

Virtual Reality in Tourism: Is it 'Real' Enough?

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Virtual Reality Technology is increasingly becoming popular in the tourism sector. So far, the most researched application is the marketing of destinations. In contrast, the technology has also been mentioned as a means to limit or reduce the number of tourists at a specific sight or destination. In this respect VR is considered as a substitute for the actual trip. This paper addresses this issue by looking at the possibility to apply VR-technology to transfer the real-life experience into the digital world. In a qualitative research framework, visitor behaviour and experience are investigated when encountering VR sights in order to better understand items driving technology adoption. Structured content analysis is applied for data analysis where coding follows an adjusted Unified Theory of Acceptance and Use of Technology model. For interpretation purposes a pure qualitative framework was chosen. We find that enjoyment is an important driver for VR technology acceptance, whereas facilitating conditions and outcome expectations seem to be obstacles for it. Perceived usefulness is evaluated controversially. While the technology is not acknowledged as a substitute for a regular holiday trip, especially for travellers who take pleasure in active holidays or appreciate social interaction, it was recognised as an alternative for special occasions such as brief getaways from everyday life or short city trips. Overall, when appropriately implemented the technology might not only be useful to decrease visitor concentration in touristic hotspots or to decrease negative aspects associated with frequent travel but could further be applied to sites where visitors do not engage physically because sites are too distant, expensive, inhospitable, unsafe or fragile.

Keywords: virtual reality, tourism, travel substitute, technology adoption, UTAUT



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Introduction

Although virtual reality (VR) technology and research thereof has been around for more than 20 years, it has recently seen a renewed upsurge in academic inter-

est due to advancements in technology (Williams & Hobson, 1995). The most commonly used definition of Guttentag (2010, p. 638) describes the term 'virtual reality' as 'the use of computer-generated 3D environ-

ment [...] that one can navigate and possibly interact with, resulting in a real-time simulation of one or more of the user's five senses.' Whereas the ability to move around and explore the virtual environment is labelled as a compulsory requirement, interaction is only facultative. According to this definition it is not straightforward to determine whether 360° videos or even augmented reality (AR) is part of VR or not. While both applications represent, for the most part, a mere passive consumption, some navigation or limited interaction might nevertheless be possible. Apparently, lines are blurred and opinions differ in this regard. In fact, academia has been arguing about whether navigation is an optional component of VR or not (Yung & Khoo-Lattimore, 2019).

For the purpose of this paper, we follow the more flexible point of view (Gibson & O'Rawe, 2018; Wiltshier & Clarke, 2017) and consider VR as a computer-generated 3D environment where navigation and interaction are optional.

Irrespective of the technology or device used to create a VR experience, two main factors are necessary. The first one is physical immersion and the second one psychological presence (Disztinger et al., 2017; Tussyadiah et al., 2018). The more the VR user is detached from the real world the more physically immersed he is. In light of this and the elaborated definition, on the one end of the VR spectrum there are semi-immersive virtual environments where the user is still in contact with the reality around him such as 360° videos followed by AR experiences. The other end of the spectrum is determined by fully immersive environments created, for example, by Head Mounted Display (HMD) devices, maybe accompanied by headphones and gloves or other supporting tools to create virtual tactile sensations. When smell or further haptic stimuli are added the sensation of immersion increases even more (Gutiérrez et al., 2008). Psychological presence is the subjective feeling of the user of physically being in the virtual environment rather than in the place where the body is located. This follows Wirth et al.'s (2007) definition of spatial presence. An individual might reach a high psychological presence even in a physical semi-immersive environment while another may not. It has been found, though, that

both concepts are somewhat related. Highly physical immersive technologies may lead to a high level of psychological presence. A lack of high immersion, on the other hand, does not necessarily lead to a low feeling of psychological presence. Subjective internal processes of an individual may indeed compensate for lacking external stimuli (Ijsselstein & Riva, 2003).

Empirical analyses of VR applications in tourism are a fairly new research area. Since technological progress has only recently led to an acceptable level, such studies have not been on the rise until the last few years. Nevertheless, empirical research on the adoption of VR technology in a tourism context is still limited (tom Dieck et al., 2018). This acknowledges Hine's (2000) demand for more empirical research of user experience rather than mere prophecies of groundbreaking VR applications in tourism. Yung and Khoo-Lattimore (2019) even observe that among those analyses that exist, many are still not based on theoretical concepts or frameworks which verifies Huang et al.'s (2016) assessment, that more substantive and theory-based research on VR and its application is necessary.

