Place Attachment Through Virtual Reality: A Comparative Study in Douro Region (Northern Portugal) with Video and 'Real' Visit

Nieves Losada, Filipa Jorge, Mário Sérgio Teixeira, Nuno Sousa, Miguel Melo, and Maximino Bessa

Abstract Immersive technologies, such as virtual reality, could be effective marketing tools for destination marketing, namely in creating place attachment prior experience the destination. Place attachment plays a significant role in behavioural intentions to visit and to recommend a destination. However, place attachment research is relatively new in the tourism context. This study seeks to empirically examine the effectiveness of Virtual Reality in creating place attachment to destinations exploring the changes in the place attachment after two moments. First, after watching a video and after having an experience in the Virtual Reality environment. Second, after the experience in the Virtual Reality environment and after the 'real' visit to a representative viewpoint in Douro region. Students belonging to Gen Z were sampled. Findings reflect that Virtual Reality has potentialities for marketing destinations.

Keywords Virtual reality · Place attachment · Douro region

1 Introduction

Immersive technologies, i.e. Virtual Reality, could impact the tourism industry in the coming years if people were readably able to experience locations and attractions from their own homes and from anywhere in the world [1, 2]. Furthermore, from

N. Losada (✉) · M. S. Teixeira
University of Trás-os-Montes e Alto Douro (UTAD), Quinta de Prados, 5001-801 Vila Real, Portugal
e-mail: nlosada@utad.pt

CETRAD Research Unit, University of Trás-os-Montes e Alto Douro, (CETRAD), Quinta de Prados, 5000-801 Vila Real, Portugal

F. Jorge · N. Sousa · M. Melo · M. Bessa
Institute for Systems and Computer Engineering, Technology and Science, INESC TEC, Campus da FEUP, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

N. Sousa
Faculdade de Ciências Empresariais e Turismo, Universidade de Vigo, Ourense, Spain

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a marketing perspective, Virtual Reality can enhance visitor experiences, not only at tourism destinations, but also prior to visiting them [3–5]. Also, Virtual Reality technology could act as a complement or substitute of physical journeys or 'real' holidays for some travellers, i.e. for a low-income level or reduced mobility [1, 6].

Virtual Reality adds new scopes to branding and marketing tourism destinations and can be used to complement or even supplant traditional promotional tools such as brochures or video, among others [1, 7, 8]. Research about adoption of Virtual Reality for destination marketing purposes has increased during the last years [9–13]. However, the literature on Virtual Reality applications in tourism is predominantly conceptual [14].

The main fields of interest in Virtual Reality applied to tourism marketing and destination promotion in the last years were destination image [10, 12, 15], and intention to visit/revisit and to recommend a destination [2, 16–23]. Some authors indicated that Virtual Reality can also benefit place attachment in tourism contexts [2, 24, 25]. Place attachment plays a significant role in behavioural intentions to visit and to recommend a destination. However, the potential of Virtual Reality in creating place attachment to destinations has been neglected.

The objective of this study is to deepen in the potential of Virtual Reality to be used as a promotional marketing tool for development place attachment prior to visiting a tourism destination in Gen Z by exploring the changes in place attachment across different moments: after watching a video of the touristic destination site, after a Virtual Reality experience depicting the touristic destination site, and after the visit to a 'real' site, a representative viewpoint in Douro region.

2 Theoretical Framework

Virtual Reality enhances perceived destination image compared with traditional promotional tools, such as video and websites [10, 12, 15]. Moreover, Virtual Reality is considered a powerful marketing tool because it impacts tourists' intention to visit/revisit and to recommend a destination [2, 16–23].

As noted by [26] people develop attachments with environments and places in response to the cognitive and affective components of destination image, and subsequently intention to visit/revisit or recommend the destination [27]. Experiencing a place can result in the formation of emotional connections to a place, and motivate people to return or want to return to that place [25]. However, in spite of its importance for the tourism industry, place attachment is a concept that has been widely explored in psychological, geographical, and recreational fields, but only in recent times in the tourism context [25, 28].

Place attachment has been conceptualized by [29: 275] as "an affective bond or link between people and specific places". It consists of two dimensions: (1) place dependence, which refers to a functional attachment to a place, this is, "how well a setting serves goal achievement given an existing range of alternatives" [30: 234] and (2) place identity, which refers to a symbolic, emotional, or affective attachment to a

place [31]. In the recreational field, destination attachment has been conceptualized as "a relational construct consisting of the cognitive and emotional connection visitors develop toward a destination" [32: 196].

In tourism, place attachment is often measured as the length of stay. Thus is, the greater the amount of time spent in a place, the stronger attachment levels will be developed [28, 33]. Previous studies have demonstrated that people feel attached to places they lived before or visited as a tourism destination. But, others support that people could develop an attachment to places not experienced before [34]. Individuals can develop place attachment to tourism destination prior to visit it stimulated by media or storytelling (in oral, written or visual form), among others [34].

Although place attachment in the tourism context has been explored mainly after the place visit, recent literature suggests that visitors can develop an attachment to a destination before experiencing it physically [33–36].

