with a drone, using the Lake District National Park as a case study. Their findings reveal the potential of using VR in order to engage tourists and enhance their behavioral intentions to visit destinations. Moura, Nobis, and Filho (2017) compared the influence of different communication media (VR, websites and brochures) on German senior travelers' behavioral intentions and perceptions towards a four-star hotel. They found that VR led significantly to a higher travel intention in comparison to the other two media. Griffin et al. (2017) compared the impacts of destination promotional material viewed in VR using the HMD Oculus Rift with other forms of visual promotions (2D video and websites). Based on their results, VR seems to positively influence the affective element of destination image in comparison with the other visual tools. Their study found VR to be a more engaging form of advertisement that helps people generate more positive emotions towards the destination. Moreover, VR appeared to offer potential in terms of conative destination image (e.g. seek further information, suggest to others and share information on the advertisement with others). The authors called for additional research to further understand the implications of VR on destination imagery in relation to tourism marketing.

2.3. Development of research hypotheses and conceptual framework

In order to advance the conceptualization of the role of 'next-generation' VR experiences with HMDs in the promotion of tourism destinations, this study relied on experiential marketing as a theoretical foundation and investigated the VR experience with HMDs involving virtual depictions of a real cultural heritage site in a destination. Since these new wearable devices are not yet largely examined in the tourism context, there is limited empirical evidence identifying the factors that influence the intentions of users to visit the actual destination. Therefore, critical determinants of behavioral intentions that are particularly relevant for this type of technology were identified from previous studies on VR-based marketing of tourism destinations. The identification of relevant factors was based on the key innovative features of these devices, namely their capability to create very realistic visual environments and to increase the users' feeling of being immersed in the virtual environment (Disztinger et al., 2017; Fineschi & Pozzebon, 2015; Webel et al., 2013), which includes their emotional involvement (Tan, Leong, Shen, Dubravs, & Si, 2015). For these characteristics, emerging VR devices are likely to produce relevant effects on the formation of the virtual image of the destination featured, both on its cognitive and affective components. On that basis, this study identified the perceived visual appeal (PVA) of VR experiences with HMDs and the emotional involvement (EI) of users as two key potential influencers of tourists' behavioral intentions. These are related to their intentions to visit/revisit the destination and to their willingness to recommend the destination to others (Eusebio & Vieira, 2013; Kim & Brown, 2012).

Visual appeal refers to the exhibition of fonts and other visual elements such as graphics, which enhance the overall presentation of the information system (Liu, Li, & Hu, 2013). It is an important factor of system quality in technology-mediated tourism experiences (Guttentag, 2010; Jung et al., 2015). The construct of PVA was introduced in human-computer interaction studies in relation to the user's perception of the esthetic aspect of the IT interface. PVA refers to the degree to which a user thinks that the interface is esthetically pleasing (Chung et al., 2015; Van der Heijden, 2003).

Tourism studies have demonstrated that esthetic attractiveness is a key component of the overall tourism experience (Mehmetoglu & Engen, 2011; Oh et al., 2007). Visual image appeal in the tourism destination context has been defined by 'the interest that a picture generates when viewed by potential visitors and inspires them to visit the destination whether they are first-time visitors or repeat visitors' (Ye & Tussyadiah, 2011, p. 132). Recently, the study by Chung et al.

(2015) has verified that a visually appealing AR application enhances perceived usefulness and perceived ease of use of the technology, which, in turn, has a positive effect on user's intention to visit a destination. Tussyadiah, Wang, and Jia (2016) investigated the persuasive power of VR imagery in destination marketing, stressing the importance of providing esthetically pleasing imagery to support positive destination images in the mind of potential tourists. Based on previous research, we expect that a visually appealing virtual experience of a tourist site with HMDs can encourage users to visit the real-world actual site. Hence, the following hypothesis is proposed:

H1. Perceived visual appeal of the VR experience enabled by HMDs has a positive effect on behavioral intentions to visit the tourist site.