This paper contributes to reducing this void by analysing VR user acceptance based on a qualitative empirical research approach. More precisely, participants in two semi-immersive VR tourism experiences in a CAVE Automated Virtual Environment were observed and questioned based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The aim is to better understand determinants for acceptance and adoption willingness of VR technology as a substitute for a real trip.

VR Applications in Tourism

Applications of VR in tourism have been discussed in various contexts. Suggested areas of use range from a planning and management instrument to better assess tourists' desires and needs through an entertainment tool, deployed for example within a theme park, to a means for educational purposes, for instance in a museum or at a historical site (Guttentag, 2010). The most frequently researched area is, however, the use of VR as a promotional tool. Several papers have already descriptively highlighted the marketing potential of the

technology (Williams & Hobson, 1995; Cheong, 1995; Williams, 2006; Guttentag, 2010; Griffin et al., 2017). The hypothesis has been tested empirically within diverse research settings. For example, one of the earlier studies questioned test persons after showing them 360° videos steerable by a regular PC mouse (Lee & Oh, 2007). Pantano and Servidio (2011) used what they called a pervasive environment which was represented by stereoscopic technology creating a 3D image on a screen. Both studies confirm the assumption that VR provides an efficient marketing tool for destinations. The reason is mainly attributable to the fact that VR can help reduce uncertainty associated with buying a touristic product. The 'try-before-you-buy' option helps the traveller to get a more realistic experience of what to expect. This way it can reduce travel anxiety (Lee & Oh, 2007) or increase motivation to visit places that were somewhat unfamiliar to the individual (Pantano & Servidio, 2011).

Empirical VR research in tourism gained ground with the introduction of so-called virtual worlds. The most prominent example is Second Life from Linden Lab. In this Internet-based 3D infrastructure users are able to develop and design the virtual environment and interact with each other via avatars. Related research focused on the question whether the virtual visit and associated interaction possibilities would positively contribute to destination marketing efforts (Guillet & Penfold, 2013; Huang et al., 2012; Huang et al. 2013; Huang et al., 2016; Mascho & Singh, 2013). The studies generally confirm the hypothesis, finding that users develop positive feelings and increased awareness towards the respective destination. This is in line with later analyses in alternate research settings. For example, Tussyadiah et al. (2018) conclude that the feeling of being in a virtual environment creates a positive sensation for the potential tourist, which leads to a stronger preference for the destination and ultimately a higher likelihood of visiting it. McFee et al. (2019) compare 360° video information with a more immersive VR experience and find that involvement is a key aspect in image formation. Therefore, information transmission via immersive VR should be preferred over 360° videos since it leads to a positive destination image which increases visit intention. Gibson

and O'Rawe (2018) also observe a higher likelihood of visiting the 'real' destination after experiencing it in a virtual environment. Tussyadiah et al. (2017) measure spatial presence which was found to have a positive effect on post-VR attitude change toward the tourism destination.

All of the aforementioned studies centre on the question whether VR can help to create awareness of a destination and ultimately increase visitor numbers. Yet, the opposite objective can also be of interest. It might, for example, be sensible to restrict the number of visitors at vulnerable natural or cultural spots such as heavily visited heritage sites. Dewailly (1999) adopts the specific perspective of sustainability in this context. To put it in a broader perspective, VR might be a beneficial instrument to tackle problems associated with the current overtourism debate. The general idea behind it is, that by means of a virtual visit the site is still accessible to everybody while at the same time, the environment is not harmed. This rationale holds for all destinations that might be too distant, inhospitable or unsafe. It also holds for travellers themselves who might be unable to visit a destination (Guttentag, 2010). Hence, VR can serve as a substitute for the actual trip (Cheong, 1995; Sussmann & Vanhegan, 2000) rather than a motivational factor for it. Wiltshier and Clarke (2017) point out the opportunities of virtual cultural tourism but also address some challenges for the future. The present study takes on this viewpoint as well and explores the necessary prerequisites for the tourist to accept a technology solution over a physical travel experience.

