VIRTUAL REALITY TOURISM:

THE NEW FRONTIER OR THE END OF THE JOURNEY?

by

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ABSTRACT

Prior to the COVID-19 outbreak, the tourism industry was a mega-industry. Although virtual reality (VR) is a relatively new development in tourism, due to COVID-19 it has literally transformed and improved the industry, particularly in the fields of marketing, sustainability and virtual worlds. VR is held to provide tourists with the "ultimate" tourist experience. The reason is that tourists no longer have to experience any of the negative aspects associated with conventional tourism. Despite the benefits and popularity of VR, a key question arises: will VR be the end of conventional tourism or can it be considered as a new tourism frontier?

Therefore, the main purpose of the study is to address this question by focusing on the role of VR in tourism, especially in the context of South Africa. In addition, the study provides a detailed background of VR in general and in terms of tourism; types of VR tourism; the benefits and drawbacks of VR in tourism; and finally, the study compares conventional tourism models with VR in order to highlight the similarities.

It concludes that VR does not in essence substitute conventional tourism, but rather it can be considered as a tourism niche in its own right, even if only as a futuristic prospect. For this to actualise, there are three major concerns that need to be addressed in the future; physical interaction; a full sensorial experience and the question of revenue.

Key Words

Virtual reality, tourism, COVID-19, tourist experience, South African tourism

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[I can no other answer make but thanks and thanks and ever thanks]

Twelfth Night, Act 3, Scene 3

William Shakespeare (1564-1616), English playwright, poet and actor

LIST OF ACRONYMS AND ABBREVIATIONS

Aids	Acquired immunodeficiency syndrome
App	Application
AR	Augmented reality
BOOM	Binocular Omni-Orientation Monitor
CAVE	Computer Audio-Visual Environments
COVID-19	Coronavirus disease 2019
CRT	Cathode-ray tube
Destination BC	Destination British Colombia
ESCOM	Electricity Supply Commission
GDP	Gross Domestic Product
GPS	Global Positioning System
HIV	Human immunodeficiency virus
HMD	Head-mounted display
ICT	Information and communications technology
ISS	International Space Station
LCD	Liquid crystal display
LED	Light-emitting diode
MIT	Massachusetts Institute of Technology
MR	Mixed reality
NASA	National Aeronautics and Space Administration
OTA	Online travel agents
PS VR	PlayStation VR
PwDs	People with disabilities
SAA	South African Airways
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus
SL	Second Life

SMEs	Small and medium-sized enterprises
SWOT	Strengths, Weakness, Opportunities and Threats
TALC	Tourist area life-cycle
TAM	Technology Acceptance Model
TB	Tuberculosis
3D	Three dimensional
UK	United Kingdom
UNWTO	United Nations World Tourism Organisation
USA	United States of America
VCASS	Visually Coupled Airborne Systems Simulator
VE	Virtual Environment
VPL	Virtual Programming Language
VR	Virtual Reality
WHO	World Health Organisation
WIFI	Wireless Fidelity
WTTC	World Travel and Tourism Council
XR	Extended reality

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Chapter 1: Introduction

1.1 Introduction

This study focuses on tourism and technology, but more specifically, the role of virtual reality (VR). It seeks to consider whether VR can be considered a substitute for conventional tourism or a tourism niche in its own right. In order to asses this phenomenal transformation of an age-old sector, the origins and development of VR are explored to situate and contextualise tourism within the VR domain. It interrogates both the authenticity of the VR tourist experience and what its advantages and disadvantages are. The study also turns to VR's possibilities within the South African tourism sector as an example of the global South. Finally, it positions VR within the context of well-known conventional tourism models in order to appraise its status and future prospects.

This first chapter sketches a brief background, considers the relevant terminology within the context of this study, outlines the methodology and limitations faced during the study and lastly sets out the chapter content.

1.2 Background

The tourism industry is the largest and fastest-growing industry globally.[1] It has grown into a "mega-industry", despite several setbacks.[2] The statistics generated by the World Travel and Tourism Council (WTTC), the United Nations World Trade Organisation and the United Nations World Tourism Organisation (UNWTO) support this. The United Nations World Trade Organisation and the WTTC state that in 2019, international tourist numbers have increased by 3.5% to 1.5 billion which represents the tenth year of consecutive growth.[3] According to the

[1] R. George, 'Introduction to tourism', *in* R. George (ed.), *Managing tourism in South Africa*, p. 3; C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 3; L.J. Lickorish & C.L. Jenkins, *An introduction to tourism*, p. 33; V.T.C. Middleton *et al*., *Marketing in travel and tourism*, p. 3.
[2] B.S. Sutheeshna *et al*., 'Tourism development revisited: an introduction', *in* B.S. Sutheeshna *et al*. (eds.), *Tourism development revisited: concepts, issues and paradigms*, p. 15.
[3] UNWETO, 2020a, <https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism>, access: 5 October 2020; World Travel and Tourism Council, n.d., <https://wttc.org/en-gb/Research/Economic-Impact>, access: 13 May 2020.

UNWTO's *Tourism: 2020 Vision*,[4] it was estimated that international tourist numbers would reach 1.56 billion in 2020.[5] More recently, the devastating impact the global pandemic has had on tourism, further attests to the extent and reach of the industry.[6]

Based on the WTTC statistics, the tourism industry contributes approximately 10.3% to the global Gross Domestic Product (GDP).[7] S. Lock states that in 2019, tourism contributed US$2.9 trillion to the GPD.[8] In addition, the tourism industry contributes to employment both directly and indirectly. For instance, the WTTC states that over the last five years, the industry has created one-in-four new jobs around the world.[9] Prior to the outbreak of the Coronavirus disease in 2019 (COVID-19), UNWTO predicted that by 2020, 303 million people would be employed in the tourism industry, which accounts for 9.2% of total employment.[10] Some scholars state that the rapid growth in tourism is due to the following factors: namely the expansion of global economic prosperity, evolving destination competition paradigms, product intervention and re-invention, proactive high-profile policy interventions, as well as, the advances in the development of technology and information communication and technologies (ICTs).[11] On the flip side of these predictions is the current situation where tourism statistics highlight the devastating impact COVID-19 has had on the tourism sector. For example, the WTTC estimates that COVID-19 will lead to 50 million job losses in the tourism industry.[12]

As is the case with most other industries, the tourism industry has "gone digital"[13] and has embraced technology. Examples include the computer reservation system, the global distribution

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[4] The UNWTO's *Tourism: 2020 Vision* is a long-term forecast which covers the development of tourism through the first 20 years of the millennium. J.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, pp. 296, 301.
[5] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 301.
[6] UNWETO, 2020a, <https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism>, access: 5 October 2020.
[7] World Travel and Tourism Council, n.d., <https://wttc.org/en-gb/Research/Economic-Impact>, access: 13 May 2020.
[8] S. Lock, 2020, <https://www.statista.com/topics/962/global-tourism/>, access: 7 May 2020.
[9] World Travel and Tourism Council, n.d., <https://wttc.org/en-gb/Research/Economic-Impact>, access: 13 May 2020.
[10] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, pp. 52, 303, 448.
[11] B.S. Sutheeshna *et al*., 'Tourism development revisited: an introduction', *in* B.S. Sutheeshna *et al*. (eds.), *Tourism development revisited: concepts, issues and paradigms*, p. 15; A. Guevara, 'Technology', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 933; V.T.C. Middleton *et al*., *Marketing in travel and tourism*, p. 14.
[12] J. Faus, 2020, <https://www.weforum.org/agenda/2020/03/world-travel-coronavirus-covid19-jobs-pandemic-tourism-aviation/>, access: 30 March 2020.
[13] P.D. Nyheim & D.J. Connoly, *Technology strategies for the hospitality industry*, p. xi.

system and the internet.[14] In the recent past, technology has affected and revolutionised the tourism industry and this usage has increased as it has become more advanced, cheaper and user-friendly.[15]

Moreover, tourism is an information-intensive industry and for this reason, tourism relies heavily on technology to process information, particularly ICTs.[16] The adoption of ICTs is not a new phenomenon in tourism.[17] Since the 1980s, ICTs have influenced and revolutionised the tourism industry on a global scale.[18] The aim of ICTs is to cover "any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form".[19] Car hire companies, hotels, airlines, tour operators, travel agencies and destination management organisations are some of the sectors in tourism that have shifted to ICTs due to the numerous benefits.[20] For instance, ICTs provide companies the opportunity to increase internal efficiency, to interact directly with consumers, to offer consumers a more personalised product, to widen the geographical reach, to tackle challenges (i.e., seasonality and overcrowding) and to improve the efficiency of production and quality of services.[21]

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[14] İ.O. Coşkun & H. Yilmaz, 'An introduction to consumer metamorphosis in the digital age', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 3.

[15] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 283; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 3; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 10, 16; D. Buhalis, 'Technology in tourism-from information communication technologies to Etourism and smart tourism toward ambient intelligence tourism: a perspective article', *Tourism Review* 75(1), 2020, p. 267; B. Neuhofer *et al*., 'A typology of technology-enhanced experiences', *International Journal of Tourism Research* 16, 2014, p. 340.

[16] A. Poon, *Tourism, technology and competitive strategies*, pp. 41, 102, 153; B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 325; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 10; P. Horan, 'Virtual reality applications in the hospitality/tourism industry', *Hospitality Information Technology Association*, 1996, p. 1.

[17] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 4; B. Neuhofer *et al*., 'A typology of technology-enhanced experiences', *International Journal of Tourism Research* 16(4), 2014, p. 340.

[18] D. Buhalis & R Law, 'Progress in information technology and tourism management: 20 years on and 10 years after the Internet – the state of Etourism research', *Tourism Management* 29(4), 2008, p. 609; D. Buhalis & P. O'Conner, 'Information communication technology revolutionizing tourism'. *Tourism Recreation Research*, 30(3), 2005, p. 7; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 4; S.A.I. Urriza *et al*., 'MoViT: a 3D mobile virtual tour app of Panguil River Eco-Park', *in* E.S. Sezgin (ed.), *e-Consumers in the era of new tourism*, p. 106; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 586; V. Nair, 'Information technology', *in* P. Robison, (ed.), *Tourism: the key concepts*, p. 109.

[19] V. Nair, 'Information technology', *in* P. Robison, (ed.), *Tourism: the key concepts*, p. 109.

[20] M. Smith *et al*., *Key concepts in tourist studies*, p. 58.

[21] M. Smith *et al*., *Key concepts in tourist studies*, p. 58; UNWETO, n.d., <https://www.unwto.org/digital-transformation>, access: 20 July 2020; A. Poon, *Tourism, technology and competitive strategies*, p. 153.

There are numerous types of ICTs, namely: smartphones; mobile phone applications (apps); social media; the internet; wireless over information processing; geographical information systems; global positioning systems (GPS); location-based services; coverage (e.g. voice and media); digital radio ordering systems (e.g. e-Table technology); artificial intelligence and augmented reality.[22] However, one of the most significant developments in the field of ICTs is VR.[23] Scholars note that VR has transformed the tourism industry by changing the way tourists experience travel-related products and services.[24] With VR, tourists now have a more interactive and diverse tourist experience and the ability to travel anywhere, (from space to theme parks), without ever leaving their homes.[25]

1.3 Research area

There are two key gaps in the literature that have been noted and this study aims to address them. The first gap is that scholars have yet to pay any attention to VR as a tourism niche, although they have addressed it as a substitute for conventional tourism. The second gap that is noted by Wei, W. Wei *et al*. and S.M. Loureiro *et al*. is that scholars have mainly focused their research on VR in global North countries, especially Europe (i.e., Germany, Ireland, the United Kingdom (UK), Italy, Switzerland, Denmark, Finland, Greece, and the Czech Republic), the United States of

[22] B. Neuhofer *et al*., 'A typology of technology-enhanced experiences', *International Journal of Tourism Research* 16(4), 2014, p. 344; UNWETO, n.d., <https://www.unwto.org/digital-transformation>, access: 20 July 2020; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 10-11.
[23] A. Pestek & M. Sarvan, 'Virtual reality and modern tourism', *Journal of Tourism Future* 7(2), 2020, pp. 245-250; W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 282; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 3; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 637; I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 140; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 94; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 63.
[24] S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 1; Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, p. 282; A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 285.
[25] M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 1; Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, p. 282.

America (USA), Australia as well as Asia (i.e., South-Korea, Taiwan and Hong Kong).[26] Thus, scholars have neglected the role of VR in tourism industries in global South countries (excluding Asia). In order to address this void, the main case study for this thesis is a global South country, namely the Republic of South Africa (henceforward South Africa).

South Africa is situated in the southernmost tip of Africa and covers an area of 1,223,201 sq. km (472,156 sq. miles). It is surrounded by five neighbouring countries eSwatini (formally Swaziland), Lesotho, Namibia, Zimbabwe, and Mozambique and two oceans (the Atlantic Ocean and the Indian Ocean) (See Figure 1).[27]

Figure 1: Map of South Africa

From: W.P. Perry & B.M. Richard, 'South Africa', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 882.

[26] W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 288; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 15; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 542.

[27] W.P. Perry & B.M. Richard, 'South Africa', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 882; M. Brett *et al*., *Eyewitness Travel: South Africa*, p. 14; H. Du Plessis, *Tourism destinations Southern Africa*, p. 2.

In many regards, South Africa has long been heralded as the "gateway" to Africa.[28] It is seen as an economic hub, as the leader in a number of domains within the context of the African continent and also falls into the category of one of the top African tourist destinations.[29] In terms of technology, South Africa has for a considerable time been one of the leaders in this domain. For example, South Africa has been one of the largest ICT markets in Africa. In 2018, the President of South Africa, Cyril Ramaphosa, incorporated the 4th industrial revolution into his economic policy. He announced the establishment of a Digital Industrial Revolution Commission to focus on the 4th industrial revolution in South Africa.[30]

1.4 Definitions of key concepts

This section defines the key concepts mentioned in this thesis so as to explain what they mean in this particular context. These include: virtual and reality; virtual reality; VR tourism; immersion; interaction; types of immersive (i.e., non-immersive, semi-immersive and fully immersive); interaction and presence.

1.4.1 *Virtual and reality*

First, it is imperative to understand the definitions of the words "virtual" and "reality" in order to comprehend the compound concept "VR tourism". During the past decade, the word "virtual" has become one of the most over utilised words in the English language.[31] The word "virtual" is derived from the Latin words *virtuālis* [effective] or *virtūs* [virtue].[32] The *Collins Dictionary* defines "virtual" as "something [that] is so nearly true that for most purposes it can be regarded as

[28] M. Sandretton, 2016, <https://www.howwemadeitinafrica.com/south-africa-still-gateway-africa/56591/>, access: 19 February 2021.
[29] A. Saayman & M. Saayman, 'Forecasting tourist arrivals in South Africa', *Acta Commercii* 10(1), 2010, p. 281; N. Krige, 2019, <https://www.thesouthafrican.com/travel/tourism-in-south-africa-on-the-decline-2019/>, access: 19 February 2020; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314; J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 91; S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 80.
[30] International Trade Administration, 2020, <https://www.trade.gov/knowledge-product/south-africa-information-technology>, access: 19 February 2021; E. Sutherland, 'The fourth industrial revolution – the case of South Africa', *Politikon* 47(2), 221, pp. 233-234.
[31] J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 1.
[32] Collins Dictionary, 2018a, <https://www.collinsdictionary.com/dictionary/english/virtual>, access: 21 May 2018.

true".[33] According to K. Pimentel and K. Teixeira, "virtual" means "the essence or effect of something, not the fact".[34] P. Lévy adds that "virtual" often refers to "signify the absence of existence".[35] All of these definitions indicate that "virtual" is not entirely real, implying that it is not tangible.

Regarding computing, W.R. Sherman and A.B. Craig state that the word "virtual" has been applied to early concepts in computing.[36] The *Collins Dictionary* defines virtual in terms of computing as "objects and activities [that] are generated by a computer to simulate real objects and activities".[37] The online *English Oxford Living Dictionary* and the *Free Dictionary* explain this by stating that the activity or object does not physically exist, but the computer software creates an environment that appears real on the screen to the user.[38] Here again in the context of computing, the intangible reality is a common denominator in the definitions.

Sherman and Craig also state that scholars struggle to define the word "reality" because the definition of the word often leads to complex philosophical discussions.[39] The word "reality" is derived from the French word *realite* [property] and the Latin word *realitas* [property].[40] Based on the *Pharos Dictionary*, the word "reality" refers to "the real world, real life, actuality, truth, physical existence".[41] Lévy defines the "reality" as "a material embodiment, a tangible presence". In other words, "reality" refers to "a place that exists and … [be] can experience[d]",[42] which "[is] not imaginary".[43] It therefore, appears that reality is the opposite of virtual and, thus the combined term is almost a contradiction.

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[33] Collins Dictionary, 2018a, <https://www.collinsdictionary.com/dictionary/english/virtual>, access: 21 May 2018.
[34] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 417.
[35] P. Lévy, *Becoming virtual: reality in the digital age*, p. 16.
[36] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 6.
[37] Collins Dictionary, 2018, <https://www.collinsdictionary.com/dictionary/english/virtual>, access: 21 May 2018.
[38] English Oxford Living Dictionary, 2018, <https://en.oxforddictionaries.com/definition/virtual>, access: 5 June 2018; The Free Dictionary, 2018, <https://www.thefreedictionary.com/virtual>, access: 6 June 2018.
[39] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 6.
[40] Oxford English Dictionary, 2018, <http://www.oed.com.uplib.idm.oclc.org/view/Entry/158934?redirectedFrom=reality>, access: 28 May 2018.
[41] M. Waite (ed.), *Oxford Thesaurus of English*, p. 709.
[42] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 6.
[43] *Pharos English dictionary for South Africa*, Kernerman Semi-Bilingual Dictionaries, pp. 56-57.

1.4.2 *Virtual reality*

Thus, the numerous definitions and the literature on VR indicate that scholars find it difficult to define the concept of VR (or also known as cyberspace, telepresence, artificial reality, immersion computing immersive media, synthetic experience, virtual/artificial worlds).[44] This is because the definition of "VR" is in flux as it is still a relatively new and developing technology. Moreover, scholars often disagree on what properties are necessary for an experience to be classified as VR.[45] For this reason, most definitions are based on technological terms, the different technologies, concepts and theories.[46] The *Cambridge Dictionary* defines the concept of "VR" as a " set of images and sounds, produced by a computer, that seem to represent a place or a situation that a person can take part in".[47] J. Kaminski describes "VR" as a "3D [three dimensional] computer-generated "virtual environment" that users can navigate and interact with in real time".[48] C.E. Loeffler and T. Anderson state that VR is "a three-dimensional, computer-generated, simulated environment that is rendered in real time according to the behaviour of the user".[49] The Virtual Reality Society explains VR as follows:

> a three-dimensional, computer-generated environment which can be explored and interacted with by a person. That person becomes part of this virtual world or is immersed within this environment

[44] C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xiii; J. Kaminski, 'Virtual reality tourism', *in* L.L Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), T*ourism: the state of the art*, p. 285; D.C. Traub, 'The promise of virtual reality for learning', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. 107; A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 109.

[45] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 109; E. Marchiori *et al*. 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 205; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 6.

[46] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 95.

[47] Cambridge Dictionary, 2018a, <https://dictionary.cambridge.org/dictionary/english/virtual-reality>, access: 2 June 2018.

[48] J. Kaminski, 'Virtual reality tourism', *in* L.L Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404.

[49] C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xiv.

> and whilst there, is able to manipulate objects or perform a series of actions.[50]

Tourism scholars also define the concept of VR by mostly relying on D.A. Guttentag's well-known definition of VR:[51]

> the use of a computer-generated environment [the virtual environment] that one can navigate [the ability to move and explore the virtual environment] and possibly interact [to the ability to select and move objects within the virtual environment] with resulting in real time simulation of one or more of the user's five senses.[52]

For J. Lovine, "VR" means "a synthetic, three-dimensional, interactive environment typically generated by a computer".[53] J.P. Hobson and A.P. Williams explain that "VR" "gives people the feeling that they are being transported from a physical world to a world of imagination".[54] W.C. Hunter refers to "VR" as a "form of information technology which enables users to navigate in computer-simulated environments. They [the users] are immersed in an interactive three-dimensional digital representation of places or real-world scenarios".[55]

Derived from the range of definitions and this study, the majority of scholars seem to agree that the word "VR" resembles Alice's adventure in *Wonderland*[56] as it transports users from their reality to a 3D interactive computer-generated virtual world.

1.4.3 *Virtual reality tourism*

Although several tourism scholars provide their own definition of the concept of VR, there appears to be no definitive definition of virtual tourism in tourism literature. This is due to scholars often

[50] Virtual Reality Society, 2017a, <https://www.vrs.org.uk/virtual-reality/what-is-virtual-reality.html>, access: 2 June 2018.
[51] M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research*, 30(3), 2005, p. 65; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism* 2017, p. 2; R. George, *Marketing tourism in South Africa*, p. 343.
[52] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 638.
[53] J. Lovine, *Step into virtual reality*, p. 2.
[54] J.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 128.
[55] W.C. Hunter, 'Virtual reality', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 1006.
[56] A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 438.

failing to define the concept "VR" in a tourism context.[57] In terms of tourism, A. Beaver defines "VR" as "experiencing a destination artificially".[58] For P. Robison, "VR" "offers tourists an opportunity to visit and experience a destination using a computer or other technologies".[59] C. Krug describes "VR" as the "form of elaborate cyber-journeys to traditional tourist destinations (or, more precisely, to their virtual equivalents on … the internet)".[60] M.J. Kim and M.C. Hall state that VR tourism is a "virtual representation of an actual attraction, destination, or visitor experience that is designed as a prelude to visitation or to extend previous experiences".[61] J. Hopf *et al*. explain their definition by stating that "VR technology enables viewers to virtually experience and explore destinations by immersing them into an VR and triggering a feeling of 'being present'".[62]

It can, therefore, be noted from the above range of definitions, that scholars mostly define the concept of "VR" as a non-physical form of tourism that allows tourists to travel to a computer-generated destination without them having to physically go there.[63] Typical examples of VR tourism include on-line guided tours of museums or heritage sites, panoramic photographs of a location and virtual tourist agencies.[64]

[57] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, pp. 591, 600; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147.
[58] A. Beaver, *A dictionary of travel and tourism terminology*, p. 352.
[59] P. Robison, 'Virtual tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 271.
[60] C. Krug, 'Virtual tourism: the consumption of natural and digital environments', *in* C. Gersdorf & S. Mayer (eds.), *Nature in literary and cultural studies: transatlantic conversations on ecocriticism*, p. 249.
[61] M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 236.
[62] J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, p. 169.
[63] M.M. Maymand *et al*., 'Investigation of the key success factors of virtual tourism', *Indian Journal of Science and Technology* 5(7), 2012, p. 3073; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 35; P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Sharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4113; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 148; H.L. Vogel, *Travel industry economics: a guide for financial analysis*, p. 243; L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 203.
[64] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 195; P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Sharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4113; H.L. Vogel, *Travel industry economics: a guide for financial analysis*, p. 243; L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 203.

1.4.4 *Immersion, interaction and presence*

Scholars seem to concur that there are three key criteria necessary for a VR experience: immersion, interaction and presence (See Diagram 1).[65]

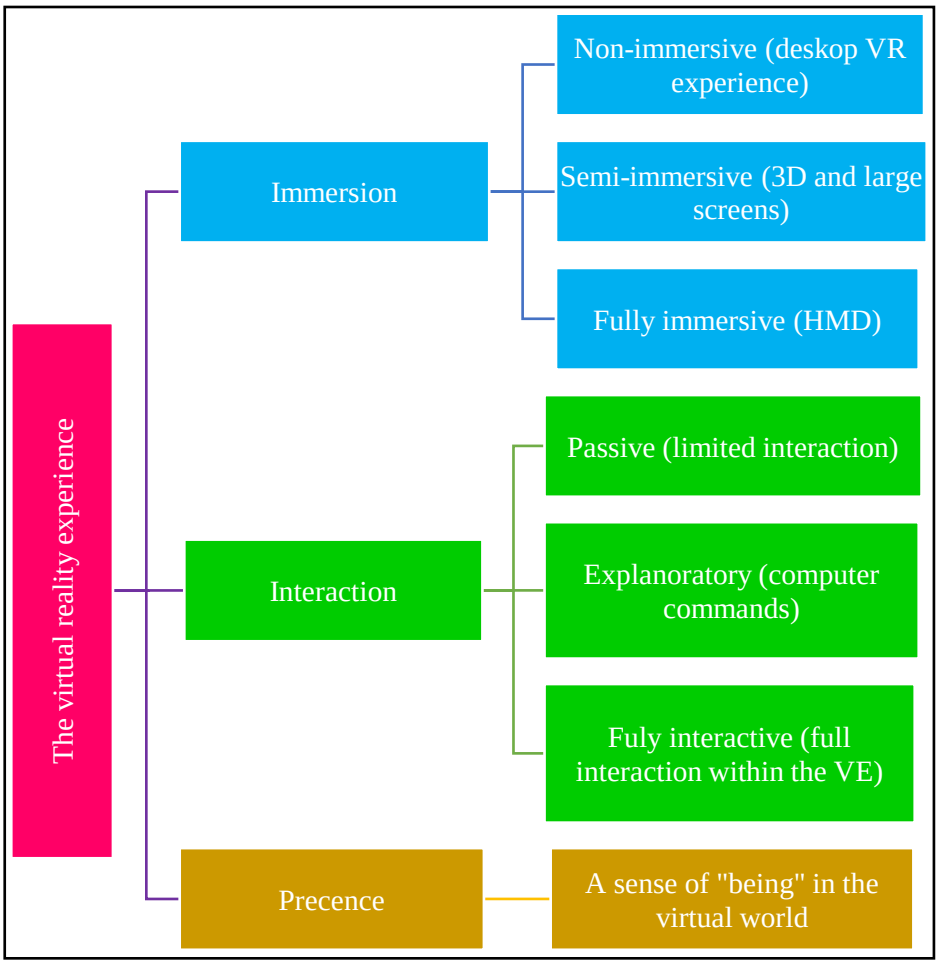

Diagram 1: The VR experience

VR literature shows that there is no clear definition of the word "immersion".[66] Basically, immersion isolates people from their reality by creating an illusion that are they "present" in a virtual world.[67] Immersion can be divided into three types of systems, namely non-immersive,

[65] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 3; J. Eddings, *How virtual reality works*, p. xi; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 143.

[66] M.I. Berkman & E. Akan, 'Presence and immersion in virtual reality', *in* N. Lee (ed.), *Encyclopedia of Computer Graphics and Games*, p. 1.

[67] Reality Technologies, 2016, <http://www.realitytechnologies.com/virtual-reality>, access: 05 June 2018; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 9; J. Eddings, *How virtual reality works*, pp. xi, 5; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism*

semi-immersive and fully immersive.[68] The non-immersive system (also known as a desktop-based VR system) is the most common and least immersive of the three systems. The reason is that a non-immersive system is based on a desktop-type computer system that allows the user to view the virtual environment (VE) through a computer monitor or a similar device (See Figure 2). To interact with the VE, a person uses a mouse, a keyboard, a trackball or any other external device.[69]

Figure 2: A non-immersive system

From: Reality Technologies, 2016, <http://www.realitytechnologies.com/virtual-reality>, access: 5 June 2018.

Management 31(5), 2010, p. 638; S.A.I. Urriza *et al*., 'MoViT: a 3D mobile virtual tour app of Panguil River Eco-Park', *in* E.S. Sezgin (ed.), *e-Consumers in the era of new tourism*, p. 105; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 438; A. Dix *et al*., *Human-computer interaction*, p. 71.

[68] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 6; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 638; J. Vince, *Virtual reality systems*, p. 12; Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xiv; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 182.

[69] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 6; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 638; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xv; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 591; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 182.

The second is the semi-immersive system which has 3D sound and a large-screen projection or multiple projection screens that project images on the walls and the floor of a room (See Figure 3). This provides the user with a multipurpose experience and varying degrees of immersion.[70]

Figure 3: A semi-immersive system

From: Reality Technologies, 2016, <http://www.realitytechnologies.com/virtual-reality>, access: 5 June 2018.

Although a non-immersive system and semi-immersive system still enable the user some interaction with the real world, it is the third type, the fully immersive system, that does not allow the user any interaction with the real world, but rather immerses the individual totally in the VE. This is due to a head-mounted display (HMD), which isolates a person completely (See Figure 4). As a result, the user has a deeper sense of presence.[71]

[70] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 6; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 638; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, pp. xiv-xv; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 591; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 182.

[71] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 6; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 638; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xiv; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 591; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 182.

Figure 4: A fully immersive system

From: Reality Technologies, 2016, <http://www.realitytechnologies.com/virtual-reality>, access: 5 June 2018.

The second criterion for the VR experience is interaction. Interaction is a vital component in the VR experience as it provides the user with an authentic experience and the feeling of presence.[72] The reason is that interaction gives the user the ability to navigate the VE and to manipulate virtual objects, such as a chair.[73] According to A.V. Seaton and M.M. Bennett, there are three main levels of interaction, namely passive, exploratory and fully interactive.[74] In the passive system, there is limited interaction as the user does not control the image. The exploratory system allows the user to move through the VE by giving the computer commands. The fully interactive system provides the user with a full interaction experience as the user is able to interact with the environment, for example, to pick an object up in the virtual world.[75]

The last criterion of the VR experience is presence (or also known as telepresence and virtual presence).[76] There is no accurate definition of the word "presence". Similar to VR, scholars define

[72] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 287; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 10.
[73] J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 4; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xv; J. Eddings, *How virtual reality works*, p. xi.
[74] A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 438.
[75] A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 438.
[76] M.I. Berkman & E. Akan, 'Presence and immersion in virtual reality', *in* N. Lee (ed.), *Encyclopedia of Computer Graphics and Games*, p. 1.

"presence" differently.[77] In terms of VR, scholars state that the word "presence" gives a person a sense of being in a virtual world, even if that person is physically situated in another place.[78]

1.5 Methodology, source limitations and future recommendations

A qualitative research approach was used for this study. Qualitative research has become a popular form of research among scholars in a range of disciplines, including: education, sociology, anthropology, information studies and consumer behaviour,[79] as well as tourism. However, these scholars do not appear to agree on the definition of qualitative research.[80] For C. Ren, qualitative research aims to "explore and search the meaning or to develop an understanding through empirical studies, generating rich descriptions or collecting material, which may become subject to interpretation".[81] In basic terms, qualitative research describes research methods and techniques that provide information in the form of words, sounds and images, unlike quantitative research that focuses on numerical data and statistics.[82]

Being a relatively new field of study, many scholars in tourism were unfamiliar and hesitant to adopt and accept qualitative research methods. This is partly because early research based on qualitative methods was published in non-tourism journals and monographs, particularly, the

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[77] D.A. Guttentag, 2010, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), p. 638.

[78] M.I. Berkman & E. Akan, 'Presence and immersion in virtual reality', *in* N. Lee (ed.), *Encyclopedia of Computer Graphics and Games*, pp. 1-2; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 141; E. Marchiori *et al*., 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 205; P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 257; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), p. 589; V. Bogicevic *et al*., 'Virtual reality presence as a preamble of tourism experience: the role of mental imagery', *Tourism Management* 74, 2019, p. 56; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 7; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 155; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 9.

[79] R.W. Riley & L.L. Love, 'The state of qualitative tourism research', *Annals of Tourism Research* 27(1), 2000, p. 165; V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 12; L.M. Given, 'Introduction', *in* L.M. Given (ed.), *The SAGE encyclopedia of qualitive research methods*, p. xxix; R.K. Yin, *Qualitative research from start to finish*, p. 6.

[80] L. Goodson & J. Phillimore, 'Progress in qualitative research in tourism: epistemology, ontology and methodology', *in* L. Goodson & J. Phillimore (eds.), *Qualitative research in tourism: ontologies, epistemologies and methodologies*, p. 3.

[81] C. Ren, 'Qualitative research', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 763.

[82] A.J. Veal, *Research methods for leisure and tourism*, pp. 135, 278.

Social Research, the *American Journal of Sociology*, the *International Journal of Comparative Sociology and Sociology*.[83] Another reason is that some tourism scholars often considered qualitative research as a "soft", "non-scientific" and an "inferior" approach compared to quantitative research. It was also because most tourism research was initially located in the economic and management sciences.[84] In recent decades, qualitative research has begun to emerge and even sometimes dominate tourism studies as scholars have considered it as an essential and valid tourism research strategy.[85] The numerous journals based on qualitative research reflect this, such as, *Tourism Studies*, as well as, the chapters in L. Goodson and J. Phillimore's book, '*Qualitative research in tourism: ontologies, epistemologies and methodologies*'.[86]

Qualitative research consists of a range of data-collection methods, for example interviews, focus groups, participant observation, ethnography, phenomenology, narrative, ground theory and content analysis and case study.[87] The qualitative research methods used for this study include case studies, the conceptual research approach and open-ended interviews. The case study approach is a popular method used in numerous social science fields, for instance, anthropology, psychology, sociology, political sciences, social work, business, community studies, education and law, as well as tourism.[88] As a matter of fact, the case study approach is a widely used strategy among tourism scholars.[89]

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[83] R.W. Riley & L.L. Love, 'The state of qualitative tourism research', *Annals of Tourism Research* 27(1), 2000, p. 165; V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 12; L. Goodson & J. Phillimore, 'Progress in qualitative research in tourism: epistemology, ontology and methodology', *in* L. Goodson & J. Phillimore (eds.), *Qualitative research in tourism: ontologies, epistemologies and methodologies*, pp. 3-4.

[84] K.L. Harris, 'Taking history on tour – lowering the disciplinary drawbridge', *Journal of Tourism History* 9(2-3), 2017, p. 223.

[85] A.J. Veal, *Research methods for leisure and tourism*, p. 282; C. Ren, 'Qualitative research', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 765.

[86] C. Ren, 'Qualitative research', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 765.

[87] A.J. Veal, *Research methods for leisure and touris*m, p. 136; J. Sauro, 2015, <https://measuringu.com/qual-methods/>, access: 5 August 2020; L.M. Given, 'Introduction', *in* L.M. Given (ed.), *The SAGE encyclopedia of qualitative research methods*, p. xxix; R.K. Yin, *Qualitative research from start to finish*, p. 6; D.R. Hancock & B. Algozzine, *Doing case study research: a practical guide for beginning researchers*, p. 9.

[88] H. Xiao & S.L.J. Smith, 'Case studies in tourism research: a state-of-the-art analysis', *Tourism Management* 27(5), 2006, p. 739; H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 123; R.K. Yin, *Case study research and applications: design and methods*, p. 34.

[89] D. Botterill & V. Platenkamp, *Key concepts in tourism research*, p. 20; H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 123; A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 136; S. Beeton, 'The case study in tourism research: a multi-method case study approach', *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 37.

The concept of case study is difficult to define as a research method as scholars differ about the basic characteristics.[90] Another reason is that some scholars do not understand the case study approach because they sometimes confuse it with doing "fieldwork", as in the case of participant-observation.[91] Moreover, earlier social science scholars did not consider the case study approach as a formal method.[92] However, based on the well-known definition by R.K Yin, the case study approach "is an empirical method that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident".[93] Yin adds another definition by stating that a case study approach is "a study of a particular case or set of cases, describing or explaining the events of the case(s)".[94] D. Botterill and V. Platenkamp describe the case study approach as "the study of a few cases, sometimes one, constructed out of naturally occurring social situations and investigated in considerable depth".[95] For S. Beeton, the case study approach is "a holistic empirical inquiry used to gain an in-depth understanding of a contemporary phenomenon in its real-life context, using multiple sources of evidence".[96] A.J. Veal and J. Mouton state that cases can include the following: individuals, households, communities (i.e., villages, islands, cities), organisations and companies, places, projects, events, countries/nations and regions.[97]

Initially, the case study approach was also criticised among tourism scholars. Numerous scholars regard the case study approach as weak, atheoretical, fundamentally intuitive, ungeneralised, speculative and an unreliable method compared to other research methods, such as experiment or survey methods.[98] Some scholars also claimed that doing case study research can be time-

[90] P. Swanborn, *Case study research: what, why and how*, p. 11; J.K. Blatter, 'Case study', *in* L.M. Given (ed.), *The SAGE encyclopedia of qualitative research methods*, p. 68.
[91] R.K. Yin, *Case study research and applications: design and methods*, p. 44.
[92] R.K. Yin, *Case study research and applications: design and methods*, p. 44.
[93] R.K. Yin, *Case study research and applications: design and methods*, p. 44.
[94] R.K. Yin, *Qualitative research from start to finish*, p. 17.
[95] D. Botterill & V. Platenkamp, *Key concepts in tourism research*, p. 19.
[96] S. Beeton, 'The case study in tourism research: a multi-method case study approach', *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 42.
[97] A.J. Veal, *Research methods for leisure and tourism*, pp. 138, 399; J. Mouton, *How to succeed in your master's and doctoral studies: a South African guide and resource book*, p. 149.
[98] H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 122; S. Beeton, 'The case study in tourism research: a multi-method case study approach', *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 38; H. Xiao & S.L.J. Smith, 'Case studies in tourism research: a state-of-the-art analysis', *Tourism Management* 27(5), 2006, pp. 738-739; Y.C. Gagnon, *The case study as research method: a practical handbook*, p. x; A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 136; R.K. Yin, *Case study research and applications: design and methods*, p. 50.

consuming and sometimes cases can be extremely long. They argued that as a result, the meaning of the study would be lost.[99] Furthermore, Mouton provides more limitations of case study research by stating that they lead to "bias of the researcher", and lack "generalisability of results" and "rigour in analysis".[100]

However, tourism scholars' stereotypical perceptions have been changing over the years due to the increase of literature on case study methodology.[101] This is because case studies are richly descriptive as tourism scholars use multiple sources, especially primary material (i.e., archival/statistical documents, government reports and newspaper articles), interviews and focus groups. This is beneficial as it increases the reliability of any explanation.[102] Another advantage of case study research is that it is an all-encompassing method. It also aligns with J. Tribe's perception of tourism as an "indiscipline" given its multi-faceted nature.[103] This means that the case study research covers the logic of design, information-collection techniques and specific approaches to information analysis.[104] Moreover, case study research has a high construct validity and provides the researcher with in-depth insight to the study.[105] With regards to tourism, H. Xiao and S.L.J. Smith, note that the case study approach has been used to address different issues and topics, especially tourism development and planning, alternative forms of tourist experience, marketing, tourism niches, host-guest relations, management and consumer behaviour.[106]

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[99] S. Beeton, 'The case study in tourism research: a multi-method case study approach', *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 40; A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 136; R.K. Yin, *Case study research and applications: design and methods*, p. 54; Y.C. Gagnon, *The case study as research method: a practical handbook*, p. 3.

[100] J. Mouton, *How to succeed in your master's and doctoral studies: a South African guide and resource book*, p. 150.

[101] H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 123.

[102] H. Harder, 'Explanatory case study' *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 371; H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 124; P. Swanborn, *Case study research: what, why and how*, p. 14; A.J. Veal, *Research methods for leisure and tourism*, p. 138; A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 135; D.R. Hancock & B. Algozzine, *Doing case study research: a practical guide for beginning researchers*, p. 16.

[103] J. Tribe, 'The indiscipline of tourism', *Annals of 'Tourism Research* 24(3), 1997, p. 654.

[104] A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 135; H. Xiao & S.L.J. Smith, 'Case studies in tourism research: a state-of-the-art analysis', *Tourism Management* 27(5), 2006, p. 739.

[105] J. Mouton, *How to succeed in your master's and doctoral studies: a South African guide and resource book*, p. 150.

[106] H. Xiao & S.L.J. Smith, 'Case studies in tourism research: a state-of-the-art analysis', *Tourism Management* 27(5), 2006, pp. 742,746; H. Xiao, 'Case study research in tourism', *in* A.J. Mills *et al*. (eds.), *Encyclopedia of case study research*, p. 125; D. Botterill & V. Platenkamp, *Key concepts in tourism research*, p. 21.

There are serval classifications of case studies, for instance, intrinsic, instrumental, collective, exploratory, single, descriptive and explanatory.[107] This study utilises the single-case study and descriptive case studies. A single-case study focuses mainly on a single case that is selected because it is a critical, common, unusual, revelatory or longitudinal case. The single-case study is used where the case represents a critical test of existing theory, an extreme or unusual circumstance, a common case or for a revelatory or longitudinal purpose. A single-case study can either be holistic or embedded. In terms of a holistic case, the case is the unit of analysis. In an embedded case, there are numerous units of analysis in the case.[108] For this thesis, the holistic approach is used as it only focuses on one case study.

Descriptive case studies provide the researcher with detailed descriptions of the case in terms of its real-world context. For example, a hospital administrator will use a descriptive case study to gain a detailed description of the hospital's emergency room procedures when new patients are admitted.[109] In terms of this study, the descriptive case study refers to VR, which will be described in a real-world context, namely South Africa.

The second methodological approach used for this study is conceptual research. Unfortunately, tourism researchers have for the most part ignored the conceptual research approach as most research mainly focuses on quantitative and qualitative research methods.[110] The definition of the word "concept" is that it "help us [to] understand complex ideas (e.g. responsibility) and propose novel juxtapositions of ideas (e.g. responsible tourism)".[111] The conceptual research approach is different from empirical research as it "does not offer hypotheses testing or theory development".[112] Researchers often use the conceptual research approach in order to "develop new

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[107] R.E. Stake, *The art of case study research*, p. 3; R.K. Yin, *Case study research: design and methods*, p. 40; R.K. Yin, *Case study research and applications: design and methods*, p. 39.
[108] M. Adolphus, n.d., <https://www.emeraldgrouppublishing.com/archived/research/guides/methods/case_study.htm#:~:text=Single%20cases%20and%20multiple%20cases,of%20analysis%20in%20the%20case.>, access: 13 August 2020; R.K. Yin, *Case study research and applications: design and methods*, p. 353; R.K. Yin, *Case study research: design and methods*, pp. 97, 319.
[109] D.R. Hancock & B. Algozzine, *Doing case study research: a practical guide for beginning researchers*, p. 33; R.K. Yin, *Case study research and applications: design and methods*, p. 351; P. Baxter & S. Jack, 'Qualitative case study methodology: design and implementation for novice researchers', *The Qualitative Report* 13(4), 2008, p. 548; A. Fyall, 'Case study', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 135; R.K. Yin, *Case study research: design and methods*, p. 316.
[110] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, pp. 66, 68.
[111] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, p. 68.
[112] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, p. 68.

concepts or to reinterpret existing ones".[113] The conceptual approach offers tourism scholars many benefits, for example, it answers difficult questions that cannot be addressed by empirical research.[114] Unfortunately, the conceptual research approach also has many drawbacks. According to Xin *et al*., the biggest drawback of the conceptual approach is that it lacks a tangible degree of precision.[115]

The study also utilised a limited number of oral interviews particularly because there is very little written on VR in the context of South Africa and because COVID-19 restrictions obstructed the interview process. Interviews are often a favourite method among researchers from the social science field, including tourism.[116] Scholars define interviews as face-to-face interactions or voice-voice interactions between the researcher and participant.[117] In terms of tourism, interviews are often used to obtain information from stakeholders, governments, planning agencies, companies and organisations, and host communities regarding consumer behaviour, tourist satisfaction, constraints to travel, tourism niches and motivation.[118]

Tourism researchers prefer the interview method because it is more exploratory and in-depth. Interviews are also chosen as they are regarded as cost-effective and an efficient research approach.[119] Another benefit of the interview method is that it allows the researcher more flexibility with a range of themes and topics.[120] However, the interview method also has some drawbacks. Unfortunately, the researcher depends on the honesty of the participant in order to have a successful interview.[121] Interviews are also prone to bias. For instance, if a researcher changes his/her tone of voice or facial expression, it might promote or put answers into the participant's

[113] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, p. 72.
[114] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, p. 73.
[115] S. Xin *et al*., 'Conceptual research in tourism', *Annals of Tourism Research* 41, 2013, p. 74.
[116] G.R. Jennings, 'Interviewing: a focus on qualitative techniques' *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 99.
[117] G.R. Jennings, 'Interviewing: a focus on qualitative techniques' *in* B.W. Ritchie *et al*. (eds.), *Tourism research methods: integrating theory with practice*, p. 101; M.M. Su, 'Interview', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 489.
[118] M.M. Su, 'Interview', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 489; N.G. McGehee, 'Interview techniques', *in* L. Dwyer *et al*. (eds.), *Handbook of research methods in tourism: quantitative and qualitative approaches*, pp. 367-368.
[119] M.M. Su, 'Interview', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 489.
[120] M.M. Su, 'Interview', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 489; N.G. McGehee, 'Interview techniques', *in* L. Dwyer *et al*. (eds.), *Handbook of research methods in tourism: quantitative and qualitative approaches*, p. 371.
[121] N.G. McGehee, 'Interview techniques', *in* L. Dwyer *et al*. (eds.), *Handbook of research methods in tourism: quantitative and qualitative approaches*, p. 371.

mouth.[122] Another drawback is that if there is not a partnership between the researcher and participant and this can result in misunderstanding.[123] There are three types of interviews: structured, semi-structured and unstructured interviews. The type of interview used for this study is semi-structured. The semi-structured interview is "partially formulated by a flexible interview guide, which ensures the focus on desired themes, but allows new ideas to be brought up".[124]

The sample size for the study consisted of ten tourism attractions[125] and ten VR companies.[126] The aim of the open-ended interviews was to obtain information on the role of VR in tourism in the context of South Africa. As a result of COVID-19, interviews were not physically conducted, but were virtually conducted via virtual platforms, such as Zoom and WhatsApp.