Next-generation VR devices, HMDs in particular, allow the users to be completely immersed in the 3D experience, involving them at an emotional level. Holsapple and Wu (2007) define emotional involvement as the degree to which an individual is emotionally engaged in a behavior. This element has acquired increasing importance in studies on technology, as the imaginative and emotional components of the virtual world may influence the user experience and his/her level of satisfaction. In particular, previous studies on the emotional involvement of technology investigated the positive role of emotional involvement of users in influencing their behavioral intentions (Koufaris, 2002; Pohlmeyer & Blessing, 2011; Saeed, Yang, & Sinnappan, 2009). Emotional involvement has also been studied in tourism with regard to destination visit intention (Huang et al., 2013). Therefore, emotional involvement is likely to positively affect the behavioral intention to visit a tourist site. This leads to the following hypothesis:

H2. Emotional involvement of the user experiencing VR enabled by HMD has a positive effect on behavioral intentions to visit the tourist site.

Given the increasing interest in customers' emotions and in the experiential aspects of technology-mediated consumption (Bagozzi, Gopinath, & Prashanth, 1999; Carù & Cova, 2007; Schmitt, 1999), the influence of different quality aspects of technology on customer emotions has received attention by studies in the field of human-computer interaction. A study on the use of photo cameras by Pohlmeyer and Blessing (2011) showed that high quality standards for technology might be considered a prerequisite of emotional involvement. According to the authors, the pleasure of using technology depends on the combination of both functional and experiential attributes; users are satisfied with technology due to its high quality and intuitive interface as well as with a pleasurable experience and emotional involvement.

With regard to VR, the visual element can boost the emotionally immersive effect of VR, since the quality of 3D images can affect the feelings of presence of the users in the virtual environment (Gutiérrez et al., 2008; Guttentag, 2010). Wu, Weng, and Xue (2016) investigated the relationship between the visual, auditory and tactile stimuli in virtual reality systems and the emotion induced in users. They found that the influence of visual stimulation on emotion is stronger than that of the auditory and tactile aspects. The study by Hyun and O'Keefe (2012) on virtual destination image found that the virtual cognitive or perceptual image influences the formation of the virtual emotional image. Moreover, Reiners et al. (2014) stressed that with the introduction of next-generation HMDs, like the Oculus Rift, more immersive and authentic virtual environments can be created that stimulate real-world emotional states and feelings. Based on these previous studies, we expect that perceived visual appeal is able to positively affect the emotional involvement of users. Hence, the following hypothesis is proposed:

H3. Perceived visual appeal of the VR experience enabled by HMD has a positive effect on the emotional involvement of the user.

Fig. 1 illustrates the theoretical model developed based on the three research hypotheses derived from the literature review.
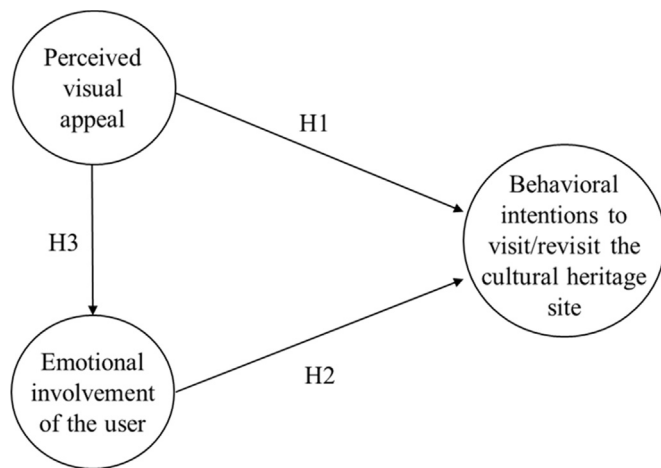
Fig. 1. Proposed theoretical model.