A study conducted in Xi'an city airport by [35] showed that place attachment (dependence dimension) mediated the relationship between destination image (cognitive dimension) and perceived service quality prior to visiting a destination.

Another study setting in the Swiss Alps and using 'Heidi', a famous literary and television series persona, as a "virtual agent"revealed that place attachment and motivation are keys determinants of intention to visit the destination [34].

One more study dealing with South Korean tourists' perceptions of Vietnam showed that destination image, both cognitive and affective dimensions, was significant in predicting place attachment before travel [33].

Finally, the study of one more author [36] examined pre-trip attachment formation via mobile technology and social media. Results revealed that text and video on a destination's Facebook page influence mental imagery and subsequently attachment to that destination.

Apart from that, it has been pointed out that Virtual Reality can benefit place attachment in tourism contexts [2, 24, 25]. In a recent qualitative study with a small sample, researchers [24] found that virtual reality positively influences place attachment by enhancing spatial cognition and positive feeling about the destination. However, research on place attachment in Virtual Reality remains scarce [18, 24, 25].

Examining the shift in place attachment after the virtual tourism experience and before the 'real' visit, by comparing with video and site visit, will provide more valuable insights about the efficacy of Virtual Reality for destination marketing purposes.

3 Methodology

The study setting considered was São Leonardo de Galafura viewpoint in the Alto Douro Vinhateiro (Alto Douro Wine Region) world heritage site, Fig. 1. Douro region (NUT III) is a rural area and one of the oldest demarcated wine regions in the world (since 1756), where the world-renowned port wine is produced. It occupies an area of 4100 km^2, around 19% of the total landmass of Northern Portugal [37]. The number

Fig. 1 Screenshot of the VR experience developed by the research team illustrating the teleport feature

of visitors in the Douro region has increased during the last years due to Portugal's tourism boom [38].

The Virtual Reality experience was designed to be as close to reality as possible. The research team adopted photogrammetry techniques to recreate a hyper-realist virtual replica of the tourism destination. Participants were allowed to explore the touristic site in the Virtual Reality environment by using real walking within the tracked area (approx. 3.5 m × 3.5 m) or by teleporting using the VIVE remote.

The touristic site allowed to be explored in the Virtual Reality environment was delimited to be coincident with the area that participants could explore in the visit to the real location.

For delivering the Virtual Reality experience, a computer equipped with an Intel i7-6700K and an NVIDIA GeForce GTX 1080 graphics card were used. The visual stimulus was delivered using the HTC Vive setup, and the audio was delivered via Bose QuietComfort 25 headphones with active noise cancellation.

The items utilized in this study "The destination means a lot to me", "I identify strongly with this destination", "I feel no commitment to this destination", "The Douro is the best place for the things I like to do", "For the activities I enjoy most, the settings and facilities provided by Douro are the best", "For what I like to do, I could not imagine anything better than the settings and facilities provided by Douro", "I am very attached to this destination", are based in [28, 31, 39, 40]. Items were rated on a seven-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (7).

A pretest was conducted before data collection in order to validate our survey and the experiment procedure, in particular, the comparison process of the above-mentioned variables regarding video, Virtual Reality experience, and actual visit.

This study procedure is composed of two steps, Fig. 2. First, participants arrived at the laboratory at a pre-fixed hour. They came into a room to experiment São

Fig. 2 Experiment procedure

Leonardo de Galafura in a Virtual Reality scene for five minutes. After that, they were moved to another room to experience the same tourist destination in virtual reality, also for five minutes. Following this first step, they were asked to complete the first questionnaire (Q1) in a separate room. This experiment was intentionally designed to participants do not cross during the procedures in Laboratory, in order to not influence other participants' perceptions. Participants were exposed to the video, the Virtual Reality experience, and the 'real' visit for the same amount of time (five minutes) in order to ensure consistency. Second, after joining a small group, participants were conducted to the 'real' site, São Leonardo de Galafura viewpoint, by car or minibus and were encouraged to explore the site for five minutes. Then, participants were asked to rate the same items included in Q1 in order to compare 'pre-travel (after video visualization and Virtual Reality experience)' and 'in situ' responses (on Q2). Finally, participants returned to the laboratory. Finally, participants travelled from the touristic point to laboratory.

The sample was selected with a purposive sampling approach between university students. The only criteria were that participants belong to Generation Z. The sample is considered adequate 'as the comfort and confidence of young students using technology would be less likely to act as a confounding variable', as [15: 7] indicate.

To identify significant differences in participants' responses, relatively to place attachment, two paired sample t-tests were conducted via SPSS 25.0 statistics software. The first paired sample t-test was conducted in the first moment, after the visualization of video and after Virtual Reality experience (Q1), in order to identify significant differences between the promotional tools surveyed. The second paired sample t-test was conducted after the Virtual Reality experience and after the actual visit (Q2) to identify significant differences between Virtual Reality experience and "in situ" experience. The third paired sample t-test was conducted between the deltas (Δ) of the two moments, in order to identify significant differences in the total impact of Virtual Reality experience, and by extension, the promotional capacity of Virtual Reality, respectively to the video and "in situ" experience.