The research for this study comprises both primary and secondary sources. It used academic articles as the bulk of the research conducted on VR and tourism.[127] The second source was conference papers which deal with VR and technology, particularly, the International Federation for IT and Travel and Tourism's ENTER e-tourism Conference, and the IEEE International Conference on Consumer Electronics. The third source was tourism-related books and dictionaries, where brief, if not passing reference, is made to VR. Lastly, Google was also of relevance as it provides general information on VR and tourism as do blogs and other social media platforms. The common thread among most of these is that they are generally all focused on specific or distinct aspects of VR tourism and reflect in a sense on the fast-changing character of the topic.

In light of the study, the author also experienced some limitations. It is believed that the limitations can be used as directions and opportunities for future researchers. The major limitation for this

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[122] V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 16.
[123] N.G. McGehee, 'Interview techniques', *in* L. Dwyer *et al*. (eds.), *Handbook of research methods in tourism: quantitative and qualitative approaches*, p. 371.
[124] M.M. Su, 'Interview', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 489.
[125] Maropeng and the Sterkfontein Caves (Gauteng and North West provinces); Constitution Hill (Gauteng province); Kruger National Park (Limpopo and Mpumalanga provinces); Ushaka Marine World (Kwa-Zulu Natal province); Groot Constantia (Western-Cape province); Origin Centre province); Western Cape Tourism (Western-Cape province); &Beyond and WildEarth (Gauteng province); Scifest Africa (Eastern-Cape province); and KwaZulu-Natal Tourism (Kwa-Zulu Natal province).
[126] Virtual Reality (Johannesburg); SenseVirtual (Cape Town); Unlock Reality (Johannesburg); Speak Geek? (Johannesburg); Afriten Technologies (Johannesburg); Virtual Reality South Africa (Association) (Johannesburg); Virtual Reality Production Company (Johannesburg); Eden Labs (Johannesburg); New Reality (Johannesburg); bizAR Reality (Boksburg); and VR Events (Cape Town).
[127] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 8.

study was COVID-19. As is mentioned in Chapter 6, the South African government imposed a strict national lockdown and as a result, the University of Pretoria, where the candidate is a student, had to close its doors temporarily. This meant access issues to sources and no face-to-face interviews.

Another limitation of this study was that the literature regarding VR and its impact on the tourism industry in South Africa is relatively scarce. The reason is that most scholars have focused their attention on Europe, the USA, Australia and Asia. To address this gap, future tourism scholars from the global South need to contribute to the literature by focusing on VR and its impact on their respective tourism industries.

Lastly, due to the limited information on VR in South Africa, the candidate conducted interviews with a limited number of stakeholders who responded to the invitation. Under lockdown circumstances these were difficult to arrange due to companies not being accessible and other restrictions imposed by the Covid-19 circumstances. Future scholars should adopt other methodological approaches in order to further research on VR. See Appendix 3 for ethnical approval.

1.6 Chapter outline

The last section of this Chapter provides the outline for this thesis. It is divided into eight chapters. The first is essentially the background and context. It presented a short introduction and considered the background, key concepts, methodology, limitations, and future recommendations. Chapter 2 considers the literature and presents a critical review of the areas that tourism scholars have addressed regarding VR and tourism. This chapter concludes by highlighting the key research gaps and areas of future study that need to be addressed by tourism scholars. In Chapter 3, entitled "Then and now", traces the origin and development of VR in a historical discussion. This is achieved by focusing on the important events and the evolution of the technology required for a person to have an experience in a so-called virtual world.

The second half of the thesis turns to the specifics of VR and tourism. Chapter 4 examines the role of VR in the tourism industry. This is by providing a detailed analysis of the various types of VR tourism, namely gamification tourism, e-tourism, smartphone and app tourism, film and television tourism, virtual video/image tourism, drone tourism and space tourism. Chapter 5 assesses the

benefits and drawbacks regarding the issue of VR tourism and what the implications of this are on the tourism domain. It is divided into two main sections. The first investigates the positive and negative aspects of VR found within the tourism sector, and the second addresses the vital questions scholars are asking concerning VR and its role in tourism, such as: VR as a substitute for conventional tourism; the authenticity of VR in a tourism context; and the influence of VR on the conventional concept and definition of tourism. Chapter 6 turns to the role of VR in the tourism industry in South Africa. The aim of Chapter 6 is to examine how VR can address the three current problematic issues faced by the South African tourism industry, namely crime, political instability and health-related issues. The penultimate chapter showcases the similarities between the conventional tourism models and VR. The next chapter is divided into two main sections. The first section pays particular attention to C.A. Gunn's functioning tourism system model; N. Leiper's tourism system model; A. Mathieson and G. Wall's tourist decision-making process model; RW. Butler's Tourist area life-cycle (TALC) model and S.L.J Smith's tourism product model. In the second section of Chapter 7, the chapter discusses to what degree VR aligns to these models. Finally, Chapter 8 concludes the thesis by addressing the main question of the thesis, namely will VR tourism be considered as a frontier or the end of the tourism industry? This is achieved through focusing on the role of VR in tourism.

Chapter 2: Literature Review

2.1 Introduction

This literature review is divided into a number of sections which reflect on the multitude of foci in the scholarship of VR in a tourism context. In order to make a discussion of this plethora of research work manageable, Chapter 2 begins by first highlighting the key authors in the field of VR in tourism, and then turns to consider a selection of literature reviews that present a useful overview of the vast scholarship. The chapter then addresses the literature in three main focus areas – marketing, virtual worlds and sustainability - whereafter it presents an overview of additional focus areas, including the recent COVID-19 pandemic. Despite this extensive scholarship, there still remain numerous voids that are pointed to in the penultimate section. In addition, the vast literature has also been summarised in a table to reflect on the extent and expanse of this research (See Appendix 1).

As indicated in Chapter 1, VR is not a new phenomenon.[128] As a matter of fact, VR has become one of the most discussed electronic devices in the twenty-first century, particularly for scholars and businesses from the media, education, health industry, retailing and consumer services.[129] Since the 1990s, scholars and practitioners from the tourism industry have also begun to show a keen interest in VR.[130] This is because scholars have started to appreciate the huge impact of VR

[128] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 95; J.P. Guerra *et al*., 'Virtual reality – shows a new vision for tourism and heritage', *European Scientific Journal*, 2015, p. 49.

[129] P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 255; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, 2017), p. 1; N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, p. 72; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 5; J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 125; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 93.

[130] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 424; C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 2; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, 2017), p. 1; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 1; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.),

in the tourism industry.[131] Another reason is that the relationship between technology and tourism has been evolving at an ever increasing fast pace.[132]

2.2 Key authors on virtual reality and tourism

As indicated, given the plethora of literature that has been published on VR and tourism, this select literature review will begin by focusing on key contributions to this expansive and fast developing field of study.

There appear to be four key authors which scholars generally rely heavily on, namely A.P. Williams and J.S.P. Hobson (1994, 1995, 1997); R. Cheong (1995); and D.A. Guttentag (2010). The 1995 article written by Williams and Hobson, 'Virtual reality and tourism: fact of fantasy?', was one of the first to present VR as a new technology for tourism. Their article mainly dealt with the uses of VR, its opportunities and challenges and the future development of VR in tourism, as well as the three aspects of VR, namely visualisation, immersion and interactivity.[133] Similarly, Cheong, who also published in 1995, focuses on the capabilities and the threats facing VR in the

Augmented and reality and virtual reality: empowering human, place and business, p. 95; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 2; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), D*igital culture and e-tourism: technologies, applications and management approaches*, p. 205; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 237; T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, p. 15; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 587.

[131] J. Swarbooke, *The development and management of visitor attractions*, p. 359.

[132] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 424; C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective'. *E-reviews of Tourism Review*, 2018, p. 2; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, 2017), p. 1; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 1; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 95.

[133] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 423; J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 125; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 39; A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, pp. 288-289; A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 139; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, pp. 4-5, 12.

tourism industry. He also discusses the early days of VR in tourism from both a developer's planning and sceptic's point of view.[134] Guttentag is another important author as he was one of the first to provide an overview of the conceptualisation of VR and its applications within the tourism industry. In his article in 2010, Guttentag presents a definition of VR and considers various issues, such as VR as a substitute for tourism; the question of authenticity; the integration of VR; as well as the six main uses of VR within the tourism industry. This includes planning and management, marketing, entertainment, education, accessibility and heritage preservation (for further detail on Guttentag's benefits see Chapters 5 and 6).[135] These pioneering scholars already highlight some key concerns relating to VR and tourism.

2.3 Literature reviews

A survey of the published literature makes it clearly apparent that VR has become a popular topic in tourism. The recent increase in research and publications on VR and tourism has resulted in a number of literature reviews. These are a convenient way to assess the trends and developments. This section discusses literature reviews from 2011 to 2020, including R. Yung and C. Khoo-Lattimore; J. Beck, M. Rainoldi and R. Egger; W. Wei; S.M. Loureiro, J. Guerreiro and F. Ali; M. Sarvan and A. Pestek; N. Kulakoğlu-Dilek, İ. Kızılırmak and S.E. Dilek; J. Zhao, P. Ordóñez de Pablos and R. Tennysson; and J. Zhao, P. Ordóñez de Pablos, and R. Tennysson.

Yung and Khoo-Lattimore completed an extensive literature study in 2017 on VR and augmented reality (AR) by reviewing 46 articles, ranging from marketing to sport. They observed that the popular themes for tourism scholars are VR as a marketing and educational tool. They also noted three issues in the literature regarding VR and tourism, namely the inconsistent use of terminology,

[134] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, pp. 417, 422; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 5; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 97.

[135] S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, pp. 5-6; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, pp. 637-638; D. Plunkett, 'On place attachments in virtual worlds', *World Leisure Journal* 53(3), 2011, p. 175; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 12.

the lack of theory-based VR/AR research, the gaps and challenges, such as awareness of VR/AR technology, usability and time commitment.[136]

Beck *et al*. reviewed 27 articles and conference papers from 1994 to 2018. They provided a systematic and structured overview by presenting a novel and useful classification of the different VR systems, namely: non-immersion, semi-immersion and full immersion. The results revealed that tourism scholars mainly pay attention to the effects of VR on the pre-travel and on-site phases. Their analysis also showed that between 2015 and 2018, scholars have been focusing on the application of HMDs. This reflects the temporal development of VR technology.[137]

Wei's article is a vital component of VR research as it is one of the first to critically review the progress of both VR and AR. The author analysed 60 journal articles published between 2000 and 2018. The aim was to determine the stimuli, dimensions and consequences of VR/AR-related user behaviour and experience in terms of a theoretical framework. Regarding the theoretical framework, the outcome of the study indicated that scholars needed to focus more on other topics related to VR and AR, such as marketing, destination management, customer experience, e-service and co-creation. Wei concluded that the adoption of VR and AR applications go beyond the interpersonal level (i.e. the focal user) and are also extended to the interpersonal level (i.e. a social network).[138]

Loureiro's *et al*. article paper is important since it is one of the few studies conducted on the current state of VR and AR-related studies. The authors examined 56 journal articles and 325 conference papers by using a text-mining approach. According to the authors, the most popular topics used in journal articles are mobile and mobility implications, tourism destination marketing, experience and emotions, atmospherics, smart cities and cultural heritage. In terms of the conference papers,

[136] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, pp. 1, 18-19; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 559.
[137] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, pp. 586, 588.
[138] W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, pp. 539, 563-565.

scholars mainly discussed the following areas, namely mobile uses for sustainable tourism, the use of the Technology Acceptance Model (TAM) as a theoretical model to support VR/AR studies.[139]

According to Kulakoğlu-Dilek *et al*. and Zhao *et al*. and Zhao *et al*., tourism scholars usually consider the definition of virtual tourism, the uses of VR, the positive and negative impacts of VR on tourism, the implications of VR for the future of the tourism industry and whether VR can be a substitute for conventional tourism.[140]

Lastly, in their 2020 publication, Sarvan and Pestek provided an understanding of how recent trends in VR have changed the way the tourism industry communicates and meets the needs of tourists, especially by focusing on planning and management, marketing and consumer requirements. The authors reviewed 49 articles from 2010 to 2019. They concluded that VR in planning and management, and consumer requirements, can be associated with 3D visualisation, simulators, virtual tours, previews and effective planning. Regarding VR in marketing of tourism destinations, they point out that it is associated with attachment, simulation, evaluation, decision-making and experience. The authors conclude their research by stating that VR will continue to advance and as a result, the tourism industry will grow exponentially.[141]

2.4 Main focus areas

This section focuses on the three main areas that have been extensively covered in the literature, namely marketing, virtual worlds and sustainability. Marketing is a key area that tourism scholars have focused on extensively for the last three decades. Specific areas of attention include: VR as a tool for marketing, as well as the benefits of VR for promoting tourism products, services and places (see Chapter 5).[142] Some scholars compare VR with other traditional marketing media (i.e.,

[139] S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, pp. 1, 17.
[140] N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, p. 69; J. Zhao *et al*. 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 201; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 1.
[141] A. Pestek & M. Sarvan, 'Virtual reality and modern tourism', *Journal of Tourism Futures* 7(2), 2020, pp. 245-250.
[142] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 11; J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, p. 170; Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 139; A. Gibson

photos, videos, websites and brochures).[143] For instance, M. Cooper and N.J. MacNeil (2005, 2007, 2008) have mainly focused on the potential of VR tools over the internet for marketing.[144] According to these authors, the use of VR via the internet will become an important marketing medium in the future.[145] In their articles, Cooper and MacNeil also ask a question, namely "what if the place variable could be removed from this equation through further development of virtual reality techniques".[146] The authors reveal that on the one hand, VR reduces the need to travel to the real destination, but on the other hand, it can improve price and service quality information, as well as, change the way tourism is promoted.[147] In his article, W.B. Chiou *et al*. (2008) compare traditional brochures to virtual experiences. The results indicate that verbalisers (tourists who choose written or verbal information) prefer brochures, while the virtual experience was more apparent for visualisers (tourists who prefer visual products and information).[148] T. Griffen *et al*. (2017) compare the impact of destination promotional material viewed in VR with two-dimensional video and a website. The authors use South Africa as part of their methodology to survey students' perceptions of the country. Students watched a video produced by the South African Tourism Board through either an Oculus Rift HMD or a two-dimensional video, or a website. Based on the results, participants that watched the content in VR, reported a better

& M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 97.

[143] T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, p. 16.

[144] M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 61; B. Prideaux, 'Cyber-tourism: a new form of tourism experience', *Tourism Recreation Research* 30(3), 2005, p. 5.

[145] M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 61.

[146] M. Cooper & N.J. MacNeil, 'Virtual reality mapping revisit: IT tools for the divide between knowledge and action in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 211; M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 67; M. Cooper & MacNeil, 'Virtual reality mapping revisit: IT tools for the divide between knowledge and action in tourism', *in* J. Kisielnicki (ed.), *Information communication technologies: concepts, methodologies, tools, and applications*, p. 1906.

[147] M. Cooper & N.J. MacNeil, 'Virtual reality mapping revisit: IT tools for the divide between knowledge and action in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, pp. 201, 211; M. Cooper & N.J. MacNeil, 'Virtual reality mapping revisit: IT tools for the divide between knowledge and action in tourism', *in* J. Kisielnicki (ed.), *Information communication technologies: concepts, methodologies, tools, and applications*, p. 188-189, 1906; M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 67.

[148] W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 146.

destination image and the tendency to visit, to seek information, and recommend South Africa as a tourist destination.[149]

K. Pasanen *et al*. (2019) compare the methods to view 360° videos, namely iPad tablets and the Samsung Gear VR. Their study had two main aims: firstly, the authors wanted to determine how tourists perceive 360° videos and secondly, they wanted to explore how the VR experience and the device used for watching the video affects tourists' future travel intentions. Based on their study, both the iPad tablets and the Samsung Gear VR showed the same effects on travel intention and behaviour of tourists. However, with regard to the tourist experience, participants had a more immersive experience as they felt part of the action rather than just observing.[150] A. McFee *et al*. (2019) explore the impact that VR has on the formation of a destination's image. The authors compare a 360° video viewed through the Samsung Gear VR with a 360° video viewed on a computer. McFee's *et al*. results were somewhat similar to Pasanen's *et al*. study. The reason is that based on the results, HMDs have a more significant impact on the destination image formation. This is because participants that viewed the 360° video through an HMD showed an interest to visit the actual destination compared to the group that viewed the video via a computer.[151]

Another topic favoured by tourism scholars is presence in terms of marketing. I.P. Tussyadiah's *et al*. (2016) investigated the persuasive power of VR imaginary in destination marketing. The authors assessed the roles of spatial presence in influencing attitude and behavioural intention to visit tourism destinations. Based on their results, participants felt varying levels of spatial presence during the experience and also recalled the moments of arrival (i.e., being in the virtual world) and departure (i.e., being transported) and the moments that generate a stronger sense of being there.[152]

J. Martins *et al*. (2017) present a new model of multisensory (more immersive) virtual experience which can be used to promote tourist destinations. This study focuses on the port wine tourism

[149] T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), pp. 5, 8; K. Pasanen *et al*., 'Comparing Tablet and virtual reality glasses for watching nature tourism videos', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 123.
[150] K. Pasanen *et al*., 'Comparing Tablet and virtual reality glasses for watching nature tourism videos', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, pp. 121, 124, 126-128.
[151] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, pp. 107, 112, 116.
[152] I.P. Tussyadiah *et al*., 'Exploring the persuasive power of virtual reality imagery for destination marketing', *Tourism Travel and Research Association: Advancing Tourism Research Globally* 25, 2016, p. 1.

industry in the Douro Valley in Portugal. The authors wanted to provide tourists with a unique and immersive sense of what the region has on offer in terms of wine. Therefore, they present a conceptualisation of multisensory port wine that includes conceptional perspectives and technological solution proposal. Their results reveal that it is possible to conceive of a multisensorial thematic tourism experience through VR.[153]

The TAM is also a popular topic for tourism scholars.[154] This is due to its straight forward and context-independent applicability.[155] Most scholars focus on the TAM to examine the impacts of perceived ease of use, cost of use, usefulness, benefits and facilitating conditions on consumers' behavioural intentions and attitudes in diverse settings.[156] However, A. Gibson and M. O'Rawe (2018) discuss VR in terms of tourism marketing and promotion using the TAM model and interviews. Participants viewed a range of 360° videos of Ireland's *Wild Atlantic Way*. The results show that VR as a marketing tool increases the likelihood of people visiting the real destination.[157]

Tourism scholars have also addressed VR devices in terms of marketing. A. Marasco *et al*. (2018) investigated the impact of the VR experience created with the new generation of wearable devices on the intention to visit sites and attractions. The authors also determine whether the perceived visual appeal of VR and the emotional involvement of the user has a positive impact on the behavioural intentions to visit a destination. Their results show that the visual appeal of the VR experience with wearable devices have a positive impact on behavioural intentions towards the destination.[158] There has not been much written on virtual tourism displayed with fully-immersive VR systems, such as HMDs. However, J. Beck and R. Egger (2018) fill this gap by investigating

[153] J. Martins *et al*., 'A multisensory virtual experience model for thematic tourism: a Port wine tourism application proposal', *Journal of Destination Marketing and Management* 6(2), 2017, pp. 103-105, 108.
[154] P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 259; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 94.
[155] P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 259.
[156] W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 560.
[157] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, pp. 93-94.
[158] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 138; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 559.

the effects of the application of fully-immersive systems and determine how it influences emotion and the decision-making process. To address their aim, the authors used an experimental design. The authors showed that a fully-immersive VR elicits more intense emotions compared to a non-immersive VR.[159]

Little research has been conducted on the effects of VR on tourism marketing. However, T. Li and Y. Chen (2019) fill the gap. Their study stands out to determine whether VR will be a stimulus or an inhibition of tourist' travel intention. For this reason, they use the extrinsic (perceptive of VR) and intrinsic (expected enjoyment of a destination) theory. The outcome shows that VR has a negative effect on travel intention. This is because the perceived enjoyment of VR affected tourists' travel intention. Thus, if a tourist has a low expected enjoyment of the destination, then the higher enjoyment of VR will reduce the travel intention.[160]

J. Hopf *et al*. (2020) are also important to this study because they fill in two important gaps in the literature, namely other sensory dimensions and the impact of presence enabled by HMDs on users' intention to market and recommend the destination. The authors use a multisensory approach to VR and examine its impact of the intention to recommend a destination through the lens of presence. Their results show two factors: first, in contrast to previous research, additional senses do not add to the user's senses of presence; and second, tourists' intention to recommend the destination does increase.[161]

Virtual worlds are becoming a popular topic in the literature.[162] Based on Yung and Khoo-Lattimore's study, virtual worlds have received the most research attention.[163] The reason is that tourism scholars have begun to realise the implications of virtual worlds for the tourism industry.[164]

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[159] J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, pp. 3-4, 8, 11.
[160] T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, pp. 15-16, 24.
[161] J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, pp. 169-170, 178.
[162] D. Plunkett, 'On place attachments in virtual worlds', *World Leisure Journal* 53(3), 2011, p. 168.
[163] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 8.
[164] D. Plunkett, 'On place attachments in virtual worlds', *World Leisure Journal* 53(3), 2011, p. 175.

The virtual world that is the most popular among scholars is Second Life (SL).[165] SL is a digital world where users (or residents) can explore 3D environments, travel, start businesses, buy land, build structures and interact with other residents.[166] In terms of SL, scholars focus on two key areas, namely marketing and sustainability. According to Yung and Khoo-Lattimore's study, the second area that gained the most attention by scholars in terms of SL was marketing.[167] The key authors that have focused on this topic are B. Stangl and C. Weismayer (2008), Y.C. Huang *et al*. (2012, 2013(a)(b), 2016), and E. Mascho and N. Singh (2014). Stangl and Weismayer are important as there has been little research conducted that combines websites with VR as a marketing tool. The authors bridge this gap by determining whether adding VR to hotel websites will provide tourists with both synchronous and experiential information. For this reason, the authors compare Übergossene Alm, an Austrian spa, with its SL-counterpart, "First Spa Hotel". The results show that the experimental tasks that participants had to fulfil show the popularity of discovering things. This indicates that SL is an important aspect of experiencing flow. Regarding interactivity, it revealed that synchronous communications are appreciated. Thus, the authors recommend combining the application of SL with websites.[168]

Huang *et al*. (2012) examined the marketing of virtual worlds in terms of the flow theory, which refers to the process of optimal experience. Their study aimed to understand the impacts of virtual experiences of SL on people's intentions to travel. The authors found that the flow experience is positively influenced by the dimension of skills, tele-presence and interactivity. Their results also reveal that the flow experience has a positive effect on the travel intention to visit the real destination.[169] Huang *et al*. (2013a) also focused on SL and marketing. The authors provide an

[165] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 8.
[166] C. Cooper, *Essentials of tourism*, p. 334; C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 585; E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, p. 140.
[167] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 8.
[168] B. Stangl & C. Weismayer, 'Websites and virtual realities: a useful marketing tool combination? An exploratory investigation', *in* P. O'Conner *et al*. (eds.), *Information and communication technologies in tourism 2008*, pp. 141, 143, 146, 149.
[169] Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 4; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, pp. 550, 556, 561; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 610.

overview of SL and its potential in the context of marketing and tourism management. Based on their conclusion, it is stated that virtual worlds present for tourism companies an optimal marketing platform to provide tourists information and the ability to network. In terms of management, virtual worlds develop brand awareness and to gain a competitive advantage.[170] Huang *et al*. (2013b) are also important because only a few studies have applied the formal theory to understand the significance of virtual worlds to tourism destination marketing. The authors use the TAM and Hedonic Theory to understand the experience and behavioural intentions of virtual tourists when using SL. Therefore, the authors developed the Basecamp Maasai Mara in SL based on its potential to be engaging and informative and to create awareness about the Maasai, an ethnic group from Kenya and Tanzania. The virtual version consists of a reception, guest accommodation, local jewellery shop, a bonfire and wild animals. The outcome of their study showed that perceived usefulness is positively related to the behavioural intention to visit the real destination.[171] Huang *et al*. (2016) also use the TAM and self-determination theory to discuss the importance of marketing destinations through virtual worlds and to understand consumers' experience in SL. Based on their findings, a virtual experience in SL affects consumers' purchase intention.[172]

E. Mascho and N. Singh determine how virtual worlds, especially SL, are used to market real destinations. They provide the benefits, challenges and uses of marketing destinations in virtual worlds. Based on their results, virtual worlds, such as SL, are a more effective marketing method compared to traditional marketing media. This is because virtual worlds are cheaper and offer a personal experience to tourists. As a result, it increases the destination's web presence.[173]

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[170] Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, pp. 471, 474; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), p. 557.

[171] Y.C. Huang *et al*., 'Exploring user acceptance of 3D virtual worlds in travel and tourism marketing', *Tourism Management* 36, 2013b, pp. 490, 494, 498; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 6; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, pp. 556, 561; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 609.

[172] Y.C. Huang *et al*., 'Exploring the implications of virtual reality technology in tourism marketing: an integrated research framework', *International Journal of Tourism Research* 18(2), 2016, pp. 6, 116, 118; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 558.

[173] E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, p. 140; W. Wei, 'Research progress on virtual

SL has also received research attention in terms of sustainability. Scholars, such as A. Ali and D. Carson (2011),[174] A. Ali and A.J. Frew (2013),[175] as well as C. Cooper (2012),[176] S. McCabe (2009),[177] and Goeldner and Ritchie (2009)[178] use SL as a tool that can be used for sustainability.[179] The authors conclude that SL can be used for destinations that have reached their tourism visitation capacity and reduce transport emissions.[180]

VR and sustainability are also popular areas of research for a range of scholars, as is discussed in Chapter 5. Many scholars mention VR and sustainability in their studies, such as Ali and Carson, A. Petropoulos (2015), and Ali and Frew. These authors discuss how VR can be used as the ultimate tool for sustainability, as well as the benefits of using VR to preserve destinations.[181] However, the two authors that focus solely on VR and sustainability are R.S. Bristow (1999) and J.M. Dewailly (1999). Bristow comments on the potential elements of virtual ecotourism by discussing the internet in terms of Belize, in South America. According to Bristow, the internet enables tourists to become truly "green tourists" as it minimises the impact on a local environment.[182] Dewailly, another key author that scholars often rely on, aims to describe how VR may enhance sustainability of tourism by asking "whether a combination of VR and reality could give mass tourism greater sustainability".[183] The author also states that VR can lead to "dual tourism". This means that the wealthy will have the real holiday, while the poor have to be content

reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, pp. 557, 561.

[174] A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139.

[175] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 35, 134.

[176] C. Cooper, *Essentials of tourism*, pp. 333-334.

[177] S. McCabe, *Marketing communications in tourism and hospitality: concepts, strategies and cases*, pp. 274-275.

[178] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 585.

[179] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 35, 134.

[180] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 35; A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139; C. Cooper, *Essentials of tourism*, p. 334.

[181] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 35, 134; A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139; A. Petropoulos, 'Virtual tourism', *in* C. Cater *et al*. (eds.), *The encyclopedia of sustainable tourism*, p. 516.

[182] R.S. Bristow, 'Commentary: virtual tourism – the ultimate ecotourism?', *Tourism Geographies* 1(2), 1999, pp. 219, 221.

[183] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies*1(1), 1999, p. 41; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 15.

with VR experience.[184] Despite this negative discrepancy, the combination of conventional and VR tourism amounts to what could be termed "hybrid tourism".

2.5 Additional focus areas

VR as a substitute for conventional tourism has become an extremely popular topic among tourism scholars.[185] S. Muslin and G. Pigel (1994) focus on this vital area by discussing three aspects. First, the authors provide the chances and risks that VR offers the tourism industry. Second, the authors use a future recreational centre to show how VR can be used for tourism purposes. Lastly, the authors focus on the technologies needed to produce such an experience, its abilities and shortcomings.[186] S. Sussmann and H. Vanhegan (2000) also pay attention to this point. Their study aims to provide an answer to their question, namely "will virtual reality provide a substitute for the tourism product?"[187] The authors answer the question by stating that virtual holidays are not regarded as real holidays, but have the potential to complement conventional tourism.[188]

A similar comparison is evident in the work of A. Wagler and M.D. Hanus (2018), where they compared a VR experience with the physical experience. Participants either undertook a two-dimensional 360° immersive video or physical tour of a state Capitol building. They concluded that 360° tourism may be an analogue to a real-world experience.[189] Guttentag also briefly provides the negative and positive impacts of VR as a substitute for conventional tourism. The author states that VR as a substitute for conventional tourism offers tourists, for example, a cheaper holiday. But the author concludes that VR will not substitute conventional tourism because the tourism

[184] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies*1(1), 1999, p. 41.
[185] P.J. Sheldon, *Tourism information technology*, p. 204; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 140; I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 589.
[186] S. Muslin, & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1994*, p. 88.
[187] S. Sussmann & H. Vanhegan, 'Virtual reality and the tourism product: substitution or complement?' (paper presented at the 8th European Conference on Information Systems, Trends in Information and Communication Systems for the 21st Century, Vienna, Austria, 3-5 July 2000), p. 1077.
[188] S. Sussmann & H. Vanhegan, 'Virtual reality and the tourism product: substitution or complement?' (paper presented at the 8th European Conference on Information Systems, Trends in Information and Communication Systems for the 21st Century, Vienna, Austria, 3-5 July 2000), p. 1077.
[189] A. Wagler & M.D. Hanus, 'Comparing virtual reality tourism to real-life experience: effects of presence and engagement on attitude and enjoyment', *Communication Research Reports* 35(5), 2018, pp. 456-457, 462.

experience cannot be replicated in VR.[190] However, in a later publication, Guttentag (2020) focused solely on the acceptance of VR as substitute for conventional tourism. According to the results from his study, VR will not replace conventional tourism, but rather it will be accepted as a substitute by some people for some tourist experience.[191] Lastly, N. Losada *et al*. (2021) explored the capacity of VR to act as a substitute of the real visit by comparing it to a physical visit to São Leonardo de Galafura, a World Heritage Site. Their outcome also indicated that VR does not replace the real visit, but rather acts as a complement for an actual visit.[192]

Scholars have also discussed place attachment. This refers to the emotional bond between places and people. However, place attachment has received little attention from scholars in the VR context.[193] D. Plunkett (2011) identifies the main reason why people are attached to virtual worlds is that SL provides people with the opportunity to get away from their reality and to try new things.[194] C. Pantelidis *et al*. (2018) explore to what extent VR increases tourists' experience and affects tourists' place attachment using Lake District National Park, in the UK, as a case study. They concluded that all the participants had a positive relationship to the Lake District National Park. Thus, VR has a positive influence on place attachment. Furthermore, their results identified two themes, namely enhanced spatial cognition and positive feelings. The cognitive aspect refers to when people become more familiar with the place and create knowledge about the details of the environment. Positive feelings strengthen the emotional bond to the Lake District National Park. Thus, their results reveal that place attachment is generally associated with positive feelings and experiences.[195]

VR applications are frequently discussed in the tourism literature, as well as education and medical fields.[196] P. Horan (1996) discusses the possible applications of VR to the tourism industry, namely

[190] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 644.
[191] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, pp. 1-2.
[192] N. Losada *et al*., 'Could virtual reality substitute the 'real' experience? Evidence from a UNESCO World Heritage Site in northern Portugal', *in* A. Abreu *et al*. (eds.), *Advances in tourism, technology and systems*, pp. 153-154, 159.
[193] C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 1, 2.
[194] D. Plunkett, 'On place attachments in virtual worlds', *World Leisure Journal* 53(3), 2011, pp. 169, 175.
[195] C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 1, 3-4.
[196] P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 256; R. Tavakoli & P. Mura, ''Journeys in

tourism policy and planning, information provision and marketing.[197] C. Gurău (2007) identifies, analyses and presents the existing VR applications in tourism. According to the author, VR applications in tourism have various uses. For example, disabled tourists can visit destinations without leaving their rooms. He, however, also addresses the drawbacks of VR applications. For instance, and most importantly, the lack of technological infrastructure needed to experience VR.[198] In a study by S.A.I. Urriza's *et al*. (2016), the authors focus on people being able to reach and experience hidden areas without actually going there. Hence, the authors develop a 3D Mobile Virtual Tour Application for Panguil River Eco-Park, in the Philippines. Participants that used the virtual tour guide application could easily determine the different points of interest. As a result, the participants were able to have the "feel" of the eco-park.[199] A. Nayyar *et al*. (2018) focus on the definition, technologies and applications of VR and AR for the tourism industry, such as planning and management, and entertainment and education.[200] Kulakoğlu-Dilek *et al*. (2018) pay attention to the advantages and disadvantages of VR applications in the tourism industry by conducting a Strengths, Weakness, Opportunities and Threats (SWOT) analysis. The results from the SWOT analysis reveal that one of the important strengths of VR is its unique way of marketing. They point out that VR's weakness is that the physical experience cannot be replicated. In terms of the opportunity, VR links the pre-trip, on-site and post-trip experiences together. Lastly, the threat is that the VR experience lacks cultural interaction, regarded by many as a key advantage of the real time experience.[201]

Technology plays a vital role in cultural heritage as it can be used to enhance the experience of monuments, sites and museums, create new venues for experiencing cultural heritage and provide

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Second Life' – Iranian Muslim women's behaviour in virtual tourist destinations', *Tourism Management* 46, 2015, p. 399; N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, p. 69; T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, p. 16.

[197] P. Horan, 'Virtual reality applications in the hospitality/tourism industry', *Hospitality Information Technology Association*, 1996, pp. 1, 4.

[198] C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, pp. 180, 190; W.R. Pease *et al*., 'Preface', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. xi.

[199] S.A.I. Urriza *et al*., 'MoViT: a 3D mobile virtual tour app of Panguil River Eco-Park', *in* E.S. Sezgin (ed.), *e-Consumers in the era of new tourism*, pp.103-104, 120-121.

[200] A. Nayyar *et al*., 'Virtual reality (VR) and augmented reality (AR) technologies for tourism and hospitality industry', *International Journal of Engineering & Technology* 7(2), 2018, pp. 156-159.

[201] N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, pp. 69-72.

remote access to virtual venues. For this reason, a number of scholars have paid attention to VR and its role in cultural heritage.[202] For example, D. Arnold (2005) examines potential cultural heritage areas where the technology as he puts it, may be moving the goalposts. The author investigates Jorvik Viking Centre in the UK, the Ename Centre for Public Archaeology and Heritage Presentation in Belguim, and the Archeoguide –an EU funded project that offers AR tours of archaeological sites. The study also reveals that technology enhances the tourists' experience and offers marketing opportunities for cultural heritage destinations. Furthermore, the results of this study show that VR has barriers, including the fact that to develop new experiences is expensive and time-consuming.[203] K. Ab. Aziz and T.G. Siang (2014) propose a conceptual model by combining VR and AR in terms of heritage preservation. The authors use Melaka, in Malaysia and a UNESCO World Heritage Site, as a case study. They argue that VR and AR provide an alternative form of access. The reason is that VR offers tourists a realistic experience without risking and damaging actual heritage sites.[204]

Authenticity is not a new concept as over many decades, scholars from disciplines, such as religion, psychology, anthropology, art and museum studies have paid extensive attention to it.[205] In 1976, Dean MacCannell, an American anthropologist, introduced the concept of authenticity to tourism scholars. Authenticity has since then been well-researched in tourism literature and over the last 20 years, the body of knowledge regarding authenticity has grown exponentially.[206] Some scholars have also acknowledged that there is a link between VR and authenticity, and therefore have also focused on the issue of VR and authenticity.[207] P. Mura *et al*. (2017) provide insight into

[202] D. Arnold, 'Virtual tourism: a niche in cultural heritage', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases,* p. 227.
[203] D. Arnold, 'Virtual tourism: a niche in cultural heritage', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases,* pp. 223, 225, 227, 228, 230.
[204] K. Ab. Aziz & T.G. Siang, 'Virtual reality and augmented reality combination as a holistic application for heritage perseveration in the UNESCO World Heritage Site of Melaka', *International Journal of Social Science and Humanity* 4(5), 2014, pp. 333, 337.
[205] J. G. Molz, *Travel connections: tourism, technology and togetherness in a mobile world,* p. 111.
[206] B.T. Knudsen & A.M. Waade, 'Preface', *in* B.T. Knudsen & A.M. Waade (eds.), Re-investing authenticity: tourism, place and emotions, p. xv; J.G. Molz, *Travel connections: tourism, technology and togetherness in a mobile world,* p. 112; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, pp. 145, 150; M. Smith *et al*., *Key concepts in tourist studies*, p. 13; M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 4; N. Wang, 'Rethinking authenticity on tourism experience', *Annals of Tourism Research* 26(2), 1999, p. 349.
[207] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, pp. 145, 147.

perceptions of authenticity and VR in relation to students. Their findings indicate that in general students did not consider VR as inauthentic. According to the students, they agreed physical and sensorial involvements, which were missing in a virtual experience, are two important components to experience authenticity in a tourism setting. However, the students were open to the possibility of combining VR with non-virtual forms of tourism. This suggests that VR and conventional tourism are related and should not be considered as exclusive categories.[208]

In terms of experience, VR has also gained a lot of attention from tourism scholars.[209] For example, T. Jung *et al*. (2017) were the first scholars to qualitatively explore the dimension of VR. The authors conducted interviews at the Lake District National Park. Based on the results, participants were found to have had a positive attitude towards the use of VR in the tourism industry and that it engaged them and enhanced their behavioural intention to visit the real destination.[210] Tussyadiah *et al*. (2017) also cover aspects of VR experiences. They concentrate on how a VR experience influences the travel decision-making process by investigating spatial presence in the VR environment and its impact on the attitudes toward tourism destinations. Their study shows that the sense of presence in VR experience led to several positive consequences.[211] Tussyadiah's *et al*. study is vital as it provides a better understanding of spatial presence and its determinants, as well as its consequences on user attitude in the experience involving depictions of real tourism destinations.[212]

Efforts to predict the future have fascinated humanity since time immemorial.[213] However, only a few scholars have focused on predicting the future of tourism.[214] Most of these scholars only pay

[208] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, pp. 145, 150, 155-156, 157.
[209] C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 1.
[210] T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA,2017), pp. 1, 3; A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 141.
[211] I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 229; A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 140; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p.140.
[212] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 140.
[213] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 321.
[214] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 320.

attention to the implication for the future of tourism.[215] In his earlier publication in 2002, B. Prideaux aims to address how VR opportunities will alter the patterns and experiences of future tourists. He also discusses the technologies and how they impact the tourism industry and tourists. The author tries to understand tourists in a changing world by providing a simple explanation for the shifts in tourism through the "Tourism Evolution Model". The model identifies three areas, namely contemporary to describe the present, pre-contemporary to describe the past and post-contemporary to describe the future. Each of these three sections provide the history of tourism by focusing on technology and when VR tourism entered the tourism industry.[216] S. Anwar and J. Hamilton (2005) are also some of those scholars that pay attention to the future of tourism. Anwar and Hamilton discuss the five key factors that will influence the tourism industry in Australia by 2020, namely human factors, geopolitical, economic factors, technological impacts and environmental factors. Based on these factors, they argue that cyber-tourism will be the major growth area by 2020[217] - a trend which has indeed been realised due to COVID-19. Guttentag *et al*. also provide an updated version of this earlier publication as the technology has since progressed. They consider the current state of VR technology, the uses of VR, and VR as a substitute for conventional tourism.[218] This again underlines the rapidly changing world of VR.

The following section considers tourism niches, including tourism education, space, sport and food tourism. VR and SL have received attention from educational tourism scholars, but these scholars mainly focus on how VR and SL can be used as a learning tool in universities to enhance the educational experience and to teach tourism.[219] For example, P. Penfold (2009) describes how SL can be used as an educational tool for teaching and learning at the School of Hotel and Tourism

[215] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149.
[216] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, pp. 318-319, 332-334.
[217] S. Anwar & J. Hamilton, 'Tourism into the future – towards 2020, and beyond', *Tourism Recreation Research* 30(3), 2005, pp. 77, 84; B. Prideaux, 'Cyber-tourism: a new form of tourism experience', *Tourism Recreation Research* 30(3), 2005, p. 6.
[218] D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 444.
[219] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 13; S. Deale, 'Incorporating Second Life into online hospitality and tourism education: a case study', *Journal of Hospitality, Leisure, Sport and Tourism Education* 13, 2013, p. 156; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 542.

Management at the Hong Kong Polytechnic University. Based on Penfold's research, students and teachers state that SL is an effective teaching tool. The reason is that SL facilitates a more enjoyable learning experience as it is more interactive. Therefore, SL is used for various class activities, namely virtual field trips, role-play, design projects and other class-related activities.[220] In his article, S. Deale (2013) uses the Scholarship of Teaching and Learning project to investigate the use of SL in online hospitality education as a learning tool. The findings indicate that SL provides many learning and engagement opportunities for students and instructors. The study showcases empirical evidence for both the benefits of SL (i.e., offers interesting and interactive learning experience) and the drawbacks (i.e., time commitment) of using it as an educational tool.[221] M.M. Zarzuela *et al*. (2013) present Virtual Reality Serious Game, a learning tool that pursues educational objectives to allow players to get knowledge and practical skills, to enable people to learn more about Valladolid, in Spain. The Virtual Reality Serious Game shows that people enjoyed using it and they considered it as a fun and entertaining way to learn or review different aspects of Valladolid, such as its history, geography, sports, art and literature.[222]

Another niche that scholars are starting to show an interest in is VR and space tourism. The literature shows that very little has been written on VR and its impact on space tourism. The reason is that VR in space tourism is still a novel area for tourism scholars.[223] L. Laing and G.I. Crouch (2004) briefly mention the use VR in space tourism.[224] Prideaux and P. Singer (2005) pay specific attention to VR and space tourism by using different scenarios to compare physical travel to space and VR travel to space.[225] K. Damjanov and D. Crouch (2019) also focus on the relationship

[220] P. Penfold, 'Learning through the world of Second Life – a hospitality and tourism experience', *Journal of Teaching in Travel and Tourism*, 8(2-3), 2009, pp. 139, 144-146, 151; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 555; S. Deale, 'Incorporating Second Life into online hospitality and tourism education: a case study', *Journal of Hospitality, Leisure, Sport and Tourism Education* 13, 2013, p. 156.
[221] S. Deale, 'Incorporating Second Life into online hospitality and tourism education: a case study', *Journal of Hospitality, Leisure, Sport and Tourism Education* 13, 2013, p. 154; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 557.
[222] M.M. Zarzuela *et al*., 'Educational tourism through a virtual reality platform', *Procedia Computer Science* 25, 2013, pp. 382-283.
[223] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 117; E. Cohen & S. Spector, 'Introduction: the dawn of a new era?', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 135.
[224] L. Laing & G.I. Crouch, 'Vacationing in space: tourism seeks 'new skies'', *in* T.V. Singh (ed.), *New horizons in tourism: strong experiences and strange practices*, p. 12.
[225] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 27.

between VR and space travel. In their chapter, the authors develop "authentic" tourism destinations and experiences. The authors also aim to render space travel while facilitating novel avenues for its social organisation and technological assertion. Their findings show that VR is incorporated into public, location-based experiences, variants of the *Destination: Mars* (2016), *Earthlight* (2017) and *Mars Experience* (2017). Furthermore, the results indicate that VR opens the whole outer space not only for astronauts, but also for space tourists to entertain themselves. But they also caution that the novelty effect of VR may fade away.[226]

Scholars have also begun to focus on sport and food tourism and how this relates to VR. J. Kurtzman and J. Zauhar (1999, 2012) pay particular attention to VR in sport tourism by focusing on how human experiences are being expanded and how powerful instrumentalities are developed and put into practical use.[227] They show how "computer simulation … offers the sport enthusiast the opportunity to experience different kinds of pre-produced programme as in real time".[228] They indicate that with the use of sound, sight and touch technology, it is possible to recreate touristic characteristics with enjoyment and entertainment.[229] Based on Yung and Khoo-Lattimore's literature review, only V. Georgakopoulos (2010) and J. Hwang *et al*. (2012) address the impacts of VR in food tourism[230], which appears fairly limited. Georgakopoulos discusses the use of VR in food safety training and beverages setting. The author uses the Hazard Analysis Critical Control Point, a preventative system of food control, as a research method. Based on the results, this system is regarded as beneficial as it increases trainees' knowledge.[231] Another tourism food-related consideration is the issue of crowding in a restaurant waiting area which usually forms the first impression of service and sets expectations. Because of this, Hwang *et al*. set out to determine how and to what extent crowding in a restaurant waiting area influences emotions and attitudes of

[226] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, pp. 117, 135-136; E. Cohen & S. Spector, 'Introduction: the dawn of a new era?', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 11.
[227] J. Kurtzman. & J. Zauhar, 'The virtual sports tourist', *Journal of Sport Tourism* 5(4), 1999, pp. 25-36; J. Kurtzman & J. Zauhar, 'Virtual sport tourism', *in* S. Hudson (ed.), *Sport and adventure tourism*, p. 293.
[228] J. Kurtzman. & J. Zauhar, 'The virtual sports tourist', *Journal of Sport Tourism* 5(4), 1999, p. 35.
[229] J. Kurtzman. & J. Zauhar, 'The virtual sports tourist', *Journal of Sport Tourism* 5(4), 1999, p. 32.
[230] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 14.
[231] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 14; V. Georgakopoulos, 'Food safety training: a model HACCP instructional technique', *Tourismos: An International Multidisciplinary Journal of Tourism* 5(1), 2010, pp. 55, 67.

tourists and clients by developing a 3D VR restaurant. The findings show that crowding has a positive impact on arousal, but a negative impact on dominance. The results also indicate that the impact of crowding on affiliation depends on the desire for privacy.[232]

As VR has grown in the tourism industry, more areas have opened for tourism scholars to focus their attention on. For one, measuring the effects of VR is a new area in the tourism field. E. Marchiori *et al*. (2017) aim to investigate the media effects of a tourism-related VR experience by focusing on a VR setting. They were one of the first group of scholars to use biophysical data, such as electrodermal activity, and heart rate to measure emotions and arousal levels (i.e., the intensity of an emotion) during an experience. The results highlight that the specific media characteristics of the VR experience hold the potential to lead the formation of strong memories. The results also showed that participants' heart rate peaked when corresponding to VR graphic design elements. This changed the usual perspective of the participants. Thus, participants were forced to focus on re-adapting their view of a new scene.[233]

P. Sung *et al*. (2000) explain the importance and necessity of cyber-tourism in a VR environment. To overcome the constraints that arise in tourism (i.e., health, cost, leisure time and the perception of tourism culture), the authors present a method for the realisation of a virtual tour based on the basis of VR and multimedia. The authors also discuss the advantages of the new system, which include providing an opportunity for tourists that cannot afford a real tour and the supply of more information for those who prefer the real tour.[234]

In more recent literature, scholars have paid attention to the implications of VR experiences on the psychological and sociological impact on human behaviour.[235] For example, R. Tavakoli and P.