3. Methodology

3.1. Study setting

The study was conducted during the pilot test of an immersive VR experience that was created for the promotion of the tourist site Fontanelle Cemetery (Fig. 2a) in the city of Naples, a tourism destination in Southern Italy. This site is an ossuary located in a cave that has gathered thousands of skulls since the 16th century. It was restored as a cultural heritage site and can be visited for free. For the purpose of developing an innovative marketing tool to increase the attractiveness of the city as a cultural tourism destination, a 'cinematic' virtual experience of the site was created with Oculus Rift. This HMD with motion tracking and 3D virtual reality capabilities allows for stereoscopic visualization according to the user's head movements (www.oculus. com). Primarily designed for gaming, this VR system has shown potential in almost any immersive application. Particularly, Oculus Rift utilizes VR technology to create a film experience unlike any other, which completely immerses the viewer in the interactive films (Oliver, 2015).

To promote the Fontanelle Cemetery, a compelling and innovative experience was developed using the latest VR technology and Oculus Rift through a collaborative effort from various disciplines and research partners. The cinematic virtual experience was designed for the purpose of creating awareness and interest about the Fontanelle Cemetery and stimulating potential visitors to visit the real site. The VR experience depicts the site through a short 3D movie lasting about 4 min, which was filmed at the Fontanelle Cemetery with real actors (Fig. 2b) moving inside the site and telling its story based on a storyboard. Potential visitors could try the cinematic virtual experience of the Fontanelle Cemetery wearing the HMD in a dedicated cabin located at a metro station near the historic center of the city (Fig. 2c). Users wearing the VR device were virtually immersed in the site and could explore it from the cabin while seeing and hearing real actors telling its story.

3.2. Measurements

The research hypotheses were measured through a questionnaire with items measured on a five-point Likert scale. The scales ranged from 'strongly disagree' (1) to 'strongly agree' (5), and were a combination of existing scales adapted from current technology and tourism literature and focused on virtual reality experiences enabled by wearable device systems for promoting cultural tourism destinations. Items from Chung et al. (2015) were adapted to measure PVA. These items were selected because they reflect a typology of virtual reality that represents an immersive, 3D experience and measure PVA from a broad

Fig. 2. a Snapshot of Fontanelle Cemetery (Cimitero delle Fontanelle) site. b Snapshot of the 3D movie filming at Fontanelle Cemetery site. c Participant wearing VR HMD in the cabin (VR contents visible from the screen).

perspective rather than focusing on a specific design elements and details. The items for EI were derived from Huang et al. (2013). The construct developed by Huang et al. (2013) was adapted, in turn, from the study by Saade and Kira (2006) on the emotional state of technology acceptance. In particular, its measurement focused on emotional responses to engaging in a behavior within virtual worlds. Finally, the items used to represent behavioral intentions were adapted from Huang et al. (2013) and Chung et al. (2015). Two items are related to the definition of behavioral intentions in tourism as the intention to visit or return to a site and the willingness to spread a positive word of mouth

about the site. The third item is related to the intention to find out more information about the featured site, and reflects the potential for cinematic virtual experience created with the Oculus Rift to serve as a marketing tool able to stimulate the user's decision-making process in the pre-visit phase of the visitors' journey. The survey also contained demographic items including gender, nationality, age, education, and occupation in order to develop a profile of the participants.

3.3. Data collection

The data were collected in December 2015 at the metro station in the city of Naples where the cabin for the VR experience was located. This study employed a random sampling method. Shenton (2004) suggests that this method has the advantage of representing the opinion of a general population instead of a selected sample (as cited in Jung et al., 2015) and it has already been used in prior studies on the use of emerging technologies by visitors and tourists (Jung et al., 2015; Lee, Chung, & Jung, 2015). For the purpose of this study, an intercept survey was used. Individuals who passed through the metro station were approached, informed about the research aims and invited to try the VR experience with Oculus Rift created for the promotion of the Fontanelle Cemetery. If they agreed, participants were guided to the cabin and instructed to wear the HMD with the assistance of qualified personnel. After the VR experience, participants were invited to complete a structured questionnaire. The questionnaire was administered by a trained and qualified researcher to 450 randomly selected individuals, including both residents and non-residents of Naples. The questionnaire was pre-tested by a group of field researchers. During the data refinement process, 17 questionnaires were eliminated due to partial or inconsistent responses. Finally, 433 questionnaires were coded for analysis.