4 Results

From a total of 200 questionnaires distributed, 192 valid questionnaires were returned. The complexity of the study design has favoured this high response rate, 96%, since all the phases of the experiment and data collecting were concentrated on the same day. Within the final sample, 64.1% were national students from different locations of the country. The median age was 20.67 years old, being 24 years old for international students and 19 years old for national students. Most of the participants were females (60.4%). The majority of respondents were attending to a bachelor degree (67.7%), Master (29.7%) or Ph.D. (2.1%); namely in the fields of Management, Economics and Tourism (42.2%), Technology (21.9%) and Others (35.9%) Table 1.

Table 1 Sociodemographics

	$\overline{X}$ or %
Origin	64.1%
Portugal	35.9%
Other nationalities	
Age	20.6
Gender	39.6%
Male	60.4%
Female	
Study cycle	67.7%
Bachelor	29.7%
Master	2.1%
Ph.D.	
Course	42.2%
Management, economics or tourism	21.9%
Technology	35.9%
Others	

The first paired sample *t*-test analysis was conducted to identify whether any significant differences exist in Douro destination place attachment rating after watching the video and after Virtual Reality experience (Q1). As exposed in Table 1, all items had a statistically significant positive change. Therefore, Virtual Reality has demonstrated positive effects when comparing with traditional media (in this case video), not only in relation with perceived destination image, as shown by [10, 12, 15], but also in creating place attachment to tourism destination.

The second paired sample *t*-test analysis was applied to identify whether any significant differences exist in Douro destination place attachment rating after Virtual Reality experience and after the site visit (Q2). As presented in Table 2, all items had a statistically significant positive change. Hence, in spite of the power of Virtual Reality to impact positively in perceptions about a destination, the 'real' visit to a representative viewpoint in Douro region has more powerful in creating place attachment than the immersive experience. So, it doesn't seem likely that Virtual Reality can substitute the real experience, contrary to what was pointed out by some studies [1, 6].

5 Discussion and Conclusion

Virtual Reality technology can enhance visitor experiences complementing or supplanting physical journeys for some travellers [1, 2, 6]. Virtual Reality could be an effective promotional tool in the previsit phase because it can develop place attachment to tourism destinations [2, 24, 25].

The objective of this study was to empirically examine the effectiveness of Virtual Reality for tourism promotion purposes prior to visiting a tourism destination, exploring the changes in place attachment after watching a video, after Virtual

Table 2 *T*-test sample pairs first moment (Q1) and second moment (Q2) for place attachment

	First moment (Q1)			Second moment (Q2)		
	Video (mean)	VR (mean)	*t*-value	VR (mean)	'Real' visit (mean)	*t*-value
The destination means a lot to me	4.07	4.86	−9.57[a]	4.43	5.17	−8.83[a]
I identify strongly with this destination	4.2	4.99	−8.55[a]	4.59	4.23	−7.91[a]
I feel no commitment to this destination	3.45	3.7	−2.4[c]	3.7	3.9	−2.6[c]
The Douro is the best place for the things I like to do	3.82	4.2	−5.57[a]	4.14	4.63	−7.57[a]
For the activities I enjoy most, the settings and facilities provided by Douro are the best	3.83	4.28	−5.79[a]	4.24	4.66	−5.87[a]
For what I like to do, I could not imagine anything better than the settings and facilities provided by Douro	3.78	4.15	−5.22[a]	4.08	4.53	−7.03[a]
I am very attached to this destination	3.99	4.63	−7.21[a]	4.38	5.03	−7.7[a]

"a" is "$p < 0.001$"
"c" is "$p < 0.05$"

Reality experience and after the 'real' visit to a representative viewpoint in Douro region.

Results indicate positive significant differences in all items of place attachment in the first moment (Q1), after watching the video and after Virtual Reality experience, and in the second moment (Q2), after Virtual Reality experience and after the 'real' visit. According to previous studies [25, 36] visitors can develop place attachment through virtual worlds before having visited the destination.

Then, Virtual Reality increases tourists' responses compared with other marketing tools, namely video, as suggested by previous studies [10, 12, 15], and it could be an effective marketing tool in the pre-visit phase, developing place attachment to tourism destination.

Moreover, the results show that 'real' visit has a more powerful capacity to create place attachment to destinations compared with Virtual Reality. So, Virtual Reality experience could act better as a promotional tool in creating place attachment to destinations compared with video. However, place attachment originated by 'real' visit is greater, compared with Virtual Reality experience.

The major limitation of this study is methodological. The sample was selected with a purposive sample approach, given the complexity of the experience. Also, all the participants belong to Generation Z. Therefore, it's mandatory to extend this study to other generations to obtain differences between different cohorts.

Moreover, differences in the perceived image of destinations "a priori" and "in situ" from the nationality of the participants were suggested previously [41]. Additionally, given the uniqueness of destinations, it's necessary to replicate this study in other destinations.

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