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[232] J. Hwang *et al*., 'Desired privacy and the impact of crowding on customer emotions and approach responses: waiting in a virtual reality restaurant', *International Journal of Contemporary Hospitality Management* 24(2), 2012, pp. 224-250; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 14; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, pp. 542, 556.

[233] E. Marchiori *et al*., 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, pp. 203-204, 212.

[234] P. Sung *et al*., 'Development of virtual cyber-tour in the virtual reality system', *Asia Pacific Journal of Tourism Research* 5(2), 2000, pp. 48-49.

[235] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the State of the art*, p. 285.

Mura (2015) examine the patterns of behaviour of Muslim women when they travel in SL. Their findings revealed that in SL people rejected gender-based stereotypes toward Muslim women's bodily representations in Iran. The reason is that the women took their time selecting their avatar as they made sure that their avatars were "proper" portrayals of Western stereotypical images of "femaleness".[236]

M.J. Kim and M.C. Hall (2019) are important because they fill the gap regarding VR and hedonic motivation (i.e., enjoyment, pleasure, flow experience and happiness). In their article, the authors identified the effect of consumers' hedonic behaviours on the continued use of VR tourism. Their results showed that the effect of consumers' usefulness affected their flow state from using VR activities. This indicates that entertainment is the key hedonic motivation for continued usage of VR. Another important finding was that flow state and subjective well-being also influenced the continued usage of VR. Finally, the results reveal that people want to visit the destination shown in VR.[237]

In just a span of a few months, since the outbreak of COVID-19, scholars have written extensively on the pandemic and its devastating impact on tourism. Some of this literature has also highlighted VR's role in this global crisis. O. Atsiz (2021) focused on how VR can offer tourists an alternative travel experience, while complying with physical distancing (or social distancing). The article also provided ways on how travel companies and destination managers can utilise VR to prevent the spread of COVID-19 and still earn extra revenue.[238] O.S. Itani and L.D. Hollebeek (2021) used the motivation theory to examine how attractions are adapting to physical distancing by comparing the expected effect on consumers' intent to purchase VR-based site tours compared to in-person tours during and after COVID-19. The outcome of their study demonstrated that "visitor perceived threat severity", "response efficacy" and "self-efficacy" raised physical distancing behaviour.

[236] R. Tavakoli & P. Mura, ''Journeys in Second Life' – Iranian Muslim women's behaviour in virtual tourist destinations', *Tourism Management* 46, 2015, pp. 398, 405; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 557; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 100.

[237] M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, pp. 236-238, 245-246.

[238] O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, pp. 27-28.

Their results also showed that physical distancing boosted visitors' intent to use VR tours during COVID-19.[239] A.F. Schiopu *et al*. (2021) used the extended TAM model to assess the role of VR in tourism during COVID-19. They considered whether tourists prefer less risky experiences and accept VR as a substitute for conventional tourism. Their results showed that the intention was influenced by the "perceived ease of use, perceived usefulness, perceived substitutability" and perceived authenticity of VR.[240] Lastly, D. Sarkady *et al*. (2021) primarily examined the role of VR as a substitute for conventional tourism during COVID-19. Based on their conclusion, tourists used VR as a substitute for conventional tourism during the pandemic and predicted that they will do so thereafter as well.[241]

2.6 Virtual voids in the literature

Despite the popularity of VR in the tourism industry, some voids need to be addressed. It appears that relatively little has been written on VR tourism.[242] This is mainly because VR and its technology, as well as its role in tourism, is still at a relatively early phase in terms of development.[243] It is evident that VR only became a popular topic at the beginning of the 1990s.[244] Disztinger *et al*. and W. Wei *et al*. also provide a reason by stating that scholars have also paid more attention to AR and mixed reality (MR) applications than VR.[245] This section discusses some voids that need to be filled.

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[239] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, pp. 1, 2.
[240] A.F. Schiopu *et al*., 'Virus tinged? Exploring the facets of virtual reality use in tourism as a result of the COVID-19 pandemic', *Telematics and Informatics* 60(2), 2021, pp. 1, 2.
[241] D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454.
[242] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147.
[243] J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 2; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 205; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; J. Swarbooke, *The development and management of visitor attractions*, p. 359; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 600.
[244] N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, p. 69.
[245] P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 256; W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 288.

Although VR as a tool for marketing tourism has received much attention, there are still gaps in the literature. This is again due to the fact that VR in tourism marketing is still a relatively new feature.[246] According to Yung and Khoo-Lattimore, scholars need to do more research on the "adaption of the technology for the optimal application of VR as a marketing tool".[247] In terms of this void, Guttentag adds that scholars should compare the effectiveness of different VR output-devices for marketing different types of attractions, such as archaeological sites or beach resorts.[248] Another void that scholars must address is the target market of VR.[249] Guttentag adds that scholars need to fill in how VR can be used to market specific tourism destinations to different demographic segments, such as gender, age or nationality.[250] Scholars also need to pay more attention to the opportunities of VR for destination marketing.[251] Moreover, future research is needed regarding how VR affects the tourist information search, travel decisions, behaviour and attitude towards a destination or type of tourism.[252]

Although comparing VR with other traditional marketing media has been a popular topic among tourism scholars, Marchiori *et al*. and Pantelidis *et al*. state that scholars still need to do more research on this topic.[253] They need to address this gap because then they can assess the potential of VR, determine the durability and impact of the affective destination imagery.[254]

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[246] T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 3.
[247] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 12.
[248] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647.
[249] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 176.
[250] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647.
[251] T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), pp. 3, 8.
[252] K. Pasanen *et al*., 'Comparing Tablet and virtual reality glasses for watching nature tourism videos', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 121.
[253] E. Marchiori *et al*., 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 213; C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 5.
[254] E. Marchiori *et al*., 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 213; C. Pantelidis *et al*., 'Exploring tourist experience of virtual reality in a rural destination: a place attachment perspective', *E-reviews of Tourism Review*, 2018, p. 5; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 8.

Another area that has received relatively little attention in the last 15 years by scholars is tourists' experience in virtual worlds and the 360° VR experience, despite the technological development in the year 2000 that paved the way for more elaborate virtual experiences.[255] This is probably due to the shortcomings of virtual worlds that originate from technological restrictions.[256] Another reason is that most scholars mainly focus on the future of VR and its implications for tourism.[257] Furthermore, qualitative research on tourist's experiences of VR applications is scarce in the tourism literature.[258] In this regard, scholars should broaden their focus and start to pay more attention to other virtual worlds, such as: Active World, OpenSim, Croquet, Consortium, ActiveWorlds, Project Wonderland, and Sansar, the successor to SL.[259] Few scholars have discussed different market segments' experiences and the factors that influence their use of the virtual world.[260] Another area that has received sparse attention is the focus on actual environments (i.e., virtual depictions of real environments) that relate to tourism experiences.[261] According to Beck and Egger, it is essential to address these voids because marketers need to know which marketing strategy to invest in.[262]

Scholars also need to do more research on VR in terms of experience. Only a few scholars have attempted to discuss the impact of technology and tourism experience from a complex

[255] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 20.
[256] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 180.
[257] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 147.
[258] T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1.
[259] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, pp. 20-21; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 598; Y.C. Huang *et al*., 'Exploring the implications of virtual reality technology in tourism marketing: an integrated research framework', *International Journal of Tourism Research* 18(2), 2016, p. 117.
[260] Y.C. Huang *et al*., 'Exploring the implications of virtual reality technology in tourism marketing: an integrated research framework', *International Journal of Tourism Research* 18(2), 2016, p. 123; R. Tavakloli & P. Mura, ''Journeys in Second Life' - Iranian Muslim women's behavior in virtual tourism destinations', *Tourism Management* 46, 2015, pp. 398-399.
[261] I.P. Tussyadiah *et al*., 'Exploring the persuasive power of virtual reality imagery for destination marketing', *Tourism Travel and Research Association: Advancing Tourism Research Globally* 25, 2016, p. 2.
[262] J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 34.

perspective.[263] Marasco *et al*. add that empirical studies have not sufficiently explored the virtual experiences that are enabled by HMDs.[264] Another area that is under represented in the tourism literature is tourists' experience of VR applications.[265] Scholars need to fill in these voids as they can show the effect of tourists' behavioural intentions towards destination sites and attractions.[266]

Although VR as a substitute for conventional tourism has received much attention, there are also still gaps in the literature. Scholars need to determine the different motivations and constraints and how these impact tourists' acceptance of a VR substitute. Other areas that require attention include the role of VR in destination substitution and the use of VR experiences as a substitute for tourism experiences.[267]

Even though the TAM is popular among scholars, there appear to be gaps that need to be addressed. An almost unexamined aspect is TAM in VR, especially in terms of presence in the virtual world.[268] Another vital area that has received little attention from scholars is the different levels of readiness and attitude of the user towards these new technologies.[269]

According to Hopf *et al*., previous scholars have primarily paid attention to two of the five senses, namely sight and sound.[270] Thus, there is a need for scholars to explore the other five senses within

[263] B. Neuhofer *et al*., 'A typology of technology-enhanced experiences', *International Journal of Tourism Research* 16(4), 2014, p. 340.
[264] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 139.
[265] T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1.
[266] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 139.
[267] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 104; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 648.
[268] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 100; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 595; E. Pantano & R. Servidio, 'Advanced technologies and tourist behavior: the case of pervasive environment', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 57.
[269] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 145.
[270] J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, p. 169.

the VR context, such as taste, touch and smell.[271] Scholars must focus on these senses as all five senses affect the sense of presence and authenticity for tourists.[272]

Although authenticity has been a key focus point in tourism, there are aspects of this that still require attention. Mura *et al*. point to a gap in the literature by stating that there is no empirical and no in-depth research that discusses the experience of tourists' perceptions of authenticity.[273] Another void that scholars need to address is the impact of technology on tourists' quest for authenticity.[274] Moreover, Yung and Khoo-Lattimore add that more research is needed in terms of authenticity in the virtual environment.[275]

Guttentag adds that more research needs to be done in terms of the educational benefits of VR in museums by comparing it with traditional exhibits.[276] S.M. Loureiro *et al*. agree with Guttentag by adding that scholars should focus on the applications of VR to support educational experiences at museums as well as other attractions.[277]

It is import for scholars in the future to shift more of their attention towards newer immersive technologies, such as mixed reality[278] (MR) and extended reality[279] (XR). Beck *et al*. and Wei *et al*. point out another gap in the literature by stating that scholars have to compare VR applications with MR and AR to examine tourists' behaviour. Scholars can compare the impact of MR and XR

[271] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 180; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 420; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 599; J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, p. 169.
[272] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 146.
[273] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, pp. 145, 147.
[274] J. G. Molz, *Travel connections: tourism, technology and togetherness in a mobile world*, p. 113.
[275] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 20.
[276] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647.
[277] S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, pp. 1, 13.
[278] MR combines VR and AR in order to provide an interactive experience over a real environment. J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 17.
[279] XR "combines virtual and physical realities" by merging VR, AR and MR. Dictionary.com, 2021, <https://www.dictionary.com/browse/extended-reality>, access: 16 February 2021.

on tourism with VR. Future scholars must address this gap as this will assist tourism-related businesses to take full advantage of each of these new technologies.[280]

Another important gap in the literature pertains to literature studies. It was noted that previous literature reviews conducted by Yung and Khoo-Lattimore, Loureiro *et al*., and W. Wei focus on VR and AR. However, the only authors that pay specific attention to VR in their literature study are Beck *et al*. Scholars need to address this gap by conducting more literature reviews that focus on VR and its role in tourism.

Other unexplored aspects are the use of VR in meetings and event planning, acceptance of VR in the tourism industry, VR's impact on the restaurant and hotel industries, how to achieve profits in virtual tourism, VR in cruise tourism, and the ability to experience a full tourism adventure remotely or virtually as an e-tourist.[281]

There is an extremely fine line between the real world and the fantasy or virtual world, (see Chapter 5). In the future, the line may become less visible due to the rapid developments in VR technology.[282] For this reason, tourism scholars must focus more on the line between the real world and virtual world and how it will affect tourism.

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[280] M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 17; M.J. Kim *et al*., 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, p. 247; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 600; W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 247.

[281] S. Anwar & J. Hamilton, 'Tourism into the future – towards 2020, and beyond', *Tourism Recreation Research* 30(3), 2005, p. 81; R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, pp. 14-15; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 542; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, pp. 1, 13; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 209; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 6; P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism* 2017, p. 256; M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 66.

[282] J. Eddings, *How virtual reality works*, p. 147.

2.7 Concluding remarks

Tourism scholars have covered a range of topics on VR and tourism. Similar to Yung and Khoo-Lattimore's study, this literature review also pointed to the three main areas extensively covered, namely marketing, virtual worlds and sustainability. But it also considered other topics of discussion that have developed over the years. VR as a marketing tool is one of the most popular topics among tourism scholars. The reason is that VR was first used in marketing in the tourism industry.[283] The second area scholars focused on is VR as a tool for sustainability. These studies argue that VR can be used for the preservation of sites and destinations. The virtual world that tourism scholars mostly examined is SL, but also primarily paying attention to its use as a marketing and sustainability tool.

It is also apparent that scholars have started to pay attention to other areas of research, namely the role of VR in different tourism niches, such as heritage, education, space, food and sport; the question of VR as a substitute for conventional tourism; authenticity; the TAM; and the VR tourist experience. Most recently scholars have begun to focus on the COVID-19 pandemic and VR's role to assist with the recovery of tourism. It is clear from this literature review that VR in tourism is a relevant and ever-growing field of research.

The last section pointed to the gaps in the literature. For example, scholars need to compare VR with MR and AR to examine tourists' behaviour. Another gap that needs attention is tourists' perception of authenticity within the VR tourism realm. Scholars also need to address the other five senses, especially taste, touch and smell, as well as other virtual worlds.

Based on this and the study at hand, a gap that emerged was the role of VR in tourism industries in the global South. As is evident, most of the research to date has been conducted in the global North countries, particularly Europe, Australia, and the USA, as well as parts of the East.[284] Some scholars have paid attention to VR and tourism regarding global South countries in Africa, such

[283] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641.
[284] W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 288; S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 15; W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 542.

as P. Ankomah and T. Larson (2017). They mainly pay attention to VR in Sub-Saharan Africa countries by discussing the areas that can be marketed as virtual tourism destinations to add value to the existing destination. Moreover, they also identify the problematic issues and seek to provide possible solutions in terms of VR in Sub-Saharan countries.[285] However, scholars have only begun paying attention to global South countries in Africa since the outbreak of COVID-19, such as I. Chirisa *et al*. (2020), and O.C. Jude and U. Chike (2020). In the paper, Chirisa *et al*. (2020) explore how VR can contribute to the economy and sustainability in Africa during the COVID-19 pandemic. The authors also investigate whether VR can sustain the tourism industry and promote the health and safety of tourists. The authors use Zimbabwe as their main case study.[286] Jude and Chike discuss VR and tourism in Africa by focusing on Nigeria. Their findings revealed that VR in tourism has benefits (i.e., tourism planning, preservation and insecurity challenges) and drawbacks (i.e., economic losses) for the tourism industry in Nigeria. Thus, according to the them, VR can enhance tourism development in Nigeria, but its applications is still risky because of previous challenges the country faces.[287] Although there is some research conducted on African countries, there remains a vital void as scholars have yet to address a global South country such as South Africa. Wei states that scholars must address the void as it will provide tourism practitioners with the necessary information to be able to engage with VR to benefit the sector.[288] Thus, this thesis addresses this gap by focusing on South Africa as global South country.It also shifts the focus to consider VR as a tourism niche.

[285] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, pp. 4113, 4117-4118.
[286] I. Chirisa *et al*., 'Scope for virtual tourism in the times of COVID-19 in select African destinations', *Journal of Social Sciences* 64(1), 2020, pp. 1-2.
[287] O.C. Jude & U. Chike, 'Tourism and Virtual Reality (VR) in Developing Nations', *African Journal of Hospitality, Tourism and Leisure* 9(2), 2020, p. 12.
[288] W. Wei, 'Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: a critical review of publications from 2000 to 2018', *Journal of Hospitality and Tourism Technology* 10(4), 2019, p. 565.

Chapter 3: Virtual reality: then and now

3.1 Introduction

For over a century, VR has intrigued science-fiction authors, as well as inventors. A plethora of authors have in fact predicted VR and inventors have long been experimenting with it.[289] What science-fiction authors have written on VR, has to a large extent become reality.[290] VR has become one of the most world-changing technologies of the twenty-first century and a new "fad" among society.[291] Chapter 3 introduces the concept of "VR" and is divided into two sections: the first section discusses the history from the origin and early beginnings to the present and future of VR, - which is showcased in the timeline in Appendix 2; the second section focuses on the various technologies that have been developed in order to enhance a person's experience in the virtual world of VR.

3.2 A virtual history

VR is not a new or twenty-first century invention.[292] According to W.R. Sherman and A.B. Craig, history shows a progression of intangible or virtual media used to convey and experience ideas.[293] One of the first indications of this can be traced back to the Neolithic cave paintings depicting hunts and religious rituals. These paintings illustrated people's representation of ontologically alternative worlds and that it is possible to travel outside of the body.[294] For example, rock art and engravings made by the San (or Bushmen), indigenous hunter-gathers of southern Africa, describe metaphysical journeys into a virtual world of spirits and potency, as well as of magic and mystery (See Appendix 2). The figure shown on the timeline also emphasises one of the individuals "leaving" his body to travel to the spiritual world. The shaman (the medicine man/woman)

[289] J. Eddings, *How virtual reality works*, p. xi; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xiii.
[290] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. xix; P. Mealy, *Virtual and augmented reality for dummies*, p. 2.
[291] A. Nayyar *et al*., 'Virtual reality (VR) and augmented reality (AR) technologies for tourism and hospitality industry', *International Journal of Engineering & Technology* 7(2), 2018, p. 156; J. Lovine, *Step into virtual reality*, p. vii.
[292] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 3; B. Sherman & P. Judkins, *Virtual reality and its implications: glimpses of heaven, visions of hell*, p. 20.
[293] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 5.
[294] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 146.

conveyed these stories of virtual worlds to their people to keep a record of their experience in the virtual world.[295] C.E. Loeffler and T. Anderson are of the opinion that this indicates that people were always immersed in some form of 3D, multisensory and simulated environments.[296]

Greek and Roman theatres also took people to distant lands of Troy and Olympus again emulating a virtual world.[297] Moreover, ancient literature and myths projected virtual worlds, for instance, Homer's Odyssey.[298] Furthermore, books also "became the magic carpet ride" since people were now able to travel down into rabbit holes, be stranded on desert islands, or were involved in the emotional life of fictional characters as they enabled people to experience being immersed in an imaginative and contemplative state of mind.[299]

The following section discusses the key pioneers that led to the development of VR as we know it today, such as Edwin Link, Morton Heilig, Ivan Sutherland, Frederick Brooks, Myron Krueger, William Gibson, Jaron Lanier, Thomas DeFanti, Palmer Luckey, among others.

One of the earliest forerunners of VR was the HMD which was first patented in 1916 by Albert B. Pratt, known as the "Weapon" (See Appendix 2). The HMD was a simple soldier's helmet with a crosshair that was used for aiming. The user had to use his/her tongue to push a cable to fire the gun. Although the HMD was far from its modern design, it had some similarities. For example, the material for the "Weapon" also had to be rigid enough to provide a solid platform.[300]

In the 1920s, a significant forerunner of VR was the Link Simulator.[301] Previously, pilots trained using an aircraft, known as the "Penguin" trainer. The military wanted a non-flying trainer that would eliminate the danger of an actual flight, and thus, Breese Aircraft Cooperation created the "Penguin". However, the problem with these trainers was that their wings were short, and they had no brakes or steerable wheels. This made it difficult to control the trainer to generate enough lift

[295] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 5.
[296] C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xv.
[297] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 25.
[298] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 146.
[299] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 27.
[300] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 24; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xv; B.D. Foote & J. Melzer, 'A history of helmet mounted displays at Rockwell Collins' (paper presented at the Proc. SPIE, Head- and Helmet- Mounted Displays XX, Baltimore, USA, April 2015), p. 1.
[301] J. Eddings, *How virtual reality works*, p. 9.

to get off the ground.[302] It was for this reason that Edwin A. Link, an aviator, decided in 1929 to develop an improved flight simulator, called the Link Flight Simulator (See Appendix 2).[303] Pilots used the Flight Simulator to learn how to fly and navigate instruments without actually taking to the air. The Flight Simulator was a full-sized replica of an actual fighter cockpit that was mounted on a motion platform. The cockpit physically pitched, rolled and yawed based on the actions of the pilot. As a result, pilots felt as if they were flying a real airplane. This is a form distinct from VR as the equipment simulates reality, but it is a virtual experience.[304]

The next pioneer in the field of VR was Morton L. Heilig, a cinematographer. In 1960, Heilig invented a simulation mask, called the Telesphere Mask (See Appendix 2) to immerse and engage the audience. The Mask had stereoscopic 3D visuals, focusing controls, smell and stereo sound. This was one of the earliest examples of an HMD and looked very similar to the modern-day HMD.[305]

However, Heilig would become more famous for his invention of the Sensorama Simulator (See Appendix 2). In 1962, he created the Sensorama, one of the first VR video arcade and a multimodal experience display system. The Sensorama was a simulated motorcycle ride through New York City, in the USA, that offered users the opportunity to be able to feel potholes and smell food when they passed stores. This was due to the Sensorama's sound, 3D images, seat movement wind and aromas. Unfortunately, the Sensorama was not really interactive, but it was indeed an early prototype for VR.[306] This was a forerunner of the use of VR in the realm of entertainment, which

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[302] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 24; The Cradle of Aviation Museum and Education Center, 2020, <https://www.cradleofaviation.org/history/exhibits/exhibit-galleries/world_war_i/breese_penguin.html>, access: 9 November 2020.

[303] J. Eddings, *How virtual reality works*, p. 9; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 45.

[304] J. Eddings, *How virtual reality works*, p. 9; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 45; B. Cotton & R. Oliver, *Understanding hypermedia: from multimedia to virtual reality*, p. 30; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 25.

[305] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 4; P. Mealy, *Virtual and augmented reality for dummies*, p. 18; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 25; M. Heilig, 'The Cinema of the Future', *in* R. Packer & K. Jordan (eds.), *Multimedia: from Wagner to virtual reality*, p. 220; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 26; Virtual reality Society, 2017b, <https://www.vrs.org.uk/virtual-reality/history.html>, access: 31 July 2018.

[306] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; G. Burdea & P. Coiffet, *Virtual reality technology*, pp. 3-4; J. Vince, *Virtual reality systems*, p. 20; J. Eddings, *How virtual reality works*, pp. 5-9; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; P. Mealy, *Virtual and augmented reality for dummies*, p. 18; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 25; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and*

would become one of its most popular uses towards the end of the twentieth century going into the twenty-first.

In 1961 Charles Comeau and James Bryan from Philco Cooperation Engineers, developed one of the first fabricated HMDs, called the Headsight (See Appendix 2). The Headsight consisted of a single cathode ray tube (CRT) for each eye and a magnetic motion tracking element linked to a closed-circuit camera. The user's head movement moved the camera, which enabled him/her to naturally view and explore a remote area.[307] This was also a key development in the history of VR.

Another key pioneer in the VR domain was Ivan E. Sutherland, an American scientist. Sutherland was known as the "father of computer graphics".[308] In 1963 during his doctoral study, he developed "Sketchpad", a computer program (See Appendix 2). Sketchpad aimed to focus on interactive computer graphics, which was achieved by using a light pen to select and to draw on the computer.[309] Sutherland also continued with Heilig's work regarding HMDs.[310] In 1965, he wrote a paper for the International Federation for Information Processing, called "The Ultimate Display". In the paper, Sutherland discussed how a user is able to interact with objects in a virtual world. The HMD allowed users to view simulations rendered in wire-frame graphics. Immersion was achieved by changing the viewpoint of the wire-frame graphics according to the movement of the user's head. The HMD included touch and sight stimuli, interactive graphics, force-feedback, sound, smell and taste.[311] In 1966, based on his research, Sutherland developed one of the first

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Engineering Research 4(4), 2013, p. 304; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, pp. 39-40; M. Heilig, 'The Cinema of the Future', *in* R. Packer & K. Jordan (eds.), *Multimedia: from Wagner to virtual reality*, p. 220; B. Cotton & R. Oliver, *Understanding hypermedia: from multimedia to virtual reality*, p. 30; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 27.

[307] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 25; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 27; Virtual Reality Society, 2017b, <https://www.vrs.org.uk/virtual-reality/history.html>, access: 31 July 2018.

[308] J. Vince, *Virtual reality systems*, p. 21; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 43; A. Nayyar *et al*., 'Virtual reality (VR) and augmented reality (AR) technologies for tourism and hospitality industry', *International Journal of Engineering & Technology* 7(2), 2018, p. 158; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 27.

[309] J. Vince, *Virtual reality systems*, p. 21; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, pp. 5, 26; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 43; B. Sherman & P. Judkins, *Virtual reality and its implications: glimpses of heaven, visions of hell*, p. 32.

[310] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 4.

[311] J. Vince, *Virtual reality systems*, p. 21; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 4; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 26; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 304; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 5; I. Sutherland, 'The Ultimate Display', *in* R. Packer & K. Jordan (eds.), *Multimedia: from Wagner to virtual*

computer-based HMD at the Massachusetts Institute of Technology's (MIT) Lincoln Laboratory and at the University of Utah, in the USA.[312] It was during this time that VR started to take a more definite shape and form.[313]

Previous inventors primarily paid attention to the simulation of sight and sound, but Frederick P. Brooks Jr, an American computer scientist, moved away from this notion. Brooks Jr was inspired by Sutherland's system of sense of touch. In 1967, at the University of North Carolina, in the USA, Brooks Jr launched the GROPE project, one of the first prototypes of a force-feedback system - the simulation of physical touch (See Appendix 2). The GROPE project was a haptic display for 6D force fields of interacting protein molecules. Brooks Jr wanted biochemists to "feel" the force constraints when creating new molecule combinations. This was achieved through the Argonne Remote Manipulator, a large mechanical device mounted on the ceiling. The Argonne Remote Manipulator provided the force-feedback by grasping and manipulating molecules. Unfortunately, in 1990, the GROPE project ended due to lack of proper hardware and software tools.[314]

In 1968, Sutherland published another article, entitled "A Head-Mounted Three-Dimensional Display".[315] In this article, he described the development of a tracked stereoscopic HMD. He and one of his students, Bob Sproull, developed one of the first HMD systems at the University of Harvard, in the USA (See Appendix 2). This was a far cry from what had been developed by Pratt in the early twenty-first century, but the HMD was a "periscope-like helmet shaped apparatus" that displayed output from a computer program in a 3D stereoscopic display.[316] The HMD was

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reality, p. 233; L.C. Larijani, *The virtual reality primer*, p. 4; B. Sherman & P. Judkins, *Virtual reality and its implications: glimpses of heaven, visions of hell*, p. 32.

[312] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 44; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; L.C. Larijani, *The virtual reality primer*, p. 4.

[313] J. Vince, *Virtual reality systems*, p. 21.

[314] M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 26; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; F.P. Brooks *et al*., 'Project GROPE - haptic displays for scientific visualization', *Computer Graphics* 24(4), 1990, p. 177; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, pp. 21, 57; IRIS Dynamics Ltd., 2019, <https://www.irisdynamics.com/what-is-force-feedback-haptic-feedbackandcontrolloading/#:~:text=To%20put%20it%20simply%2C%20force,of%20motorized%20motion%20or%20resistance.&text=Force%20feedback%20can%20accomplish%20this,the%20effect%20through%20your%20muscles.>, access: 11 November 2020; M.A. Gutiérrez *et al*., *Stepping into virtual reality*, p. 6; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 34.

[315] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 34.

[316] F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 27.

supported by a mechanical arm known as the "Sword of Damocles". The potentiometers in the arm measured the direction of the user. The HMD also consisted of two CRTs that were mounted alongside the users' ears. The optics in the CRTs focus the image onto half-silvered mirrors, which provides users with a left and right view. Despite the fact that the graphics were outdated and not immersive, the HMD was still ground-breaking. With this HMD, Sutherland took VR to the next level as this was one of the first times that VR would not just be a concept, but also a hardware. Thus, VR as we know it today was born.[317]

In 1968, David C. Evans and Sutherland established the Evans and Sutherland Computer Corporation. The company provided realistic simulators that were used to train military and commercial pilots. Today their products are still used in planetariums, schools and other educational institutions.[318] In 1973, Evans and Sutherland Computer Corporation launched *Novoview*, the first digital computer image-generation system used as a flight simulation. Unfortunately, the *Novoview* had a limit in its display and it could only simulate night scenes.[319]

In 1972, Nolan Bushnell, from Atari, developed "Pong", one of the first interactive electronic games (See Appendix 2). Players interacted with a bouncing ping-pong ball with a "tennis-like" feature that was displayed on a TV screen.[320] It was one of the first and most successful commercial games played initially as an arcade game, but in 1975 Atari released a home edition. Pong was heralded as the game which began the video game industry.[321]

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[317] J. Vince, *Virtual reality systems*, p. 21; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 4; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 44; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 4; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 26; I. Sutherland, 'The Ultimate Display', *in* R. Packer & K. Jordan (eds.), *Multimedia: from Wagner to virtual reality*, p. 233; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 27; J. Bown *et al*., 'Looking for the Ultimate Display: a brief history if virtual reality', *in* J. Gackenbach & J. Bown (eds.), *Boundaries of self and reality online: implications of digitally constructed realities*, p. 248.

[318] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 26; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 45; Reuters, 2020, <https://in.reuters.com/finance/stocks/company-profile/ESCC.PK>, access: 11 November 2020; FundingUniverse, n.d., <http://www.fundinguniverse.com/company-histories/evans-sutherland-computer-corporation-history/>, access: 23 November 2020.

[319] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 28.

[320] J. Eddings, *How virtual reality works*, p. 10; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 27.

[321] Pong.org, n.d., <https://www.ponggame.org/>, access: 6 March 2021.

The following pioneer in the field of VR is Myron Krueger, a computer artist and a man who is known as the "father of virtual reality" (See Appendix 2).[322] In 1973, he coined the concept "artificial reality".[323] He is however also well-known for his 1985 invention of *Videoplace*, an artificial library (See Appendix 2). Users controlled the virtual world by using cameras and other input devices. The camera captures the user's body in real-time and represents it as a silhouette on a larger video projection screen in a darkened room. Image processing techniques that detect edges of a silhouette enable the user to "fingerpaint" by holding their finger up and moving it. A trail of coloured paint would then appear on the video screen.[324]

In 1977, Dan Sandin and Richard Sayre developed the "Sayre Glove", a bend-sensing glove, at the University of Illinois, in the USA (See Appendix 2).[325] The Sayre Glove used "flexible tubes with a light source at one end and a photocell at the other".[326] The tubes were mounted on each finger. Once the tube bent, the light passing between its source and photocell decreased. The voltage of the photocell could then be correlated with finger bending. The computer then interprets the information in order to estimate the configuration of the user's hand. The Sayre Glove was cheap and lightweight and ideal to mimic a set of sliders.[327]

By the 1980s, VR had made headlines as it became commercially available and was recognised as a viable and established technology.[328] In 1981, Tomas A. Furness, invented the Visually Coupled Airborne Systems Simulator (VCASS) at the US Air Force Armstrong Medical Research Laboratories. The VCASS used a 6D position to monitor where the pilot was looking. The HMD would provide an abstract or symbolic representation of the world. This was a huge breakthrough

[322] J. Vince, *Virtual reality systems*, p. 22.
[323] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 50; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 28.
[324] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 28; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 50; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, pp. 29, 50.
[325] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 28; J. Vince, *Virtual reality systems*, p. 21.
[326] D.J. Sturman & D. Zeltzer, 'A survey of glove-based input', *IEEE Computer Graphics and Applications* 14(1), p. 32.
[327] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 28; D.J. Sturman & D. Zeltzer, 'A survey of glove-based input', *IEEE Computer Graphics and Applications* 14(1), p. 32.
[328] J. Vince, *Virtual reality systems*, pp. 2, 21; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 1.

as it reduced distraction caused by an overload of visual information.[329] The VCASS was one of the most advanced flight simulators to be developed thus far. This showed the effectiveness of VR techniques.[330]

In 1982, Thomas Zimmerman patented an interactive glove that was developed to use as a musical instrument to create music. Similar to the concept of an "air guitar",[331] users play invisible instruments by moving their fingers. The glove has optical sensors that correlate with finger flexion and is connected to a computer that controls a music synthesiser.[332] In 1983, Mark Callahan at MIT developed an early see-through HMD which was similar to Sutherland's. The HMD consisted of half-silvered mirrors mounted on eyeglass frames, two monochrome CRTs and a bicycle helmet. The optical disk rapidly displays pre-recorded images in response to head movements. Callahan's research on HMDs was one of the first university projects outside of Sutherland's work.[333]

The next pioneer in the field of VR was William F. Gibson, an American-Canadian speculative science-fiction writer and essayist (See Appendix 2). In 1984, Gibson wrote a cyberpunk novel, *Neuromancer* (See Appendix 2). This brought the concept of VR to the public by introducing the world of "cyberspace".[334] At the end of the novel, two artificial intelligence systems are merged to become a powerful digital being.[335]

The following pioneer was Jaron Z. Lanier, a computer scientist. In 1984, he established the Virtual Programming Language (VPL) Research, Inc.[336] With the support of the National Aeronautics and

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[329] S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, pp. 304-309; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, pp. 53-54.
[330] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 56.
[331] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 64.
[332] J. Vince, *Virtual reality systems*, p. 22; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 64.
[333] W. Robinett & J.P. Rolland, 'A computational model for the stereoscopic optics of a head-mounted display', *in* R.A. Earnshaw *et al*. (eds.), *Virtual reality systems*, p. 52; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 30; J. Vince, *Virtual reality systems*, p. 22; J. Vince, *Introduction to virtual reality*, p. 28.
[334] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. xix; J. Eddings, *How virtual reality works*, p. 5; J. Vince, *Virtual reality systems*, p. 22; C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xviii; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, pp. 17, 30; J. Lovine, *Step into virtual reality*, p. 3.
[335] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. xix; J. Lovine, *Step into virtual reality*, p. 3; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, pp. 21-22.
[336] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 30; M.A. Gutiérrez *et al.*, *Stepping into virtual reality*, p. 6.

Space Agency (NASA) VIEW laboratory, Lanier invented the DataGlove (1985) and EyePhones (1989).[337] The DataGlove, a sensing glove, sends the posture of the user's hand to the computer through fibre-optic sensors (See Appendix 2). This allows the computer to measure finger and thumb bending. The drawback was that the DataGlove was expensive, lacked tactile feedback and could only fit certain hand sizes.[338]

VPL made one of the first VR devices to be sold commercially, known as EyePhone, an HMD. The EyePhone used a pair of liquid crystal display (LCD) screens in conjunction with large expanse enhanced perspective optics. Each LCD screen provided a different image, which created the illusion of depth. The only obstacle was that the EyePhone was heavy, expensive and had a low resolution.[339]

In 1989, Fake Space Labs commercialised the Binocular Omni-Orientation Monitor (BOOM). The BOOM is mounted on a jointed mechanical arm and consists of tracking sensors at the joints. The user places his/her face into the display and uses the side grips to manoeuvre the BOOM. The joints are measured to enable the BOOM's 3D position to be computed (See Appendix 2). The computer generates an image based on the position of the joints on the mechanical arm. The BOOM is more popular compared to HMDs as the user does not have to wear it as in the case of an HMD.[340]

Up the 1980s, inventors did not refer to the technology and applications as VR. But this was to change in 1989 when Lanier coined and publicised the concept of "VR" (See Appendix 2). The

[337] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 30; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305.
[338] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 8; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 64; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 30.
[339] S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 9; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 30; J. Vince, *Virtual reality systems*, p. 22; Virtual Reality Society, 2017c, <https://www.vrs.org.uk/virtual-reality-profiles/vpl-research.html>, access: 11 November 2020.
[340] S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; L.C. Larijani, *The virtual reality primer*, p. 39; J. Vince, *Introduction to virtual reality*, pp. 84-85; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 86; M.O. Onyesolu *et al*., 'A survey of some virtual reality tools and resources', *in* C. Lányi (ed.), *Virtual reality and environments*, p. 27.

reason was that Lanier wanted to distinguish it from immersive digital worlds and traditional computer simulations.[341]

In 1989, *Nintendo*, a game company, introduced the Power Glove (See Appendix 2). The ultrasonic flex sensors measured the wrist position of the user relative to the computer screen. The flex sensors were a small strip of mylar plastic coated with electronically conductive ink. As the sensor bends, the ink residence changes, which measures the finger bending. The Power Glove was later discontinued as not many games required the use of the glove.[342]

During the 1990s, VR reached a critical point due to the growth and development of applications and hardware.[343] In 1990, Jim Kramer, owner of Virtual Technologies, Inc., invented the Cyberglove (See Appendix 2) to aid people with speech impairments. The Cyberglove has thin electrical strain gauges that is placed on an elastic nylon blend material and it uses instruments that measure the position of the finger with respect to the wrist. The glove also has bend sensors on each finger that monitor thumb crossover, palm arch, wrist flexion and wrist abduction.[344]

In 1990, J. Jonathan Waldern, from W-Industries (later renamed Virtuality Group PLC), provided the general public with access to VR by opening *Virtuality* (See Appendix 2). *Virtuality* is a dual player arcade game. Each player has an HMD, a hand-held prop and a ring platform. Virtuality Group PLC was one of the best-known developers in VR entertainment of the 1990s. *Virtuality* showed that interactive games had moved to the next level.[345] In 1991, *CyberEdge Journal*, one of the first commercial newsletter for the VR community, was published (See Appendix 2). The

[341] J. Vince, *Virtual reality systems*, p. 22; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. xxi; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1139; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 29; M.A. Gutiérrez *et al.*, *Stepping into virtual reality*, p. 6.
[342] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 31; G. Burdea & P. Coiffet, *Virtual reality technology*, pp. 9, 190; L.C. Larijani, *The virtual reality primer*, pp. 9, 44.
[343] G. Burdea & P. Coiffet, *Virtual reality technology*, pp. 10-11; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 340; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 304.
[344] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 53; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 32; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 17.
[345] Virtual Reality Society, 2017d, <https://www.vrs.org.uk/dr-jonathan-walden-virtuality-new-reality-promise-two-decades-soon/>, access: 1 March 2021;W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, pp. 31-32; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, pp. 29-30.

aim of the journal was to provide information for people that want to enhance the human-computer interaction.[346]

In 1992, Montpellier, in France, was the first city to organise an international conference on VR, entitled "Interfaces for Real and Virtual Worlds".[347] A virtual conference was also held in San Diego, in the USA, entitled "Medicine Meets Virtual Reality". In 1992, Thomas A. DeFanti displayed the Computer Audio-Visual Environments (CAVE)[348], a VR scientific visualisation system, for the first time at the SIGGRAPH'92 conference in Chicago, in the USA (See Appendix 2).[349] In 1993, two academic orientated conferences focused mainly on VR, namely the VRAIS'93 and the Institute of Electrical and Electronics Engineers. In 1995, these two conferences merged to form the Premier International Conference on VR and 3D User Interfaces. The conference aimed to be a venue for the presentation of research results in the area of VR. Thus, these conferences show that VR played an integral part in the scientific and engineering community,[350] but remained limited to these worlds.

In 1993, *Nintendo* launched the Virtual Boy, one of the first portable unit capable of displaying stereoscopic 3D graphics (See Appendix 2). Each eye had an oscillating mirror light-emitting diode (LED) array. The oscillating mirror moved back and forth and used the reflection from the LED to sweep across the visual field. As a result, a bright and sharp image with a high resolution was created. However, the Virtual Boy was a failure because the LED screens had problems as they lacked colours and software support and users often experienced motion sickness. As a result, *Nintendo* ceased production in the following year.[351]

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[346] B. Delaney, *Virtual reality 1.0 – the 90's: the birth of virtual reality in the pages of CyberEdge Journal*, p. 27; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 33.
[347] G. Burdea & P. Coiffet, *Virtual reality technology*, p. 8.
[348] The CAVE system is discussed in detail later in the chapter.
[349] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 33; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 6.
[350] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 34; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 8; IEEE VR, n.d. <http://ieeevr.org/#about>, access: 18 November 2020.
[351] P. Mealy, *Virtual and augmented reality for dummies*, pp. 20-21; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 30; J. Bown *et al*., 'Looking for the Ultimate Display: a brief history if virtual reality', *in* J. Gackenbach & J. Bown (eds.), *Boundaries of self and reality online: implications of digitally constructed realities*, p. 250.

In 1994, two major events happened. The first was founding the Virtual Reality Society, an information and news resource for VR (See Appendix 2).[352] The second major event was that for the first time a surgeon at Johns Hopkins Hospital used an HMD to remove a gall bladder.[353] This was a significant milestone as the medical world would continue to embrace the use of VR. From then on inventions and advances were continued at a steady pace. In 1997, Virtual Technologies, Inc. launched the *CyberGrasp*, a hand-based force feed-back device. The *CyberGrasp* allowed the user to close his/her hand, which enhanced the experience.[354] In a sense, it allowed the user to "reach into [their] computer and grasp computer-generated or tele-manipulated objects",[355] to literally allow the user to feel the object being manipulated. It was originally developed for use in telerobotic applications for to the United States Navy, in the USA.[356]

In 1998 developments appeared more effectively in the entertainment world. Disney Regional Entertainment opened its first DisneyQuest family arcade centre at Disney Springs, in the USA (See Appendix 2). DisneyQuest offered numerous VR attractions and projection-based visual displays. It also planned to open other centres in the USA, but due to the high price of tickets, the tight space and long queues, the idea never really succeeded. However, on 2 June 2017, DisneyQuest finally closed its doors.[357] This development, although terminated, also marked a milestone in the use of VR for large-scale entertainment purposes.

However, by the 2000s, VR had improved greatly.[358] In 2003, SL was released by Philip Rosedale, founder of Linden Labs (See Appendix 2). Despite the fact that SL is not considered as VR, it provides users and institutions a massive-scale virtual world that allows them to purchase properties. In 2006, *Nintendo* launched the Wii (See Appendix 2). The Wii was one of the first mass-consumer product to use physical tracking in a virtual world. The Wiimote, the wireless game controller, has an accelerometer and an infrared camera used for position tracking.[359]

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[352] J. Vince, *Virtual reality systems*, p. 23; Virtual Reality Society, 2017e, <https://www.vrs.org.uk/>, access: 15 November 2020.
[353] J. Vince, *Virtual reality systems*, p. 23.
[354] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 35.
[355] CyberGlovesystems, n.d., <http://www.cyberglovesystems.com/cybergrasp>, access: 6 March 2021.
[356] CyberGlovesystems, n.d., <http://www.cyberglovesystems.com/cybergrasp>, access: 6 March 2021.
[357] N. Schmidt, 2020, <https://allears.net/2020/06/13/the-history-behind-disneyquest-and-its-defunct-expansion/>, access: 25 November 2020.
[358] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 36.
[359] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, pp. 50-51.