3.4. Data analysis

Preliminary data cleaning and analysis was conducted in SPSS v23.0. Confirmatory factor analysis (CFA) was used to verify the relationships between the survey items and theoretical constructs of the model, while structural equation modeling (SEM) was used to test the study's hypotheses. Both analyses were conducted in Mplus 7.31 and employed maximum likelihood estimation. Several indices were used to assess the fit of both the CFA and SEM models. They were the chi-square (χ^2) statistic, the root mean square error of approximation (RMSEA) and corresponding 90% confidence limits, the standardized root mean square residual (SRMR), the Tucker-Lewis Index (TLI) and the comparative fit index (CFI), using the benchmarks outlined by Hair, Black, Babin, and Anderson (2010) and O'Rourke and Hatcher (2013). Based on the CFA and prior to analyzing the hypothesized model, construct validity was established via the procedures suggested by Hair et al. (2010).

4. Results

4.1. Respondents' profile

Table 1 provides the demographic profile of the sample. The sample was almost evenly split between male (50.7%) and female (49.3%). The average age of respondents was 38 (SD = 13.46) and the median age was 36. The vast majority of respondents were Italian (97.9%) and just over half resided in Naples (55.4%). Among the remaining 44.6% of Italian participants, over 50 different provinces and cities were reported as the primary residence. The majority of the sample (62.6%) were first-time visitors to the Fontanelle Cemetery, regardless of whether they were Naples residents (56.7%) or tourists (69.9%). Most respondents either had a bachelor's degree (41.6%) or completed secondary education (34.2%). In terms of employment, the majority reported being an employee (32.8%), a student (21.2%), or unemployed (21.2%).

Table 1
Respondents profile.

		n	Percentage
Gender			
	Male	217	50.7
	Female	211	49.3
Nationality			
	Italian	424	97.9
	Foreign	9	2.1
Education			
	Primary	25	5.8
	Secondary	148	34.2
	Bachelor's degree	180	41.6
	Post-Graduate	80	18.5
Occupation			
	Student	92	21.2
	Employee	142	32.8
	Entrepreneur/Professional	56	12.9
	Self-employed	10	2.3
	Homemaker	18	4.2
	Retired	23	5.3
	Unemployed	92	21.2
	Mean (SD)	**Median**	**Range**
Age	37.9 (13.46)	36.0	18.0 – 78.0

Table 2
Zero-order correlations, means, and standard deviations for study variables.

	M	**SD**	**PVA1**	**PVA2**	**EI1**	**EI2**	**BI1**	**BI2**	**BI3**
PVA1	4.56	0.629	–						
PVA2	4.60	0.631	0.547[*]	–					
EI1	4.55	0.644	0.465[*]	0.550[*]	–				
EI2	4.48	0.701	0.431[*]	0.468[*]	0.561[*]	–			
BI1	4.40	0.733	0.352[*]	0.370[*]	0.377[*]	0.263[*]	–		
BI2	4.53	0.642	0.301[*]	0.400[*]	0.375[*]	0.313[*]	0.684[*]	–	
BI3	4.34	0.726	0.387[*]	0.380[*]	0.336[*]	0.352[*]	0.545[*]	0.554[*]	–

[*] Correlations are significant at p < 0.01.