When investigating VR acceptance the sense of presence plays an important role (Slater et al., 1994; Hyun & O'Keefe, 2012; Tussyadiah et al., 2018). Although not placed within a VR environment, empirical researches (Klein, 2003; Jacob et al., 2010) highlight the importance of media richness, i.e. number and quality of sensory stimuli, as well as interaction possibility on the attitude towards and acceptance of an envisioned product. VR-related studies support this outcome by confirming that a high level of presence can be achieved by addressing multiple senses (Dinh et al., 1999; Feng et al., 2016; Rodrigues Martins et al., 2017). Apart from the user's sensations, the

aforementioned interaction possibility requires further thought. Guttentag (2010) argues that acceptance of the VR tourism substitute is influenced by the individual's perception of authenticity as well as travelling motivations. While the technology is able to closely reconstruct objects and sites, social interaction is restrained. However, an individual's motivation to travel to a specific destination can be a friends or family visit regardless of the touristic surroundings. Furthermore, many tourists like to meet and exchange with locals and delve into their lifestyle to experience authenticity. Even the trip itself is oftentimes perceived as a social occasion. People usually do not travel alone and individuals who do, enjoy the company of others. Those social interactions can influence the tourism experience as much as the destination itself. Thus, each tourist becomes a co-creator of value. This does not only apply to the producer-consumer relationship such that the consumer enhances or degrades the value provided by the tourism producer (Binkhorst & Den Dekker, 2009; Grisseemann & Stokburger-Sauer, 2012). It also holds for the consumer-consumer relation, since travellers influence each other in their tourism experience (Rihova et al., 2015). Integrating a social element is therefore vital when investigating a VR tourism experience, even though the technology can only provide for this aspect to a limited extent at the current stage.

Methodology

Research Design

The present study deals with visitors to two VR tourism sites who were observed and later questioned with regard to their experiences and assessments. Participants in the researched group were 16 University students of a Tourism Management programme. All of them had already encountered full or semi-immersive virtual environments using VR HMD devices. For the purpose of this study they were sent into a CAVE Automatic Virtual Environment (Cruz-Neira et al., 1992) 3 metres in diameter. Shutter glasses had to be put on in order to create the 3D image but no VR HMD was necessary. Although this implies a lower physical immersion this semi-immersive research framework, similar to the one used by Pantano and Servidio (2011),

was chosen in order to provide for a more interactive and social environment. More precisely, participants were sent into the CAVE in groups of 5–6 people, simulating a travelling group. As pointed out earlier, individuals may nevertheless develop feelings of psychological presence. The spatial area left room for motion in every direction enabling the group to change positions in order to show things to and talk with each other.

In the CAVE they were shown two different settings. The first one was a 3D reconstruction of Christ the Redeemer on Corcovado with a view down to Rio de Janeiro, Brazil. The participants were able to change perspective as well as zoom in and out of the picture with a handheld controller. This way involvement and interaction was intensified, which may also increase psychological presence for some individuals (Wirth et al., 2007). The second setting was a guided tour through the Syrian ruined city of Palmyra, a digital 360° movie initiated by the TV station ZDF/Terra X and the Prussian Cultural Heritage Foundation showing the reconstructed site.

As Guttentag (2010) elaborates, the acceptance of VR as a substitute for the real destination is subjective. Not only is the tourist's individual perception of the substitute's authenticity of importance but also his or her travel motivations and constraints. It is therefore central to profoundly understand and question the VR user's behaviour, perception and sensation on an individual basis. In light of this, and due to the exploratory character of the research, a non-participative observation research framework of the groups in the CAVE was chosen as a first step. Two researchers were deployed to get a better view and align observations in order to limit observation errors. Results were subsequently backed and further elaborated. One week after the visit, semi-structured interviews took place with each participant, questioning them regarding their general travel motivations, their virtual travel experience and their technology adoption appraisal. Contrary to Sussmann and Vanhegan (2000), by actually sending sample groups into the CAVE, individuals were able to more precisely verbalise their experience rather than answering what they think it would feel like.