In 2009, Kickstarter, a crowd-funding website, was started by Perry Chen, Yancey Strickler and Charles Adler to provide potential projects a funding outlet. Many VR inventors have used Kickstarter to reinvigorate their devices in the market place.[360] One of these inventors is Palmer F. Luckey, founder of Oculus VR. In 2012, Luckey launched a Kickstarter campaign to generate funds for this prototype, the Oculus Rift (See Appendix 2). After the Kickstarter campaign, Luckey gained US$2.4 million for the development of the Rift. In 2014, Mark Zuckerberg, the founder of Facebook, saw the potential of the Rift and bought it for US$2 billion. Today, the Rift is popular among people because it is cheaper, lighter in weight and had a large field-of-view (the total area a user is able to see).[361]

The release and popularity of the Rift and the development of the smartphone encouraged other companies to develop their own HMDs.[362] In 2014, Google launched the Google Cardboard, a "do-it-yourself" HMD for smartphones (See Appendix 2). The Cardboard contains a magnetic-based toggle input and an application programming interface that only requires a smartphone capable of running VR applications to function.[363] Samsung also unveiled its smartphone-based HMD, called the Samsung Gear VR (See Appendix 2). The Gear VR has an accelerometer, gyroscope, magnetometer, proximity sensors, a touchpad and buttons on the side, which gives the user 96° panoramic views for movies and games.[364]

Valve, a software development company, and HTC, a phone manufacturer, showed a keen interest in HMDs. Initially, Valve and HTC worked on separate VR-related projects, but in 2015, they decided to team up to reveal the HTC Vive (See Appendix 2). The Vive uses room-scale tracking

[360] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 53.
[361] P. Mealy, *Virtual and augmented reality for dummies*, p. 21; F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 31; Ossic, 2017, <https://medium.com/ossic/the-history-of-virtual-reality-e517983b1253>, access: 10 March 2019; Virtual Reality Society, 2017b, <https://www.vrs.org.uk/virtual-reality/history.html>, access: 31 July 2018; B. Johnson, 2020, <https://electronics.howstuffworks.com/oculus-rift.htm>, access: 13 November 2020.
[362] Virtual Reality Society, 2017b, <https://www.vrs.org.uk/virtual-reality/history.html>, access: 31 July 2018.
[363] Ossic, 2017, <https://medium.com/ossic/the-history-of-virtual-reality-e517983b1253>, access: 10 March 2019; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 56.
[364] PCmag, 2020, <https://www.pcmag.com/encyclopedia/term/samsung-gear-vr>, access: 19 November 2020; J. Laukkonen, 2020, <https://www.lifewire.com/gear-vr-4157591>, access: 19 November 2020; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 56.

technology, such as motion-tracked handheld controllers, which enables users to move and interact in a 3D space.[365]

By 2016, VR had become an overnight success. As a result, companies released VR-related products. For example, Sony unveiled the PlayStation VR (PS VR) for the PlayStation 4 gaming console (See Appendix 2). The PS VR uses the PlayStation Camera to track the position of the user's head in real time. The games use the user's head position to render 3D visuals and audio to make the user feel as if he/she is in the virtual world. The PS VR also has built-in microphones, which create a more immersed experience.[366]

As VR is progressing, inventors are starting to pay attention to new areas in order to improve HMDs. An area that has begun receiving attention at this time is eye-tracking in VR.[367] There are currently two key companies at the forefront of eye-tracking, namely FOVE, Inc., a Japanese company and Tobii, a technology company in Sweden. In 2016, FOVE, Inc. released the FOVE, one of the first eye-tracking HMDs (See Appendix 2). The FOVE also started as a Kickstarter campaign which generated US$1 million. The FOVE uses an infrared sensor to monitor a user's eye movement in a virtual world. Therefore, the user does not have to physically move his/her head.[368]

In 2016, Tobii, the world leader in eye-tracking research unveiled the HTC Vive Pro Eye HMD (See Appendix 2). The Vive Pro Eye is unique as the Tobii eye-tracking is built into the HMD from the beginning, thus, eliminating the use of hand-held controllers. The Vive Pro Eye uses "gaze-orientated menu navigation",[369] which means that the user navigates around the content by

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[365] Ossic, 2017, <https://medium.com/ossic/the-history-of-virtual-reality-e517983b1253>, access: 10 March 2019; Centre for Computing History, n.d., <http://www.computinghistory.org.uk/det/52936/HTC-Vive-Virtual-Reality/>, access: 12 November 2020; A. Souppouris, 2016, <https://www.engadget.com/2016-03-18-htc-vive-an-oral-history.html>, access: 13 November 2020.

[366] S. Shuman, 2017, <https://blog.playstation.com/2017/10/02/playstation-vr-the-ultimate-faq/#:~:text=The%20headset%20contains%20blue%20LED,you%20into%20a%20virtual%20world.>, access: access: 19 November 2020; How It Works, 2016, <https://www.howitworksdaily.com/how-the-playstation-vr-works/>, access: 19 November 2020; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 57.

[367] P. Mealy, *Virtual and augmented reality for dummies*, p. 40.

[368] S. Charara, 2017, <https://www.wareable.com/vr/how-does-vr-work-explained>, access: 8 August 2018.

[369] K. Bell, 2019, <https://mashable.com/article/htc-vive-pro-eye-and-cosmos-ces-2019/>, access: 14 November 2020.

simply looking at it.[370] The release of the Vive Pro Eye and the FOVE have encouraged other companies to invest in eye-tracking systems for VR, such as the mega companies Facebook, Apple and Google.[371]

The second major area that inventors are addressing is the sense of touch and how it can be incorporated into VR.[372] A company that is at the lead regarding this is HaptX. In 2018, Jake Rubin, CEO and founder of HaptX, launched the HaptX Gloves (See Appendix 2). These gloves provide users with the opportunity to "physically" feel objects in a virtual world. The gloves have two components, namely the skin and the skeleton. The skin consists of "microfluidic actuators", which are small air pockets with controllable pressure. The pressure in the actuators changes when a user encounters an object in the virtual world, which simulates contact with a physical object. The skeleton allows the fingers to feel the weight and the distance of the virtual object due to tubes connected to a mini compressor.[373]

Regarding the future of VR, it is predicted that the applications will become so miniaturised that it will be possible to wear it in one's eyes, similar to contact lenses or as sunglasses.[374] Prideaux takes this further by introducing nanobots (See Appendix 2).[375] In essence, a nanobot is near the intraneuronal connections of the sense organs (i.e., eyes, skin or ears) and, they suppress "the imputes from the real senses and substitute the signals that will create a virtual environment". [376] Thus, the user is able to access a website or computer network by entering a VE with nanobot technology. Another benefit of nanobots is that they do not need external apparatus in order to create reality-like experiences. As a result, nanobots can provide a fully immersive experience for users.[377] It is believed that within the next three decades it will be possible to produce self-

[370] K. Bell, 2019, <https://mashable.com/article/htc-vive-pro-eye-and-cosmos-ces-2019/>, access: 14 November 2020.
[371] P. Mealy, *Virtual and augmented reality for dummies*, p. 40.
[372] J. Eddings, *How virtual reality works*, p. 147; P. Mealy, *Virtual and augmented reality for dummies*, p. 255.
[373] J. Jaehnig, 2019, <https://arpost.co/2019/02/19/haptx-vr-technology-in-touch-with-the-virtual-world/>, access: 14 November 2020.
[374] J. Lovine, *Step into virtual reality*, p. 68; J. Eddings, *How virtual reality works*, p. 148.
[375] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 327.
[376] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 328; B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 33.
[377] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 328; B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 33.

replicated nanobots the size of human blood cells or smaller.[378] Thus, it is apparent that the technology for VR has transformed phenomenally over the past century.

3.3 Virtual reality technologies

VR needs several technologies in order to immerse a person in the virtual world.[379] This section discusses some of the most important technologies that have been developed, namely HMDs, gloves and bodysuits, joysticks, wands, 3D mice and the CAVE system. Diagram 2 indicates what technologies are required by VR.

3.3.1 *Head-mounted displays*

People usually associate HMDs with VR.[380] The reason is that HMDs provide a full immersion into the virtual world by blocking out the outside world. This allows users to experience the virtual world from a first-person view.[381] There are two types of HMDs, namely tethered (high-end devices) and untethered (mid-tier devices and low-end devices). Tethered HMDs are powered by a computer to process the graphics and have a motion controller, sensors to track the user, a wide field of view and high resolution. These HMDs offer a room-scale experience and provide users with improved graphics, real-time tracking and interactions. Examples of tethered HMDs include the Vive, Rift and OSVR.[382] Untethered HMDs (also called mobile VR) only need a smartphone device as a display. However, untethered HMDs are dependent on a smartphone for their processing power and their ability to process real-time 3D content. The abovementioned Gear VR and Cardboard are examples of untethered HMDs.[383]

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[378] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, pp. 327-328; B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 33.

[379] How stuff work, n.d.(b), <https://www.howitworksdaily.com/how-does-virtual-reality-work/>, access: 8 August 2018.

[380] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1141.

[381] J. Lovine, *Step into virtual reality*, p. 26; B.S. Santos *et al*., 'Head-mounted display versus desktop for 3D navigation in virtual reality: a user study', *Multimedia Tools Application* 41(1), 2009, p. 164; J. Vince, *Virtual reality systems*, p. 181; Eddings, *How virtual reality works*, p. 69.

[382] I.P Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management*, 2018, p. 141; P. Mealy, *Virtual and augmented reality for dummies*, p. 80.

[383] I.P Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management*, 2018, p. 141; P. Mealy, *Virtual and augmented reality for dummies*, pp. 81-82.

The HMD is attached to the user's head and there are two screens mounted to it that offer the user stereoscopic images. HMDs use two types of displaying images, namely CRT and LCD screens.[384] CRT screens are similar to the screens used in a TV set.[385] An electron gun releases a stream of electrons. The electrons are swept across the screen. The screen is covered with phosphors. As the beam hits the phosphors, they start to glow. The colour image is "painted" on the screen by pointing the guns at a type of phosphor that glows a different colour.[386]

LCD screens use liquid crystals to create an image. An electrical charge results in the crystals changing their physical orientation. LCD screens have polarising filters. This means that only light orientated in one direction is able to pass through the filter. Light waves become orientated to the normal resting place of the liquid crystals to create colour displays. The electrical charge also changes the orientation. As a result, the ray of light is blocked. Colour filters can also be used to create colour displays.[387] In terms of an HMD, the LCD screens channel the images from the screen to the eyes.[388] Each eye views the same image, but from a different vantage point. For example, by closing one eye and then the other, the object will move from side to side. The brain then combines the different views to form one stereoscopic image.[389] Most consumer-based HMDs use LCD screens because they are light, flat, cheap and use very little electric power.[390]

HMDs also always include a tracking device.[391] Tracking devices are a key component in an HMD.[392] A tracking device monitors the position and orientation of the user's head.[393] The tracking

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[384] J. Lovine, *Step into virtual reality*, p. 30; L.C. Larijani, *The virtual reality primer*, p. 32; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al.* (eds.), *Information and communication technologies in support of the tourism industry*, p. 185.
[385] L.C. Larijani, *The virtual reality primer*, p. 32; J. Lovine, *Step into virtual reality*, p. 30; J. Eddings, *How virtual reality works*, pp. xi, 22; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 408.
[386] J. Eddings, *How virtual reality works*, p. 22; A. Dix *et al*., *Human-computer interaction*, p. 72.
[387] J. Eddings, *How virtual reality works*, p. 23.
[388] M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1141; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 411; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 151.
[389] L.C. Larijani, *The virtual reality primer*, p. 33; J. Eddings, *How virtual reality works*, p. 19; S. Charara, 2017, <https://www.wareable.com/vr/how-does-vr-work-explained>, access: 8 August 2018.
[390] L.C. Larijani, *The virtual reality primer*, p. 32; J. Lovine, *Step into virtual reality*, p. 31.
[391] M.A. Gutiérrez *et al*., *Stepping into virtual reality*, p. 130.
[392] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 77; J. Vince, *Virtual reality systems*, p. 283.
[393] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, pp. 14, 77; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 76; J. Vince, *Introduction to virtual reality*, p. 146; J. Lovine, *Step into virtual reality*, p. 30; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1141.

device then reports the position and orientation to the computer, which then displays an image from the vantage point appropriate to the position of the user.[394] As a result, the user is able to look around the VE.[395] HMDs are also sometimes equipped with other devices to enhance the VR experience. One such device is a voice recognition system. This enables the user to interact in the VE by using voice control.[396] Another device is a headphone which provides sound and blocks the user from the real world.[397]

3.3.2 *Gloves and body suites*

Gloves are one of the most well-known devices for control and input into a virtual world.[398] The glove enables users to navigate, grasp, move and interact with virtual objects in a similar manner as they would in reality.[399] In fact, it has been shown that ability to "touch" virtual objects, increases the sense of presence.[400] As mentioned, gloves contain thin fibre optic cables that are attached to the back of the user's hand and fingers. The optical characteristics of the fibre changes when the user flexes his/her fingers. The computer captures the information and determines which finger is being bent and by how much. Gloves also have a tracking device attached to the wrist that monitors the position and orientation of the user's hand.[401] The recently released the Manus VR Data Glove has two sensors, a vibration motor for touch feedback and a rechargeable battery.[402]

A bodysuit (or also known as a haptic vest, gaming suit, VR suit or tactile suit) provides haptic (the "sense of touch artificially recreated by applying forces or vibrations") feedback to the

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[394] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14; J. Eddings, *How virtual reality works*, p. 23; J. Lovine, *Step into virtual reality*, p. 30; L.C. Larijani, *The virtual reality primer*, p. 36.
[395] M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1141.
[396] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14.
[397] L.C. Larijani, *The virtual reality primer*, p. 32; J. Eddings, *How virtual reality works*, p. 28.
[398] L.C. Larijani, *The virtual reality primer*, p. 41.
[399] W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14; L.C. Larijani, *The virtual reality primer*, p. 44; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 185.
[400] M.A. Gutiérrez *et al*., *Stepping into virtual reality*, p. 147; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 185.
[401] J. Vince, *Virtual reality systems*, p. 182; L.C. Larijani, *The virtual reality primer*, p. 41; J. Vince, *Introduction to virtual reality*, p. 78; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 80; J. Lovine, *Step into virtual reality*, p. 190; J. Eddings, *How virtual reality works*, p. 51.
[402] R. Hills-Duty, 2017, <https://www.vrfocus.com/2017/03/manus-vr-announce-launch-of-development-kit-for-data-glove/>, access: 12 April 2019.

body.[403] Bodysuits also contain a tracking fibre optic cable that runs through to collect the movement of each part of the suit. The computer then showcases the information on the screen or virtual scenario.[404] There are numerous types of bodysuits, such as the Tesla Suit. This suite enables users to interact in the VE by touching and feeling objects. The suit transmits sensations to the body through neuromuscular electrical stimulations.[405]

3.3.3 *Joysticks, wands and 3D mice*

The most widespread hand-held interfaces are joysticks. People prefer to use them due to the fact that they are cheap and easy to work with. Joysticks provide a limited degree of freedom and are compactly shaped and produce moderate forces with high mechanical bandwidth.[406]

Another control device is a wand. This is a 3D input device that is used to navigate, to paint, to interact and to select virtual objects. Wands consist of several buttons and a tracking sensor at its tip and base. To navigate in a virtual world, users point the wand to an object and press a button. The laser beam then selects the closest object. The Oculus Touch and HTC Vive are examples of wands.[407]

The last control device is a 3D mouse. This is used to lift virtual objects and to navigate in a virtual world.[408] In order to lift objects, the user presses a button that "picks" a virtual object when it intersects with the 3D icon associated with the mouse. The user is then able to identify and manipulate objects within the VE.[409] To navigate, the 3D mouse controls the forward speed and

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[403] P. Pita, 2017, <https://virtualrealitytimes.com/2017/02/28/list-of-full-body-virtual-reality-haptic-suits/>, access:12 April 2019.
[404] L.C. Larijani, *The virtual reality primer*, p. 44; P. Pita, 2017, <https://virtualrealitytimes.com/2017/02/28/list-of-full-body-virtual-reality-haptic-suits/>, access:12 April 2019.
[405] P. Pita, 2017, <https://virtualrealitytimes.com/2017/02/28/list-of-full-body-virtual-reality-haptic-suits/>, access:12 April 2019.
[406] K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 189; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 102.
[407] L.C. Larijani, *The virtual reality primer*, p. 47; J. Eddings, *How virtual reality works*, p. 51; K. Pimentel & K. Teixeira, *Virtual reality: through the new looking glass*, p. 185; M. Arguinbaev, 2017, <https://thevrsoldier.com/what-is-a-magic-wand/>, access 30 November 2020.
[408] J. Vince, *Introduction to virtual reality*, p. 78; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 80.
[409] J. Vince, *Virtual reality systems*, p. 182.

the user's gaze dictates the direction of travel. For example, if a 3D mouse is tilted forward, it can initiate a forward movement and holding it vertically will stop the motion.[410]

3.3.4 *The Computer Audio-Visual Environments System*

As mentioned earlier in the chapter, in 1992, the Electronic Visualization Lab developed the CAVE system at the University of Illinois. The aim of the system is to create a VR system without any limitations.[411] The CAVE system comprises a room that consists of numerous walls with 3D stereoscopic projections.[412] There are three rear-projection screens for walls and a down-projection screen for a floor (See Appendix 2).[413] The computer provides the images projected on the screen, which enables the user to have a stereoscopic view.[414] The user wears an HMD and holds a wand to interact in the VE. As a result, the user has a full immersion experience.[415] Another reason for its popularity is that more than 10 people can experience the CAVE together as long as they do not move.[416] This was a pivotal development in terms of how VR would become part of the tourism domain.

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[410] J. Vince, *Introduction to virtual reality*, p. 78; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 80.
[411] M.A. Gutiérrez *et al*., *Stepping into virtual reality*, p. 135; W.R. Sherman & A.B. Craig, *Understanding virtual reality: interface, application, and design*, p. 14; J. Lovine, *Step into virtual reality*, p. 3; J. Vince, *Virtual reality systems*, p. 14; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 87; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 78; J. Eddings, *How virtual reality works*, p. 69; J. Vince, *Introduction to virtual reality*, p. 87.
[412] F. Steinicke, *Being really virtual: immersive natives and the future of virtual reality*, p. 6.
[413] J. Vince, *Introduction to virtual reality*, p. 87; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 87; J. Lovine, *Step into virtual reality*, p. 3; J. Vince, *Virtual reality systems*, p. 14.
[414] J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 87; J. Vince, *Introduction to virtual reality*, p. 87; How stuff works, n.d.(a), <https://electronics.howstuffworks.com/gadgets/other-gadgets/VR-gear2.htm>, access: 9 April 2019.
[415] J. Lovine, *Step into virtual reality*, p. 3; S. Mandal, 'Brief introduction of virtual reality and its challenges', *International Journal of Scientific and Engineering Research* 4(4), 2013, p. 305; J. Vince, *Introduction to virtual reality*, p. 87; J. Vince, *Essential virtual reality fast: how to understand the techniques and potential of virtual reality*, p. 87; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 80.
[416] J. Eddings, *How virtual reality works*, pp. 69, 73; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 80.

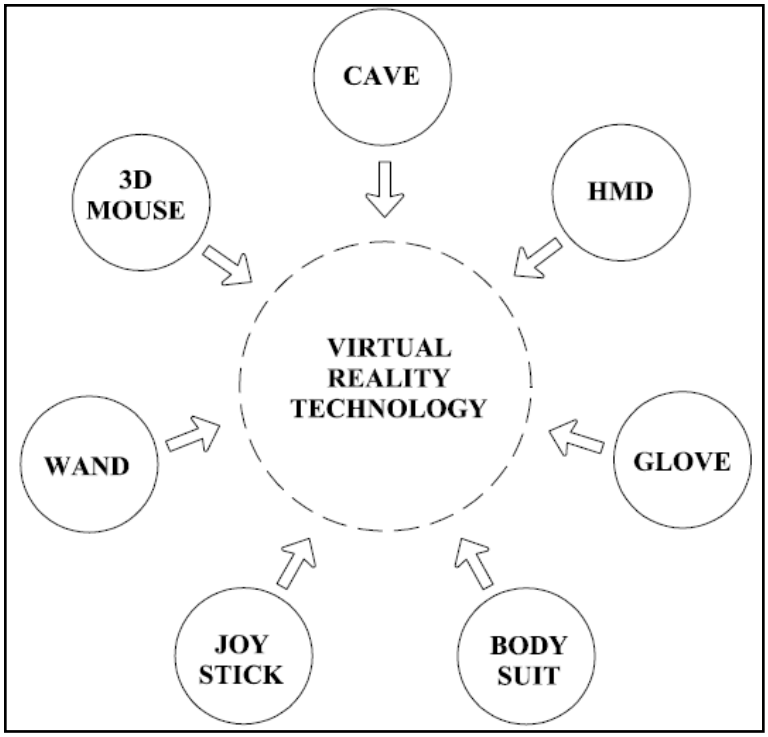

Diagram 2: VR technology

3.4 Concluding remarks

This Chapter introduced the concept of "VR" in its broadest terms and inception phases. It reflected on the history of VR from the beginning to modern-day developments. Based on this history, VR is a not a new phenomenon and has been developing over a long period of time. Many pioneers have played a major role in the development of VR, especially Link, Heilig, Sutherland, Krueger, Gibson, Lanier and Luckey. In short, Link created the Link Flight Simulator, one of the first modern-day flight simulators. Heilig wanted to immerse his audience and therefore, he created an early version of an HMD and the Sensorama. Both inventions were immersive, but the Sensorama took VR to the next level. The reason being that Sensorama offered its audience 3D images, seat movement, wind and aromas. Sutherland was so inspired by Heilig's HMD, that he invented one of the first computer-based HMD. This was the first step in VR becoming hardware and not just a concept. Krueger is well-known because he coined the concept "artificial reality" as he wanted to immerse people in the virtual world through *Videoplace*. Gibson's famous cyberpunk novel, *Neuromancer*, brought VR and cyberspace to the public. Lanier coined the concept "VR" for the

first time. Lastly, Luckey's invention of the Rift encouraged other companies to develop their own HMDs, such as Google, Samsung, Valve and HTC and Sony.

The future of VR remains unpredictable. Inventors are only now starting to pay attention to other areas, such as eye-tracking and the sense of touch. In addition, the technology is now focused on the potential of nanobots.

This background and the various technologies are of relevance for the introduction of VR within a tourism context.

Chapter 4: Virtual reality and tourism

4.1 Introduction

As is evident from the preceeding chapter, since 1990, VR has been utilised in a range of sectors, namely aviation, education, healthcare, military and entertainment.[417] Chapter 4 focuses specifically on the role of VR in the tourism industry by discussing the various types of virtual tourism, and how they have been included in the sector.

4.2 Virtual reality and tourism

One of the most significant technological advancements in the field of the tourism industry is VR.[418] In fact, the tourism industry can be seen as one of the first industries to indirectly adopt VR in the form of flight simulations.[419] Although VR was not developed for tourism, it has greatly influenced the industry by offering new opportunities.[420] VR has phenomenally changed the way tourists experience travel, destinations and attractions, as well as tourism products and services.[421] By using VR technologies, tourists now have the chance to escape their reality and travel to any

[417] Virtual Reality Society, 2017f, <https://www.vrs.org.uk/virtual-reality-applications/>, access: 21 June 2018; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 417; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 637; A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 107; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 236.

[418] I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 140; I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 3; A. Pestek & M. Sarvan, 'Virtual reality and modern tourism', *Journal of Tourism Futures* 7(2), 2020, p. 245.

[419] M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 1; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 237; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 439.

[420] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 107; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 3.

[421] S.M. Loureiro *et al*., '20 Years of research on virtual reality and augmented reality in tourism context: a text-mining approach', *Tourism Management* 77, 2020, p. 1; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 34; W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 282.

location anywhere at any time and do almost anything they desire.[422] VR also offers tourists all the variables to create the so-called "perfect virtual destination", for instance, the sun will always shine and there will be good weather.[423] In a nutshell, it has been argued that tourists do not have any negative experiences usually associated with conventional tourism, such as queues, traffic jams, risks of accidents and sickness, bureaucratic and health formalities, language issues, natural hazards, destruction of the environment, public access limitations and various cumulative expenses.[424]

Moreover, in the last decades VR has become increasingly more affordable and accessible.[425] The advancements in hardware and software have led to the development of cheap portable HMDs, such as those mentioned in Chapter 3 including, the Cardboard, the Microsoft HoloLens, the Vive, the Gear VR and the Rift.[426] This makes it easier for tourists to partake in virtual tours of cities and attractions.[427] The reason is that tourists become active participants, which means that they are immersed in the activities.[428] As a result, tourists have a more interactive and diversified experience.[429]

A large percentage of the literature on tourism and VR shows attempts of using VR to "attract" tourists.[430] For example, the Marriott Hotel group is at the forefront in terms of employing VR to market its rooms and services.[431] In 2015, Marriott and Framestore, a British animation, visual effects and creative studio, unveiled the Marriott Teleporter as part of the *Travel Brilliantly*

[422] M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 1; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 589.
[423] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 420.
[424] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 49.
[425] J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 6.
[426] J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism* 2018, p. 6; K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 119.
[427] I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230.
[428] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 288.
[429] W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 282.
[430] T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), pp. 1-3.
[431] G. Inkpen, *Information technology for travel and tourism*, p. 229.

marketing campaign. The Teleporter transports hotel guests to a beach on Maui or a skyscraper in London. Guests enter the Teleporter and wear a Rift. The Teleporter has pneumatic pumps in the floors, misting nozzles in the walls, heat fans in the ceiling, as well as a "scent dispenser" and a 1000-watt amplifier on the floors. When guests land on the beach, the pumps on the floor enable them to feel 80^{o}C warmth, a sea breeze through the fans and ocean mist through the nozzles. At the skyscraper, the floor tilts to heighten the sense of being 122m high. As a result, the Teleporter provides guests with a fully immersive 4D sensory experience.[432]

The Teleporter led to other creations, such as the VRroom Service and VR Postcard.[433] Marriott, in collaboration with Samsung Electronics America, launched VRroom Service. This service allows hotel guests a VR experience if they order a Gear VR and headphones. Marriott also created VR Postcard, a virtual travel platform. This provides tourists with 360° videos of intimate and immersive travel stories. Tourists are immersed as they follow real travellers on a journey to the Andes Mountain range in South America, a market in Beijing in China, and an ice-cream shop in Rwanda in Africa. VR Postcard is available to guests that partake in VRroom Service.[434] Another marketing method Marriott uses is quick time virtual reality. Quick time virtual reality VR was developed by Apple and enables tourists to view the hotel room in 360° vision before making a booking.[435]

Thomas Cook was one of the first tour companies to use VR as a marketing tool. In 2014, Thomas Cook and Visualise, a production company, launched the "Try before you fly" campaign for Thomas Cook Airlines. People were transported to the cockpit of a Thomas Cook plane where

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[432] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality*, p. 96; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), pp. 1-3; N. Sturgis, 2014, <https://www.dailymail.co.uk/travel/travel_news/article-2762092/Marriott-virtual-reality-teleporter-booth-lets-travellers-feel-smell-holiday-locations-without-booking-flight.html>, access: 03 May 2018; P. Rubin, 2014, <https://www.wired.com/2014/09/marriott-vr-teleporter/>, access: 4 December 2020; eHotelier, n.d., <https://insights.ehotelier.com/global-news/2014/09/18/marriott-trying-to-teleport-travelers/>, access: 4 December 2020.

[433] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality*, p. 96.

[434] P. Jacobius, n.d.(a), <http://www.virtual-reality-in-tourism.com/overview-vr-in-tourism/>, access: 17 May 2019; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), pp. 1-3; P. Disztinger *et al*., 'Technology acceptance of virtual reality for tourism planning', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 258; Mariotte International, 2015, <https://news.marriott.com/news/2015/09/09/marriott-hotels-introduces-the-first-ever-in-room-virtual-reality-travel-experience>, access: 11 February 2020.

[435] G. Inkpen, *Information technology for travel and tourism*, p. 230.

they could view videos of countries, such as Egypt, Cyprus, Greece, New York and Singapore. The campaign was highly successful as Thomas Cook claimed to generate US$15, 500 in flights and hotel bookings increased with a 40% return on their investment.[436]

First Airlines, a company in Tokyo, is considered as one of the first airlines that allowed tourists to travel business class or first class to New York, Rome, Paris and Hawaii without ever leaving the ground. The experience is the same as an actual flight experience. This is because the facility looks similar to a real airplane and it has actual airbus seats. Tourists have to sign-in before the flight and the air hostesses provide the safety instructions, as in the case of an actual airline procedure. The meals (not virtual) are prepared by a chef and represent the destination. For example, on a trip to Paris, tourists are served salmon tartar and onion soup, while in New York they receive chopped salad and Manhattan clam chowder. Once the plane has "landed" at the destination, tourists can partake in a 360° video of the city.[437]

Destinations also rely heavily on VR as a marketing tool. Two famous destinations include Destination British Colombia (Destination BC) in Canada, and Tourism Australia.[438] In 2014, Destination BC launched the first market campaign that used VR, namely *The Wild Within VR Experience*. This showcases 360° video footage taken at the Great Bear Rainforest, a diverse and protected area in British Colombia. For filming, the crew used 3D printers to create a custom rig for multiple GoPro cameras that they were able to mount on a backpack, a boat, a drone and on foot. First- and third-person views were utilised to immerse tourists by allowing them to partake in activities, such as visiting a colony of sea lions, walking along the coast, watching whales or hiking in the mountains. The 360° video has been successful in terms of marketing. Since its

[436] N. Campbell, 2017, <https://www.rezgo.com/2017/08/virtual-reality-tourism-perfect-pairing>, access: 22 May 2019; R. Banino, 'Revolutionising industry', *BBC Focus Magazine*, 14 April, 2016, p. 80; J. Morris, 2016, <https://www.travolution.com/articles/16143/thomas-cook-enlists-virtual-reality-for-360-degree-in-flight-showcase>, access: 4 December 2020.

[437] TimeOut, n.d., <https://www.timeout.com/tokyo/things-to-do/travel-the-world-in-virtual-reality-with-first-airlines>, access: 11 February 2020; FirstAirlines, n.d., <https://firstairlines.jp/>, access: 11 February 2020; L. Dayman, 2018, <https://theculturetrip.com/asia/japan/articles/inside-first-airlines-japans-virtual-holiday-experience/>, access: 11 February 2020; J.G. Martin, 2018, <https://www.lonelyplanet.com/articles/first-airlines-japanese-virtual-reality>, access: 11 February 2020.

[438] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 5; P. Jacobius, n.d.(b), <http://www.virtual-reality-in-tourism.com/overview-destinations/>, access: 17 May 2019.

inception in 2014, it has received over 65 million views worldwide.[439] In 2010, Tourism Australia launched its marketing campaign, "There is nothing like Australia". The campaign aims to show tourists the unique assets of Australia found above and below the waterline. The 360° video footage covers 17 coastal and aquatic areas of Australia. According to Tourism Australia, since the video was launched a decade ago, international tourism spend increased by more than US$19 billion.[440]

4.3 Types of virtual tourism

This section provides more detail on the use of VR in tourism by paying particular attention to the types of virtual tourism, namely drone tourism, e-tourism, film and television tourism, gamification tourism, smartphone and app tourism, space tourism and virtual video tourism (360° images and videos).

Drones have become a popular technology used in a number of areas, such as archaeological studies, monitoring and managing natural disasters, wildlife censuses and live sports broadcasting.[441] They are similar to an airplane due to their single and multiple blades,[442] but are controlled by apps installed on wrist-worn devices, smartphones, tablets or consoles.[443] They are

[439] P. Jacobius, n.d.(b), <http://www.virtual-reality-in-tourism.com/overview-destinations/>, access: 17 May 2019; S. Magál & M. Slivka, 'Virtual Reality in tourism' (paper presented at the *7th Advances In Hospitality & Tourism Marketing and Management*, Famagusta, Cyprus, 10-15 July 2017), p. 67; P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', in M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4117; K. Zimmerman, 2015, <https://www.theglobeandmail.com/life/travel/destinations/can-virtual-reality-bring-real-tourists-to-bc/article27578414/>, access: 3 March 2021.

[440] S. Magál & M. Slivka, 'Virtual Reality in tourism' (paper presented at the *7th Advances In Hospitality & Tourism Marketing and Management*, Famagusta, Cyprus, 10-15 July 2017), p. 67; P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4117; P. Jacobius, n.d.(b), <http://www.virtual-reality-in-tourism.com/overview-destinations/>, access: 17 May 2019; Tourism Australia, 2021, <https://www.tourism.australia.com/en/news-and-media/news-stories/theres-still-nothing-like-australia-campaign-roll-out.html>, access: 3 March 2021.

[441] T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1; L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 86; U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, p. 808.

[442] L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 85; U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, p. 808.

[443] L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 85; U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, p. 808.

often fitted with a camera, sensors or other electronics that enable the user to live-stream and record their adventures.[444] This provides the user with a live first-person view, which means that the user sees exactly what the drone is encountering in reality.[445]

Drones are also having an impact on the tourism industry. Scholars are only now starting to explore drone platforms as they are becoming more widespread because of their availability and affordability.[446] For instance, Dr Helmut Hlavacas, professor of computer science at the University of Vienna in Austria, is at the forefront regarding drone tourism. Hlavacas developed technology that enables tourists to control a drone through an HMD. The drone uses GPS technology to fly over and film tourist cities and attractions. The images are then transported to the HMD. This provides tourists with a view of any destination from a drone's perspective.[447]

There are many benefits of drones in the tourism industry. It is believed that VR videos filmed from the perspective of drones are the "most compelling and engaging visual form".[448] The reason is that VR adds to the tourist experience and creates involvement. Tourists can view every angle by directing the screen of the drone to areas of interest.[449] Furthermore, videos shot from drones provide access to attractions and destinations that tourists cannot travel to or are too dangerous or even off-limit locations, such as volcanos and cliffs.[450] Another benefit is marketing. Many tourism companies use drones as a marketing tool. For example, Dana Warf Whale in the USA, linked

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[444] L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 85; U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, p. 808.

[445] L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 85.

[446] U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, pp. 808-809; L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, pp. 85-86; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1; A. Rutkin, 2015, <https://www.newscientist.com/article/dn27631-first-person-drone-tourism-will-let-you-see-the-sights-from-home/>, access: 13 September 2018.

[447] R. Burks, 2015, <https://www.techtimes.com/articles/57076/20150601/how-drones-and-virtual-reality-will-change-tourism.htm>, access: 5 November 2019.; The Local, 2015, <https://www.thelocal.at/20150722/scientists-develop-virtual-tourism-drone>, access: 25 August 2020; A. Phillips, 2015, <https://dronelife.com/2015/06/05/drone-tourism-is-set-to-revolutionise-the-way-we-experience-attractions/>, access: 25 August 2020.

[448] M. Mancosu, <http://skytango.com/how-drones-arechanging- tourism-marketing/>, access: 7 September 2019; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1.

[449] Nevada Institute for Autonomous Systems, 2018, <https://nias-uas.com/drones-positively-affect-tourism/>, access: 2 February 2020.

[450] U. Stankov *et al*., 'The view from above: the relevance of shared aerial drone videos for destination marketing', *Journal of Travel Marketing* 36(7), 2019, pp. 809-810.

their YouTube drone footage of dolphins and whales to promote Dana Point to tourists.[451] Unfortunately, the major drawback of drones are legal regulations. Many countries have begun to create new regulations about the use of drones within certain jurisdictions for privacy protection rights, such as the USA, South Africa, Canada and Australia.[452]

The internet is regarded as one of the most remarkable inventions after the development of the printing press.[453] Scholars define the internet as a "self-regulated global network of computer interconnecting independent hosts"[454] on "various types of devices (computers, tablets, smartphones, etc.)" [455] around the world. One of its pioneering advances, was the Defence Advanced Research Project Agency that used the internet in 1969 during the Cold War as a strategic communication system to enable people to communicate with each other, share data and remain operational if systems were destroyed.[456]

Since 1985, the internet has become the fastest growing medium of all time, despite the negative impacts that the world has faced.[457] Today, the internet plays an important role in people's daily lives as they rely on it for numerous reasons, such as checking e-mails, working, learning, socialising, entertainment, leisure and shopping.[458] Under the COVID-19 pandemic, this has become exponentially apparent. Statistics show the popularity of the internet among users which has grown from 619 million internet users in 2002 to over 4.66 billion in 2021, which amounts to almost 60% of the world's population (See Figure 5).[459] The increase in the number of users is due to the fact that people have easier access to computers, countries around the world are modernising

[451] L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 87.
[452] R. Burks, 2015, <https://www.techtimes.com/articles/57076/20150601/how-drones-and-virtual-reality-will-change-tourism.htm>, access: 5 November 2019; L.M. King, 'Will drones revolutionise ecotourism?', *Journal of Ecotourism* 13(1), 2014, p. 86.
[453] D. Buhalis & S.H.J. Jun, *E-tourism*, p. 3; R.S. Bristow, 'Commentary: virtual tourism – the ultimate ecotourism?', *Tourism Geographies* 1(2), 1999, p. 223.
[454] D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 348.
[455] J. Leiva, 'Internet', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 486.
[456] D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 15; Z. Zhou, *E-commerce and information technology in hospitality and tourism*, p. 17; R. Law, 'Internet in travel and tourism- part I', *Journal of Travel and Tourism Marketing* 9(3), 2000, p. 66.
[457] J. Fletcher *et al*., *Tourism: principles and practice*, p. 589; R. Egger & D. Buhalis, 'Introduction', *in* R. Egger & D. Buhalis (eds.), *Etourism: case studies*, p. 1.
[458] D. Buhalis & S.H.J. Jun, *E-tourism*, p. 3; P.J. Sheldon, *Tourism information technology*, p. 89; C.M. Chen *et al*., 'A linkage between internet use and tourism activities', *Current Issues in Tourism* 22(3), 2019, p. 291.
[459] Z. Zhou, *E-commerce and information technology in hospitality and tourism*, p. 2; J. Clement, 2018, <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/>, access: 3 December 2018; J. Johnson, 2021, <https://www.statista.com/statistics/617136/digital-population-worldwide/>, access: 6 March 2021.

in both the global North and South and there is an increased use of smartphones, the distribution of multimedia applications (i.e., textual data, graphics, pictures, videos and sounds) is free and people have access to information and knowledge, regardless of their location or ownership.[460]

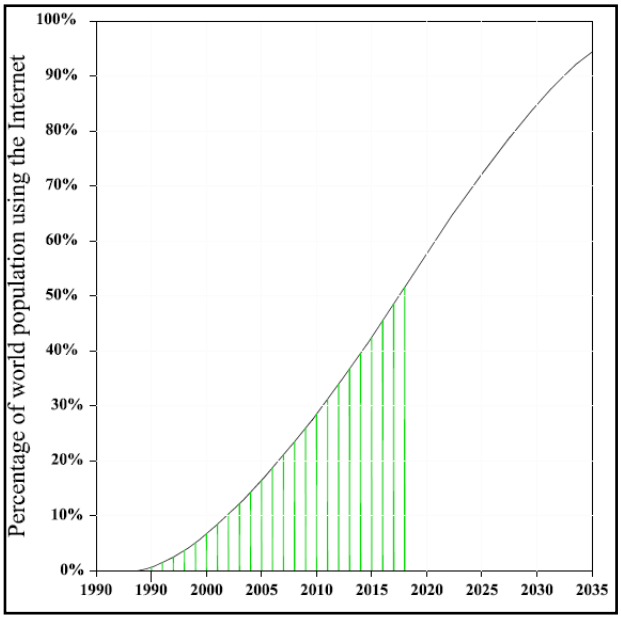

Figure 5: Percentage of the world's internet users from 1990 to 2018.

From: FutureTimeline.net, 2018, <https://www.futuretimeline.net/data-trends/10.htm>, access: 2 March 2021.

There is a close historical link between the internet and tourism. The internet can be regarded as the basis of the virtual tourism era.[461] As a matter of fact, Baxter and Pieszek consider the internet as a form of virtual tourism.[462] Krug explains this as follows:

> we 'visit' a homepage by entering an 'address' and clicking a 'go'-button and the icon of the Netscape 'Navigator', a ship's steering

[460] J. Clement, 2018, <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/>, access: 3 December 2018; M. Cooper & N.J. MacNeil, 'Virtual reality mapping: IT tools for the divide between knowledge and action in tourism', *Tourism Recreation Research* 30(3), 2005, p. 62; J. Fletcher *et al*., *Tourism: principles and practice*, p. 589; D. Buhalis & P. O'Conner, 'Information communication technology revolutionizing tourism', *Tourism Recreation Research* 30(3), 2005, p. 8.

[461] C. Krug, 'Virtual tourism: the consumption of natural and digital environments', *in* C. Gersdorf & S. Mayer (eds.), *Nature in literary and cultural studies: transatlantic conversations on ecocriticism*, p. 251; C. Standing *et al*., 'The impact of the internet in travel and tourism: a research review 2001-2010', *Journal of Travel and Tourism Marketing* 31(1), 2014, p. 82; S. Anwar & J. Hamilton, 'Tourism into the future – towards 2020, and beyond', *Tourism Recreation Research* 30(3), 2005, p. 82.

[462] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 172.

> wheel, evokes an early modern means of travelling and exploration, sailing.[463]

This relationship between ICTs and tourism has led to the creation of "electronic tourism", also known as e-tourism, travel technology or eTravel.[464] There are many definitions of e-tourism. These include: D. Buhalis's popular definition which refers to e-tourism as "reflecting the digitalisation of all processes and value chains in tourism, travel, hospitality, and catering industries";[465] M. Smith *et al*. define e-tourism as "the application of new technologies to activities within the tourism sector, such as bookings of package holidays, flights, hotels and the provision of visitor information";[466] and Pan states that e-tourism is "a phenomenon and research area in which the adoption of … (ICT) by tourists and businesses transforms the processes and the value chain in the industry."[467] For Werthner *et al*., e-tourism is defined as:

> the design, implementation and application of [information technology] and e-commerce solutions in the travel and tourism industry as well as the analysis of the impact of the respective technological and economic processes and market structures on all the involved actors and especially on the traveller's experience.[468]

Werthner also indicates that e-tourism can be regarded as "everything that happens electronically related to the travel and tourism industry/experience".[469] It is thus clear, as Buhalis indicates, that e-tourism is encompassing of the entire tourism sector.