4.2. The measurement model

Table 2 reports the means, standard deviations, and zero-order correlations for the study variables. According to CFA results, the measurement model provided a good fit to the data (χ^2 = 28.505 [df = 11, p < 0.01], RMSEA = 0.061, 0.034 ≤ RMSEA CI$_{90}$ ≤ 0.088, SRMR = 0.028, TLI = 0.971, CFI = 0.985). The RMSEA was below the generally accepted cutoff value of 0.08 and the corresponding range of the 90% confidence limits was also acceptable; the lower bound fell below 0.05, which suggests a close fit to the data, and the upper bound fell below 0.90, which is considered adequate (Hoyle, 2012; Kline, 2011; O'Rourke & Hatcher, 2013). The SRMR was below the ideal cutoff value of 0.06 and the CFI and TLI both exceeded the ideal threshold of 0.94 (Hair et al., 2010; O'Rourke & Hatcher, 2013). Further, all standardized loadings were statistically significant (p < 0.001) and exceeded 0.60 (O'Rourke & Hatcher, 2013). Reliability scores were examined using Cronbach's alpha to ensure the appropriateness of the research instrument. The Cronbach's alpha for the PVA items was 0.707 and the measure for the EI items had an alpha value of 0.717. The Cronbach's alpha for the behavioral intentions (BI) measure was acceptable at 0.811.

Construct validity of the measurement model was established by assessing convergent and discriminant validity (Hair et al., 2010). Table 3 provides the standardized factor loadings, average variance extracted (AVE), and construct reliabilities. Convergent validity was supported by both the AVEs and the construct reliabilities of each factor; all AVE values were in excess of 0.50 (0.634–0.676), while all construct reliabilities were in excess of 0.70 (0.710–0.823). Discriminant validity is evident when the AVE estimates for each factor are

Table 3
Convergent validity estimates for the measurement model.

Items	Std. loading	AVE	Cronbach's α	Construct reliability
Perceived visual appeal		0.634	0.707	0.710
PVA1. The Cimitero delle Fontanelle as seen through the cinematic experience is quite attractive	0.691[**]			
PVA2. The cinematic experience with the Oculus provided a way to easily experience the Cimitero delle Fontanelle	0.791[**]			
Emotional involvement		0.673	0.717	0.723
EI1. I felt carried off by the virtual environment	0.805[**]			
EI2. I felt as if I am part of the virtual environment	0.697[**]			
Behavioral intentions		0.676	0.811	0.820
BI1. After the cinematic experience I will visit or visit again the Cimitero delle Fontanelle	0.814[**]			
BI2. After the cinematic experience I will recommend the Cimitero delle Fontanelle to others	0.826[**]			
BI3. After the cinematic experience I intend to find out more information about Cimitero delle Fontanelle	0.684[**]			

[**] Standardized loadings are significant at $p < 0.001$.

greater than the corresponding inter-construct squared correlations. Discriminant validity for this model was largely supported, as the AVE values for PVA and BI were both greater than their respective squared correlation ($\rho = 0.615$), as were the AVE values for EI and BI when compared to their respective squared correlation ($\rho = 0.567$). However, the AVE values for PVA and EI were slightly lower than the squared correlation between the two constructs ($\rho = 0.858$). Then again, the AVE approach is conservative approach; discriminant validity is also evident when the model is congeneric, meaning that none of the individual measurement items or error terms cross-loaded onto multiple constructs (Hair et al., 2010). The CFA process confirmed that this study's measurement model was congeneric, thus providing further support for discriminant validity for all constructs. Having confirmed the fit and construct validity of the measurement model, the theoretical model was tested using structural equation modeling.