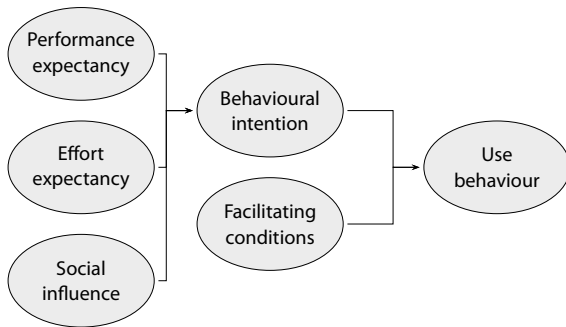


Figure 1 UTAUT Model (adapted from Venkatesh et al., 2003)

Theoretical Background

The Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) provided the underlying theoretical basis for observations and semi-structured interviews. UTAUT is an empirically validated evolution of the Technology Acceptance Model (TAM). TAM was introduced by Davis (1989) and applied in several tourism-related VR studies, partly with minor adaptations (Disztinger et al., 2017; Huang et al., 2016, 2013; Mascho & Singh, 2013). UTAUT applications are not as widespread as some to be found in the VR-related segment of Augmented Reality. For example, Hein et al. (2018) investigate consumer assessment of opportunities and threats of smart glasses for society. Targeted towards the tourism industry is Paulo et al.'s (2018) research of influencing factors of mobile AR adoption in tourism. A specific case is studied by Kourouthanassis et al. (2015) who test a mobile AR travel guide in Corfu, Greece.

Variables impacting technology adoption according to UTAUT are performance expectancy, effort expectancy, social influence and facilitating conditions. The first three drive the intention to use the respective technology. Behavioural intention in turn, together with facilitating conditions, motivate technology use.

Additionally, UTAUT postulates that constructs are moderated by individual differences, i.e. gender, age and experience, as well as by the voluntariness to use the technology.

In the present research we adopted UTAUT categories to formulate and evaluate interview questions

and observations. A few adjustments in accordance with the literature reviewed were made to fit the needs of the specific setting. First, Venkatesh et al.'s (2003) study was tailored to the business environment as opposed to the present analysis. The item 'job-fit' was therefore omitted to describe performance expectancy. However, a more hedonic-related item was included to define performance expectancy in order to represent the interactive and social nature of the technology (tom Dieck et al., 2018). More specifically, the item 'perceived enjoyment' was supplemented similar to Disztinger et al. (2017), who follow Holsapple and Wu's (2007) proposition that VR is a hedonic rather than a utilitarian technology. Within the construct effort expectancy the item 'perceived ease of use' and 'ease of use' are very similar (Davis, 1989; Moore & Benbasat, 1991; Venkatesh et al., 2003) and it is criticised that statements are therefore not clearly allocable to either one. Additionally, participants were not questioned a second time after applying the technology several times. Therefore, it was unlikely that they were able to clearly assess ease of use. In order to avoid distortions and ambiguities, both items were grouped together to 'perceived ease of use.' The item 'social factors' in the original UTAUT model refers to co-workers and supervisors who use the system, as well as to organisational support given to the individual. Again, this is not applicable for the present analysis. Consequently, the item was excluded. To sum up, constructs and tantamount items used are shown in Table 1 with respective anchoring statements from the interviews.

Due to the small sample size we did not control for gender. Neither was age and experience accounted for since all of the participants were in the same age group and had the same prior VR experience. Lastly, the purpose of the technology employment is solely for leisure activities and participation in the study was free of choice for the sample group. Therefore, voluntariness of use was also not applicable in the present setting.

Structured content analysis (Mayring, 2014) was used to analyse and interpret data obtained by the observations and interviews. Coding followed the previously described adjusted UTAUT constructs and items.