E-tourism can be divided into two levels, namely a tactical level and a strategic level. The tactical level applies to ICTs to maximise the efficiency and effectiveness of the tourism organisation. The

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[463] C. Krug, 'Virtual tourism: the consumption of natural and digital environments', *in* C. Gersdorf & S. Mayer (eds.), *Nature in literary and cultural studies: transatlantic conversations on ecocriticism*, p. 251.
[464] S.A.I. Urriza *et al*., 'MoViT: a 3D mobile virtual tour app of Panguil River Eco-Park', *in* E.S. Sezgin (ed.), *e-Consumers in the era of new tourism*, p. 106; D. Buhalis & S.H.J. Jun, *E-tourism*, p. 6; B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 324; S. Lama *et al*., 'An e-tourism adoption model and its implications for tourism industry in Nepal', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 292.
[465] D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 76; D. Buhalis & S.H.J. Jun, *E-tourism*, pp. 6, 36; D. Buhalis & P. O'Conner, 'Information communication technology revolutionizing tourism', *Tourism Recreation Research* 30(3), 2005, p. 11; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 11; L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 68.
[466] M. Smith *et al*., *Key concepts in tourist studies*, p. 57.
[467] B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 324.
[468] H. Werthner *et al*., 'Future research issues in IT and tourism: a manifesto as a result of the JITT workshop in June 2014, Vienna', *Information Technology Tourism* 15, 2015, p. 2.
[469] H. Werthner *et al*., 'Future research issues in IT and tourism: a manifesto as a result of the JITT workshop in June 2014, Vienna', *Information Technology Tourism* 15, 2015, p. 2.

strategic level is where e-tourism transforms the business process, the value chain, and the relationship between tourism organisations and their stakeholders.[470] E-tourism includes ICT tools and applications used in the tourism industry for business management, planning, developing, marketing, and distribution, such as e-commerce and e-marketing, e-finances and e-accounting, e-human resource management, e-research and development and e-production, e-strategy, e-planning and e-management.[471] Basically, e-tourism makes the organisation of access to the destination and its facilities more effective and efficient and assists the managers to reach and serve their customers by offering facilities where they can compare, book and purchase tourism products.[472]

It is apparent that e-tourism literally revolutionised tourism. The internet impacts every sector in tourism from information distribution and marketing to travel products and purchase of services.[473] The internet also changed the method used by tourists to search, find, read, and buy products and services.[474] Generally, tourists no longer use traditional methods (i.e. libraries, encyclopaedias, newspapers, magazines, brochures and travel agents) to obtain information on destinations and attractions.[475] Tourists use the internet mainly to search for travel information, plan holidays, compare offers, pay for tour packages, track flights online, obtain weather reports and make

[470] D. Buhalis & S.H.J. Jun, *E-tourism*, pp. 6, 36; D. Buhalis, *eTourism: information technology for strategic tourism management*, pp. 76-77; D. Buhalis & P. O'Conner, 'Information communication technology revolutionizing tourism', *Tourism Recreation Research* 30(3), 2005, p. 11; E. Pantano & L. Di Pietro, 'From e-tourism to f-tourism: emerging issues from negative tourists' online reviews', *Journal of Hospitality and Tourism Technology* 4(3), 2013, p. 212.
[471] D. Buhalis, *eTourism: information technology for strategic tourism management*, pp. 76-77; J. Fletcher *et al*., *Tourism: principles and practice*, p. 594; E. Pantano & L. Di Pietro, 'From e-tourism to f-tourism: emerging issues from negative tourists' online reviews', *Journal of Hospitality and Tourism Technology* 4(3), 2013, p. 212; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 11; P. Robison, 'E-tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 73.
[472] L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 68; E. Pantano & L. Di Pietro, 'From e-tourism to f-tourism: emerging issues from negative tourists' online reviews', *Journal of Hospitality and Tourism Technology* 4(3), 2013, p. 212.
[473] Z. Zhou, *E-commerce and information technology in hospitality and tourism*, p. 8.
[474] J. Leiva, 'Internet', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 486; R. Law, 'Internet in travel and tourism- part I', *Journal of Travel and Tourism Marketing* 9(3), 2000, p. 67.
[475] W. Theobald & H.E. Dunsmore, *Internet resources for leisure and tourism*, p. 3.

reservations and bookings.[476] Therefore, many hotels, airports and cafes provide tourists access to the internet via Wireless Fidelity (WIFI) , which is a wireless-radio connection.[477]

Increasingly more tourists have become sophisticated and independent and appear no longer to have an interest in package tours typically offered by tour agencies. These new tourists prefer to pursue their own preferences and schedules, and the internet has enabled tourists to bypass travel agencies and tour operators to allow them to create their own online packages, buy tickets, arrange itineraries and book travel arrangements.[478] This has led to the establishment of 'e-mediaries', or online travel agents (OTAs) (e.g., Expedia.co.uk, Opodo.co.uk, and Travelocity.co.uk), who sell virtually a range of tourism services to destinations.[479] There are also other new tools, such as search engines and meta-search engines (i.e., Google and Kayak), destination management systems (i.e., visitbritain.com), social networking (i.e., Facebook) and web 2.0 portals (i.e., wayn and tripadvisor), price comparison sites (i.e., kelkoo) and individual suppliers and intermediaries' websites.[480]

The internet is, however, also beneficial to travel and tourism companies. Since the 1990s, the internet has offered companies new opportunities to market and distribute their services and products to larger numbers of tourists at lower costs.[481] Companies of all sizes and backgrounds

[476] D. Buhalis & S.H.J. Jun, *E-tourism*, p. 3; Z. Zhou, *E-commerce and information technology in hospitality and tourism*, pp. 5-6; S. Lama *et al*., 'An e-tourism adoption model and its implications for tourism industry in Nepal', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 291; R.S. Bristow, 'Commentary: virtual tourism – the ultimate ecotourism?', *Tourism Geographies* 1(2), 1999, p. 220; P. Robison, 'E-tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 74; D. Arnold, 'Virtual tourism: a niche in cultural heritage', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 230.

[477] D. Buhalis & R Law, 'Progress in information technology and tourism management: 20 years on and 10 years after the Internet – the state of Etourism research', *Tourism Management* 29(4), 2008, p. 615.

[478] D. Buhalis & R. Law, 'Progress in information technology and tourism management: 20 years on and 10 years after the Internet – the state of Etourism research', *Tourism Management* 29(4), 2008, pp. 610-611; J. Leiva, 'Internet', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 486; P. Robison, 'E-tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 74; L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 182; E. Pantano & L. Di Pietro, 'From e-tourism to f-tourism: emerging issues from negative tourists' online reviews', *Journal of Hospitality and Tourism Technology* 4(3), 2013, p. 212.

[479] L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 68; IGI Global, 2019, <https://www.igi-global.com/dictionary/destination-management-systems-implementation/42773>, access: 10 December 2019.

[480] D. Buhalis & R. Law, 'Progress in information technology and tourism management: 20 years on and 10 years after the Internet – the state of Etourism research', *Tourism Management* 29(4), 2008, p. 611.

[481] Z. Zhou, *E-commerce and information technology in hospitality and tourism*, p. 7; A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, pp. 11161-11162; B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 325.

also have an equal chance to compete for consumers attention.[482] The internet is easier to communicate with a wide range of potential tourists.[483] Compared to traditional media, the internet has many advantages, such as it reduces costs of information exchange, high transmission speed, direct and customised relationships with consumers, transaction control and flexibility in the use of marketing elements.[484] For these reasons, all sectors in tourism use a home page, for example, suppliers, destinations and attractions, airlines, hotels, car rentals, travel agencies and tour operators. In fact, tourism home pages dominate the internet.[485]

Studies show that the internet is also a very effective marketing tool and since the 1990s the tourism industry has increasingly used it in this manner.[486] E-tourism offers potential tourists a "try before buy" experience and tasters for future visits to destinations and attractions.[487] Potential tourists explore destinations and attractions online prior to making decisions to travel.[488] For example, Expedia.com provides tourists with the opportunity to view and walk around a hotel room and open doors and wardrobes by wearing the Vive and using controllers.[489] This enables tourists to decide whether they want to actually stay at the hotel.

The following section discusses the types of e-tourism where VR is applicable, namely Google Earth VR, Google Maps, Google Street View and Tour Creator. In 2001, Keyhole Earth Viewer was launched by Keyhole, Inc. and in 2004 Google acquired Keyhole Earth Viewer and renamed it Google Earth.[490] Google Earth is a free internet-based geographic information system software

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[482] G. Inkpen, *Information technology for travel and tourism*, p. 178; R. Law, 'Internet in travel and tourism- part I', *Journal of Travel and Tourism Marketing* 9(3), 2000, p. 69.
[483] L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 68.
[484] J. Leiva, 'Internet', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 486.
[485] P.J. Sheldon, *Tourism information technology*, pp. 86-90.
[486] C.T. Lin, 'Examining e-travel sites: an empirical study in Taiwan', *Online Information Review* 34(2), 2010, p. 205; A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 107; C.T. Lin, 'Examining e-travel sites: an empirical study in Taiwan', *Online Information Review* 34(2), 2010, p. 205; B. Stangl & C. Weismayer, 'Websites and virtual realities: a useful marketing tool combination? An exploratory investigation', *in* P. O'Conner *et al*. (eds.), *Information and communication technologies in tourism 2008*, p. 141.
[487] D. Arnold, 'Virtual tourism: a niche in cultural heritage', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 230; J. Beck, 2017, <http://www.virtual-reality-in-tourism.com/try-before-you-buy-with-expedia/>, access: 14 May 2019.
[488] P. Robison, 'E-tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 74.
[489] J. Beck, 2017, <http://www.virtual-reality-in-tourism.com/try-before-you-buy-with-expedia/>, access: 14 May 2019.
[490] M. Karch, 2018, <https://www.lifewire.com/what-is-google-earth-1616440>, access: 6 June 2019.

that allows users to explore the earth through satellite images and 3D graphics.[491] It is considered as a form of virtual tourism as tourists can participate in virtual tours to numerous attractions, such as the Eiffel Tower (in France), the Grand Canyon (in the USA) and the Forbidden City (in China), and even to outer space.[492] Google Earth takes tourists to the destination automatically and then pauses. This enables tourists to explore the destination by navigating any direction from up and down, to right and left, and back and forth. As a result, tourists get a full 3D view of the destination[493] and the feeling is one of "just like being there".[494]

In 2016, Google launched a VR version of Google Earth, called Google Earth VR. This application "puts the whole world within your reach".[495] According to J. Kim, the Product Manager of Google Earth VR, tourists can visit the Amazon River (in South America), the Manhattan skyline (in the USA), the Grand Canyon and the Alps (in Switzerland).[496] Tourists can also "fly over a city, stand at the top of the highest peaks, and even soar into space".[497] Thus, Google Earth VR provides virtual tourists with breath-taking views without them having to leave the comfort of their homes.[498]

Google Maps has revolutionised the world of digital maps.[499] In 2004, Lars and Jens E. Rasussen, two Danish brothers, wanted to develop a web application that would display static maps, as well as a map that provides people with a searchable scrollable and zoomable map.[500] In 2005, Google

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[491] H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 138.
[492] H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 138; M. Karch, 2018, <https://www.lifewire.com/what-is-google-earth-1616440>, access: 6 June 2019.
[493] J.L. Jensen, 'Online tourism: just like being there?', *in* B.T. Knudsen & A.M. Waade (eds.), *Re-investing authenticity: tourism, place and emotions*, p. 218; M. Karch, 2018, <https://www.lifewire.com/what-is-google-earth-1616440>, access: 6 June 2019.
[494] J.L. Jensen, 'Online tourism: just like being there?', *in* B.T. Knudsen & A.M. Waade (eds.), *Re-investing authenticity: tourism, place and emotions*, p. 219.
[495] Google Earth VR, n.d., <https://arvr.google.com/earth/>, access: 29 December 2019.
[496] M. Podwal, 2016, <https://www.blog.google/products/earth-vr/google-earth-vr-bringing-whole-wide-world-virtual-reality/>, access: 3 June 2019; J. Kim, 2017, <https://www.blog.google/products/earth-vr/get-closer-look-street-view-google-earth-vr/>, access: 3 June 2019.
[497] M. Podwal, 2016, <https://www.blog.google/products/earth-vr/google-earth-vr-bringing-whole-wide-world-virtual-reality/>, access: 3 June 2019.
[498] C. De Jesus, 2016, <https://futurism.com/tour-the-world-anytime-with-google-earth-vr>, access: 6 June 2019.
[499] S. Gibbs, 2015, <https://www.theguardian.com/technology/2015/feb/08/google-maps-10-anniversary-iphone-android-street-view>, access: 30 December 2019.
[500] S. Gibbs, 2015, <https://www.theguardian.com/technology/2015/feb/08/google-maps-10-anniversary-iphone-android-street-view>, access: 30 December 2019.

Maps was launched and in 2007, it appeared on Apples' first iPhone.[501] This then transformed access for virtual tourists as it provides them with aerial and satellite views of regions, cities and sites.[502] Tourists can travel to sites by entering a search term (i.e., hotels near the destination) and then view the plotted results.[503] Google Maps then enables tourists to further explore a destination by clicking and dragging maps to navigate and zoom. This provides tourists a quick, seamless and highly interactive experience. For this reason, numerous, if not all, travel companies integrate Google Maps into their websites.[504]

Google Street View is an additional feature of Google Maps.[505] In 2003, Larry Page, the co-founder of Google, wanted to capture street-level views on a large scale. Thus, in May 2007, Street View was officially launched and covers numerous cities and suburbs across the world.[506] Street View allows tourists to take virtual walks, explore landmarks, and to find shops, restaurants and hotels by providing them with 360° horizontal and 290° vertical panoramic street-level images of cities and suburbs.[507]

Google mainly uses two methods to obtain the images for Street View, namely cars and a Street View Trekker. Vehicles used by Google have cameras, laser ranging, GPS and image analysis to pinpoint the position of each picture. The cameras capture images in every direction at regular intervals. The driver, usually a local driver, checks the shots to make certain that both streets are covered. The hard-drive is then sent to Google where the software "stitches" the images to form a panorama.[508] The Street View Trekker is a backpack with a photographic system. It has been used since 2012 as it is able to reach inaccessible areas. The cameras are positioned at different angles

[501] R. Conrady, 'Travel technology in the era of Web 2.0', *in* R. Conrady & M. Buck (eds.), *Trends and issues in Global Tourism 2007*, p. 175; S. Gibbs, 2015, <https://www.theguardian.com/technology/2015/feb/08/google-maps-10-anniversary-iphone-android-street-view>, access: 30 December 2019.
[502] M. Rouse, 2018a, <https://watis.techtarget.-com/definition/Google-Maps>, access: 9 July 2018.
[503] R. Conrady, 'Travel technology in the era of Web 2.0', *in* R. Conrady & M. Buck (eds.), *Trends and issues in Global Tourism 2007*, p. 176.
[504] R. Conrady, 'Travel technology in the era of Web 2.0', *in* R. Conrady & M. Buck (eds.), *Trends and issues in Global Tourism 2007*, pp. 175-177.
[505] M. Rouse, 2018b, <https://whatis.techtarget.com/definition/Google-Street-View>, access: 14 February 2018.
[506] M. Rouse, 2018b, <https://whatis.techtarget.com/definition/Google-Street-View>, access: 14 February 2018; M. Weber, 2012, <http://www.computerhistory.org/atchm/going-places-a-history-of-google-maps-with-street-view/>, access: 23 January 2018.
[507] M. Rouse, 2018b, <https://whatis.techtarget.com/definition/Google-Street-View>, access: 14 February 2018.
[508] M. Weber, 2012, <http://www.computerhistory.org/atchm/going-places-a-history-of-google-maps-with-street-view/>, access: 23 January 2018.

and this enables them to capture a photo of a destination every 2.5 seconds. As a result, this provides a panoramic view of the destination.[509]

In 2016, Google brought Street View to Earth VR.[510] Virtual tourists enter the destination that they want to view in the search engine. They then go to the street-level and check on the controller if Street View is available. Street View can be viewed through Vive, Rift, Cardboard[511] and provides an immersive experience as virtual tourists feel as if they "enter an immersive 360° photo".[512]

Another development of Google is Tour Creator which is mainly used in the education sector. The aim is for teachers and students to participate more in VR field trips, instead of viewing 360° videos. However, Tour Creator is also used in the tourism industry as it allows people to create their own professional-level VR tours using web-based tools. Users upload images for their tour from a camera, Street View or their own 360° photos. Afterward, users can view their tour on Poly, Google's library of 3D content, or through Cardboard. Companies also use Tour Creator to promote their products, for example, Time Out New York made tours centred around famous attractions in New York in the USA.[513]

Films have fascinated people since the world's first public screening in 1895 in Paris, in France.[514] This fascination has led to the creation of film tourism, also referred to as cinematic tourism, movie-induced tourism, film-induced tourism, television-induced tourism, media related tourism, screen tourism, media pilgrimage, jet setting and TV tourism.[515] Film tourism refers to tourists that visit a destination or attraction after it has been featured on television, video or the cinema

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[509] T.L. Louw, 2018, <https://www.huffingtonpost.co.za/tatum-lee-louw/google-street-view-goes-wild-in-south-africa_a_23267667/>, access: 3 November 2018.
[510] A. Moscaritolo, 2017, <https://www.pcmag.com/news/356238/google-brings-street-view-to-earth-vr-app>, access: 30 December 2019.
[511] A. Moscaritolo, 2017, <https://www.pcmag.com/news/356238/google-brings-street-view-to-earth-vr-app>, access: 30 December 2019.
[512] J. Kim, 2017, <https://www.blog.google/products/earth-vr/get-closer-look-street-view-google-earth-vr/>, access: 3 June 2019.
[513] K. Bell, 2018, <https://mashable.com/2018/05/09/google-vr-tour-creator/>, access: 31 December 2019; B. Fraser, 2018, <https://www.blog.google/outreach-initiatives/education/tour-creator-schools-vr/>, access: 31 December 2019.
[514] P. Bolan *et al*., '"We've seen it in the movies, let's see if it's true": authenticity and displacement in film-induced tourism', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 102.
[515] S. Hudson & J.R. Ritchie, 'Promoting destinations via film tourism: an empirical identification of supporting marketing initiatives', *Journal of Travel Research* 44(4), 2006a, p. 387; E. Sellgren, *Film-induced tourism: the effects of films have on destination image formation, motivation and travel behaviour*, p. 3; M. Smith *et al*., *Key concepts in tourist studies*, pp. 71-72; S. Kim & P. Long, 'Touring TV soap operas: genre in film tourism research', *Tourist Studies* 12(2), 2012, p. 174; S. Beeton *et al*., 'The mediatisation of culture: Japanese contents tourism and pop culture', *in* J.A. Lester & C. Scarles (eds.), *Mediating the tourist experience: from brochures to virtual encounters*, p. 144.

screen.[516] Film tourism is still a relatively new area in tourism literature as relatively little academic research has been done on this niche.[517] However, over the last two decades, the relationship between film and tourism has become a popular area of study due to the increasing number of students, academics, tourism organisations, local communities and film producers that are beginning to show an interest. In fact, there are numerous journals that focus specifically on film tourism, such as *Tourism: Culture and Communication*, *Tourist Studies*, *Tourism Analysis*; *Tourism Review International*, and *Tourism and Hospitality Planning and Development*,[518] as well as academic studies, such as C. Herselman (2014), N.B. Hoffmann (2015) and Y. Smith (2012). According to Herselman, Hoffmann and Y. Smith, film tourism is related to literature tourism.[519] Similar to film tourism, literature tourism also refers to tourists traveling to locations associated with the author and settings of novels.[520] Another reason is that books, as well as films, take tourists to imaginary worlds.[521]

Film tourism has become a growing and lucrative industry worldwide.[522] This is due to the rise in international travel and the history of film-making.[523] Many destinations experience an influx of

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[516] S. Hudson & J.R. Ritchie, 'Promoting destinations via film tourism: an empirical identification of supporting marketing initiatives', *Journal of Travel Research* 44(4), 2006a, p. 387; E. Sellgren, *Film-induced tourism: the effects of films have on destination image formation, motivation and travel behaviour*, p. 3; S. Hudson & J.R. Ritchie, 'Film tourism and destination marketing: the case of *Captain Corelli's Mandolin*', *Journal of Vacation Marketing* 12(3), 2006b, p. 256; M. Smith *et al*., *Key concepts in tourist studies*, p. 71; N N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), p. 6.

[517] S. Hudson & J.R. Ritchie, 'Film tourism and destination marketing: the case of *Captain Corelli's Mandolin'*, *Journal of Vacation Marketing* 12(3), 2006b, p. 256; N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), p. 13; K. Tomala & F. Faber, 'Film tourism', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 149.

[518] N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), p. 17; W.G. Croy, 'Film tourism: sustained economic contributions to destinations', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 159; R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 91.

[519] N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), p. 19; Y. Smith, 'Literary tourism as a developing genre: South Africa's potential', (Master dissertation, University of Pretoria, 2012), p. 12; C. Herselman, 'From 'logging capital' to tourism phenomenon: the impact of literacy tourism on Forks, WA., United States of America', (Master dissertation, University of Pretoria, 2014), pp. 10, 48.

[520] Y. Smith, 'Literary tourism as a developing genre: South Africa's potential', (Master dissertation, University of Pretoria, 2012), p. 8; N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), pp. 55-56.

[521] N.B. Hoffmann, 'On-location film-induced tourism: success and sustainability', (Master dissertation, University of Pretoria, 2015), pp. 60, 63.

[522] G. Busby & J. Klug, 'Movie-induced tourism: the challenge of measurement and other issues', *Journal of Vacation Marketing* 7(4), 2001, p. 316; S. Hudson & J.R. Ritchie, 'Film tourism and destination marketing: the case of Captain Corelli's Mandolin', *Journal of Vacation Marketing* 12(3), 2006b, p. 256.

[523] S. Hudson & J.R. Ritchie, 'Film tourism and destination marketing: the case of *Captain Corelli's Mandolin'*, *Journal of Vacation Marketing* 12(3), 2006b, p. 256.

tourists when a film or TV series is filmed at real destinations, attractions, towns and regions.[524] It is estimated that approximately 300 000 tourists still flock to Salzburg in Austria every year, due to one of the most famous films, *The Sound of Music* (1965) having been screened there.[525] In Normandy, in France, the number of American tourists increased by 40% after the release of the film *Saving Private Ryan* (1998).[526] Approximately, 551 186 tourists flocked to Bali, an Indonesian island, after the release of the film *Eat, Pray, Love* (2010).[527] Even India's tourism industry boomed after the film. Haridwar, Rishikesh, Varanasi and Kerala, locations mentioned in the film, had an increase in tourist numbers and the popularity of the meditation centres increased by an impressive 20%.[528]

Even TV series influence the popularity of destinations.[529] An example is such as Southfork Ranch in the USA, the home portrayed in the popular series *Dallas* (1978-1991), which attracts between 400 000 and 500 000 visits annually, despite the series being discontinued. The reason for this popularity is because the house showcases the so-called "American Dream", open spaces, rich people, Western lifestyles, cowboys and opportunity.[530] In 2013, Highclere Castle in the UK, the main setting for the popular drama series and film, *Downtown Abbey* (2010-2015, 2019) attracted 105 904 tourists, which generated £10.5 million to Britain's economy.[531] The famous *Game of Thrones* (2011-2019) series, which was based on the novel, *A Song of Ice and Fire* by George R.R. Martin, also attracted large number of tourists. Locations, such as Ireland, Spain, Croatia and

[524] S. Zimmermann & T. Reeves, 'Film tourism – locations are the new stars', *in* R. Conrady & M. Buck (eds.), *Trends and issues in global tourism 2009*, p. 157; G. Busby & J. Klug, 'Movie-induced tourism: the challenge of measurement and other issues', *Journal of Vacation Marketing* 7(4), 2001, p. 317; R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 97.
[525] R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 97; S. Roesch, *The experiences of film location tourists*, p.8.
[526] G. Busby & J. Klug, 'Movie-induced tourism: the challenge of measurement and other issues', *Journal of Vacation Marketing* 7(4), 2001, p. 317.
[527] H. Brenhouse, 2010, <http://content.time.com/time/magazine/article/0,9171,2011931,00.html>, access: 6 September 2018.
[528] S. Rai, 2010, <https://www.pri.org/stories/2010-08-21/indias-tourism-banks-eat-pray-love>, access: 24 August 2020.
[529] J.C. Holloway, *The business of tourism*, p. 225; R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 97.
[530] R.W. Riley, 'Movie-induced tourism', *in* A.V. Seaton (ed.), *Tourism: the State of the art*, p. 456.
[531] X. Liu & S. Pratt, 'The Downtown Abbey effect in film-induced tourism: an empirical examination of TV drama-induced tourism motivation at heritage attractions', *Tourism Analysis* 24(4), 2019, p. 504.

Iceland had an influx in the number of tourists. For example, San Juan de Gaztelugatxe, an island near Spain, attracted 150 000 tourists just after the release of the series.[532]

Tourists travel to film and TV-related destinations for various reasons. Some tourists consider it as a form of pilgrimage. Fans of *Monty Python and The Holy Grail* (1975) have a semi-spiritual experience at Doune Castle, in Scotland.[533] Tourists also travel to film and TV- related destinations because of the glamour associated with a celebrity or lifestyle portrayed in the film and series. For instance, "On Location", a movie and tour company, offers tourists a "Sex and the City" tours based on the film and series, *Sex and the City* (1998-2004, 2008, 2010). The tours mainly focus on the "shopping and brunching life" of New York women. Tourists are able to shop and dine at the same locations as the characters.[534] Some tourists have an emotional connection with a destination featured in a film and series. For example, some tourists experience nostalgia when visiting locations featured in *The Railway Children* (1970).[535] The reason is that these tourists long to return to the past because this type of film is considered as "a window into the past" as they mirror the experiences of the past.[536] Many tourists visit film and television studios, especially in the case of sci-fi films as they are often set in a fictitious settings and not at actual locations.[537] Another reason why tourists visit sci-fi films is because they want to travel to "off worlds", in other words, films that transport people to other alternative worlds. For example, the film *Bladerunner* (1982) showcases a vision of a bad new future.[538]

Film tourism scholars and commentators also provide other reasons for why tourists visit film and series locations. These include to view the scenery, the landscape, to relive an experience

[532] R. Moor, 2019, <https://www.tourism-review.com/perfect-tourism-marketing-opportunity-the-game-of-thrones-news11048>, access: 9 December 2020.
[533] M. Smith *et al*., *Key concepts in tourist studies*, p. 72.
[534] M. Smith *et al*., *Key concepts in tourist studies*, p. 72; K. Tomala & F. Faber, 'Film tourism', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 152.
[535] M. Smith *et al*., *Key concepts in tourist studies*, p. 72.
[536] S.S. Kim *et al*., 'Nostalgia film tourism and its potential for destination development', *Journal of Travel and Tourism Marketing* 36(2), 2019, p. 237.
[537] R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 94.
[538] B. Markham & R. Staiff, 'The cinematic tourist: perception and subjectivity', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, pp. 300-301.

encountered in the film and series, curiosity, amusement, the narrative or storyline, the music or film score, to identify with the film characters or the actors, and an element of celebrity status.[539]

Gamification is not a new concept and is derived from the concept "game".[540] The concept of "gamification" was first used in 2002 by Nick Pelling, a computer programmer. The first definition of gamification appeared in the literature in 2008, but it only gained popularity after 2010.[541] There are numerous definitions of gamification.[542] The most cited definition[543] is provided by S. Deterding: "the use of game elements and game thinking in a non-gaming context".[544] Ali and Frew also define gamification as "the process of taking approaches, techniques and technology developed in the sphere of game design and applying them to non-game functions, typically to engage gamers in real-world application".[545] Games are often played on smartphones and tablets as apps and provide players with a immersive and interactive entertainment experience.[546]

VR is used in gaming due to the development of motion sensors, graphics, multimodal display technologies and interaction. The aim of VR in gaming is to train people, to attract people and to

[539] S. Beeton, 'Understanding film-induced tourism', *Tourism Analysis* 11, 2006, p. 186; P. Bolan *et al*., '"We've seen it in the movies, let's see if it's true": authenticity and displacement in film-induced tourism', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 105; R.W. Butler, 'It's only make believe: the implications of fictional and authentic locations in films', *Worldwide Hospitality and Tourism Themes* 3(2), 2011, p. 94; S. Beeton, 'The advance of film tourism', *Tourism and Hospitality Planning and Development* 7(1), 2010, p. 2.

[540] E. Bartoli *et al*., 'Gamification in tourism', *Psychology and Behavioral Science International Journal* 8(3), 2018, p. 002; M.T.L. Garcia *et al*., 'Validation of a gamified mobile experience by DMOs', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 333; E. Ozkul *et al*., 'Digital gamification in the tourism industry', *in* E. Çeltek (ed.), *Handbook of research on smart technology applications in the tourism industry*, p. 171; A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, p. 11162.

[541] F. Xu *et al*., 'Gamification in tourism', *in* Z. Xiang & I. Tussyadiah (eds.), *Information and communication technologies in tourism 2014*, p. 525; A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, p. 11162; H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 59; D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 412; E. Ozkul *et al*., 'Digital gamification in the tourism industry', *in* E. Çeltek (ed.), *Handbook of research on smart technology applications in the tourism industry*, pp. 171-172.

[542] E. Ozkul *et al*., 'Digital gamification in the tourism industry', *in* E. Çeltek (ed.), *Handbook of research on smart technology applications in the tourism industry*, p. 172.

[543] A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, p. 11162.

[544] S. Deterding *et al*., *From game design to elements to gamefulness: defining gamification*, 2019, cited in F. Xu *et al*., 'Gamification in tourism', *in* Z. Xiang & I. Tussyadiah (eds.), *Information and communication technologies in tourism 2014*, p. 525.

[545] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 36.

[546] F. Xu *et al*., 'Tourists as mobile gamers: gamification for tourism marketing', *Journal of Tourism Marketing* 33(8), 2015, p. 3; E. Bartoli *et al*., 'Gamification in tourism', *Psychology and Behavioral Science International Journal* 8(3), 2018, p. 001.

engage clients in new experiences. VR in gaming has expanded to schools, the real estate, the automobile industry, healthcare organisations, as well as tourism.[547]

Gamification in tourism is also not a new phenomenon.[548] The tourism industry uses a form of games during all trip phases.[549] Airlines and hotels mainly use games due to their loyalty programmes.[550] For example, Lufthansa, British Airways and Singapore Airlines utilise games for their frequent flyer programmes where customers have to save miles in order to obtain higher awards and privileges, such as complementary flights, upgraded seats and special ground services.[551] Hotels also use the same approach where customers collect points and use them for free accommodation and upgraded services.[552]

However, tourism scholars have paid little attention to gamification in tourism. A few studies focused on tourism and online games, such as advergames. This is because gamification in tourism is a relatively new area for tourism scholars. Therefore, there is a need for research on the impact of games in the tourism industry and how it relates to enjoyment, persuasion and knowledge acquisition.[553]

Gamification offers many benefits to the tourism industry and destinations can use games to enable tourists to learn and have fun at the same time.[554] Another advantage is that the games increase the

[547] D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 411; C.C. Neira *et al*., 'Virtual reality and games', *Multimodal Technologies and Interaction* 2(8), 2018, pp. 1-2.
[548] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 63.
[549] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 63; M.T.L. Garcia *et al*., 'Validation of a gamified mobile experience by DMOs', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 331.
[550] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 65.
[551] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 65.
[552] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 65.
[553] J. Dorcic *et al*., 'Mobile technologies and applications towards smart tourism – state of the art', *Tourism Review* 74 (1), 2019, p. 91; A. Shelton, 'Two tickets for paradise: gaming and tourism', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 93; M.T.L. Garcia *et al*., 'Validation of a gamified mobile experience by DMOs', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 333.
[554] D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 419; E. Bartoli *et al*., 'Gamification in tourism', *Psychology and Behavioral Science International Journal* 8(3), 2018, p. 001; F. Xu *et al*., 'Tourists as mobile gamers: gamification for tourism marketing', *Journal of Tourism Marketing* 33(8), 2015, p. 13.

duration of visits and extend time spent at the points of interest.[555] The city of Pafos in Cyprus, developed Pafos Treasure Hunt with the aim of enabling tourists to explore and learn more about the destination, as well as to encourage tourists to spend more time and money.[556] Tourists do not have to take a tour of a destination as they can explore a destination by installing an app.[557] For example, Smile Land is found on the Tourism Thailand website. The aim is for tourists to take a tour of Thailand (known as the "Land of Smiles") visiting up to 200 locations.[558] Games enhance the tourist experience and bring tourists to lesser-known sites and destinations.[559] Moreover, games help tourists to overcome travel anxiety, such as safety, health and other risks. For example, Expedia.com developed an app that enables tourists to travel around the world in 100 days from the comfort of their home.[560] Tourists also play games due to their curiosity to try a new game for the first time, to obtain information about the destination, to experience the boundaries between the real world and virtual world, to share their experience with other tourists and locals, and to experience the challenges and achievement of goals.[561]

Many tourism companies utilise games as a marketing tool.[562] The reason is that it reinforces tourists' behaviour through in-game elements, such as competitions, prizes, ranks, badges and score tables.[563] Numerous tourism companies are moving away from traditional media to games.[564] The popularity of traditional loyalty programmes is decreasing. For this reason, hotels and restaurants are beginning to incorporate games into their loyalty programmes. For example, InterContinental Hotel Group added online trivia to their loyalty program. Tourists were awarded

[555] J. Dorcic *et al*., 'Mobile technologies and applications towards smart tourism – state of the art', *Tourism Review* 74 (1), 2019, p. 91; M.T.L. Garcia *et al*., 'Validation of a gamified mobile experience by DMOs', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 332.
[556] M.T.L. Garcia *et al*., 'Validation of a gamified mobile experience by DMOs', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 333
[557] P.J. Benckendorff *et al.*, *Tourism information technology*, p. 167.
[558] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 37.
[559] P.J. Benckendorff *et al*., *Tourism information technology*, p. 167.
[560] E. Ozkul *et al*., 'Digital gamification in the tourism industry', *in* E. Çeltek (ed.), *Handbook of research on smart technology applications in the tourism industry*, p. 188.
[561] J. Dorcic *et al*., 'Mobile technologies and applications towards smart tourism – state of the art', *Tourism Review* 74 (1), 2019, p. 91; E. Bartoli *et al*., 'Gamification in tourism', *Psychology and Behavioral Science International Journal* 8(3), 2018, p. 001; H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 65.
[562] D. Parapanos, & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 411.
[563] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 54.
[564] A. Shelton, 'Two tickets for paradise: gaming and tourism', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 93.

free miles based on their quick and correct responses.[565] Rewards are beneficial in that they support marketing goals, increase the length of stay and expenditure and provide tourism companies interactive ways to communicate with their target market.[566] Games are also beneficial as they assist companies with brand awareness, encourage engagement, attracting potential tourists, collecting information about new and existing tourists, gaining customer loyalty and building up a destination image.[567]

Smartphones have become one of the most important electronic devices of the twenty-first century,[568] so much so that it has have become known as the "mobile age".[569] A smartphone is a "pocket/hand-held computer"[570] due to its similar functions.[571] In 1999 smartphones first appeared and gained increasing popularity from 2003 onwards.[572] According to ComScore, smartphones are the fastest-growing segment of the mobile phone market.[573] The number of smartphone users have increased exponentially across the world from approximately 100 million people in 2004 to a figure that surpasses three billion in 2020 and is expected to increase by several hundred million

[565] A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, p. 11169.
[566] A. Shelton, 'Two tickets for paradise: gaming and tourism', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 93; P.J. Benckendorff *et al*., *Tourism information technology*, p. 167.
[567] H. Yilmaz & İ.O. Coşkun, 'New toy of marketing communication in tourism: gamification', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 65; A.L. Negruşa *et al*., 'Exploring gamification techniques and applications for sustainable tourism', *Sustainability* 7(8), 2015, p. 11162; D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 412; A. Shelton, 'Two tickets for paradise: gaming and tourism', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, pp. 93, 95.
[568] J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81.
[569] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 14.
[570] M. Raaum, *An intelligent smartphone application*, 2010, cited in R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 47.
[571] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 166; P.D. Nyheim & D.J. Connoly, *Technology strategies for the hospitality industry*, p. 53; R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 47.
[572] J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 82.
[573] R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 47.

in the near future (See Figure 6).[574] Smartphones play an important part in people's daily lives as they are used to check e-mails, to browse the web and to play games.[575]

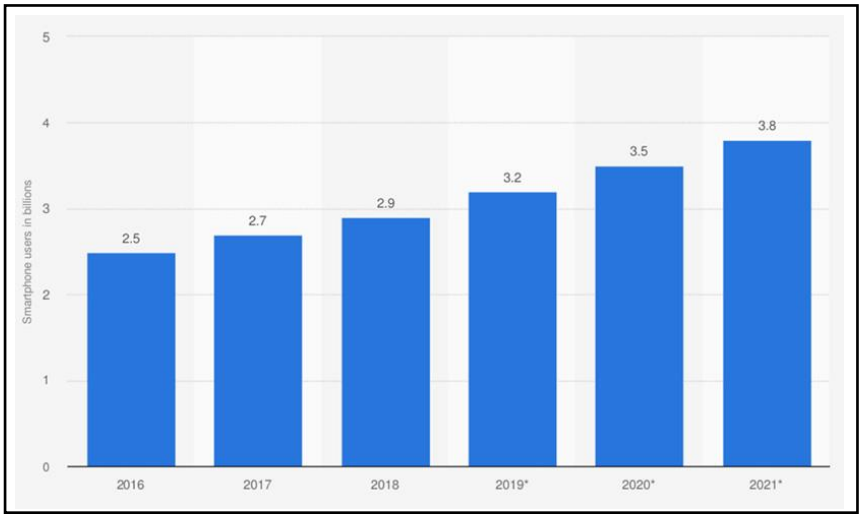

Figure 6: Number of smartphone users worldwide from 2016 to 2020

From: T. Mtrea & M. Borda, 'Mobile security threats: a survey on protection and mitigation strategies', *International conference KNOWLEDGE-BASED ORGANIZATION* 26(3), pp. 131.

Smartphones are an important partner for tourism and the tourism industry has been extensively influenced by the advancements of this technology.[576] They have altered the tourism industry, particularly the way tourists access and consume information, interact and communicate with other tourists, tourists' experiences and the way companies communicate and do business with

[574] S. O'Dea, 2020a, <https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/>, access: 2 March 2021; S. O'Dea, 2020b, <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>, access: 6 March 2021; R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 47; J.M. Kwon *et al.*, 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81.
[575] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 13; J.M. Kwon *et al.*, 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 82.
[576] J.E. Dickinson *et al.*, 'Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain', *Current Issues in Tourism* 17(1), 2014, p. 85; H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 31.

tourists.[577] Smartphones have been adopted at a rapid pace as a travel tool[578] and are considered as tourists' "travel buddies".[579] Tourists want high-speed access to relevant information and media content on the move and smartphones do exactly that by assisting them in their travels by enabling them to access the internet at virtually any time or anywhere, thus making tourists constantly online.[580] This means tourists have constant information at any time and from any place, which allows them to purchase products and services, and conduct business and travel plans on the move.[581] This reduces tourists' uncertainty and they can make accurate real-time decisions.[582] For this reason, airports, airlines and hotels also have smartphone related services, such as WIFI on flights along with charger sockets.[583]

One of the most important functions of smartphones is the ability to download and install apps.[584] In 2008, apps first appeared when Apple Inc. developed them for their App Store. Apps are

[577] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 166; J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81; B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 326; I.G. Fuentetaja *et al*., 'An analysis of mobile applications classification related to tourism destinations', *in* Z. Xiang & I.P. Tussyadiah (eds.), *Information and communication technologies in tourism 2014*, p. 32; D. Buhalis, 'Technology in tourism-from information communication technologies to Etourism and smart tourism toward ambient intelligence tourism: a perspective article', *Tourism Review* 75(1), 2020, p. 268.

[578] J.E. Dickinson *et al*., 'Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain', *Current Issues in Tourism* 17(1), 2014, p. 86.

[579] D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 412.

[580] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 166; H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, pp. 16, 18; J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81; A. Adukaite *et al*., 'Hotel mobile apps. The case of 4 and 5 star hotels in European German-speaking countries', *in* Z. Xiang & I.P. Tussyadiah (eds.), *Information and communication technologies in tourism 2014*, p. 46.

[581] B. Pan, 'eTourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 326; J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 82; H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 17.

[582] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, pp. 16, 18; A. Adukaite *et al*., 'Hotel mobile apps. The case of 4 and 5 star hotels in European German-speaking countries', *in* Z. Xiang & I.P. Tussyadiah (eds.), *Information and communication technologies in tourism 2014*, p. 46.

[583] T. Haupt, 2019, <https://www.tourism-review.com/impact-of-modern-technology-on-tourism-news11024>, access: 7 June 2019; J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81.

[584] R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 47; J.E. Dickinson *et al*., 'Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain', *Current Issues in Tourism* 17(1), 2014, p. 86; H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 14.

software designed to run on a smartphone or tablet and they often have limited functions, such as a game, calculator or mobile web browsing.[585] Users download apps on their smartphones from device manufacturers and third-party developers found in app stores.[586]

Apps have become the "hot new topic" in the literature and play a crucial part in the tourism industry.[587] The tourism industry is one of the well-suited sectors for apps. Airlines, travel agencies, tour operators and tourism companies have used apps since the first technological wave.[588] Many tourism scholars have started to pay attention to apps due to the popularity of smartphones and these studies mainly address the applicability of apps to: enhance the tourist experience; assist mobile guides; the use of mobile information systems; manage check-ins; positioning data to track tourists' movement; the development of apps for tourism and the use of mobile technology in order to receive payments.[589] However, there are still gaps in the literature in terms of apps. Studies focusing on tourism apps and smartphones are limited.[590] The reason is that the study of apps is still in its early stage as they are still in the conception or prototype phase.[591]

The main aim of apps in tourism is to provide accurate information to tourists about the destination and attraction, such as accommodation, dining, weather, exchange rate and transport information. It is estimated that there are over 300, 000 apps available on app stores and they have been

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[585] Techopedia, 2018, <https://www.techopedia.com/definition/2953/mobile-application-mobile-app>, access: 21 June 2018.

[586] P.J. Benckendorff *et al*., *Tourism information technology*, pp. 156-157; Cambridge Dictionary, 2018b, <https://dictionary.cambridge.org/dictionary/english/app>, access: 21 June 2018.

[587] R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 48; A. Douglas *et al*., 'Managing business travellers' use of mobile travel applications', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 272.

[588] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 31; P.D. Nyheim & D.J. Connoly, *Technology strategies for the hospitality industry*, p. 145.

[589] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 167; G.W.H. Tan *et al*., 'Mobile applications in tourism: the future of the tourism industry?', *Industrial Management & Data Systems* 117(3), 2017, p. 561; R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 48.

[590] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 167; J.M. Kwon *et al*., 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 81; G.W.H. Tan *et al*., 'Mobile applications in tourism: the future of the tourism industry?', *Industrial Management & Data Systems* 117(3), 2017, p. 561.

[591] S. Karanasios *et al*., 'A classification of mobile tourism applications', in J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 167; R. Law & Y. Liu, 'The adoption of smartphone applications by airlines', *in* L. Cantoni & Z. Xiang (eds.), *Information and communication technologies in tourism 2013*, p. 48.

downloaded 10.9 billion times.[592] Based on the survey conducted by eMarketer, travel-based apps are the seventh most downloaded category.[593] There are numerous tourism-based apps developed for tourists to plan and facilitate their holiday known as "mobile travel guides" as they provide tourists information, such as directions, attractions and accommodations. Apps also enable tourists to: book and check flights; to make hotel reservations (i.e., Booking.com, Trivago, Hotels.com); to purchase tickets for popular events and attractions; to undertake virtually guided tours; for transportation (i.e., Uber); and to translate (i.e., Google Translate) anywhere and anytime.[594]

Apps provide many benefits to tourists and businesses.[595] For tourists, apps simplify their lives, especially in terms of transactions, social networking, content dissemination, personal productivity and leisure.[596] Apps also have the ability to act as travel agents, tourist guides, guidebooks and maps.[597] For example, Road Trip RSA enables tourists to explore the less travelled roads in South Africa. The app allows tourists to view and visit famous attractions, restaurants and hotels.[598] Thus, if tourists want to book a flight, they can compare prices with the assistance of apps.[599] Another benefit is that tourism-based apps enhance the tourist experience.[600] Based on the evidence, apps create a more spontaneous and creative experience by stimulating surprise, excitement and imagination.[601]

In terms of tourism companies, apps are beneficial as they are used as a marketing tool. Apps allow companies to market their products and services as they reduce marketing costs. This enables

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[592] J.E. Dickinson *et al*., 'Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain', *Current Issues in Tourism* 17(1), 2014, p. 86.
[593] Techopedia, 2018, <https://www.techopedia.com/definition/2953/mobile-application-mobile-app>, access: 21 June 2018.
[594] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, pp. 14, 18, 24, 26, 27, 28; P.J. Benckendorff *et al*., *Tourism information technology*, pp. 157, 166; J.E. Dickinson *et al*., 'Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain', *Current Issues in Tourism* 17(1), 2014, p. 87.
[595] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 14.
[596] K. Soosksatit, 'Consumer decisions on hotel booking via mobile phone and tablet applications: a case study of luxury hotels in Bangkok', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 96.
[597] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 14.
[598] Road Trip RSA, n.d., <http://roadtriprsa.co.za/#top>, access: 11 December 2020.
[599] H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 14.
[600] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, pp. 165-166.
[601] P.J. Benckendorff *et al*., *Tourism information technology*, p. 167.

companies to increase their sales and to reach potential tourists. Apps also enable tourism companies to interact more closely with tourists anytime and anywhere. As a result, companies are at the forefront of their competition.[602]

Space has fascinated and intrigued humanity since ancient times.[603] In fact, scholars have written extensively on space tourism, ranging from the expected market size to the rules of 3D microgravity football.[604] Important events, for instance, the moon landing and the International Space Station (ISS) have further triggered humanity's fascination with space.[605] This is shown in the number of tourists that travel to view space shuttle launches, solar eclipses or to experience astronauts and cosmonauts training shows.[606] In fact, approximately two million people travelled to Cape Canaveral in the USA, to witness John Glenn, the first orbital astronaut in the USA, embark on his second space flight. When the "Sojourner Rover" strolled over Mars, 556 million views were recorded on the NASA Mars Pathfinder's website. Even the photos taken of Mars by the Mars Excursion Rover made headlines on magazines, television shows, websites and books as was the case with most recent landing of "Perseverance Rover" on Mars on 18 February 2021.[607] This shows that the investment in and idea of touring to space is becoming popular among the broader public.[608] For this reason, aerospace companies, space agencies and the tourism industry are seriously focusing on space tourism.[609] One such individual who is promoting this is the South

[602] S. Karanasios *et al*., 'A classification of mobile tourism applications', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 166; H. Yilmaz & S. Olgaç, 'Mobile communication and applications in tourism', *in* E.S. Sezgin (ed.), *E-Consumers in the era of new tourism*, p. 24; J.M. Kwon *et al*. 'Mobile applications in the hospitality industry', *Journal of Hospitality and Tourism Technology* 4(1), 2013, p. 82; G.W.H. Tan *et al*., 'Mobile applications in tourism: the future of the tourism industry?', *Industrial Management & Data Systems* 117(3), 2017, p. 561.
[603] E. Cohen & S. Spector, 'Introduction: the dawn of a new era?', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 5; I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018.
[604] M. Van Pelt, *Space Tourism: Adventures in earth orbit and beyond*, p. xi.
[605] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 29.
[606] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 27.
[607] M. Van Pelt, *Space Tourism: Adventures in earth orbit and beyond*, p. 5; L. Rovira, 2021, <https://earthsky.org/space/get-ready-nasa-perseverance-landing-feb2021>, access: 2 March 2021.
[608] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 118.
[609] M. Van Pelt, *Space Tourism: Adventures in earth orbit and bey*ond, p. 3.