4.3. The structural model

Results from the hypothesis testing of the structural model are presented in Fig. 3. Overall, the fit indices were in the adequate-to-ideal range ($\chi^2 = 28.505$ [df = 11, $p < 0.01$], RMSEA = 0.061, $0.034 \leq$ RMSEA CI$_{90}$ ≤ 0.088, SRMR = 0.028, TLI = 0.971, CFI = 0.985), meaning that the model fit well and required no modification. Hypotheses 1 and 2 stated that PVA and EI would, respectively, have positive effects on BI of users to visit the cultural heritage site. The results indicated that PVA had a statistically significant positive influence on BI ($\gamma1 = 0.485$, $p < 0.01$), whereas the relationship between EI and BI was not significant ($\gamma2 = 0.151$, $p = 0.389$). Thus, H1 was supported while H2 was not supported. The R^2 value indicated that PVA accounted for 38.4% of the variance in BI. Hypothesis 3 stated that PVA

would have a positive effect on the EI of the user. This hypothesis was supported ($\gamma3 = 0.858$, $p < 0.001$), and the R^2 value suggests that 73.6% of the variance in PVA was accounted for by EI.

5. Discussion and conclusions

The rapid progress in information and communication technologies has offered tourism destination organizations new tools to attract and retain visitors. In particular, the introduction of cutting-edge wearable devices provides significant opportunities for boosting the potential of VR systems in generating awareness, interest and appeal in the destination they feature. This study focused on 'next-generation' VR experiences with HMDs and their influence on visit intentions. Particularly, our purpose was to investigate whether the PVA of VR experiences with HMDs and the user's EI had positive impacts on the behavioral intentions to visit a cultural tourism site at the destination. Based on the study results and subsequent discussion, several conclusions are offered and theoretical and practical implications are provided below.

Study results revealed that the PVA of the VR experience had a positive and significant impact on behavioral intentions of users. In particular, this result indicates that the Fontanelle Cemetery, as seen through the virtual experience enabled by the HMD, was attractive enough that users were motivated to visit, recommend, and find out more information about the actual site. Furthermore, users recognized the cinematic experience with the Oculus Rift as a way to easily experience the Fontanelle Cemetery in a virtual environment, encouraging them to make a real visit. This result is consistent with previous research indicating the importance of the visual aspect of VR experiences (Guttentag, 2010) and its role in influencing destination visit intention (Chung et al., 2015; Tussyadiah et al., 2016). This study result also offers new insights into the relationship between PVA and behavioral intentions to visit the site. In particular, this study builds on the research by Chung et al. (2015) in the area of information technology, which demonstrated a positive effect of visual appeal on destination visit intentions through the technology perception variables of perceived ease of use and perceived usefulness. The results of the present study add to this previous research by demonstrating the direct positive relationship between PVA and behavioral intentions.

An interesting result concerns the role of EI in influencing the potential visitors' behavioral intentions towards the actual site of Fontanelle Cemetery. In contrast with our hypothesis and with the results of previous studies (Huang et al., 2013), the emotional involvement of the user experiencing VR enabled by HMD did not have a significant positive effect on behavioral intentions. Particularly, the capability of the VR system to make users feeling completely immersed and carried off by the virtual environment appears to be insufficient to engage them as potential visitors. A possible reason is that EI may indirectly affect behavioral intentions through other variables. Moreover, this result may be related to the specific tourism site featured by the
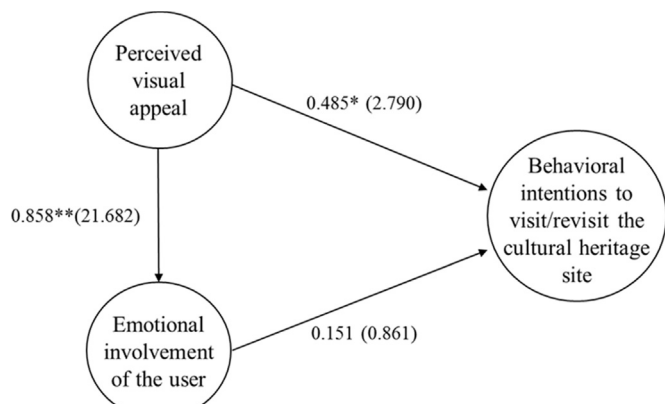
Notes: Figures in parentheses are t-values; figures outside parentheses are standardized path coefficients;
* $p < 0.01$; ** $p < 0.001$
R^2 for Behavioral Intention = 0.384
R^2 for Emotional Involvement = 0.736