Table 1 Adjusted Constructs and Anchoring Statements

Construct	Item	Anchoring Statement
Performance expectancy	Perceived usefulness	I had read before, that it's an application to rebuild historical sites
	Extrinsic motivation	When I start my travel plans, there is some outside influence
	Relative advantage	A lot of things are missing – activities. This is why I travel
	Outcome Expectations	I am looking for recuperation. To be away from everyday life
	Enjoyment	I thought it was cool
Effort expectancy	Perceived ease of use	I would say, using the controller seemed to be relatively easy
	Complexity	It wasn't complex, it was easy to operate
Social influence	Social norm	I don't travel alone, but together with a friend or in a small group
	Image	Social Media is relevant for me when choosing a destination
Facilitating conditions	Facilitating conditions	I didn't find it too impressive from a technical point of view
	Compatibility	I don't think it can be a substitute for real travel experiences

Table 2 Frequencies of Codings

Outcome expectations	142
Perceived usefulness	80
Relative advantage	46
Enjoyment	52
Extrinsic motivation	31
Perceived ease of use	42
Complexity	12
Social norm	57
Image	2
Facilitating conditions	108
Compatibility	29

The intention with this approach is not to measure impact on behavioural intention and use behaviour on a quantitative scale as this requires a large sample survey methodology. Rather, the aim is to get a deeper understanding of the relevant input parameters affecting technology acceptance and adoption in the outlined travel context.

Results

Frequencies of coded observation results and interviews are displayed in Table 2.

Within the construct performance expectancy, outcome expectations and perceived usefulness seem to

be important elements for the participants. It was found that the assessment of outcome expectations strongly depends on the travel motive of the individual interviewee. While travellers with motives such as hiking, kite-surfing or two-week relax holidays were less likely to imagine VR travel as a substitute at the current stage, those with motives like short-term city breaks or sightseeing tours considered it more positively. Further investigations revealed that the first set of motives are linked to certain feelings, emotions and the search for authenticity in terms of getting into contact with the local community, which cannot properly be transported via VR. For example, one person primarily looking for recovery from a demanding working life mentioned: 'I actually want to feel emotions. [...] Simply, that it was a good time.' Another one pointed out that the feeling of actually being on Corcovado is different because 'you have gone or driven up. You've already taken the path. You know "ok I'm here" and have a certain feeling. I didn't get this feeling in the cave.' Regarding the search for authentic encounters with locals, one interviewee expressed: 'So if it is really about travelling and not about city trips, then the people and their hospitality are always the most important thing.' More generally, it was added that only authentic experiences are able to create a positive attitude in the tourist, which he or she can live off in the weeks and months to come. Even though the reasoning of many

participants went in this direction, there were some exceptions, which imply a higher psychological presence: ‘Nevertheless, I felt like I am walking through it [Palmyra]. You have to get involved, you have to tell yourself “ok, I’m really looking at this now.” And not think of something else at the same time. You have to get involved and then you can empathize.’

Usefulness of the technology in the travel industry was saliently perceived to be very low. During the observations, only one group started to develop ideas for whom such a virtual travel would be suitable. Interestingly, during the interviews, after reference to potential alternative uses (e.g. travel option for physically disabled people) was made by the interviewer, almost all respondents revised their opinion and confirmed the suggested applications as being a relative advantage over the actual trip. Some even developed further ideas subsequently. For example, as a consequence of watching the Palmyra video, some stated the advantage of experiencing a destination that no longer exists. Few mentioned additionally, that there might be an advantage in the cultural tourism area, where VR technology could be used as an efficient educational tool. In some instances, a potential economic threat of VR travel for destinations and their service providers was voiced mainly due to loss of revenues caused by shrinking visitor numbers. Besides these special-purpose applications, many interviewees were able to imagine VR to be a substitute for a short getaway from everyday life, for example as a two-hour VR travel experience to relax after work. The time and monetary savings potential supports a possible relative advantage over a real trip in that respect: ‘You have only little time and need a break, but you can’t fly or drive anywhere at the moment because it takes too long. Then you might want to go to a VR studio for a city trip and come back more relaxed.’ Or, as another one put it: ‘I would consider it an experience. Maybe it can replace a short holiday. Like a visit to an amusement park.’

Enjoyment was a clear positive contributor to performance expectancy. In fact, all of the participants mentioned the ‘fun-factor’ and the pleasure that group members experienced during the activity. This was also observable during the surveillances and empha-

sises the importance of hedonic elements when driving technology acceptance. It also hints towards the supposition that intrinsic motives play a much greater role among the participants than extrinsic ones. Especially when taking the circumstance into account that extrinsic motivation had no declared influence on using VR technology for travel purposes, even though it sometimes played a minor role in choosing a destination or holiday activity.