African born Elon Musk, founder of SpaceX. In September 2021, Musk was one of the first to launch a three-day all-civilian mission aboard the Dragon spaceship.[610]

Despite humanity's fascination with space travel, there are two major factors that are preventing people to travel to space. The first factor is the exorbitant cost. Traveling to space is prohibitively expensive due to the launch vehicle. It is estimated that ticket prices range from US$200 000 for a brief suborbital trip to US$150 million for a tour around the moon. This means that only extremely wealthy tourists will be able to afford to travel to space.[611] The second factor is the risk as many astronauts and cosmonauts that have travelled to space have died, for example, the Challenger disaster in 1996 and the Columbia disaster in 2003.[612]

However, VR technologies have given ordinary people the opportunity to travel to space without ever having to leave earth. VR in space travel is possible due to the developments in informatics, media and communication technologies.[613] For this reason, Crouch considers VR as a form of space tourism (See Figure 7).[614] However, again little is written on the impacts of VR and space travel as it is still in its early phase and extra-terrestrial tours are still undeveloped.[615]

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[610] D. Chow, 2021, <https://www.nbcnews.com/science/space/spacex-announces-first-mission-space-all-civilian-crew-n1256390>, access: 2 March 2021; S. Gorman, 2021, <https://www.reuters.com/lifestyle/science/spacex-capsule-with-worlds-first-all-civilian-orbital-crew-set-splashdown-2021-09-18/>, access: 27 October 2021.
[611] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 27; M. Van Pelt, *Space Tourism: Adventures in earth orbit and beyond*, pp. 3, 99; E. Cohen & S. Spector, 'Introduction: the dawn of a new era?', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 10.
[612] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, pp. 27, 30.
[613] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, pp. 117, 120.
[614] G.I. Crouch, 'Space tourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 889.
[615] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, pp. 121, 135.

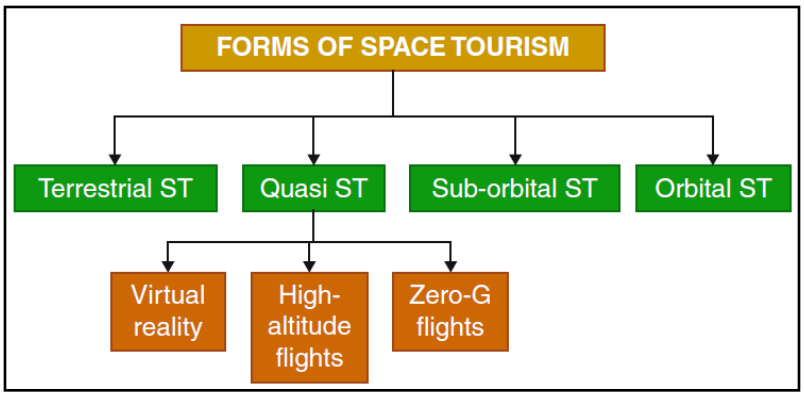

Figure 7: Forms of space tourism

From: G.I. Crouch, 'Space tourism', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 889.

However, many space-related companies are moving to VR as it is safer and cheaper, but can still provide a real and exciting experience.[616] One of these companies is NASA, the famous space agency, which spends considerable time and money on developing VR technologies for scientific research, planning and aerospace engineering, and to train astronauts for travel to space and Mars.[617] In 2016, visitors at Kennedy Space Center Visitor Complex in the USA, had the opportunity to partake in a VR tour called *Destination: Mars*. By wearing an HMD, visitors were transported to Mars to explore Curiosity Rover's tracks and discoveries. This experience provided tourists an "immersive" interaction with the landscape of another planet.[618]

Other companies also aim to launch VR satellites that will provide tourists the chance to visit space. One company is SpaceVR which planned to launch "Overview", one of the first VR satellites, in 2018.[619] The goal was to create an opportunity for tourists to experience the "truly infinite boundless Universe through [VR]".[620] Overview has 4K sensors that capture 360° video

[616] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 33.
[617] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 120; J. Eddings, *How virtual reality works*, p. 99; J. Lovine, *Step into virtual reality*, p. 26.
[618] K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, pp. 117-118.
[619] A. Bonasio, 2018, <https://www.forbes.com/sites/alicebonasio/2018/06/06/the-startup-that-wants-to-use-virtual-reality-to-make-the-world-a-better-place-from-space/#66ab54b02e56>, access: 28 November 2019.
[620] A. Bonasio, 2018, <https://www.forbes.com/sites/alicebonasio/2018/06/06/the-startup-that-wants-to-use-virtual-reality-to-make-the-world-a-better-place-from-space/#66ab54b02e56>, access: 28 November 2019.

footage of Earth. People can access the content using a smartphone, Rift and StarVR.[621] Two UK-based companies, Rewind an immersive content studio and In-Space Missions launched SpaceTime Enterprises, a VR satellite, in 2020. The companies wanted to broadcast live images of Earth from space for tourists to enjoy. Thus, tourists will feel as if they are watching "out of a window of the International Space Station".[622]

Moreover, apps provide tourists the opportunity to explore space, namely *Titans of Space 2.0*; *Earthlight, Home: a VR Spacewalk*; *Mission: ISS*; and *ADR1FT*. One of the first apps that shows what VR has to offer is *Titans of Space 2.0*. Users are taken on a theme park ride through the solar system where they learn about the planets and the distances between the planets. *Titans of Space 2.0* also enables users to set the pace of the "travel" experience, thus they feel as if they are in control.[623] *Earthlight* is a collaboration between NASA and Opaque Space, a software developing and consulting company. The app allows players to experience the tasks performed on the ISS through Ana, an avatar and NASA astronaut.[624] *Home: a VR Spacewalk* was created by Rewind, in conjunction with BBC Studios Digital, BBC Studios Science and BBC Learning. In the app, players are given a glimpse of life on the ISS. The creators used experts from the European Space Agency and astronauts. Users can also use a haptic gaming chair, which gives players an authentic and immersive experience.[625] *Mission: ISS* was developed by NASA, the European Space Agency and the Canadian Space Agency. Users learn from astronauts what life is like in the ISS by allowing them to move and work in zero gravity and to dock a space capsule.[626] Lastly, in *ADR1FT*, a space survival game app, users are placed amongst the wreckage of a fallen space station. There they have to survive by finding debris for resources, while oxygen is leaking from their spacesuit.[627]

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[621] I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018; A. Bonasio, 2018, <https://www.forbes.com/sites/alicebonasio/2018/06/06/the-startup-that-wants-to-use-virtual-reality-to-make-the-world-a-better-place-from-space/#66ab54b02e56>, access: 28 November 2019.
[622] S. Clark, 2018, <https://www.theguardian.com/science/across-the-universe/2018/may/17/space-tourism-for-the-people-become-a-virtual-reality-astronaut>, access: 7 July 2018; NewSpace, 2020, <https://www.newspace.im/constellations/spacetime-enterprises>, access: 13 December 2020.
[623] A. O'Donnell, 2019, <https://www.lifewire.com/virtual-reality-tourism-4129394>, access: 10 June 2019.
[624] I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018.
[625] I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018.
[626] I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018.
[627] I. Gorman, 2018, <https://appreal-vr.com/blog/virtual-reality-space-travel/>, access: 18 October 2018.

Recently, virtual video tourism or 360° images and videos (also known as or VR video panoramic, omnidirectional, spherical or surround videos) gained momentum in the creation of VR content and experiences.[628] For McFee *et al*. 360° images and videos are defined as "a full-screen image presentation that allows the viewer to virtually experience a scene in 360°".[629] Basically, 360° images and videos, such as Street View, are multiple overlapping images stitched together to create 360° panoramic views.[630]

There is a debate regarding whether 360° images and videos can be considered as a type of VR. For example, Guttentag argues that 360° images and videos do not have the characteristics of VR, such as free navigation.[631] This means that virtual tourists do not have control over their position in the virtual world. The reason is that 360° images and videos offer virtual tourists with limited interaction and movement possibilities. Virtual tourists can only control the angle of the view in VR 360° images and videos.[632] This is due to the reason that 360° images and videos are an early stage technology of VR.[633] However, many other scholars now consider 360° images and videos as a VR type.[634] These scholars state that 360° images and videos offer tourists a more interactive VR experience.[635] Virtual tourists have the opportunity to look omnidirectional instead of limiting

[628] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; A. Somrak *et al*., 'Estimating VR sickness and user experience using different HMD technologies: an evaluation study', *Future Generation Computer Systems* 94, 2019, pp. 304-305.
[629] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism* 2019, p. 110.
[630] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590.
[631] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers' intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 1359; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, pp. 95-96.
[632] A. Lisnevska, 2016, <http://www.virtual-reality-in-tourism.com/360-degree-video-and-virtual-reality/>, access: 5 November 2019; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590.
[633] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 96.
[634] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers' intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 1359; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, pp. 95-96; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590.
[635] A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 96.

themselves to a fixed point of view.[636] As a result, virtual tourists still experience a sense of presence and authenticity.[637]

More commonly, the internet offers tourists 360° virtual videos of hotels and destinations.[638] For example, tourists are able to take virtual tours of many UNESCO World Heritage Sites across the globe, such as the Taj Mahal (in India), Stonehenge (in the UK), Oxford (in the UK), the statue of David (in Italy), the Florentine Pietà (in Italy), the Great Buddha carving (in China) and the Terra Cotta Warrior statues (in China).[639] This has the advantage of keeping tourist numbers down and hence preserving the heritage.

4.4 Concluding remarks

The key focus point of Chapter 4 was to present an overview of the uses of VR in the tourism industry. The tourism industry was one of the first industries to embrace VR in a number of formats. VR has changed the tourism industry phenomenally and continues to do so. Tourists no longer have to physically travel to destinations and VR also offers many marketing opportunities for tourism companies.

Chapter 4 also provided a detailed discussion of VR in tourism by paying attention to the different types of virtual tourism, namely e-tourism, smartphone and app tourism, film and television tourism, virtual video tourism, drone tourism, gamification tourism and space tourism. These types of virtual tourism are regarded as VR due to the fact that tourists can visit destinations and attractions without ever leaving the comfort of their homes. For example, the internet gives tourists the chance to travel to various locations through Earth VR, Maps, Street View and Tour Creator. Films and series often take tourists to off-world locations which then entices then to want to visit

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[636] A. Somrak *et al*., 'Estimating VR sickness and user experience using different HMD technologies: an evaluation study', *Future Generation Computer Systems* 94, 2019, pp. 304-305.
[637] A. Lisnevska, 2016, <http://www.virtual-reality-in-tourism.com/360-degree-video-and-virtual-reality/>, access: 5 November 2019; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590.
[638] R. George, *Marketing tourism in South Africa*, p. 343; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 146.
[639] J.C. Holloway, *The business of tourism*, p. 227; R. George, *Marketing tourism in South Africa*, p. 344; K. Ab. Aziz & T.G. Siang, 'Virtual reality and augmented reality combination as a holistic application for heritage perseveration in the UNESCO World Heritage Site of Melaka', *International Journal of Social Science and Humanity* 4(5), 2014, p. 333.

actual destinations. Drones allow tourists to explore a destination or attraction in greater detail through 360° virtual videos of attractions and destinations. Gamification enables tourists to learn about the destination through playing games and the numerous tourism-based apps provide tourists the opportunity to travel anywhere, including to space. VR tourism is set to make any tourism destination a virtual reality.

Chapter 5: Virtual reality tourism: the benefits and barriers

5.1 Introduction

VR is perceived as both an opportunity and as a threat to the tourism industry.[640] This Chapter deals with the benefits and barriers surrounding the issue of virtual tourism and what the implications of this are for the tourism domain. The Chapter is divided into three sections. The first section focuses on the benefits, and the second on the drawbacks of VR in the tourism industry. The third section discusses critical issues regarding VR, namely VR as a substitute or supplement for conventional tourism, addressing issues of authenticity and the influence of VR on the conventional understanding of the concept and definition of tourism.

5.2 Benefits of virtual reality for tourism

Many tourism scholars agree that VR offers numerous benefits to tourism, especially for destinations, tourism companies and host communities.[641] They also argue, as indicated earlier, that tourists benefit from VR as there are no queues, transportation problems, language issues, bureaucracy, visas and poor weather concerns.[642] Even prior to the COVID-19 pandemic, many scholars were showing an interest in the benefits of VR within the tourism industry,[643] such as the seminal work by Guttentag. In his 2010 publication, he discusses six main areas where VR provides benefits in tourism, namely: marketing; planning; sustainability; accessibility; education and entertainment.[644] The benefits discussed in this chapter are based on Guttentag's six areas, but have been broadened to include other benefits, such as training, democratising tourism, physical distance, experiences and risks.

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[640] S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 64.
[641] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 288; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 589.
[642] A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 35; W.C. Hunter, 'Virtual reality', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 1006; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 644; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405.
[643] I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 141.
[644] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 637.

As indicated in the previous chapter, a high percentage of tourism companies promote travel-related products and services through traditional and conventional media, for instance, brochures, travel books, TV commercials and websites.[645] Traditional media is often considered outdated, inauthentic and a one-way medium as it only provides tourists with general information of what the destination will offer them. This leads to tourists making uniformed decisions because they miss important up-to-date information or get misleading and outdated information. As a result, holidays can be a disappointment as they do not meet the tourist's expectations.[646] Since the tourism industry is a highly competitive sector with all destinations trying to get a stake in it, companies try to gain an advantage by marketing destinations to attract new tourists. It is imperative that they use new technologies for this purpose to broaden their reach, and as a result there is a trend to move away from traditional or conventional media to VR.[647]

As was made apparent in the previous chapter, VR as a marketing tool is however not a new phenomenon, especially in the tourism domain. Destinations, museums, hotels, restaurants, tour operators and travel agencies have utilised VR and VR-type technologies to market tourism services and products since its inception in the mid-1990s.[648] However, VR is revolutionising the

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[645] W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 146.

[646] C. Bauer & R. Jacobson, 'Virtual travel: promoting tourism to unfamiliar sites through pre-trip experience', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1995*, p. 16; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 4; P. Jacobius, n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019.

[647] T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 4; W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 147; D. Parapanos & E.E. Michopoulou, 'Understanding key motivations for using a hotel gamified application', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 412; A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 138.

[648] J. Beck, 2017, <http://www.virtual-reality-in-tourism.com/try-before-you-buy-with-expedia/>, access: 14 May 2019; H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers' intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 1357; R. George, *Marketing tourism in South Africa*, p. 343; W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 146; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 4; A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 138; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality:*

way tourism companies promote and sell their products and services.[649] Tourism marketers considered VR as a unique and powerful marketing tool and the "ultimate travel brochure",[650] because tourism is an intangible product that cannot be tangibly evaluated beforehand.[651] Therefore, VR assists tourists during the information search and decision-making process[652] and, in some cases, provides tourists with extensive sensory information by offering them a "try before buy" [653] experience. The "try before buy" concept means that tourists have the opportunity to "explore" a destination before traveling to the actual destination. Thus, VR provides them the opportunity to "sample" the delights, as well as, to experience spaces, adventures and special events of a destination.[654] For example, Qantas, the Australian Airlines, launched a VR app, which

empowering human, place and business, p. 96; S.M.C. Loureiro, 'Virtual reality, augmented reality and tourism experience', *in* S.K. Dixit (ed.), *The Routledge handbook of tourism experience management and marketing*, p. 443.

[649] T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, p. 24; A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 425; A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 110; H.T. Chen & T.W. Lin, 'How a 3D tour itinerary promotion affect consumers' intention to purchase a tour product?', *Information Technology Journal* 11(10), 2012, p. 1357; W. Wei *et al*., 'Effects of Virtual reality on theme park visitors' experience and behaviors: presence perspective', *Tourism Management* 71, 2019, p. 283.

[650] N. Kulakoğlu-Dilek *et al*., 'Virtual reality or just reality? A SWOT analysis of the tourism industry', *Journal of Tourismology* 1(4), 2018, p. 71; K. Pasanen *et al*., 'Comparing tablet and virtual reality glasses for watching nature tourism videos', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 120; T. Li & Y. Chen, 'Will virtual reality be a double-edged sword? Exploring the moderation effects of the expected enjoyment of a destination on travel intention', *Journal of Destination Marketing and Management* 12, 2019, p. 24; I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 141.

[651] D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 449.

[652] A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 439; A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 111.

[653] I.P. Tussyadiah *et al*., 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 230; I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 141.

[654] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; P. Robison, 'Virtual tourism', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 271; M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 3; M. Rainoldi *et al*., 'Virtual reality: an innovative tool in destination's marketing', *The Gaze: Journal of Tourism and Hospitality* 9, 2018, p. 54; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), *Augmented and reality and virtual reality: empowering human, place and business*, p. 97; R. George, *Marketing tourism in South Africa*, p. 344; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 587; J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & W. Wörndl (eds.), *Information and communication technologies in tourism 2020*, p. 169; D.A. Guttentag *et al*., 'The

enables tourists to explore famous landmarks before they actually visit Australia, such as Kakadu National Park, Sydney Harbour and Uluru-Kata Tjuta National Park.[655] It is, thus, beneficial for tourists to visit the virtual version of the destination/attraction in VR before they go to the real destination/attraction. This is because they gain experience and important information beforehand, which enables them to decide if it is worth it to travel to the physical destination.[656] As a result, through VR, tourists are then able to make informed decisions and have more realistic expectations, which enables them to initiate travel arrangements.[657]

Another benefit of using VR in tourism marketing is that it can encourage tourists to visit the genuine destination.[658] Research supports this, as for instance, the participants in both Mura's *et al*. and Tussyadiah's *et al*. studies demonstrate this. There was a higher level of visitation to the actual destination/attraction and tourists stated that their fantasies and desires arose after visiting a virtual version of a destination/attraction.[659] Studies across the UK and in Hong Kong also showed that the majority of tourists participated in VR before visiting the actual destination.[660] A survey conducted by the "Wildlife Trust of South and West Wales" revealed that after watching VR

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future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 448; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.

[655] J. Lieu, 2016, <https://mashable.com/2016/11/10/qantas-vr-australia-app/>, access: 8 October 2019; Qantas, 2016, <https://www.qantasnewsroom.com.au/media-releases/new-qantas-app-gives-travellers-a-virtual-experience-of-australia-before-they-fly/>, access: 8 October 2019.

[656] Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 555; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419; E. Marchiori *et al*., 'Measuring the media effects of a tourism-related virtual reality experience using biophysical data', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 204.

[657] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 188.

[658] D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 92; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; I.P Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management*, 2018, p. 141; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 3; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 236.

[659] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 155; I.P Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management*, 2018, p. 151.

[660] M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 236.

videos, 85% of participants stated that they would visit the Wildlife Trust's physical attractions.[661] VR also influences the image of a destination by providing a personalised mental image of the characteristics of a destination. Clear distinctive and noticeable images build expectations before tourists visit the destination.[662] Even if tourists do not want to visit the destination immediately, the image will linger in their minds and may lead to future decisions to visit a destination.[663]

There are two major VR methods used by tourism organisations and destinations to promote their products and services, namely SL and 360° images and videos. SL attracts several tourism embassies, boards, organisations and companies.[664] For instance, the Netherlands Board of Tourism, which opened one of the first virtual national tourism offices in SL, provides information on the country.[665] Similarly, the Tourism Department of Ireland created "Tourism Ireland" using SL to promote Dublin and its attractions to tourists.[666] Sweden also launched "Second House", a virtual SL embassy, to provide tourists with the necessary information and a cultural experience of Sweden.[667] Starwood Hotels have established "Aloft", a new prototype hotel using SL to obtain feedback from customers and to attract more "tech-savvy" tourists as studies have shown the youth is overwhelming attracted by VR.[668] The "Student Travel Agency", one of the largest student travel

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[661] S. Gidey, 2017, <https://www.bbc.com/news/uk-wales-41635746>, access: 7 May 2019.
[662] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 108; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 4.
[663] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419.
[664] C. Cooper, *Essentials of tourism*, p. 334; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 134; D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 446.
[665] Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 5; E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, p. 141; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 556.
[666] Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 5; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 556; E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, p. 141; Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, p. 474.
[667] Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, p. 473.
[668] Y.C. Huang *et al*., 'Exploring user acceptance of 3D virtual worlds in travel and tourism marketing', *Tourism Management* 36, 2013b, p. 491; Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 5; A. Ali &

agencies in the world, has a virtual travel agency in SL. Students can visit exotic areas and interact with other students, which builds a social network and can motivate travel.[669]

These examples are evidence that SL has become a popular marketing tool across countries for tourism destinations to showcase themselves.[670] SL offers tourism companies several benefits. As mentioned, virtual visits might inspire tourists to visit the actual destination/attraction. For example, the Mexican Tourism Board placed Chichén Itzá, an ancient Mayan city, on SL to encourage tourists to visit the actual site in Mexico.[671] Another benefit is that SL is a comparatively inexpensive marketing tool in contrast to the traditional media.[672] Furthermore, SL offers tourists a new way to experience destinations, and tourism companies have the ability to attract a younger generation. For example, the Philippine Department of Tourism developed a virtual site in SL to specifically attract young tourists. Young tourists can explore the numerous attractions and "participate" in various activities in the Philippines.[673] Tourism companies can also attract and connect with hard-to-reach people and people that do not usually visit travel fairs and travel agencies, through SL. Finally, an e-tourism study conducted in 2008 by the UNWTO and the

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A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 134; C. Cooper, *Essentials of tourism*, p. 334; S. McCabe, *Marketing communications in tourism and hospitality: concepts, strategies and cases*, p. 275; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 556; I.P. Tussyadiah *et al.*, 'Virtual reality and attitudes toward tourism destinations', *in* R. Schegg & B. Stongl (eds.), *Information and communication technologies in tourism 2017*, p. 233; Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, p. 473.

[669] Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 5; C. Cooper, *Essentials of tourism*, p. 334; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 555; Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, p. 474.

[670] A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139.

[671] Y.C. Huang *et al*., 'Exploring the impacts of involvement and flow experiences in Second Life on people's travel intentions', *Journal of Hospitality and Tourism Technology* 3(1), 2012, p. 5; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 556; Y.C. Huang *et al*., 'Exploring user acceptance of 3D virtual worlds in travel and tourism marketing', *Tourism Management* 36, 2013b, p. 491; Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, pp. 473-474.

[672] E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, pp. 140, 142.

[673] Y.C. Huang *et al*., 'Second Life: the potential of 3D virtual worlds in travel and tourism industry', *Tourism Analysis* 18(4), 2013a, p. 473-474.

European Travel Commission shows that virtual worlds enable tourism companies to provide tourists with an individualised personal experience.[674]

Another VR type used as a marketing tool is 360° images and videos. Virtual videos and images are becoming increasingly more popular marketing tools as they are cheaper compared to other VR forms.[675] A study conducted by Google reveals that tourists prefer 360° images and videos, they receive more subscriptions, shares and views compared to traditional tourism videos.[676] A key reason for this is that 360° images and videos provide tourists with a direct experience without them actually having to visit the destination/attraction.[677] As a result, tourists obtain richer information and this also allows tourists the ability to interact. Tourists can choose the angle, rotate and drag a video and this captures their attention, which might influence them to visit the real destination/attraction and increase online purchasing.[678]

The issue of sustainability and preservation is also vital to the tourism industry. It is a known and concerning fact that the tourism industry contributes to the destruction of countless sites/destinations around the world. For example, the rate of erosion at Stonehenge has increased because of tourists' trampling feet, while a large number of tourists have caused destruction to the coral reefs in Hanauma Bay in the USA.[679] Therefore, preservation and restoration are critical, as research has shown that it is impossible to reverse the negative impacts of tourism.[680] To try and combat this negative impact, managers of these sites/destinations have tried to build pseudo-

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[674] S. McCabe, *Marketing communications in tourism and hospitality: concepts, strategies and cases*, p. 275; Y.C. Huang *et al*., 'The impacts of virtual experiences on people's travel intentions', *in* U. Gretzel *et al*. (eds.), *Information and communication technologies in tourism 2010*, p. 557.

[675] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 110; A. Gibson & M. O'Rawe, 'Virtual reality as a travel promotional tool: insights from a consumer travel fair', *in* T. Jung & D.M. tom Dick (eds.), Augmented and reality and virtual reality: empowering human, place and business, p. 97.

[676] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 110.

[677] W.B. Chiou *et al*., 'Virtual experience vs. brochures in the advertisement of scenic spots: how cognitive preferences and order effects influence advertising effects on consumers', *Tourism Management* 29(1), 2008, p. 146.

[678] A. McFee *et al*., 'The effects of virtual reality on destination image formation', *in* J. Pesonen & J. Neidhardt (eds.), *Information and communication technologies in tourism 2019*, p. 110; N. Campbell, 2017, <https://www.rezgo.com/2017/08/virtual-reality-tourism-perfect-pairing>, access: 22 May 2019.

[679] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 644; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, pp. 420-421.

[680] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 43; K. Ab. Aziz & T.G. Siang, 'Virtual reality and augmented reality combination as a holistic application for heritage perseveration in the UNESCO World Heritage Site of Melaka', *International Journal of Social Science and Humanity* 4(5), 2014, p. 333.

sites,[681] prohibited access, imposed restrictive regulations, required entrance fees and erected physical barriers.[682] However, technology can also be utilised to protect a tourism destination/attraction, and one such technology is VR.[683] A good majority of tourism scholars agree that VR is considered the "ultimate sustainable tool".[684] It can be used as a sustainable tool for sensitive and fragile sites/destinations because it lessens or eliminates any environmental degradation (i.e., deforestation for hotel construction, erosion and wildlife disturbances), and sociocultural impacts (i.e., xenophobia and prostitution) which result from tourism by offering tourists an alternative form of visitation.[685]

VR as a sustainable tool, therefore, has numerous benefits. Moreover, in terms of environmental degradation tourism transport methods are one of the greatest contributors to greenhouse gas emissions, including aircraft, automobiles, trains and even ships. VR can help do develop sustainable tourism by reducing emissions and, thus, eliminating the need for transport.[686] Tourists

[681] Pseudo-sites are representations of original sites, such as the caves of Lascaux and certain tombs in Egypt. J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 46.
[682] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 45; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, pp. 420-421.
[683] D.M. Stipanuk, 'Tourism and technology: interactions and implications', *Tourism Management* 14(4), 1993, p. 270.
[684] A. Petropoulos, 'Virtual tourism', *in* C. Cater *et al*. (eds.), *The encyclopedia of sustainable tourism*, p. 516.
[685] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 425; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 39; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 35, 69; C. Krug, 'Virtual tourism: the consumption of natural and digital environments', *in* C. Gersdorf & S. Mayer (eds.), *Nature in literary and cultural studies: transatlantic conversations on ecocriticism*, p. 251; A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139; K. Ab. Aziz & T.G. Siang, 'Virtual reality and augmented reality combination as a holistic application for heritage perseveration in the UNESCO World Heritage Site of Melaka', *International Journal of Social Science and Humanity* 4(5), 2014, p. 333; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, pp. 63-64; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149; A. Petropoulos, 'Virtual tourism', *in* C. Cater *et al*. (eds.), *The encyclopedia of sustainable tourism*, p. 516; C. Cooper *et al*., *Tourism principles and practice*, p. 781; H.L. Vogel, *Travel industry economics: a guide for financial analysis*, p. 244; J. Swarbrooke, *The development and management of visitor attractions*, p. 360; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; M. Rutty *et al*., 'The global effects and impacts of tourism: an overview', *in* C.M. Hall *et al*. (eds.), *The Routledge handbook of tourism and sustainability*, p. 53; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[686] D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 8; J. Fletcher *et al*., *Tourism: principles and practice*, p. 433; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 13.

can experience VR at home and they no longer have to physically travel to destinations/attractions and reduce the impact of carbon emissions.[687] VR also has the ability to simulate the implications or impacts of tourists' actions on the environment.[688] Moreover, VR allows tourists to virtually "touch" an object, without damaging it. For instance, tourists can "touch" a virtual version of a gold crown found in Italy, and this provides them with a better understanding of the object. Therefore, they might support the conservation of the real object as research has shown that they will only support what they understand.[689]

Previous research indicates that it is critical to involve the local community in the tourism planning process as they play an integral part in the success of a destination.[690] Unfortunately, local communities are often overlooked during the planning process as planners do not always show the advantages of projects to them because they use 2D representations, blueprints or 3D rendered models on a computer screen. For the local community, this is problematic as they often lack the necessary skills to understand the proposed project and as a result, they might block or shun tourism.[691] Therefore, VR assists planners, authorities and experts to discuss plans with local communities in a less complex way, answer questions and obtain their input.[692] VR can also be used to illustrate plans and to obtain information from the general public. For example, a SL-type

[687] J. Swarbrooke, *The development and management of visitor attractions*, p. 360; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 64; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 424; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 35, 70; A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139.
[688] A. Ali & A.J., Frew, *Information and communication technologies for sustainable tourism*, p. 77.
[689] E. Pantano & R. Servidio, 'Advanced technologies and tourist behavior: the case of pervasive environment', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 54; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 7; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643; V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 122.
[690] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; P. Jacobius, n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019.
[691] P. Jacobius n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 419.
[692] This approach was used in Sweden during the planning of two roads that passed through cultural heritage sites. D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; P. Jacobius n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019.

virtual world was created of a transportation hub in Italy. Users could explore and obtain information regarding the project and feel more part of it.[693]

Another key concern in tourism is the question of "accessibilty". According to D. Sarkady *et al*. in the context of tourism, accessibility is "access to specific touristic sites that are hard to enter due to remoteness, costs, undeveloped conditions or physical limitations of the tourists themselves".[694] Guttentag adds that this may be due to sites being "too remote, too expensive, too inhospitable, too dangerous, too fragile, or simply no longer exist".[695] Based on these definitions, the following benefits in terms of accessibility are discussed, namely inaccessible sites and attractions, financial restrictions, remote areas, sacred sites, fragile areas and sites that no longer exist, underdeveloped conditions, disability and dangerous and inhospitable areas.

An advantage of VR is that it provides access to inaccessible locations and attractions.[696] For example, Dunhuang Caves in China, are closed as a result of tourists' impact and other degradation factors. For this reason, a CAVE system was developed. Tourists were able to navigate a re-creation of the caves by using a virtual flashlight to illuminate the murals.[697] Furthermore, VR allows tourists with financial restrictions the opportunity to travel to such destinations. For example, every Muslim must undertake the journey to Mecca, an Islamic holy city located in Saudi Arabi, as part of their religion.[698] However, not all Muslims can afford to travel to Mecca and so "BSocial" developed an app called the "Experience Mecca". The app aims to provide Muslim pilgrims that cannot afford to go to Mecca the chance to experience the Hajj (pilgrimage). Tourists

[693] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 64; P. Jacobius, n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019.
[694] D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454.
[695] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.
[696] D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454.
[697] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.
[698] BBC, 2009, <https://www.bbc.co.uk/religion/religions/islam/practices/hajj_1.shtml>, access: 30 October 2019.

can go on a virtual walk-through of the Kaaba, the holiest site in Mecca, wander through the Holy Mosque or hear the call to prayer while the voiceover explains the features of the mosque.[699]

Through VR, tourists also have access to remote areas,[700] such as Namib-Naukluft National Park in Namibia. This park is one of the oldest deserts and most remote places in the world. Tourists are able to visit the famous dunes (i.e., Dune 7, Big Daddy and Big Mamma) found at Namib-Naukluft National Park by using interactive 360° images from AirPano.[701] Another benefit is that tourists have access to sacred sites. For example, tourists are able to climb the Uluru Rock, located in Australia, in VR, although it has been closed to climbers due to its sacredness to the Anangu, a local Australian Aborigine community.[702]

As mentioned earlier, there are numerous areas that are extremely fragile to tourism, such as the Antarctic.[703] VR tourism allows access to these sites, without causing damage to them. Moreover, even sites that no longer exist are accessible through VR. For example, the Buddha statues in Afghanistan which were destroyed by the Taliban, have been virtually reconstructed and developed into a tourist experience that enables tourists to engage with the "reconstructed statues".[704]

In terms of underdeveloped conditions, there are many variables that impede access. Road infrastructure to a destination is one of the most prevalent factors that inhibits access. If a road is in a poor condition, tourists might be deterred and choose another destination.[705] The issue is that building and operating road infrastructure for tourism is expensive and is a long process. For

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[699] F. Farid, 2017, <https://www.vice.com/en_us/article/785xgb/this-ramadan-you-can-go-to-mecca-in-vr>, access: 8 October 2019; S. Cheng, 2017, <https://qz.com/980821/mecca-in-vr-the-first-oculus-developer-from-the-middle-east-is-inviting-people-to-the-hajj/>, access: 9 October 2019.
[700] T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 1; D. Sarkady *et al*, 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 453.
[701] Trafalgar, 2020, <https://www.trafalgar.com/real-word/national-parks-online-virtual-tours/>, access: 8 June 2021.
[702] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[703] J. Fletcher *et al*., *Tourism: principles and practice*, p. 189.
[704] A. Bec *et al*., 'Virtual reality and mixed reality for second chance tourism', *Tourism Management* 83(104256), p. 2.
[705] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 111.

example, the Channel Tunnel took seven years to construct and amounted to £10 billion.[706] It is for this reason that VR is vital component as tourists do not have to "travel" to the destination.

Many sites are also inaccessible to people with disabilities (PwDs), health issues or age-related infirmities due to the physical barriers that exist and these are sometimes impossible to remove or avoid.[707] VR offers alternative solutions to these tourists by removing the so-called physical barriers.[708] For example, Stratford-upon-Avon in the UK, and the home of Shakespeare, has incorporated VR where the ground floor has a VR exhibit that offers a virtual re-creation of the floor above.[709] VR also provide PwDs the chance to "pre-test" or investigate the accessibility of the destination and the activities beforehand.[710] Moreover, SL bypasses physical barriers through avatars.[711] Thus, PwDs eliminate their disability in the virtually constructed avatar.[712] For paraplegic tourists, this is an easier and less frustrating method to travel to locations with physical barriers.[713] In fact, a woman with a chronic pain disorder used SL to skydive, ice-skate and interact with friends and family. The woman claimed that SL "opened another world up for her".[714]

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[706] L.J. Lickorish & C.L. Jenkins, *An introduction to tourism*, p. 105.
[707] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 176; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405.
[708] I.P. Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management* 66, 2018, p. 141; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; J. Eddings, *How virtual reality works*, p. 144; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 191.
[709] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.
[710] J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[711] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 425; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 39; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.
[712] C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 191.
[713] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.
[714] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 643.

VR also gives tourists access to dangerous and inhospitable areas. Crime against tourists and the 9/11 terrorist attack in New York have made many tourists afraid to travel.[715] VR addresses this as it limits tourists' anxiety or risk by enabling them to pre-acclimatise to unfamiliar environments in a safe pretravel setting as it mirrors the effects of reality. This results in relaxation, rejuvenation, expectation, surprise, trust in oneself and improves self-esteem.[716] Another benefit is that through VR, tourists do not physically have to travel to these countries.[717] For example, some parts of Nigeria are negatively affected by the activities of Boko Haram, a terrorist group. This means tourists avoid attractions in these areas, such as Yankari National Park and Sambisa Forest. But with VR, tourists can still experience these areas virtually from another safe destination.[718]

VR is also used in an educational or informative tool in tourism. Numerous heritage sites have incorporated VR into their exhibits due to its edutainment (educational + entertainment) capabilities as it brings the exhibit to life.[719] For example, the Cultural Centre at the Foundation of the Hellenic World, a Greek heritage institution, has VR exhibits. Tourists are able to take a journey through the ancient city of Miletus, be an archaeologist and conduct experiments related to some of Archimedes' discoveries or assist a sculptor in creating a statue of Zeus. The VR exhibits have become one of the most popular attractions at the Cultural Centre.[720]

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[715] P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 17; A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 24.

[716] M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 23; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; G. Riva & B.K. Wiederhold, 'How cyberpsychology and virtual reality can help us to overcome the psychological burden of coronavirus', *Cyberpsychology, Behavior, and Social Networking* 23(5), 2020, p. 277; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 23; V. Schaffer *et al*., 2018, <https://phys.org/news/2018-10-vr-technology-holidaying-home-substitute.html>, access: 17 May 2019; G.T. Flaherty & N. Nasir, 'Reiseangst: travel anxiety and psychological resilience during and beyond the COVID-19 pandemic', *Journal of Travel Medicine* 27(8), 2020, p. 2.

[717] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4115.

[718] O.C. Jude & U. Chike, 'Tourism and virtual reality (VR) in developing nations', *African Journal of Hospitality, Tourism and Leisure* 9(2), 2020, p. 7.

[719] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 642; J. Swarbrooke, *The development and management of visitor attractions*, p. 360; H. Lee *et al*., 'Experiencing immersive virtual reality in museums', *Information & Management* 57(5), 2020, p.1; D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454; D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 448.

[720] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 642.

As indicated in Chapter 3, VR emerged from the entertainment industry with the development of the Sensorama.[721] Since then, VR has been making waves in the entertainment business and has become a multi-dollar industry.[722] Globally theme parks, which are very popular tourist destinations, are incorporating VR into their rollercoaster rides. For instance, "Six Flags", an American amusement park corporation, has incorporated a VR component into a pre-existing Superman–Ride rollercoaster ride. Riders wear a Gear to watch a Superman story in synchronisation with the movement of the ride. Theme parks add VR to their offerings because it is a cost-effective way to reinvent an existing product and attract tourists. Another reason is that a VR element offers flexibility to be reprogrammed periodically. Lastly, VR provides several virtual accompaniments for riders to choose from.[723] "Virtual theme parks," or location-based entertainment, are also beginning to emerge since theme parks and rollercoaster rides are constrained due to their large land use and their distance from large populations. An example of a virtual theme park is "Disney World" in the USA, which boasts numerous VR-related rides, including CyberSpace Mountain, Virtual Jungle Cruise, Aladdin's Magic Carpet Ride and Ride the Comix.[724] Virtual theme parks are more beneficial as they are smaller and cheaper to build than normal theme parks. This means that these theme parks can be located in urban areas as they require less space and can then attract new and larger markets.[725]

Some tourists tend to test their limits by searching for adventures or dangerous activities, such as bungee jumping. Unfortunately, tourists are not always trained for these adventure activities, which often results in accidents and deaths. With VR, tourists can partake in these activities and

[721] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 642; G. Burdea & P. Coiffet, *Virtual reality technology*, p. 324.
[722] J. Eddings, *How virtual reality works*, p. 127; P. Mealy, *Virtual and augmented reality for dummies*, p. 213.
[723] D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 451.
[724] C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 189; A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management*, 16(6), 1995, p. 425; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?,' *World Leisure and Recreation* 39(3), 1997, p, 37; M. Burt & C. Louw, 'Virtual reality enhanced roller coasters and the future of entertainment – audience expectations', *World Leisure Journal* 61(3), pp. 183-185.
[725] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 642; A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management*, 16(6), 1995, p. 425; J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 130; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?,' *World Leisure and Recreation* 39(3), 1997, p, 37.

also know they are safe and can extricate themselves if they feel uncomfortable. VR eliminates the risk or danger aspect.[726] VR also allows tourists to participate in forbidden or unacceptable activities, such as shooting a person with a gun or hunting a wild animal. For instance, according to Islamic laws, Muslim women are prohibited to travel without a male relative's consent. However, VR enables Muslim women to travel freely.[727] Moreover, tourists are able to define their persona and the type of interaction with other virtual persons or objects. For example, a male tourist can travel to Paris using a female avatar or the persona of a cinema star.[728] Furthermore, tourists can choose destinations freely as there is no time or location limit in VR. Tourists are able to travel to any location, whether it is inaccessible, off-limit, or an imaginative site, such as a dungeon in a castle, the planet Mars, the Amazon jungle or the Antarctic, for as long as they have time or until they "have to get back to reality".[729]

While VR is an effective training tool in many professions, the tourism industry has also adopted VR in this way.[730] Hotels are starting to use VR as a training tool because it reduces training costs and time, and improves employee performance.[731] One such example is the Best Western Hotel and Resort which integrated VR simulations to train front-desk staff to improve their problem resolution and guest interaction skills.[732] In fact, the Best Western reported a 71% decrease in

[726] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 420; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 439; S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1994*, p. 91; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, p. 35; A. Ali & D. Carson, 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139; R. Tavakoli & P. Mura, ''Journeys in Second Life' – Iranian Muslim women's behaviour in virtual tourist destinations', *Tourism Management* 46, 2015, p. 401; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 63.
[727] S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 63.
[728] C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al*. (eds.), *Information and communication technologies in support of the tourism industry*, p. 191; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 421.
[729] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 585; S. Gidey, 2017, <https://www.bbc.com/news/uk-wales-41635746>, access: 7 May 2019; R. George, *Marketing tourism in South Africa*, p. 344; L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 203; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 420; D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 454.
[730] D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 448.
[731] Heartofthehouse, 2021, <https://www.heartofthehouse.com/virtual-reality-training-hotels/>, access: 30 January 2021.
[732] D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 448.

customer complaints after implementing VR into their training program. The Hilton hotel group also developed a VR training program for their corporate employees to understand and to support other hotel staff. The program has been a success as 87% of corporate employees have reported it increased their empathy and appreciation towards other hotel staff.[733]

Another issue facing the tourism sector is the problem of the wealth gap. Tourism is generally expensive and only caters for those who have money and time to travel for leisure. Through the use of VR, both the wealthy and poor have the opportunity to, for example, visit Paris "virtually". Therefore, VR can to some degree democratise the tourism industry by offering an equal opportunity for all tourists to experience a destination.[734] Moreover, to facilitate this, VR has become more advanced, cheaper and user-friendly.[735] This is a however a debatable issue.[736]

Another benefit of the use of VR in the context of tourism is apparent in the current COVID-19 pandemic. Even though there are possible vaccines to combat the spread of the virus, governments around the world imposed non-pharmaceutical interventions (actions taken by people without medication), such as physical distancing or social distancing (a physical distance of 1m to 2m between people).[737] Physical distance has a major impact on the tourism industry as it ruins the experience. The reason is that physical distance limits human presence and physical touch.[738] It is believed by some that physical distancing will become the so-called "new normal" [739] even once

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[733] Heartofthehouse, 2021, <https://www.heartofthehouse.com/virtual-reality-training-hotels/>, access: 30 January 2021.
[734] J.P. Vanderlei, 2021, <https://www.tourism-review.com/post-covid-tourism-is-to-make-greater-use-of-virtual-tours-news11854>, access: 17 May 2021; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 14; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149.
[735] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 283; J. Beck & R. Egger, 'Emotionalise me: self-reporting and arousal measurements in virtual tourism environments', *in* B. Stangl & J. Pesonen (eds.), *Information and communication technologies in tourism 2018*, p. 3; A. Ali & A.J. Frew, *Information and communication technologies for sustainable tourism*, pp. 10, 16; D. Buhalis, 'Technology in tourism-from information communication technologies to Etourism and smart tourism toward ambient intelligence tourism: a perspective article', *Tourism Review* 75(1), 2020, p. 267; B. Neuhofer *et al*., 'A typology of technology-enhanced experiences', *International Journal of Tourism Research* 16(4), 2014, p. 340.
[736] See discussion under drawbacks.
[737] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 2.
[738] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 3.
[739] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 2.

COVID-19 is over.[740] However, VR is considered one of the most outstanding methods to be used to overcome physical distancing.[741] With VR, companies can still offer the tourist experience whilst complying with physical distancing restrictions.[742] Tourists are also able to be together in the "same space" because VR decreases physical face-to-face interaction between them, while still allowing them to experience the tourism products and services.[743] Moreover, as a result of COVID-19, many governments were forced to close their land and sea borders. For example, 25 cruise ships were unable to dock due to confirmed COVID-19 cases. It is for this reason that people turned to virtual platforms in order to travel. As a matter of fact, many businesses and academics, as well as tourists, used video-conferences or webinars to avoid travelling by air.[744]

The following table provides a summarised version of the benefits of VR in tourism based on the six areas identified by Guttentag (2010) with other additions.