Fig. 3. Results for the structural model.

virtual reality experience. As an ossuary, the Fontanelle Cemetery is unique in terms of the visit experience, as it provides an encounter with possibly disturbing elements (i.e. skulls and bones). Therefore, this site could be experienced differently depending on the typology of tourists/visitors. In other words, it could be meaningful for visitors who have an intimate emotional involvement with dark tourism events/sites (Cohen, 2011), but not for the most common typologies of cultural tourists, including those identified by McKercher and Du Cros (2003), such as serendipitous, incidental, casual, and sightseeing tourists.

Finally, the non-significant result could be related to the eventual replacement effect of a real visit by virtual reality. Since its initial application to travel and tourism in 1990s, a debate has been developing about VR technology as a tourism substitute (Cheong, 1995; Guttentag, 2010; Moura et al., 2017). As Cheong (1995) observes, 'with its ability to recreate the essence of any tourist destination, the perceived threat of VR becoming a substitute for travel is not unfounded and should not be ignored' (p. 420). This debate is still open, with convincing arguments supporting the replacement potential as well as the opposing position. Interestingly, recent applications of the latest VR technologies propose new ways of interpreting the concept of travelling, allowing a fast and cheap virtual world travel experience, as in the case of WoBo (World in a Box) (Fibbi, Spano, Sorrentino, & Scateni, 2015). WoBo provides a new experience for travelers, allowing them to visit distant or difficult-to-reach places simply by wearing a HMD. The experience consists of watching a 360-degree video with 3D audio in a dedicated cabin. The user can select videos filmed in different places and create an immersive and realistic virtual journey with the Oculus Rift display. In a similar way, the cinematic virtual experience analyzed in the present study can provide users with a seamless experience of real tourist sites by creating an immersive and realistic visualization of the site. The possibility for such an experience to become a potential substitute of the actual visit cannot be ignored. In this regard, a lack of significant findings about the relationship between EI and behavioral intentions could be a cue for investigating a potential substitution effect by this type of VR experience. High emotional involvement in the virtual experience could reduce, rather than induce, a desire for visiting the real site.

Another interesting result related to emotional involvement indicates the positive influence of PVA on EI of users. This suggests that if virtual visitors perceive the virtual experience as visually attractive, they then become emotionally involved during their virtual experience. This result is consistent with previous studies on the important role of technology's visual appeal in influencing the user's emotional involvement (Pohlmeyer & Blessing, 2011; Wu et al., 2016). This study result also offers new insights in relation to this effect, which has not yet been investigated in the literature on information technology and tourism.

5.1. Theoretical implications

This study offers specific theoretical implications. From a theoretical perspective, it empirically illustrates the potential of the latest VR experiences enabled by wearable devices as effective destination marketing tools. While these advanced devices are expected to have a revolutionary influence on tourism experiences (Tussyadiah, 2014), empirical studies have not yet sufficiently researched how immersive and realistic virtual experiences with HMDs affect behavioral intentions of visitors and tourists. Moreover, studies on visitors using wearable devices in the context of cultural tourism attraction are still scarce (tom Dieck et al., 2016). This study contributes by advancing a conceptualization of the role of VR experiences enabled by wearable devices in influencing behavioral intentions through the lens of experiential marketing. From this theoretical basis, this study introduces PVA and EI as two key experiential factors that can potentially influence behavioral intentions. Based on previous research on VR in tourism and destination marketing, it was posited that next-generation VR technologies are likely to significantly affect both the perceptual and emotional aspects of the virtual experience of the destination, thereby