Both the observational as well as the interview analyses of effort expectancy indicate that participants perceived the ease of use as very positive and were comfortable in testing the equipment. Furthermore, they found it easy to operate the equipment and the complexity was rated low. However, some mentioned that the controller needed a little practice and thus the ease of use could be improved.

Social influence was rather negatively evaluated mainly because social norms play an important role for traveling. Almost none of the partakers travel alone and meeting locals is relevant for most of them. In fact, in several cases it seemed like social norm was almost perceived as a facilitating condition, because the respective interviewees referred to the two items within the same text passages. Within this context, it was striking that no one regarded experiencing the VR sites in a group as beneficial, which was originally intended by the researchers. Obviously the social element does not seem to be superficially present. In contrast to this, observations pointed towards the fact that it nevertheless is a valuable component because participants started conversations as well as shared impressions and encounters with each other after they familiarised themselves with the technology. Furthermore, although social media and recommendations of friends or family members are important when deciding which destination to visit, according to the interview statements this external input does not seem to be relevant for technology adoption. Thus, image does not present a stimulus in the present study. Taken together with extrinsic motivation, outside factors in general do not appear to have any importance for the respondents in their assessment of the technology.

Facilitating conditions were rated rather negatively as most partakers mentioned technical shortcomings,

specifically directed towards visual elements. Moreover, some demanded additional stimuli of senses like temperature, wind, sound or smell to make the VR experience more real. However, the latter was often mentioned only after indicated by the interviewer. Finally, evaluation of compatibility can be related to the somewhat negative appraisal already discussed in connection with relative advantage.

Discussion

In our qualitative study we were not able to define a commutated tendency for items describing the construct performance expectancy and consequently for behavioural intention. While some declared that they felt to be 'in an artificial space [...] because there is no impact from the environment around,' others acknowledged that 'the destination does not exist any longer, so VR is better than nothing.' Apparently, the absence of deeper emotions, which was criticised by many interviewees, as well as lacking social encounters with locals, seem to be a major obstacle for technology acceptance. Likewise, Mura et al. (2017) found that virtual tourism in its current form is being regarded as not authentic enough and thus not viable as a replacement for corporeal tourism. 'The journey itself is irreplaceable,' as one respondent aptly expressed. Our research revealed, however, that more granular reflections are indeed necessary in this respect.

To begin with, the assessment of outcome expectations seems to depend on how strongly the individual is able to get involved in the VR experience. This supports the proposition that a person can feel psychological presence even though physical immersion is rather low as Ijsselstein & Riva (2003) suggested. Also, answers relating to outcome expectations were connected to travel motives of the participants. In this regard, most participants proactively perceived the technology as useful and advantageous for short getaways or sightseeing tours. This points at least weakly towards the findings of Disztinger et al. (2017), who report perceived usefulness or relative advantage to have a positive effect on the intention to use VR technology. In addition, after advocated by the interviewer, respondents stated that although the VR experience cannot replace the real visit, it might be a useful appli-

cation for special purposes. This applies in particular to individuals who are not able to physically travel or to destinations that are simply not visitable anymore such as Palmyra, which is in line with Sussmann and Vanhegan's (2000) results. Summing up, the type of travel and specific motivation appear to be crucial for technology acceptance. If technology adoption wants to be achieved, the content of the VR offer therefore should reflect these customer needs. This conclusion is further backed by studies researching the application of AR in a cultural context (Dueholm & Smed, 2014; Leue et al., 2015), which state that the suitable quality of content emerged as one of the biggest requirements.

Reinforcing Disztinger et al.'s (2017) findings, perceived enjoyment gave a positive impulse for all participants. Hedonic benefits are, thus, an input parameter that should not be neglected when promoting VR travel technology acceptance.

Moreover, participants' statements gave no indication of the existence of any extrinsic motivators for technology adoption. This might be due to the fact that the usage of VR technology in the given context is leisure-related and purely voluntary. Additionally, interviewees were students who might not yet be able to assess the professional benefits of the technology at the time of the inquiry. Or, as a third explanation, the application itself might still be too new which means that an external motive and image has yet to develop.

In terms of effort expectancy we find that perceived ease of use was high among the respondents. The operation of the technique in a CAVE setting is no noteworthy hurdle. When arguing in line with quantitative studies (tom Dieck et al., 2018) this would shape attitude and behavioural intention of VR technology in a positive way.