Table 1: The benefits of the VR tourism experience compared to conventional tourism

Criteria	**Conventional tourism experience**	**Virtual reality tourism experience**
Marketing	Brochures, travel books, TV commercials.	360° images and videos: interactive.
	Information is statistic and outdated, inauthentic and one-way.	Current, dynamic information, updatable.
	No pre-visitation experience.	"Try before buy" experience. SL: encourages tourists to visit the real destination/attraction.
Sustainability and preservation	Tourism contributes to the destruction of sites. Over-tourism and negative impacts.	Lessens or eliminates the negative impact of tourism. Tourists have the opportunity

[740] O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, p. 28.
[741] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 3.
[742] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 3.
[743] S. Rogers, 2020b, <https://www.forbes.com/sites/solrogers/2020/03/26/coronavirus-has-made-wfh-the-new-normal-heres-how-virtual-reality-can-help/#5b2de5e561d5>, access: 3 June 2020; O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, pp. 28-29.
[744] S. Gössling *et al*., 'Pandemics, tourism and global change: a rapid assessment of COVID-19'. *Journal of Sustainable Tourism* 29(1), 2020, pp. 2, 14.

		to virtually "touch" objects without causing any damage to the real object.
	Pseudo-sites, prohibited access, imposed restrictive regulations, required entrance fees and physical barriers.	Actual virtual sites, unlimited access, no restrictive regulations, sometimes free access and no physical barriers.
Tourism planning	The local community often lacks the necessary skills to understand the project.	Explains tourism plans in a less complex manner and provides virtual visuals.
Accessibility	Physical barriers (i.e., inaccessible areas).	VR removes the physical barriers (makes areas accessible).
	Inaccessible sites (i.e., remote or fragile areas)	VR provides access to inaccessible locations and attractions.
	Travel is unsafe: crime and terrorist attacks.	Tourists are safe as they do not have to travel to the real destination and are not exposed to danger or risks.
	Many tourism areas are too fragile to handle tourists.	Tourists can "visit" fragile destinations, without damaging them.
	Numerous attractions and destination are destroyed and no longer exist.	VR gives tourists the opportunity to explore these attractions and destinations that are recorded virtually.
	Tourists avoid a destination if the roads are in poor condition.	With VR, tourists are able to "travel" to any location, despite the road condition.
	Tourists are prohibited from entering certain sites due to their sacredness to the local community.	Tourists can explore sacred sites in VR without invading/entering the indigenous community's culture.
Education	Museums' exhibits are considered boring.	Edutainment: brings the exhibit to life
Entertainment	Theme parks and rollercoaster rides: large land use and are often located at distant places.	Theme parks add VR to their rollercoaster rides to reinvent them to attract tourists. Virtual theme parks: cost-effective and smaller and closer to urban settings.
Experiences and risks	Tourists partake in dangerous and forbidden activities: hurt/die.	Tourists can participate in dangerous activities without risk or hurting themselves.
Training	Expensive and time consuming.	VR reduces training costs and time.

Democratising	Only the wealthy tourists can afford to travel.	VR offers less privileged tourists the chance to "travel".
Physical distance (COVID-19)	No human interaction with other tourists and hosts.	Tourists and hosts can interact in the same space, while adhering to physical distancing. They can also be in the same space and interact as VR eliminates any physical face-face interaction.
Closure of land and sea borders	Airports and sea border closed as a result of COVID-19.	Business and other tourists can still travel through for instance, virtual-conferences.

5.3 Barriers of virtual reality for tourism

Unfortunately, technology also has a down side.[745] Some tourism scholars regard VR as a serious threat to the tourism industry. Since the mid-1990s increasing attention has been paid to the drawbacks of VR on tourism highlighting the loss of revenue; health issues; technological issues; and access issues as the major areas of concern.[746] More recently, P. Townsend and Buhalis have also pointed to other drawbacks, such as privacy and security issues; inefficient and failing systems; digital exclusion; threat to languages and cultures; and elimination of human touch as further drawbacks related to VR's impact on tourism.[747]

One of the major concerns is that VR will result in revenue loss in the tourism sector. Potential tourists might have such an enjoyable experience at "home" using a VR substitute, that they lose their motivation for travel. The home can become a central and secure base for people to participate in tourism activities and this even more so under COVID-19 restrictive regulations where people were globally restricted to their homes under lockdown. Potential tourists are able to experience VR in the comfort of their homes. As a result, tourists no longer have the desire to physically travel to destinations and this is detrimental for countries, especially those in the global South, that depend heavily on the revenue generated from tourism. If fewer tourists decide to travel to these

[745] P. Townsend, *The dark side of technology*, p. 1.
[746] R. Tavakloli & P. Mura, ''Journeys in Second Life' - Iranian Muslim women's behavior in virtual tourism destinations', *Tourism Management* 46, 2015, p. 400; T. Jung *et al*., 'Tourists' experience of virtual reality applications' (paper presented at the IEEE International Conference on Consumer Electronics, Las Vegas, USA, 2017), p. 1.
[747] D. Buhalis, 'Technology in tourism-from information communication technologies to Etourism and smart tourism toward ambient intelligence tourism: a perspective article', *Tourism Review* 75(1), 2020, p. 270.

countries, they will suffer economically as these people do not always have any other source of revenue.[748] VR will then lead to a reduction in the number of employees required in the tourism industry,[749] as well as the loss of employment in the informal sector which is particularly vast.

Another key drawback of VR is that it can have a major effect on people's physical and mental health.[750] VR technology is only suitable for short periods because HMDs are known to cause motion sickness, nausea and headaches, especially if a user wears the set for an extended period of time.[751] Motion sickness is caused when the vestibular system,[752] the sense of motion and what the eye sees, are inconsistent. This causes the brain to sense inconsistency and thinks the body is ill. Therefore, the brain induces headaches, dizziness, disorientation and nausea as a way to combat the illness.[753] There are two types of motion sickness tourists can experience, namely simulator sickness and VR sickness (or cybersickness). Simulator sickness is also a condition experienced by trainee pilots.[754] It is believed that simulator sickness is caused by latency, which refers to the time the system takes to respond to the movement of the head to the direction of travel. If the rate of the timeframe is slow, the speed of the system takes longer to "catch-up" to the user.[755] This leads to dislocation, nausea or exaggerated response.[756]

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[748] S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al.* (eds.), *Information and communication technologies in tourism 1994*, pp. 88, 93; J. Swarbrooke, *The development and management of visitor attractions*, p. 361; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 63; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, pp. 420-421; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149; D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 92; C. Cooper, *Essentials of tourism*, p. 334; C. Gurău, 'Virtual reality applications in tourism', *in* W.R. Pease *et al.* (eds.), *Information and communication technologies in support of the tourism industry*, p. 193; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al.* (eds.), *Handbook of e-Tourism*, p. 14.

[749] S.M.C. Loureiro, 'Virtual reality, augmented reality and tourism experience', *in* S.K. Dixit (ed.), *The Routledge handbook of tourism experience management and marketing*, p. 446.

[750] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 426.

[751] J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 39; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al.* (eds.), *Handbook of e-Tourism*, p. 7.

[752] The vestibular system is situated on both sides of the head, close to the inner ear. The organ also registers the head's state of equilibrium. J. Vince, *Virtual reality systems*, p. 278.

[753] P. Mealy, *Virtual and augmented reality for dummies*, p. 43.

[754] J. Lovine, *Step into virtual reality*, p. 22.

[755] C.E. Loeffler & T. Anderson, 'Introduction', *in* C.E. Loeffler & T. Anderson (eds.), *The virtual reality casebook*, p. xvii.

[756] J. Lovine, *Step into virtual reality*, p. 22.

VR sickness is also considered as a visual motion sickness.[757] It is uncertain what causes VR sickness, but according to the sensory conflict theory, the visual, vestibular and proprioceptive sensory signals disagree. Sensory signals provide information about the orientation and movement of the body. If a person stands still, the vestibular and proprioceptive organs will not give cues of self-motion and the organs then become confused. This leads to sensory discrepancies and eventually to VR sickness which includes symptoms, such as discomfort, apathy, nausea, drowsiness, disorientation, eye strain and fatigue.[758] HMDs also lead to eye strain. According to the Defence Research Agency in the USA, this is caused when the intraocular distance does not match the distance between the optical centres of the HMDs.[759] HMDs can also cause sopite syndrome which refers to chronic fatigue, lack of initiative, drowsiness, lethargy, apathy and irritability.[760]

VR also affects the physiological and psychological health of tourists. Tourists can experience mental trauma if they travel to dark tourism sites, for instance, the Charles Mason house or the Holocaust with graphic displays that can be disturbing.[761] Furthermore, tourists may experience drug-related symptoms as VR heightens certain senses. Hence, VR can be considered as an "electronic LSD" as indicated by the character, Visual Mark, in 1991, in the novel *Synners*, written by Pad Cadigan.[762] Moreover, tourists can withdraw from social activities. As a result, tourists often prefer to relate to machines rather than other humans.[763] Another physiological effect of VR is that scholars and commentators believe that as VR technology improves and becomes ubiquitous, it may blur the line between reality and fantasy. If a person is immersed in VR regularly, they will struggle to differentiate between reality and cyberspace. The reason is that the

[757] A. Somrak *et al*., 'Estimating VR sickness and user experience using different HMD technologies: an evaluation study', *Future Generation Computer Systems* 94, 2019, p. 303.
[758] A. Somrak *et al*., 'Estimating VR sickness and user experience using different HMD technologies: an evaluation study', *Future Generation Computer Systems* 94, 2019, p. 303.
[759] J. Vince, *Virtual reality systems*, p. 280.
[760] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 426; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, p. 39.
[761] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 426; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', World Leisure and Recreation 39(3), 1997, p. 39.
[762] J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', World Leisure and Recreation 39(3), 1997, pp. 39-40; D. Seed, *Science fiction: a very short introduction*, pp. 25-26.
[763] J. Swarbrooke, *The development and management of visitor attractions*, p. 361.

VR experience creates a sense of comfort and as a result, tourists cannot judge the risks and consequences of their actions. Therefore, people may not be able to deal with reality.[764]

VR also has several other technological drawbacks. It does not allow people to physical move long distances due to the limited range of the tracking system and cables.[765] HMDs are fixed-focus which means people have to turn their heads when they want to look around instead of their eyes like they would have done in the real world. Movement restriction reduces people's freedom and can result in an inauthentic experience.[766] At another level, VR can affect the health of potential tourists as they do not physically move – the proverbial couch potato situation. People do not physically travel to other places, such as potentially open-air healthy destinations. This has both negative physical and psychological effects. Under the COVID-19 restrictions, the movement of people has already been limited which has led to negative social as well as psychological and physical consequences.

Another negative issue with VR technology for tourists is that some countries lack proper up-to-date technological infrastructure. This is an issue because outdated technology connected to sophisticated VR systems will lead to the application functioning ineffectually or not at all.[767] Therefore, it is critical to update VR technology constantly in order to enhance the speed, inter-operability and adaption.[768] This is a problem for individual usage, but also for those destinations that use VR to enhance the tourist experience. As VR technology is expensive, only destinations with substantial funds can afford to use it. As a result, destinations unable to afford VR

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[764] B. Prideaux, 'Cyber-tourism: a new form of tourism experience', *Tourism Recreation Research* 30(3), 2005, p. 6; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; J.S.P. Hobson & A.P. Williams, 'Virtual reality: the future of leisure and tourism?', *World Leisure and Recreation* 39(3), 1997, pp. 39-40; S. Muslin & G. Pigel 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1994*, p. 93; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 5; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 421.

[765] S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al.* (eds.), *Information and communication technologies in tourism 1994*, p. 91; M. Vafadar, 'Virtual reality: opportunities and challenges', *International Journal of Modern Engineering Research* 3(2), 2013, p. 1141; P. Mealy, *Virtual and augmented reality for dummies*, p. 45.

[766] S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al.* (eds.), *Information and communication technologies in tourism 1994*, pp. 90-91; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 439; J. Vince, *Virtual reality systems*, p. 181.

[767] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4117.

[768] D. Buhalis & P. O'Conner, 'Information communication technology revolutionizing tourism', *Tourism Recreation Research* 30(3), 2005, p. 9.

technologies could lose tourists.[769] There is also a problem as sometimes destination marketing organisations lack specialists to handle VR technology.[770]

Moreover, VR also has a negative impact when it comes to matters of access to indigenous cultures, without being concerned that it might induce cultural change.[771] Cultural change can be defined as a result of interactions and impacts on one culture through contact with another. It also results from new ideas or technologies entering a culture and causing a change to the way things are done. Another drawback in terms of access is that tourists can "visit" culturally sensitive rituals, forbidden areas or attractions. For example, the earlier mentioned, "Experience Mecca" app and other websites, offer virtual pilgrimages to people that cannot afford to take the trip and for "other curious observers".[772] This latter issue is a major concern as there are strict regulations set in place to prevent non-Muslims from entering Mecca or participating in the Hajj as they are forbidden.[773] By giving access to these sites without any concern or consent, VR can induce change that will have a negative impact on the indigenous or sacred community.[774]

Unfortunately, with VR in tourism many tourists, local communities and countries experience a form of digital exclusion due to the digital divide, especially for poor tourists, the generational gap and local communities. According to Mura *et al*., "the possibility of widening the gap between rich and poor through virtual tourism should not be underestimated".[775] Regarding wealthy and poor tourists, the divide is large. The so-called rich tourists can experience a destination virtually beforehand, while poor tourists can only sometimes have the VR experience of the destination. For this reason, Dewaily asks the following question:

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[769] J. Swarbooke, *The development and management of visitor attractions*, pp. 90, 361.
[770] E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, pp. 142-143.
[771] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[772] D.J. Timothy & T. Iverson, 'Tourism and Islam: considerations of culture and duty', *in* D.J. Timothy & D. Olsen (eds.), *Tourism, religion and spiritual journeys*, p. 194; Cheng, 2017, <https://qz.com/980821/mecca-in-vr-the-first-oculus-developer-from-the-middle-east-is-inviting-people-to-the-hajj/>, access: 9 October 2019.
[773] S. Cheng, 2017, <https://qz.com/980821/mecca-in-vr-the-first-oculus-developer-from-the-middle-east-is-inviting-people-to-the-hajj/>, access: 9 October 2019; D.J. Timothy & T. Iverson, 'Tourism and Islam: considerations of culture and duty', *in* D.J. Timothy & D. Olsen (eds.), *Tourism, religion and spiritual journeys*, p. 194.
[774] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[775] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149.

> Are we then heading towards a dual tourism, where the 'wealthy' (in terms of both time and money) are offered the opportunity of using the virtual to redefine their choice, before going to the field to experience it, while the poor have to be satisfied with just the virtual? [776]

Different generations also experience VR technology differently. Many Baby Boomers (1946-1964) struggle with technology because of issues, such as visibility and lack of technological knowledge, while most Millennials (or Generation Y) (1981 to 1996) regard technology as a functional necessity.[777] Moreover, many rural and urban indigent communities do not have access to systems and hardware, and also lack the ability to use and understand technology.[778]

VR is also considered a threat to languages and cultures.[779] According to a report conducted in 2015 by The Broadband Commission and the State of Broadband, only 5% of the world languages are represented on the internet. English is the *lingua franca* in terms of technology. For example, about 55.2% of the websites on the internet are in English, while 5.8% are in French, German, Japanese, Russian and Spanish.[780] VR technology therefore excludes the bulk of national and indigenous languages. It could, thus, be argued that it discriminates against them.

Other drawbacks regarding VR are that it has privacy and security issues due to risks, such as theft, fraud and child pornography, prevalent in virtual worlds.[781] Tourism marketers, but also hackers have access to tourists' personal and private information (e.g., their geolocation) when they register, pay or use the VR product.[782] These issues all compound the risk and negative impact of VR in tourism.

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[776] J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, pp. 41, 50.

[777] P. Townsend, *The dark side of technology*, p. 243; L. Holmes, 2012, <https://digitaldivide2012.wordpress.com/2012/03/02/digital-divide-between-generations-by-lauren-holmes-2/>, access: 20 March 2021.

[778] M. Warren, 'The digital vicious cycle: links between social disadvantage and digital exclusion in rural areas', *Telecommunications Policy* 31(6-7), 2007, p. 377.

[779] P. Townsend, *The dark side of technology*, p. 165.

[780] J. Temperton, 2015, <https://www.wired.co.uk/article/linguistic-diversity-online>, access: 20 March 2021; J.C. Evas, 2014, <https://theconversation.com/minority-languages-fight-for-survival-in-the-digital-age-22571>, access: 20 March 2021; R. Bauer, 2015, <https://www.weforum.org/agenda/2015/10/is-the-internet-killing-off-the-worlds-languages/>, access: 20 March 2021.

[781] A. Baxter & L. Pieszek, 'Armchair tourism: bring the world into your living room', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 180.

[782] M.K. McGee, 2016, <https://www.databreachtoday.com/interviews/virtual-reality-real-privacy-security-risks-i-3221>, access: 18 March 2021.

Probably one of the key concerns as regards tourism is that VR does not offer a tourist "experience".[783] In tourism, the tourist experience is an important factor.[784] It is an extremely difficult to define the concept of "tourist experience" as it "encompasses a complex variety of elements and is considered to be personal and intangible".[785] The tourist experience is referred to "as being within a person who is engaged with an event on an emotional, physical, spiritual or intellectual level and is left with memorable impressions".[786] J. Ma *et al*. state that the tourist experience is defined as "visitors travel to a tourism setting, whether it be an attraction, hotel, destination or other type. There they perceive and attend to various stimuli within this setting or "experiencescape"".[787] The tourist experience includes experiencing a destination and attraction through the five senses (hear, touch, smell, taste and sight as shown in Diagrams 3 and 4), as well as physically interacting with tourists and locals. Unfortunately, tourists cannot have the tourist experience in VR, as discussed later in the chapter.

There are therefore a range of negative concerns related to VR in the tourism domain. These are set out in Table 2 below.

Table 2: The barriers of the VR tourism experience compared to conventional tourism

Criteria	**Conventional tourism experience**	**Virtual reality tourism impact**
Revenue lost	Tourism contributes to the GDP and employment rates in countries worldwide, but more so in the global South.	Reduction of employment and negative economic impact on GDP and also the informal sector.

[783] J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405; S. Rahman & A. Bhowal, 'Virtual tourism and its prospects for Assam', *IOSR Journal of Humanities and Social Science* 22(2), 2017, p. 93.
[784] J. Ma *et al*., 'Introduction: creating memorable experiences', *in* N. Scott *et al*. (eds.), *Visitor experience design*, p. 6.
[785] S.Q. Cutler & B.A. Carmichael, 'The dimensions of the tourist experience', *in* M. Morgan *et al*. (eds.), *The tourism and leisure experience: consumer and managerial perspectives*, p. 18.
[786] S.Q. Cutler & B.A. Carmichael, 'The dimensions of the tourist experience', *in* M. Morgan *et al*. (eds.), *The tourism and leisure experience: consumer and managerial perspectives*, p. 18.
[787] J. Ma *et al*., 'Introduction: creating memorable experiences', *in* N. Scott *et al*. (eds.), *Visitor experience design*, p. 7.

Health issues	Tourism is beneficial to tourists' health as it reduces stress and is directly related to relaxation and healthy activity. Often travelling to destinations which involves physical activities.	Impacts negatively on physical health: HMDs cause motion sickness, nausea, headaches and eye strain. Physiological health: mental trauma, "electronic LSD", blur the line between reality and virtual. It also inhibits healthy physical movement.
Technological issues	Tourists can move freely, without any restrictions caused by technology. Technology does not hinder tourism.	Movement restriction. HMDs are fixed-focus. Many global South countries lack proper up-to-date technological infrastructure and specialists as they are extremely expensive.
Access issues	Communities can build barriers to prevent tourists from entering culturally sensitive, sacred and forbidden sites.	Tourists gain access to culturally sensitive, sacred and forbidden sites.
A threat to languages and cultures	Locals can still speak their native language.	English is the *lingua franca* in terms of technology.
Digital Divide	There is no divide among locals and tourists.	Wealthy tourists: a preview of the destination in VR beforehand, while still able to physically travel the world. Poor tourists view the world through VR and they also have to be content with the VR experience. Generation gap: Baby Boomers struggle with technology due to visual impairments and lack technological know-how. Rural and urban indigent communities lack the necessary VR technology and knowledge to understand what VR is.
Other drawbacks	Tourists can experience a destination through the five senses (hear, touch, smell, taste and sight). At some destinations tourists are safe.	Tourists cannot enjoy an authentic tourism experience because not all the senses can be simulated, especially smell and taste. A virtual world is not always a safe and secure place for tourists due to

	Tourism enables physical interaction between hosts and other tourists.	theft, fraud and child pornography and also hacker activity. VR tourism experience is an individual activity.

It is therefore apparent that there is an ongoing debate on the benefits and drawbacks of VR in the tourism sector.

5.4 Virtual reality as a substitute for conventional tourism

The third part of this Chapter discusses the contentious questions that have arisen in the literature regarding VR as a substitute for conventional tourism. The question arises should this lead to the redefining of the concept "conventional tourism" and how does this relate to authenticity?

Since the 1990s, tourism scholars have debated on whether VR can be considered as a substitute for conventional tourism with mixed results.[788] However, little has been written on whether VR is capable of replacing conventional tourism as most scholars have mainly focused their attention on the marketing dimension.[789] To understand the viewpoints of these scholars, it is important to define the word "substitute". The concept of "substitute" originated from economics.[790] According to the *Oxford English Dictionary*, substitute means "an object, practice, action which takes the place of another, a replacement".[791] Regarding tourism, R. van der Veen defines the word substitution as a "particular product or service [that] can be replaced by another comparable one". For example, trains to Paris and London offer tourists a close substitute to airlines and cruise

[788] A. Marasco *et al*., 'Exploring the role of next-generation virtual technologies in destination marketing', *Journal of Destination Marketing and Management* 9, 2018, p. 145; R. Tavakloli & P. Mura, ''Journeys in Second Life' - Iranian Muslim women's behavior in virtual tourism destinations', *Tourism Management* 46, 2015, p. 401; C. Cooper *et al*., *Tourism principles and practice*, p. 781; D. Weaver & L. Lawton, *Tourism management*, p. 80; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 7; D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 452.

[789] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 2; D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 453.

[790] R. Van der Veen, 'Substitution', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 905.

[791] Oxford English Dictionary, 2021, <https://www-oed-com.uplib.idm.oclc.org/view/Entry/193078?rskey=aDoACE&result=1#eid >, access: 18 January 2021.

ships.[792] However, several authors agree and add that VR will eventually supplement conventional tourism.[793] The word "supplement" is defined as "a thing added as an enhancement; an addition…"[794] Based on the definition, this means that VR will enhance the tourism experience for tourists, not only at the destination, but also before the trip.[795]

History shows that using substitutes for the actual travel experience is not a new phenomenon. Armchair tourists have long enjoyed traveling to distant lands via movies, books, images and other media.[796] Moreover, technology has always been used as a substitute for real products. For instance, the internet acts as a substitute for travel guidebooks and the TV is a replacement for in-person attendance at sporting events.[797] Hobson and Williams, as well as other scholars, are of the opinion that tourists are content with substitute travel experiences.[798] This is because VR overcomes the traditional drawbacks associated with conventional tourism by providing on-

[792] R. Van der Veen, 'Substitution', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 905.
[793] S. Sussmann & H. Vanhegan, 'Virtual reality and the tourism product: substitution or complement?' (paper presented at the 8th European Conference on Information Systems, Trends in Information and Communication Systems for the 21st Century, Vienna, Austria, 3-5 July 2000), p. 1; J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 49; C. Krug, 'Virtual tourism: the consumption of natural and digital environments', *in* C. Gersdorf & S. Mayer (eds.), *Nature in literary and cultural studies: transatlantic conversations on ecocriticism*, p. 249; P. Robison, 'Developing the e-mediated gaze', *in* J. Lester & C. Scarles (eds.), *Mediating the tourist experience: from brochures to virtual encounters*, p. 157; K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 136; N. Losada *et al*., 'Could virtual reality substitute the 'real' experience? Evidence from a UNESCO World Heritage Site in northern Portugal', *in* A. Abreu *et al*. (eds.), *Advances in tourism, technology and systems*, p. 154; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 7.
[794] Oxford English Dictionary, 2021b, <https://www-oed-com.uplib.idm.oclc.org/view/Entry/194624?rskey=lePZHU&result=1#eid>, access: 20 January 2021.
[795] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; N. Losada *et al*., 'Could virtual reality substitute the 'real' experience? Evidence from a UNESCO World Heritage Site in northern Portugal', *in* A. Abreu *et al*. (eds.), *Advances in tourism, technology and systems*, p. 154.
[796] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 32; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 5.
[797] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 8.
[798] J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 130; B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 324; G.F. Ross, 'Cyber-tourism and social capital: ethics, trust and sociability', *Tourism Recreation Research* 30(3), 2005, p. 87; A. Ali, & D. Carson 'Information and communications technology (ICT) and the challenges of sustainable self-drive tourism', *in* B. Prideaux & D. Carson (eds.), *Drive Tourism: trends and emerging markets*, p. 139; R. Tavakloli & P. Mura, ''Journeys in Second Life' - Iranian Muslim women's behavior in virtual tourism destinations', *Tourism Management* 46, 2015, p. 401; B. Boniface & C. Cooper, *Worldwide destinations: the geography of travel and tourism*, p. 571; J. Hopf *et al*., 'Exploring the impact of multisensory on VR travel recommendation: a presence perspective', *in* J. Neidhardt & Wörndl W. (eds.), *Information and communication technologies in tourism 2020*, p. 171.

demand guaranteed experiences with minimal cost, risk or hassle.[799] In fact, there are several cases of artificial and reproduced environments built especially for tourists.[800] For example, the Lascaux Caves in France, which contain ancient rock paintings that were closed in 1963 by the French government due to the excess carbon dioxide caused by tourists' breath. An artificial replica was built, known as the Lascaux II.[801] Tourists are more accepting of the replica as they know that the original cave is too sensitive for visits.[802]

While some scholars consider VR as a substitute for conventional tourism, others oppose this.[803] The latter argue that businesses as well as tourists are against virtual travel as a substitute and prefer conventional tourism.[804] Two surveys support this statement. The first was conducted by "Italy4Real", a European tour specialist, which indicated that 81% of participants felt VR cannot replace a conventional tourist experience.[805] The second survey was conducted at the University of Queensland, in Australia, with students and showed similar results.[806] Students rejected the idea of VR as a substitute because VR cannot provide tourists the "full" experience as in the case with conventional tourism. For one, tourists are unable to experiences their holiday again in VR.[807] VR also cannot "replace the feeling of being in nature and seeing, hearing feeling and breathing in an

[799] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 5.
[800] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 424; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, pp. 644-645.
[801] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, pp. 644-645; V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 127.
[802] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, pp. 644-645; D.A. Guttentag *et al*., 'The future is now: how virtual reality and augmented reality are transforming tourism', *in* C. Cooper *et al*. (eds.), *The SAGE handbook of tourism management: theories, concepts and disciplinary approaches to tourism*, p. 45.
[803] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 421; B. Boniface & C. Cooper, *Worldwide destinations: the geography of travel and tourism*, p. 571.
[804] R. Yung & C. Khoo-Lattimore, 'New realities: a systematic literature review on virtual reality and augmented reality in tourism research', *Current Issues in Tourism*, 2017, p. 20; B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 334.
[805] A. Pandey, 2017, <www.pcquest.com/will-virtual-travel-substitute-real-world-travel/>, access: 11 July 2018.
[806] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 325.
[807] B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 325; M. Cooper & N.J. MacNeil, 'Virtual reality mapping revisit: IT tools for the divide between knowledge and action in tourism', *in* J. Kisielnicki (ed.), *Information communication technologies: concepts, methodologies, tools, and applications*, p. 1898; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 64; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 418; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 639; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 440.

environment that is real and not coming out of a can".[808] This is because not all the five senses can be simulated, particularly smell and taste, due to practicalities and technical complexities.[809] It is important to simulate all the five senses to experience the vibrancy and the personal growth that is evoked by tourism (See Diagrams 3 and 4).[810] Moreover, VR is also unable to simulate the experiences that tourists desire, such as visiting natural environments or cultural and people-related events.[811] Tourists will still know that it is a VR experience and as a result may still desire the real experiences.[812] Lastly, VR has eliminated human touch by replacing it with electronic contact.[813]

[808] S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1994*, p. 93.
[809] S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 64; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 418; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 639; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 440; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1405.
[810] G.F. Ross, 'Cyber-tourism and social capital: ethics, trust and sociability', *Tourism Recreation Research* 30(3), 2005, p. 88.
[811] P.J. Sheldon, *Tourism information technology*, p. 204.
[812] D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.
[813] P. Townsend, *The dark side of technology*, p. 25.

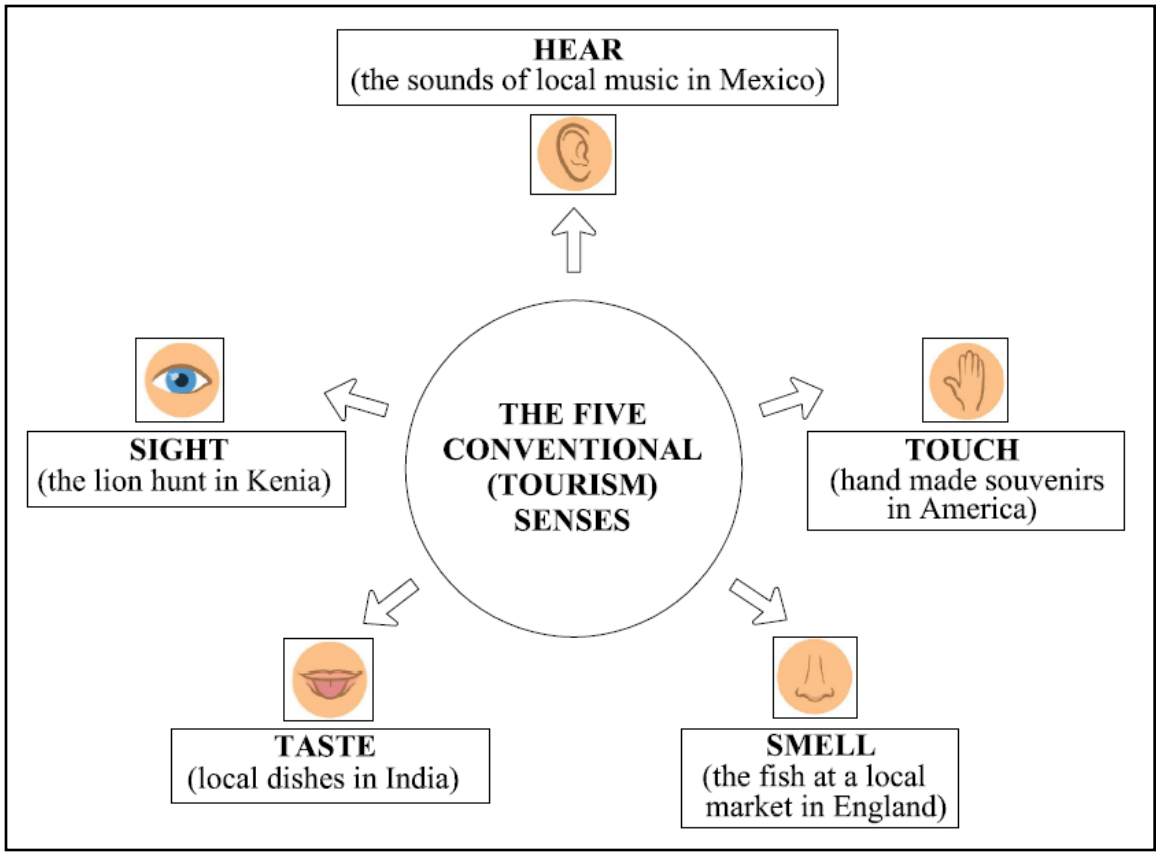

Diagram 3: The senses of the human body in terms of conventional tourism

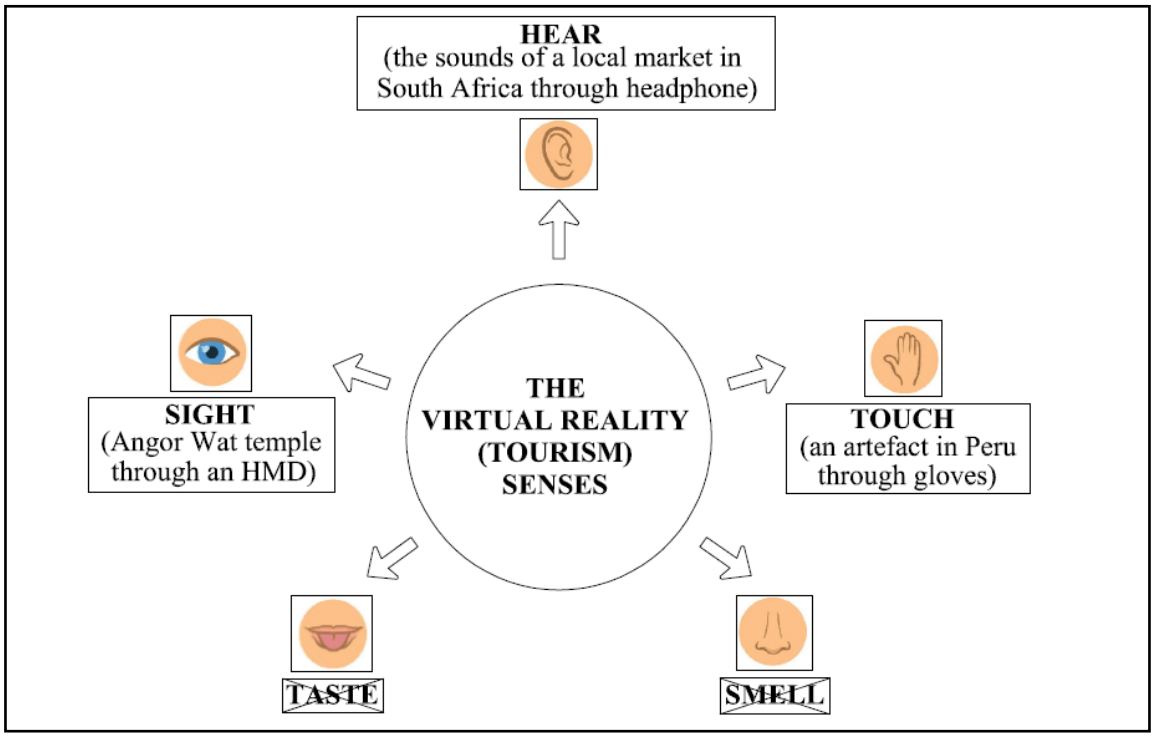

Diagram 4: The senses of the human body in terms of VR

Another reason related to the tourist experience is that is VR is essentially an individual or solo activity that does not allow any physical contact with other tourists or hosts in contrast to conventional tourism. This is a major problem, as humans are social beings and want to be in the company of other humans, and socialising is also integral to the tourist experience, as mentioned before.[814] Tourists usually travel in groups, either family of friends. Tussyadiah's *et al*. study supports this statement claiming that participants state VR did not offer a social experience and they felt that they were unable to ask or interact with other people.[815] This reduces the tourists' sense of presence.[816]

In a theoretical sense, VR questions the very definition or concept of tourism, touristic criteria and the traditional idea of tourism.[817] For this reason, Williams and Hobson and other scholars are posing the question whether VR can be regarded as "entertainment … or … tourism?"[818] Guttentag answers this question by stating VR can only be considered as a tourism niche if the tourist physically travels to make use of the VR. For example, an Australian resident is a tourist if he/she explores a VR Petra app in the British Museum. But, should the Australian resident view the VR Petra at home in Sydney, he/she is not considered a tourist.[819] Guttentag's answer complies with the established definition of tourism. According to the most cited definition of conventional

[814] J. Swarbrooke, *The development and management of visitor attractions*, p. 360; A.V. Seaton & M.M. Bennett, *Marketing tourism products: concepts, issues, cases*, p. 440; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 421; S. Horner & J. Swarbrooke, *Leisure marketing: a global perspective*, p. 64; B. Prideaux, 'The cybertourist', *in* G.M.S. Dann (ed.), *The tourist as a metaphor of the social world*, p. 334; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 11.

[815] Tussyadiah *et al*., 'Exploring the persuasive power of virtual reality imagery for destination marketing', *Tourism Travel and Research Association: Advancing Tourism Research Globally* 25, 2016, p. 5; D.A. Guttentag, 'Virtual reality and the end of tourism? A substitution acceptance model', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 6.

[816] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 599.

[817] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149; Guest editorial, 'Guest editorial: tourism geography in a changing world', *Tourism Geographies* 2(3), 2000, p. 239; J. Kurtzman & J. Zauhar 'Virtual sport tourism', *in* S. Hudson (ed.), *Sport and adventure tourism*, p. 295; J. Kurtzman & J. Zauhar, 'The virtual sports tourist', *Journal of Sport Tourism* 5(4), 1999, p. 27; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 10.

[818] A.P. Williams & J.S.P. Hobson, 'Virtual reality and tourism: fact or fantasy?', *Tourism Management* 16(6), 1995, p. 425; A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 289; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647.

[819] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647.

tourism by the UNWTO, it comprises the "physical movement" of people that travel for leisure and business and stay at other places for not more than a year. Therefore, the definition of tourism includes some sort of physical movement whereby tourists travel to and stay in, places outside of their usual environment.[820]

However, some scholars disagree with Guttentag by stating that VR is similar to conventional tourism.[821] J.L. Jensen states that even though tourists ""surf" the internet in front of a computer, we [the tourists] are physically as well as metaphorically moving around".[822] VR also "conveys a sense of escapism" [823] as is the case with conventional tourism by providing a temporary escape from the mundane routines from everyday life. The virtual world is brought to the tourist and, thus, tourists still get the tourism experience without them having to physically travel to a destination.[824] Furthermore, A. Wagler and M.D. Hanus compared the real-world tourism experience with immersive 360° videos. Based on the results, both real-world tourism experiences and 360° videos were viewed similarly.[825] Therefore, it suggests that 360° video tourism "may be a strong analogue to a real-world experience".[826]

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[820] D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; P. Jacobius, n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019; A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 289.

[821] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al.* (eds.), *Global hospitality and tourism management technologies*, pp. 2, 4, 6; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 207.

[822] J.L. Jensen, 'Online tourism: just like being there?', *in* B.T. Knudsen & A.M. Waade (eds.), *Re-investing authenticity: tourism, place and emotions*, p. 215.

[823] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 589.

[824] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 289; J. Kurtzman & J. Zauhar 'Virtual sport tourism', *in* S. Hudson (ed.), *Sport and adventure tourism*, p. 295; J. Kurtzman & J. Zauhar, 'The virtual sports tourist', *Journal of Sport Tourism* 5(4), 1999, p. 27; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 647; J. Kaminski, 'Virtual reality tourism', *in* L.L. Lowry (ed.), *The SAGE international encyclopedia of travel and tourism*, p. 1404; P. Jacobius, n.d.(c), <http://www.virtual-reality-in-tourism.com/overview-benefits-and-risks//>, access: 17 May 2019; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 149.

[825] A. Wagler & M.D. Hanus, 'Comparing virtual reality tourism to real-life experience: effects of presence and engagement on attitude and enjoyment', *Communication Research Reports* 35(5), 2018, pp. 461-462.

[826] A. Wagler & M.D. Hanus, 'Comparing virtual reality tourism to real-life experience: effects of presence and engagement on attitude and enjoyment', *Communication Research Reports* 35(5), 2018, p. 456.

The other main aspect of relevance to the debate on VR and tourism is the question of authenticity. Since MacCannell introduced the word "authenticity" as a pivotal element of tourism during the 1970s, it has become a key concept for tourism.[827] Regardless of its origin, the concept of authenticity in tourism is a complex term and scholars struggle and debate about what can be regarded as authentic. This is because authenticity has several definitions, and is an ambiguous and contentious word.[828] Authenticity is generally defined as the "sense of a true, sincere or original element in a historical context".[829] In simple terms, "authenticity" refers to products and services that are novel, real, original and genuine and not counterfeit.[830] In this context, VR is said to challenge the authenticity of a tourist experience.[831]

Some scholars consider VR blatantly as inauthentic.[832] They argue that VR is only a simulation and is not "real".[833] They state that VR does not enable tourists to have the full authentic sensorial experience. For one, as indicated above it is hard to simulate all of the five senses, particularly smell and taste due to the poor or weak quality of the technology used. Thus, according to these scholars, authenticity is only activated when all the five senses are involved.[834] S. Heitmann adds another reason to this stance by stating that the images are edited and do not involve any interaction

[827] N. Wang, 'Rethinking authenticity on tourism experience', *Annals of Tourism Research* 26(2), 1999, p. 349; J. G. Molz, *Travel connections: tourism, technology and togetherness in a mobile world*, p. 113; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 150.

[828] D. Weaver & L. Lawton, *Tourism management*, p. 148; P. Robison, 'Authenticity', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 16; J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; M. Smith *et al., Key concepts in tourist studies*, pp. 13-14; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 41; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 151.

[829] S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 45.

[830] P. Robison, 'Authenticity', *in* P. Robison (ed.), *Tourism: the key concepts*, p. 15; M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 4.

[831] J. Beck *et al*., 'Virtual reality in tourism: a state-of-the-art review', *Tourism Review* 74(3), 2019, p. 590; K. Damjanov & D. Crouch, 'Virtual reality and space tourism', *in* E. Cohen & S. Spector (eds.), *Space Tourism: the elusive dream*, p. 136; S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 55.

[832] P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 154.

[833] A.P. Williams & J.S.P. Hobson, 'Tourism - the new generation: virtual reality and surrogate travel, is it the future of the tourism industry?', *in* A.V. Seaton (ed.), *Tourism: the state of the art*, p. 286.

[834] R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 418; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 639; P. Mura *et al*., ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 154; M.J. Kim *et al*., 'Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model', *Journal of Travel Research*, 2018, p. 2.

or "authentic experiences".[835] Lastly, tourists are on an obsessive quest to seek an authentic tourist experience.[836] This means that tourists seek "the pristine, the primitive, the natural, that which is yet untouched by modernity".[837] The reason provided is that tourists want a true insight into the local culture and heritage.[838] As a result, the VR tourist experience might be illusionary and, thus, the tourist could question the authenticity of the experience.[839]

Other scholars believe VR is authentic as it provides tourists with an electronic authentic experience, that is not very different from a physical experience - at least in the conscious mind of the user.[840] These scholars argue that tourists are becoming less interested in authenticity. Therefore, they are content with not so "authentic" cultural products which can even be staged events.[841] As a matter of fact, they even argue that tourists are actually seeking environments created especially for them, because destinations are in any case losing their authenticity as they are being incorporated into the tourism marketplace.[842] Moreover, as mentioned earlier, in some cases the line between real and virtual is becoming difficult to distinguish.[843]

Lastly, it can be argued that VR can become authentic. According to S. Heitmann and E. Cohen, a cultural product or event that was once considered inauthentic may over time be regarded authentic, even by experts. This process is known as "emergent authenticity".[844] An example of

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[835] S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 55.
[836] L. Lominé & J. Edmunds, *Key concepts in tourism*, p. 11; P. Mura *et al.*, ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism', *Information Technology Tourism* 17(2), 2017, p. 150; S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 48; E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15, 1988, p. 373; J.L. Jensen, 'Online tourism: just like being there?', *in* B.T. Knudsen & A.M. Waade (eds.), *Re-investing authenticity: tourism, place and emotions*, p. 214.
[837] E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15(3), 1988, p. 374.
[838] S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 45; E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15(3), 1988, p. 374.
[839] W.C. Hunter, 'Virtual reality', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 1006.
[840] B. Prideaux & P. Singer, 'Space tourism – a future dream or a cyber-tourism reality?', *Tourism Recreation Research* 30(3), 2005, p. 33; D. Weaver & L. Lawton, *Tourism management*, p. 148.
[841] N. Wang, 'Rethinking authenticity on tourism experience', *Annals of Tourism Research* 26(2), 1999, p. 357; J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 127; J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 413; E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15(3), 1988, p. 376; J. G. Molz, *Travel connections: tourism, technology and togetherness in a mobile world*, p. 113.
[842] J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 127; J.M. Dewailly, 'Sustainable tourist space: from reality to virtual reality?', *Tourism Geographies* 1(1), 1999, p. 413.
[843] J.L. Jensen, 'Online tourism: just like being there?', *in* B.T. Knudsen & A.M. Waade (eds.), *Re-investing authenticity: tourism, place and emotions*, p. 215.
[844] S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al.* (eds.), *Research themes for tourism*, p. 48; E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15(3), 1988, p. 374.

emergent authenticity is Disney World. It was once an example of entertainment, but it has in time become part of American culture. Today, Disney World is considered an "authentic" American tradition and a huge drawcard for tourists.[845]

5.5 Concluding remarks

The first two parts of this chapter focused on the benefits and drawbacks associated with VR in the tourism industry. The third section considered the key questions that have arisen with the development of VR, namely VR as a substitute for conventional tourism, the influence of VR on the definition of tourism and issues associated with the authenticity of VR.

The results from this study indicate that VR offers the tourism industry several benefits. Guttentag provides six main benefits of VR, namely marketing; planning; sustainability and preservation; accessibility; education and entertainment. However, this study has argued that VR has additional benefits, including training, democratising tourism, physical distance, and experiences and risks. It can be noted from the discussion in Chapter 5, that the key benefit of VR is marketing. This is due to the "try before buy" concept, which means that tourists can explore a destination virtually before actually travelling to the destination. The second important benefit of VR is sustainability and perseveration. VR is a superior tool in this regard by allowing tourists to still experience a fragile or sensitive destination, without them causing physical harm to it. The last vital benefit is accessibility. Some destinations and attractions are not accessible for tourists due to many factors, such as remoteness, costs, undeveloped conditions, physical barriers, dangerous and inhospitable areas, sensitivity, or simply that they no longer exist. But VR eliminates these barriers by giving tourists virtual access to these sites.