influencing users' visit intentions. In this study, the impact of these two experiential factors was investigated in relation to a VR experience of an actual tourism site. As noted by Tussyadiah et al. (2017), VR studies in the tourism context have mainly dealt with experiences in 'simulated virtual worlds where resemblances to real places are coincidental (e.g. virtual seminar room, 3D tourism attractions)'. In this regard, they highlighted that, from a theoretical point of view, researching VR experiences with actual tourism destinations (i.e. virtual depictions of real environments where possible actions resemble actual consumption) provides a better conceptualization of the role of the VR experience in shaping attitudes toward visitation. The current study results provide evidence of the importance of the visual attractiveness of VR experiences with HMDs as a positive influencer of the users' intention to visit the featured site as well as of their emotional involvement in the virtual experience. While theoretically interrelated by a fundamental model of (virtual) destination image formation (Hyun & O'Keefe, 2012), PVA and EI have often been investigated separately in relation to their impact on destination visit intention (Chung et al., 2015; Huang et al., 2013). The present study highlights that there is a significant relationship between them and they should be considered together when addressing VR technology influences on tourists and visitors' behavioral intentions. In this way, the present study provides a theoretical contribution combining previous findings on VR in tourism from the streams of experiential marketing and destination image formation.

5.2. Managerial implications

From a managerial point of view, this research is particularly useful for DMOs to define their marketing strategies starting from the pre-visit phase of the experience process. DMOs are currently facing the strategic challenge to exploit the potential of new technologies in attracting a wider market and invest in specialized smart devices (Tussyadiah, 2015). Given the emerging nature of these advanced technologies and their recent application to tourism, it is important for destination managers to predict whether the use of virtual reality experiences enabled by HMDs as a promotion and communication tool encourages potential tourists to visit the actual sites. The results of this study provide evidence that this type of experience can serve as an effective marketing vehicle for influencing users' behavioral intentions to visit. The study results also show that destination managers should place particular importance on the visual aspect of the virtual experience, since this positively influences both the emotional involvement of users and their intentions to visit the real site and to spread positive word of mouth.

5.3. Limitations and future research directions

The results of this study are subject to several limitations. First, the study considers only a single virtual tourism site and thus results cannot be generalized. The influence of PVA and EI on destination visit intentions should be investigated in a broader and varied number of real and virtual tourism sites. Second, the nature of this study entailed a purposive sample of people involved in the pilot testing of an innovative virtual experience with the Oculus Rift. Their willingness to test the VR system could, to some extent, produce a bias in our sample. The average age of users in the study sample was 37.9. Together with other personal factors (e.g. time of use of technology devices, innovativeness), this could have influenced their readiness and attitudes towards the experience with the VR devices (Chung et al., 2015). In this regard, future research should investigate potential effects on destination visit intentions induced by different levels of readiness and attitudes of users towards these technologies.

Moreover, another limitation of this study concerns the composition of the sample, which is mostly comprised of Italian people. The need to consider a more varied sample in relation to nationality and different cultures of potential visitors should also be taken into account by future

research. Additionally, given the exploratory nature of this study, the emerging nature of wearable devices, and the limited number of previous studies on their role as marketing tool for tourism sites, we considered only two determinants of behavioral intentions. Future research should explore the influence of emotional involvement of virtual visitors on behavioral intentions. In this regard, attention should be directed toward the identification of the mediating effect of other experiential variables on destination visit intentions, including, for example, enjoyment and flow. Likewise, further efforts should investigate the possibility and implications of the dual role of cutting-edge VR experiences, both as a vehicle for actual destination visit experiences and as a replacement for a real visit by potential tourists. The potential role of multi-sensory elements (vision, sound, haptic, smell and taste) should be considered, given their effect on the sense of presence and of realism for virtual users (Martins et al., 2017).

Finally, a further limitation of the study concerns accessibility for tourists and the differences in system/technical requirements for using VR HMDs with mobile devices versus VR headsets with personal computers. The VR experience reported in the present study was provided to potential visitors through a VR device connected to a workstation. For this reason, it might be available only in limited places (e.g. metro station near historic center of the city) and users would not be able to experience it while walking throughout the destination. This issue deserves further attention, given the practical implications in devising VR strategies for marketing tourism sites and attractions.

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