Generally speaking, social interaction is a strong motivation for many tourists according to Guttentag (2010). Our study supports this viewpoint and reveals the limitations of VR technology to achieve this motivational aspect. Although participants experienced the VR application in the CAVE in small groups, no perceived social interaction was voiced even though observations conveyed a somewhat different picture. Apparently, the setting could not provide the profound social interaction that the partakers expect.

Finally, facilitating conditions were negatively perceived mainly due to technical issues. It seems that technical aspects are still one of the most important aspects driving VR technology adoption. Especially, the perceived low quality of the visual element was one of the most frequent items mentioned to hinder technology acceptance. However, these shortcomings might change in the future with more advanced VR technology and eventually more social interaction possibilities in VR applications. Even now, perceived usefulness might be assessed more positively with more cutting edge VR equipment, which then offers technically viable substitutes for short getaways or short-term sightseeing tours. Interestingly, moving pictures (Palmyra) were evaluated better than the 3D (Christ the Redeemer) experience. On the one hand, this might be due to the fact that more information is transferred via the Palmyra tour which underlines the educational aspect of VR technology. On the other hand, it could have to do with the controller handling of the still image of Corcovado since some partakers experienced motion sickness while zooming through it.

Contrasting, the absence of the naturally changing environment, such as cloud or sunlight movement, was not perceived as a disturbing factor. This is an interesting finding since Chen et al. (2015) describe the creation of dynamic geographic environments as one of the most difficult issues in moving away from a scientific setting to real virtual world research. To put it in other words, in order to generate a satisfactory tourism experience, it might not be necessary to reflect the real world in its entirety. The same might hold for other sensory stimuli. Although some participants wished for more, it did not seem to impair the experience to a significant extent because the absence was not criticised for the most part. Possibly, some participants were missing something but were not able to identify or articulate what it is. In this case, lack of additional inducements other than visual or auditive would be subconscious deficiencies that limit the VR experience. Psychological presence might, thus, be a more latent existing impression rather than that it can be proactively expressed by the users. Customer segmentation according to their sensory preferences

could consequently be feasible (Agapito et al., 2014) when applying VR travel substitutes.

Conclusion

The findings of our study contribute to tourism-related VR literature by offering a more profound and differentiated understanding of items influencing technology acceptance and use intention. Generalisation, however, is difficult due to some limitations. First of all, our approach is purely qualitative. While participants' statements and comments give first indications towards the willingness to accept and use the technology as a travel substitute, they are nevertheless subjective individual opinions. As such they can only provide the basis for a more detailed comprehensive analysis. Future research should therefore test our findings in a quantitative model to derive robust results in terms of behavioural intention and use behaviour as dependent variables within the UTAUT model.

The second limitation builds on this aspect, as our sample is relatively small with 16 participants and not representative because only students of a Tourism Management bachelor degree programme were questioned. They were mainly female students of the same age group (between 20 and 25 years). Furthermore, all participants had similar previous experience with VR technology and the time frame for observations was fairly short. Again, future research should verify our findings with larger and more representative samples within an extended time frame.

Finally, outcome expectations and facilitating conditions have been evaluated rather negatively. One might get different outcomes with more high-end VR technology currently and in the future, since VR technology is evolving rapidly.

Despite the limitations our research offers room for further research questions. The researchers of the present study assumed a CAVE environment to provide for interaction possibilities. It was found, however, that not all participants acknowledged this aspect and results are likely to change in other VR environments. It would therefore be feasible to, for example, focus on more immersive VR settings or even compare findings within different VR environments. In this context, participants' preferences for settings are

of interest as well. Moreover, in our research, the participants participated voluntarily in the study. In terms of commercialisation, the willingness to pay for a VR experience as well as the marginal price are further questions worth noting. Customer segmentation may gain additional importance in this regard. Lastly, the content of the VR experience was not part of the discussion in the present analysis. Participants were not able to choose the type or subject of the experience. As discussed and supported by our research results, personal travel motivations and interests play an important role in the evaluation of the experience and ultimately technology acceptance. Prospective studies could therefore look more deeply into the question of stakeholders' content preferences.

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