Despite the numerous benefits, VR also has many drawbacks that are a major concern for the tourism industry, such as loss of revenue; health issues; technological issues; and access issues. Townsend and Buhalis have also added other drawbacks that effect tourism, namely privacy and security issues; inefficient and failing systems; digital exclusion; threat to languages and cultures; and elimination of human touch. Based on section two, it can be argued that VR mostly influences

[845] S. Heitmann, 'Authenticity in tourism', *in* P. Robinson *et al*. (eds.), *Research themes for tourism*, p. 56; N. Wang, 'Rethinking authenticity on tourism experience', *Annals of Tourism Research* 26(2), 1999, p. 355; E. Cohen, 'Authenticity and commoditization in tourism', *Annals of Tourism Research* 15(3), 1988, p. 380.

the tourism industry negatively in global South countries. The divide between global South and global North countries, includes: the global North having access to VR technology, while many global South countries lack the necessary funds to afford the technology. Many global South countries have destinations that are not open for tourism because of the sacredness associated with destinations. The issue is that VR provides access to these sacred sites, without acknowledging or consulting the indigenous people. Unfortunately, English is the *lingua franca* language in technology and tourism. However, in many global South countries, English is not their main language, thus, VR technology excludes many of these countries. It could therefore be argued that it discriminates against them. Due to these drawbacks, these countries will lose tourists, revenue and not benefit from tourism.

As VR has progressed, these vital questions have emerged regarding VR as a substitute for conventional tourism and redefining the definition of tourism. This debate regarding VR as a substitute for conventional tourism is one of the most written about and debated topics among scholars. Some scholars argue against VR as a substitute for conventional tourism because they believe that it does not offer tourists the “authentic tourist experience”. In essence, this is because VR is not able to simulate all of the five senses. While other scholars disagree and state that tourists are content with artificial attractions/destinations as indicated by their popularity. However, several scholars agree that VR will not substitute conventional tourism, but rather supplement it. This has also led to some scholars concluding that that VR will redefine the concept of tourism.

Chapter 6: Virtual reality tourism and South Africa

6.1 Introduction

The aim of this Chapter is to consider VR and its role in the tourism industry in South Africa. It is divided into three sections. The first section presents the tourism industry and focuses on VR by discussing its origins and what technology exists in tourism in South Africa. The second section addresses the three possible reasons why tourism is declining in South Africa, including aspects such as crime, political instability and health issues. The third section focuses on the benefits and drawbacks of VR in tourism within a South African context, which has relevance for other global South countries.

6.2 Tourism in South Africa

From a tourism perspective, South Africa has been described as "a world in one country" [846] and according to the UNWTO, is considered one of the leading tourist destinations in Africa.[847] However, this was not always the case. Tourists were for the most part discouraged to visit South Africa before 1994 due to political issues.[848] The number of tourists that visited South Africa prior to this date was between 250 000 and 500 000 per annum.[849] The reason tourists did not want to travel to South Africa was due to factors such as discriminatory policies pursued by the former Apartheid government, outbreaks of violence and political struggle events (e.g., the 1960

[846] M. Brett *et al*., *Eyewitness Travel: South Africa*, p. 10.
[847] G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, pp. 18-19; S. Lock, 2019, <https://www.statista.com/statistics/300683/number-of-tourists-in-south-africa/>, access: 24 February 2020; A. Saayman & M. Saayman, 'Forecasting tourist arrivals in South Africa', *Acta Commercii* 10(1), 2010, p. 281; N. Krige, 2019, <https://www.thesouthafrican.com/travel/tourism-in-south-africa-on-the-decline-2019/>, access: 19 February 2020; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314; J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 91; S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 80.
[848] J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 91; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314.
[849] G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, p. 18.

Sharpeville massacre; 1976 Soweto uprising).[850] These factors led to South Africa being ostracised and "black-listed", which impacted negatively on the tourism industry in the country.[851]

After the establishment of a democratic dispensation in 1994, tourist arrivals increased by 18.6% compared to previous years.[852] Since then, South Africa has been listed in the top 40 tourism destinations worldwide.[853] It was considered a "safe-haven" destination following the terrorist attack of 9/11 and political turmoil in other parts of the world.[854] Moreover, South Africa was regarded as a "bargain" destination because of the relative weakness of its currency (Rand) against strong international currencies (i.e., the American Dollar, the British Pound and the European Euro) and, therefore, despite being a long-haul destination, it was seen as value for money. This of course was enhanced by the wide range of natural and cultural attractions the country offers.[855]

The two key tourist market segments that travel to South Africa are tourists from neighbouring countries and international tourists. Tourists from the five neighbouring countries, mentioned in Chapter 1, account for the majority of tourist numbers in South Africa. They mainly visit the country to conduct business, to shop at border towns and to visit family and friends.[856] The international tourist market is mainly from the UK, Europe (i.e., Germany, Netherlands and France), the USA and Asia. These international tourists visit South Africa primarily for leisure purposes.[857]

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[850] On 16 June 1976, African children protested because Afrikaans was the main language in schools. J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 91.
[851] J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, pp. 91-92; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314.
[852] G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, p. 19.
[853] M. Saayman & A. Saayman, 'International and African tourism markets for South Africa: an economic analysis', *Africa Insigh*t 33(1), 2004, p. 93.
[854] A. Saayman & M. Saayman, 'Forecasting tourist arrivals in South Africa', *Acta Commercii* 10(1), 2010, p. 281; G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, p. 11.
[855] G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, p. 11.
[856] G. Visser, 'The geography of tourism', *in* R. George (ed.), *Managing tourism in South Africa*, p. 44; A. Saayman & M. Saayman, 'Forecasting tourist arrivals in South Africa', *Acta Commercii* 10(1), 2010, p. 282; M. Saayman & A. Saayman, 'International and African tourism markets for South Africa: an economic analysis', *Africa Insight* 33(1), 2004, pp. 96-97.
[857] G. Visser, 'The geography of tourism', *in* R. George (ed.), *Managing tourism in South Africa*, p. 44; S. Lock, 2019, <https://www.statista.com/statistics/300683/number-of-tourists-in-south-africa/>, access: 24 February 2020; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314; Statistics South Africa, 2017, <http://www.statssa.gov.za/?p=10637>, access: 24 February 2020; M. Saayman & A. Saayman, 'International and African tourism markets for South Africa: an economic analysis', *Africa Insight* 33(1), 2004, p. 96.

According to the WTTC, South Africa has one of the largest economies in Africa.[858] The reason for this is because tourism contributes much to South Africa's economy. In 2012, tourism contributed US$8.35 billion and in 2018, tourism generated ZAR R425.8 billion to the economy.[859] Thus, the tourism contribution has surpassed even the gold and mining industries in terms of the GDP.[860]

South Africa attracts approximately 0.2% of the world's tourist population.[861] According to Statistics South Africa, in 2019, there were 4 657 450 tourists in South Africa and S. Lock predicted that by 2023 South Africa could attract 19.6 million tourists.[862] However, statistics show that tourist numbers are decreasing even prior to the COVID-19 pandemic. For example, tourist numbers have decreased by 50.7% from 2006 to 2019.[863] This number fell even more in 2020 to 3 091 233 due to factors, such as the COVID-19 pandemic and the emergence of a mutated corona virus discovered in South Africa.[864]

6.3 VR and South Africa

VR is not a new phenomenon in South Africa. According to B. Louw, Chief Executive Officer of VR Events, it is believed that VR also emerged in South Africa during the 1990s. This was when Edward Stanley, owner of Platypus Digital & OGLE Digital Media, and Gerald Ferreira, founder of the Virtual Reality Company, experimented with the idea of VR.[865] However, VR only appears to have been formally established in 2018 with the release of Oculus Quest.[866]

The fact that VR is prevalent in the tourism industry in South Africa is evident in the numerous destinations that already offered tourists virtual tours before COVID-19. For example, in 2009, Johan Gore, a South African photographer, took images of the exhibition at the Sterkfontein Caves

[858] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 320.
[859] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 320; W.P. Perry & B.M. Richard, 'South Africa', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 883.
[860] T.F. Breedt, 'The need for disabled friendly accommodation in South Africa', (Honours dissertation, North-West University, 2007), p. 11.
[861] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 314.
[862] Department: Statistics South Africa, Statistical Release P0351, Tourism and Migration, December 2019, p. 4.
[863] Department: Statistics South Africa, Report No. 03-51-02, Tourism, 2020, p. 3; S. Lock, 2019, <https://www.statista.com/statistics/300683/number-of-tourists-in-south-africa/>, access 24 February 2020.
[864] Department: Statistics South Africa, Statistical Release P0351, Tourism and Migration, December 2019, p. 4.
[865] B. Louw (Chief Executive Officer, VR Events), interview with author, 6 August 2021.
[866] B. Louw (Chief Executive Officer, VR Events), interview with author, 6 August 2021.

and the statue of Dr Robert Broom as part of the 360° South Africa Virtual Tour Photography. This gives tourists the ability to navigate and view certain areas of the destination in more detail.[867] In 2015, South African Tourism, the national tourism agency, utilised VR to market the country in the UK to encourage potential tourists. Tourists had the opportunity to "participate" in various activities that included shark cage diving, kite surfing, paragliding, feeding elephants and relaxing.[868] In 2018, Professor Lee Berger, the famous paleoanthropologist from the University of the Witwatersrand (in Johannesburg), and Perot Museum of Nature and Science (in Texas) revealed the Perot Museum Virtual Reality Dinaledi Experience App. This allowed tourists to visit the Dinaledi Chamber at the Cradle of Humankind World Heritage Site, where the bones of *Homo Naledi* were discovered, because tourists do not have physical access to the actual site as the cave opening is only 18cm.[869]

Moreover, in 2017, Flow Communications in collaboration with Constitution Hill, a former military fort and political prison, released the Constitution Hill Guide, one of the first Bluetooth-enabled apps used at a heritage site in South Africa. This allows tourists to explore the site outside of operational hours. The app uses imported Bluetooth-enabled beacons and the user's GPS to "tell a visitor's smartphone exactly where he or she is in the complex".[870] In the same year, the

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[867] B. Bothma, 2011, <https://www.maropeng.co.za/news/entry/360_views_of_sterkfontein_caves>, access: 22 March 2021; Maropeng, 2013a, <https://www.maropeng.co.za/news/entry/exploring-maropeng-in-360-degrees-archaeologists-entrance-to-sterkfontein-c>, access: 24 March 2021;
360cities, n.d.(a), <https://www.360cities.net/image/sterkfontein-caves-live-dig>, access: 24 March 2021;
Maropeng, 2013b, <https://www.maropeng.co.za/news/entry/exploring-maropeng-in-360-degrees-sterkfontein-caves-statue>, access: 24 March 2021;
360cities, n.d.(b), <https://www.360cities.net/image/sterkfontein-cave-statue>, access: 24 March 2021;
Maropeng, 2013c, <https://www.maropeng.co.za/news/entry/exploring-maropeng-in-360-degrees-sterkfontein-caves-exhibition>, access: 24 March 2021;
360cities, n.d.(c), <https://www.360cities.net/image/sterkfontein-caves-exhibition>, access: 24 March 2021.
[868] C. Dietz, 2015, <https://www.campaignlive.co.uk/article/south-african-tourism-launches-virtual-holiday-experience-oculus-rift/1340767>, access: 20 April 2021.
[869] Anon., 'Homo naledi was written in stars', *Cape Argus*, 11 September, 2015, p. 1.; N.K. Mutizwa, 2019, <https://www.africanews.com/2019/02/14/exploring-south-africa-through-virtual-reality-travel//>, access: 28 April 2020;
L. Wagner, 2018, <https://select.timeslive.co.za/news/2018-10-24-want-to-hold-a-fossil-all-you-need-is-a-phone/>, access: 30 April 2020;
T. Buthelezi, 2018, <https://www.maropeng.co.za/news/entry/explore-the-dinaledi-chamber-in-virtual-reality>, access: 6 May 2020; CGTN, 2019, <https://news.cgtn.com/news/7741544e31494464776c6d636a4e6e62684a4856/share_p.html>, access: 24 March 2021;
The University of Witwatersrand, 2018, <https://www.wits.ac.za/news/sources/science-news/2018/wits-and-perot-museum-launch-virtual-reality-app-of-dinaledi-cave.html>, access: 24 March 2021.
[870] News24, 2017, <https://www.news24.com/news24/travel/constitutional-hill-launches-sas-first-bluetooth-enabled-tourism-app-20170622>, access: 12 April 2021;

University of Witwatersrand's Origin Centre, which showcases the history of early humans in Africa, launched a VR experience on the history of humankind. The VR production was a partnership between Steven Sack, the director of the Origins Centre, and Barry Dwolatzky, the director of Tshimologong, and was facilitated by the Rock Art Research Institute, the Evolutionary Sciences Institute and the South African Rock Art Digital Archive. Tourists have the opportunity to partake in a virtual journey through time from the early hominin fossils to the spiritual world of the San.[871]

Another place that tourists can visit virtually is Ushaka Marine World in Durban. The Virtual Reality Company developed 360° tours of the Zulu dance, a dolphin show, a water slide and the dangerous creatures exhibition.[872] Furthermore, tourists can also visit wineries, such as Groot Constantia in Cape Town, one of the oldest wineries in the South Africa. It offers tourists a VR tour of its most famous Manor House, Cloete Cellar, the courtyard and vineyards.[873]

As mentioned in Chapter 4, another VR platform that enables tourists to view a destination virtually is through Street View. For example, since 2015, Robben Island offers tourists a VR tourist experience. The tour, which aimed to commemorate the twenty-first anniversary of South Africa's first democratic elections, allows tourists to virtually visit the island and the prison of the famous Nelson Mandela, a former president of South Africa.[874] In 2016, the South African National Parks collaborated with Google Maps to launch the "Mzansi Experience". Through this, tourists can partake in virtual tours of some of the natural attractions of South Africa, such as the Kruger National Park, Table Mountain, Lions Head and the West Coast National Park.[875] In the following year, South African Tourism and Google partnered as part of a Street View Camera

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Constitutionhill, 2017, <https://www.constitutionhill.org.za/press-releases/constitution-hill-just-made-navigating-sas-history-a-lot-easier>, access: 12 April 2021.

[871] South African Cultural Observatory, 2017, <https://www.southafricanculturalobservatory.org.za/article/origins-centre-to-launch-new-virtual-reality-experience-on-what-makes-us-human>, access: 14 April 2021.

[872] G. Ferreira, 2016, <https://mixed-reality.co.za/ushaka-marine-world-durban-virtual-reality-360-video/>, access: 24 March 2021.

[873] Groot Constantia, 2019, <https://grootconstantia.co.za/explore-groot-constantia-with-this-nifty-360-virtual-tour/>, access: 24 March 2021.

[874] M. Simpson, 2020, <https://www.thesouthafrican.com/travel/virtual-travel-experiences-to-help-satisfy-your-wanderlust-during-lockdown/>, access: 28 April 2020; Brand South Africa, 2015, <https://www.brandsouthafrica.com/tourism-south-africa/travel/robben-island-google-tour-240415>, access: 22 March 2021.

[875] S. Mzantsi, 2016, <https://www.iol.co.za/travel-tips/the-mzansi-experience-thanks-to-google-maps-1995331>, access: 15 February 2018; I. Phaahla, (Communications and Marketing, Kruger National Park), email message to author, 7 May 2021.

Loan project to create a collection of 360° images of the wildest areas in South Africa.[876] There has thus been a fair amount of VR in the tourism sector, although it remains relatively limited.

6.4 Crime and South Africa

This next section discusses the three possible key reasons for the decline in tourism in South Africa, namely crime, political instability and health issues. These are all issues that make the viability, if not necessity, of VR more relevant.

Crime against tourists is not a new phenomenon as they have been targeted by criminals since Biblical times (see Genesis 19 and beyond).[877] In addition, crime against tourists is difficult to define, due to the fact that agencies define tourism crimes differently.[878] Another reason is that tourism never occurs in one specific zone or place. It is sometimes difficult to determine whether something is a tourism crime or a crime committed in a tourism area.[879] Moreover, each country has its own definition of what is considered a crime. What is illegal in one country is not necessarily an issue in another. For example, a brothel in the UK is regarded as illegal, while it is legal in the USA and Australia.[880] Each person also has a different understanding of what a criminal is and people might not consider their actions as a crime, although it is a transgression according to law.[881]

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[876] T.L. Louw, 2018, <https://www.huffingtonpost.co.za/tatum-lee-louw/google-street-view-goes-wild-in-south-africa_a_23267667/>, access: 3 November 2018; The Newspaper, 2017, <https://www.thenewspaper.co.za/national-parks-now-google-street-view>, access: 14 February 2018.

[877] R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 576; G. Nkosi, 'The impact of crime on tourism in the city of uMhlathuze, KwaZulu-Natal', *South Asian Journal of Tourism and Heritage* 3(2), 2010, p. 77; J. Holcomb & A. Pizam, 'Do incidents of theft at tourist destinations have a negative effect on tourists' decisions to travel to affected destinations?', *in* Y. Mansfield & A. Pizam (eds.), *Tourism security and safety: from theory to practice*, p. 107.

[878] P.E. Tarlow, 'Crime and Tourism', *in* J. Wilks *et al*. (eds.), *Tourism in turbulent times: towards safe experiences for visitors*, p. 94; K. Moore & T. Berno, 'Relationships between crime and tourism', *Visions in Leisure and Business* 14(3), 1995, p. 6.

[879] P.E. Tarlow, 'Crime and Tourism', *in* J. Wilks *et al*. (eds.), *Tourism in turbulent times: towards safe experiences for visitors*, p. 94.

[880] C. Ryan, 'Crime, violence, terrorism and tourism: an accidental or intrinsic relationship?', *Tourism Management* 14(3), 1993, p. 174; P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 38.

[881] K. Moore & T. Berno, 'Relationships between crime and tourism', *Visions in Leisure and Business* 14(3), 1995, p. 6.

Crime against tourists has affected numerous destinations across the world.[882] South Africa in particular has a reputation for being unsafe and a high-risk country among international tourists.[883] As a matter of fact, South Africa is known as the "crime capital of the world".[884] The "big six" crimes of South Africa are public violence; rape; murder; aggravated assault; burglary and robbery; and vehicle theft.[885] Crime statistics show that South Africa has the highest rate of recorded murder, robbery and violent theft compared to other countries.[886] South African cities with the largest concentrations of serious crimes are Johannesburg (Gauteng province), Durban (KwaZulu-Natal province) and Cape Town (Western Cape province).[887] There are a multitude of reported examples in the media where tourists are the victims of crime in South Africa. For instance, in the year 2000, a couple from the USA was highjacked and their possessions were stolen at the Kruger National Park; in 2019 a Ukrainian tourist was assaulted and killed at Chapman's Peak near Cape Town; also in 2019, a group of Japanese tourists were attacked at the African Pride Irene Country Lodge in Pretoria; and study abroad students from an USA university were robbed at gunpoint on their way to a school in a township near Pretoria.[888]

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[882] R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 577; G. Allen & F. Brennan, *Tourism in the new South Africa: social responsibility and the tourist experience*, p. 155.

[883] S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 80; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 354; R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 575.

[884] R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 576.

[885] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 315; S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 80.

[886] R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, pp. 575-576.

[887] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 315; S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 83; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 363.

[888] T.G. Ntuli & P.J. Potgieter, 'Exploring the impact of crime on tourism in St. Lucia', *Acta Criminologica* 14(1), 2001, p. 61; S.S. Yende, 2019, <https://city-press.news24.com/Business/protests-and-crime-are-driving-away-tourists-20190820>, access: 24 February 2020; L.I.S. Sang, 2019, <https://www.foxnews.com/world/florida-university-students-faculty-robbed-at-gunpoint-during-school-trip-to-south-africa>, access: 19 May 2020.

Some of the reasons for the high crime rate include poverty, the decline in effective law enforcement and the rejection of the police force by large sectors of the population.[889] Reasons for crime against tourists is that they are usually easy targets: they are easily identifiable because they often dress differently, carry identifiable objects, and have large amounts of money and items of wealth. They are also often relaxed and off-guard and unaware of the dangerous areas or local situations, they are ill-equipped to ward off an attack and are less likely to press charges should the criminal be caught.[890] The latter situation is compounded by the fact that their stay is of limited duration, they are transient and they are therefore not able to press charges and see them resolved.

Crime against tourists has an extremely negative influence on tourism as a whole,[891] as it makes tourists afraid to travel to a specific destination.[892] These crimes against tourists are often featured in the media and tourists themselves inform friends and family spreading this negative awareness through word of mouth.[893] As a result, South Africa has received much negative publicity as an international tourist destination and is often listed as a dangerous or unsafe destination.[894] The reason is that the information obtained from the media affects tourists' travel decisions and this has a negative effect on the destination's image.[895] If a destination has a high crime rate, tourists

[889] S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 315; J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 93.
[890] J. Holcomb & A. Pizam, 'Do incidents of theft at tourist destinations have a negative effect on tourists' decisions to travel to affected destinations?', *in* Y. Mansfield & A. Pizam (eds.), *Tourism security and safety: from theory to practice*, pp. 108-109; C.R. Goeldner & J.R.B Ritchie, *Tourism: principles, practices, philosophies*, p. 240; J. Fletcher *et al*., *Tourism: principles and practice*, p. 207.
[891] P.E. Tarlow, Tourism security: strategies for effectively managing travel risk and safety, p. 38; A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 23.
[892] A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 24.
[893] G.S. Nkosi, 'The impact of crime on tourism in the city of uMhlathuze, KwaZulu-Natal', *South Asian Journal of Tourism and Heritage* 3(2), 2010, p. 77.
[894] J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 97.
[895] J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 97; J. Holcomb & A. Pizam, 'Do incidents of theft at tourist destinations have a negative effect on tourists' decisions to travel to affected destinations?', *in* Y. Mansfield. & A. Pizam (eds.), *Tourism security and safety: from theory to practice*, p. 109.

will feel unsafe and will tend to avoid the destination if their well-being might be in jeopardy.[896] As a result, the number of tourists declines.[897]

According to the Annual Personal Safety Survey, many countries have lost international tourists due to negative media coverage of acts of violent crimes against tourists.[898] For example, in Florida tourist numbers declined by 22% after attacks on British and German tourists in 1992.[899] Crime specialist, J. Bloom states that if tourist numbers decline to 2.5% and 15%, this could lead to an income loss of between US$ 6,9 million and US$42 million.[900] In a South African context, if one tourist is killed, it is estimated 200 tourists will not want to visit the country. This will result in a loss of ZAR R 3,5 million.[901] The point is that if tourists avoid a destination, tourism companies as well as the local community at large suffer as they rely on the revenue obtained from the tourism industry.[902] Unfortunately, it is difficult and expensive to change this perception and equally difficult to recover from it.[903]

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[896] P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 36; R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 577; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 355; J. Holcomb & A. Pizam, 'Do incidents of theft at tourist destinations have a negative effect on tourists' decisions to travel to affected destinations?', *in* Y. Mansfield. & A. Pizam (eds.), *Tourism security and safety: from theory to practice*, p. 106.

[897] G.S. Nkosi, 'The impact of crime on tourism in the city of uMhlathuze, KwaZulu-Natal', *South Asian Journal of Tourism and Heritage* 3(2), 2010, p. 77; K. Moore & T. Berno, 'Relationships between crime and tourism', *Visions in Leisure and Business* 14(3), 1995, p. 5; R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, p. 577; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 355.

[898] A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 23; J. Holcomb & A. Pizam, 'Do incidents of theft at tourist destinations have a negative effect on tourists' decisions to travel to affected destinations?', *in* Y. Mansfield. & A. Pizam (eds.), *Tourism security and safety: from theory to practice*, p. 109; J. Fletcher *et al*., *Tourism: principles and practice*, p. 207; S.L.A. Ferreira, 'Crime: a threat to tourism in South Africa', *Tourism Geographies* 1(3), 1999, p. 320.

[899] P Brunt *et al*., 'Tourist victimisation and the fear of crime on holiday', *Tourism Management* 21(4), 2000, p. 421.

[900] J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 96.

[901] S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 84; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 366.

[902] K. Moore & T. Berno, 'Relationships between crime and tourism', *Visions in Leisure and Business* 14(3), 1995, p. 10; J. Bloom, 'A South African perspective of the effects of crime and violence on the tourism industry', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 95.

[903] S.L.A. Ferreira & A.C. Harmse, 'Crime and tourism in South Africa: international tourists perception and risk', *South African Geographical Journal* 82(2), 2000, p. 81.

6.5 Political instability in South Africa

Politics and tourism have a close and uneasy relationship.[904] Tourism is sensitive to any political instability.[905] According to C.M. Hall and V. O'Sullivan, the concept "political instability" is "a situation in which conditions and mechanisms of governance and rule are challenged as their political legitimacy by elements operating from outside of the normal operations of the political system".[906] For D. Ferreira and S. Perks, "political instability" refers to "concerns relating to government unity, consistent and predictable government actions, corruption, current president (presidency), legislative strength, and stability of democracy".[907] Thus, based on these definitions, political instability refers to the political power of a country that is unstable. Political instability includes wars, coups, terrorism, riots, political and social unrest, corruption and protests.[908]

South Africa is considered a politically unstable country essentially because of violent protests (for example in the more recent past, the Marikana massacre in 2012 and the #Feesmustfall student protests in 2015/2016)[909] and xenophobic attacks (in 2008 and 2015)[910] and the recent looting and

[904] J.C. Henderson, *Tourism crises: causes, consequences and management*, pp. 34, 45.
[905] H.R. Seddighi *et al*., 'Political nstability and tourism', *International Journal of Hospitality & Tourism Administration* 3(1), pp. 62, 77; C.M. Hall & V. O'Sullivan, 'Tourism, political stability and violence', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 110.
[906] C.M. Hall & V. O'Sullivan, 'Tourism, political stability and violence', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 106.
[907] D. Ferreira & S. Perks, 'The influence of the political climate on South Africa's tourism industry' (paper presented at the International Sustainable Development Business Economics Finance Marketing Tourism Transport Technology Social Sciences Humanities and Education Research Conference, London, UK, 2016), p. 5.
[908] C.M. Hall & V. O'Sullivan, 'Tourism, political stability and violence', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 108; J.C. Henderson, *Tourism crises: causes, consequences and management*, p. 36.
[909] For further information on these protests see: T. Bosh, 'Social media and protest movements in South Africa: #FeesMustFall and #ZumaMustFall', *in* M. Dwyer & T. Molony (eds.), *Social media and politics in Africa: democracy, censorship and security*, pp. 68, 74; S. Adelman, 'The Marikana massacre, the rule of law and South Africa's violent democracy', *Hague Journal on the Rule of Law* 7(2), 2015, p. 247; D. Ferreira & S. Perks, 'The influence of the political climate on South Africa's tourism industry' (paper presented at the International Sustainable Development Business Economics Finance Marketing Tourism Transport Technology Social Sciences Humanities and Education Research Conference, London, UK, 2016), pp. 9, 73; South African History Online, n.d., <https://www.sahistory.org.za/article/marikana-massacre-16-august-2012>, access: 7 April 2021; E. Naidu, 'Lifting the lid on #Feesmustfall', *Sunday independent*, 25 August, 2019, p. 8; Anon., 'A timeline of #FeesMustFall protest action', *The New Age*, 4 January, 2016, p. 4.
[910] For further information on these xenophobia attacks see: D. Ferreira & S. Perks, 'The influence of the political climate on South Africa's tourism industry' (paper presented at the International sustainable Development Business Economics Finance Marketing Tourism Transport Technology Social Sciences Humanities and Education Research Conference, London, UK, 2016), p. 8; Anon., 'SA has a history of xenophobic attacks', *Weekend Witness*, 13 April, 2019, p. 9; B. Malngo, 'Xenophobia report is released today', *The New Age*, 30 September, 2016, p. 2; Century Welfare Association, 2015, <https://www.centuryassociation.org/assad-bhuglah-toc/2583-impact-of-xenophobic-attacks-on-south-african-tourism>, access: 3 April 2020.

destruction of shopping malls in 2021.[911] The tourism industry always pays the price when a country experiences political unrest as it leads to a decline in tourist numbers. In the case of South Africa, this is evident as especially tourists from Africa, the country's largest market, decline.[912] This is problematic for South Africa as tourists from Africa provide ZAR R4 billion each year in tourism revenue.[913] Unfortunately, increasingly images of violence and political lawlessness shape the image tourists have of the destination.[914] The internet has enabled tourists to view images of violent protests and xenophobic attacks from any location.[915] This is a huge drawback as images of gangs attacking foreigners or the police shootings, scare potential tourists and make it difficult to market South Africa as a tourist destination.[916] The reason is that tourists prefer destinations that have few perceived threats to their safety and security. Thus, tourists might eliminate destinations associated with images of political turmoil.[917] To compound matters, many countries issue travel warnings to their citizens to avoid travelling to South Africa. For example, Germany warned its citizens not to travel to townships after a mob killed 42 African immigrants [918] Another drawback is that foreign investors will not invest in a country that is politically unstable. This is an issue for

[911] For further information on the looting see: G. Lamb, 2021, <https://theconversation.com/why-have-south-africans-been-on-a-looting-rampage-research-offers-insights-164571>, access: 19 July 2021.
[912] S.F. Sönmez, 'Tourism, terrorism, and political instability', *Annals of Tourism Research* 25(2), 1998, pp. 436-437; R. George, *Marketing tourism in South Africa*, p. 96; D. Ferreira & S. Perks, 'The role of democratic peace and diplomatic governance in increasing South Africa's tourism demand' (paper presented at the Proceedings of Annual South African Business Research Conference, Taj Hotel, Cape Town, South Africa, 4 - 5 May 2017), p. 4; J.C. Henderson, *Tourism crises: causes, consequences and management*, p. 41; H. Preuss, 'Xenophobia and strong rand slow tourism growth', *Daily News*, 27 February, 2018, p. 4.
[913] M. Madlala, 'Tourists 'will fear becoming victims'', *Daily News*, 28 May, 2008, p. 2.
[914] S.F. Sönmez, 'Tourism, terrorism, and political instability', *Annals of Tourism Research* 25(2), 1998, p. 437; H.R. Seddighi *et al*., 'Political instability and tourism', *International Journal of Hospitality & Tourism Administration* 3(1), p. 63; D. Ferreira & S. Perks, 'The influence of the political climate on South Africa's tourism industry' (paper presented at the International Sustainable Development Business Economics Finance Marketing Tourism Transport Technology Social Sciences Humanities And Education Research Conference, London, UK, 2016), p. 5.
[915] C.M. Hall & V. O'Sullivan, 'Tourism, political stability and violence', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 107; J.C. Henderson, *Tourism crises: causes, consequences and management*, p. 42.
[916]
South African History Online, n.d., <https://www.sahistory.org.za/article/marikana-massacre-16-august-2012>, access: 7 April 2021; Century Welfare Association, 2015, <https://www.centuryassociation.org/assad-bhuglah-toc/2583-impact-of-xenophobic-attacks-on-south-african-tourism>, access: 3 April 2020.
[917] S.F. Sönmez, 'Tourism, terrorism, and political instability', *Annals of Tourism Research* 25(2), 1998, p. 438; J.C. Henderson, *Tourism crises: causes, consequences and management*, p. 36.
[918] Anon., 'Xenophobic terror casts shadow on tourism', *Star*, 23 March, 2008, p. 6.

countries that rely on foreign exchange and funds needed for the maintenance of their infrastructure and economic development of tourism.[919] South Africa is again a case in point.

6.6 Health issues in South Africa

South African tourism has faced, and in some cases still experiences, diseases, such as human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), tuberculosis (TB), malaria and cholera. South Africa is considered the epicentre for sexually transmitted diseases, such as HIV/AIDS.[920] As a matter of fact, the country is rated as having the largest number of people living with HIV/AIDS. In 1982, the first case of HIV was reported in South Africa after the death of two stewards, and it is estimated that four decades later approximately 7.2 million people have HIV/AIDS.[921] AIDS cannot be cured, except for antiretroviral drugs that check the proliferation of HIV.[922] HIV/AIDS is a huge health concern for the tourism industry in South Africa as it discourages tourism growth. HIV/AIDS damages the image international tourists have of South Africa.[923] Moreover, thre is also an economic dimension to this as well as tourism depends on a high degree of employees, as indicated.[924] Unfortunately, HIV/AIDS targets the workforce. This is because employees are unable to work effectively when they are ill, which results in absenteeism. Furthermore, if an employee dies of HIV/AIDS, the company has to recruit and train a new person, which is both time consuming and expensive.[925]

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[919] D. Ferreira & S. Perks, 'The influence of the political climate on South Africa's tourism industry' (paper presented at the International Sustainable Development Business Economics Finance Marketing Tourism Transport Technology Social Sciences Humanities and Education Research Conference, London, UK, 2016), p. 9; D. Ferreira & S. Perks, 'The role of democratic peace and diplomatic governance in increasing South Africa's tourism demand' (paper presented at the Proceedings of Annual South African Business Research Conference, Taj Hotel, Cape Town, South Africa, 4 - 5 May 2017), p. 4; South African Government, 2021, <https://www.gov.za/about-sa/history#>, access: 31 March 2021; C.M. Hall & V. O'Sullivan, 'Tourism, political stability and violence', *in* A. Pizam & Y. Mansfeld (eds.), *Tourism, crime and international security issues*, p. 118.

[920] S. Waner, 'Health risks of travelers in South Africa', *Journal of Travel Medicine* 6(3), 1999, p. 203.

[921] S. Satoh & E. Boyer, 'HIV in South Africa', *The Lancet* 394(10197), 10 August, 2019, p. 467; H. Phillips, *Epidemics: the story of South Africa's five most lethal human diseases*, p. 114; S.S.A. Karim & Q.A. Karim, 'Introduction', *in* S.S.A. Karim & Q.A. Karim (eds.), *HIV/AIDS in South Africa*, p. 37; S. Satoh & E. Boyer, 'HIV in South Africa', *The Lancet* 394(10197), 10 August, 2019, p. 467.

[922] World Health Organisation, 2020a, <https://www.who.int/news-room/fact-sheets/detail/hiv-aids>, access: 17 March 2021; H. Phillips, *Epidemics: the story of South Africa's five most lethal human diseases*, pp. 113-114.

[923] R. George, *Marketing tourism in South Africa*, p. 666.

[924] H. Siiskonen, 'The responses of the southern African tourism sector in combating HIV/AIDS', *in* P. Hottola (ed.), *Tourism strategies and local responses in Southern Africa*, p. 128.

[925] D. Dickinson, 'Managing HIV/AIDS in the South African workplace: just another duty?', *South African Journal of Economic and Management Sciences* 6(1), 2003, p. 27.

Another health concern is TB as South Africa has the fifth-highest number of reported cases.[926] TB is caused by a pathogenic bacterium (*Mycobacterium tuberculosis*), which affects the lungs.[927] Common symptoms of TB include a cough with sputum and blood, chest pains, fever and night sweats. Fortunately, TB is curable as it responds to most antibiotics.[928] As in the case with HIV/AIDS, TB also has an effect on the tourism industry. Similar to HIV/AIDS, TB also impacts the workforce as employees are vulnerable to TB, which leads to reduced productivity, absenteeism, and the recruitment and training of new employees.[929]

Another great health concern for South Africa is malaria, especially in the Mpumalanga, Limpopo and KwaZulu-Natal provinces.[930] Generally, female mosquitos of the genus Anopheles (i.e., *Anopheles arabiensis and Anopheles merus*) carry a parasite (*Plasmodium falciparum*) that causes malaria. Symptoms of malaria include flu-like symptoms, namely shaking, chills, headache, muscle aches and tiredness.[931] In 2000, there were 42,395 reported cases of malaria, the highest number of cases reported in 50 years.[932] In terms of tourism, tourists avoid areas where malaria is prevalent for fear of contracting the disease or because they have to take anti-malarial medication both before and after travel.[933] According to a study conducted by the Medical Research Council,

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[926] G.J. Churchyard *et al*., 'Tuberculosis control in South Africa: successes, challenges and recommendations', *South African Medical Journal* 104(1), p. 244; Donald Gorden Medical Centre, 2021, <http://www.dgmc.co.za/tuberculosis-in-south-africa>, access: 18 March 2021; S. Waner, 'Health risks of travelers in South Africa', *Journal of Travel Medicine* 6(3), 1999, p. 203.

[927] World Health Organisation, 2020b, <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>, access: 18 March 2021; Donald Gorden Medical Centre, 2021, <http://www.dgmc.co.za/tuberculosis-in-south-africa>, access: 18 March 2021; C. Dye *et al*., 'Tuberculosis', *in* D.T. Jamison *et al*. (eds.), *Disease and mortality in Sub-Saharan Africa*, p. 180; C.A. Dyer, *Tuberculosis*, p. 2.

[928] World Health Organisation, 2020b, <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>, access: 18 March 2021; Donald Gorden Medical Centre, 2021, <http://www.dgmc.co.za/tuberculosis-in-south-africa>, access: 18 March 2021; C. Dye *et al*., 'Tuberculosis', *in* D.T. Jamison *et al*. (eds.), *Disease and mortality in Sub-Saharan Africa*, p. 180; C.A. Dyer, *Tuberculosis*, p. 2.

[929] World Economic Forum, 'Protecting your workforce from tuberculosis: a toolkit for an integrated approach to TB', *World Economic Forum*, p. 5.

[930] S. Waner, 'Health risks of travelers in South Africa', *Journal of Travel Medicine* 6(3), 1999, p. 199; R. Maharaj *et al*., 'Epidemiology of malaria in South Africa: from control to elimination', *The South African Medical Journal* 103(10), 2013, p. 779.

[931] Centers for Disease Control and Prevention, 2021a, <https://www.cdc.gov/malaria/about/faqs.html#:~:text=Symptoms%20of%20malaria%20include%20fever,loss%20of%20red%20blood%20cells.>, access: 3 March 2021.

[932] F. Maartens *et al*., 'The impact of malaria control on perceptions of tourists and tourism operators concerning malaria prevalence in KwaZulu-Natal, 1999/2000 versus 2002/2003', *Journal of Travel Medicine* 14(2), 2007, p. 97.

[933] Anon., 'Curbing KZN malaria a 'tourism victory'', *Citizen*, 21 March, 2003, p. 10.

tourists fear contracting malaria more than crime in KwaZulu-Natal.[934] For example, during the 2002/2003 malaria season, the number of local tourists dropped to 51%.[935]

Lastly, another major health issue that is still a huge problem in this part of the world is cholera. Cholera is an acute and secretory diarrhoeal disease caused by the bacterium (*Vibrio cholerae*) and is obtained through contaminated water and food.[936] People with cholera may experience symptoms, such as stomach cramps, vomiting and diarrhoea.[937] In 1970, the seventh cholera pandemic reached Africa and spread to South Africa.[938] Between August 2000 to June 2001, KwaZulu-Natal recorded one of the worst cholera epidemics in South African history. It was estimated there were about 14 000 confirmed cases and 50 deaths.[939] Unfortunately, cholera remains a problem in South Africa as 80% of the poor population do not have access to clean running water.[940] Cholera is another drawback for the tourism industry as tourists are afraid of contracting cholera. A study conducted by the Limpopo Tourism and Parks Board supports this: between one and three bookings a day were cancelled due to an outbreak of cholera, which resulted in many establishments losing their income.[941]

In 2020, the world was hit by the novel COVID-19 disease, which is caused by the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2).[942] According to the World Health Organisation (WHO) some symptoms of COVID-19 are fever, dry cough, fatigue, loss of taste and smell, diarrhoea and headache.[943] On 31 December 2019, COVID-19 was first detected, in Wuhan,

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[934] S. Russouw, 'KZN mosquitoes scare off tourists', *This Day*, 28 May, 2004, p. 2.
[935] F. Maartens *et al*., 'The impact of malaria control on perceptions of tourists and tourism operators concerning malaria prevalence in KwaZulu-Natal, 1999/2000 versus 2002/2003', *Journal of Travel Medicine* 14(2), 2007, pp. 97, 100.
[936] B.A. Connor *et al*., 'Cholera in travellers: a systematic review', *Journal of Travel Medicine* 26(8), 2019, p. 1; World Health Organisation, 2020c, <https://www.who.int/news-room/fact-sheets/detail/cholera>, access: 23 March 2021.
[937] E. Madoroba, 'Cholera: current African perspectives', *in* E. Melbourne (ed.), *Cholera: symptoms, diagnosis and treatment*, p. 35.
[938] J. Deen *et al*., 'Epidemiology of cholera', *Vaccine* 38, 2020, p. 34.
[939] N. Moilwa & M. Wilkinson, 'Two approaches to rural sanitation delivery: case study of Kwa Zulu-Natal, South Africa' (Paper presented at 30th WEDC International Conference, Laos, 2004), p. 116; P. Sidley, 'Cholera sweeps through South African province', *British Medical Journal* 322(7278), 2001, p. 71.
[940] P. Sidley, 'Cholera sweeps through South African province', *British Medical Journal* 322(7278), 2001, p. 71.
[941] SowetanLive, 2008, <https://www.sowetanlive.co.za/news/2008-12-24-cholera-zaps-tourism/>, access: 8 May 2021.
[942] World Health Organisation, 2020d, <https://www.who..int/emergencies/diseases/novel-coronavirus-2019/technical-guidence/naming-the-coronavirus-disease-(covid-19)-and-the-virus-that-causes-it>, access: 23 April 2020.
[943] World Health Organisation, 2021, <https://www.who.int/health-topics/coronavirus#tab=tab_3>, access: 6 June 2021.

in China, and reported to the WHO Country Office.[944] On 30 January 2020, the WHO Emergency Committee declared COVID-19 a Public Health Emergency of International Concern after 98 confirmed cases were discovered outside of China. The WHO declared COVID-19 as a global pandemic on 11 March 2020.[945] Based on the latest statistics (October 2021) found on Worldometer, a website that provides live COVID-19 statistics, there are 246 534 248 confirmed cases; 5 000 112 deaths and 223 348 123 recoveries worldwide. Worldometer's statistics also show that COVID-19 has spread to 221 countries and territories worldwide.[946]

Unfortunately, COVID-19 has not spared South Africa.[947] On 5 March 2020, the first confirmed case of COVID-19 was reported in South Africa after a tourist returned from Italy.[948] On 18 December 2020, a new variant (501Y.V2) of the SARS-CoV-2 was discovered in South Africa by scientists from the KwaZulu-Natal Research Innovation and Sequencing Platform.[949] Based on the latest statistics (on 5 May 2021) obtained from the South African Resource Corona Virus Portal, there are currently 2 921 114 confirmed COVID-19 cases; 89 104 deaths, and 2 813 442 recoveries in South Africa.[950]

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[944] J. Cohen & D. Normile, 'New SARS-like virus in China triggers alarm', *Science* 367(6475), 2020, p. 234; T. Jamal & C. Budke, 'Tourism in a world with pandemics: local-global responsibility and action', *Journal of Tourism Futures* 6(2), 2020, p. 183; S. Gössling *et al*., 'Pandemics, tourism and global change: a rapid assessment of COVID-19', *Journal of Sustainable Tourism* 29(1), 2020, p. 1; A.F. Schiopu *et al*., 'Virus tinged? Exploring the facets of virtual reality use in tourism as a result of the COVID-19 pandemic', *Telematics and Informatics* 60(2), p. 2; G. Nhamo *et al*., *Counting the cost of COVID-19 on the global tourism industry*, p. 4.

[945] South African Tourism, n.d., <https://www.southafrica.net/gl/en/trade/page/coronavirus-covid-19-south-african-tourism-update>, access: 25 March 2020;T.P. Velavan & C.G. Meyer, 'The COVID-19 epidemic', *Tropical Medicine and International Health* 25(3), 2020, p. 1; J. Millán-Oñate *et al*., 'A new emerging zoonotic virus of concern: the 2019 novel Coronavirus', *Infectio* 24(3), 2020, pp. 52-53; T. Jamal & C. Budke, 'Tourism in a world with pandemics: local-global responsibility and action', *Journal of Tourism Futures* 6(2), 2020, p. 184; S. Stacey & G.A. Richards, 'Coronavirus epidemic: a South African perspective', *Wits Journal of Clinical Medicine* 2(1), 2020, p. 1; A.F. Schiopu *et al*., 'Virus tinged? Exploring the facets of virtual reality use in tourism as a result of the COVID-19 pandemic', *Telematics and Informatics* 60(2), 2021, p. 3; G. Nhamo *et al*., *Counting the cost of COVID-19 on the global tourism industry*, p. 4.

[946] Worldometer, 2021, <https://www.worldometers.info/coronavirus/>, access: 29 October 2021.

[947] N. Stiegler & J.P. Bouchard, 'South Africa: challenges and successes of COVID-19 lockdown', *Annales Médico-Psychologiques* 178(7), 2020, p. 696.

[948] Z. Mkhize, 2020, <https://www.nicd.ac.za/first-case-of-covid-19-coronavirus-reported-in-sa/>, access: 8 July 2020; C.M. Rogerson & J.M. Rogerson, 'COVID-19 tourism impacts in South Africa: government and industry responses', *Geo Journal of Tourism and Geosites* 31(3), 2020a, p. 1081; N. Stiegler & J.P. Bouchard, 'South Africa: challenges and successes of COVID-19 lockdown', *Annales Médico-Psychologiques* 178(7), 2020, p. 696; G. Nhamo, *et al*., *Counting the cost of COVID-19 on the global tourism industry*, p. 70.

[949] Anon., 'What we know about coronavirus variant in SA', *The Citizen*, 14 January, 2021, p. 6.

[950] SAcoronavirus, 2021, <https://sacoronavirus.co.za/2021/10/28/update-on-covid-19-thursday-28-october-2021/>, access: 29 October 2021.

The global tourism industry, and South Africa in particular, has faced numerous outbreaks of diseases, epidemics and pandemics in the past, such as malaria, HIV/AIDS, TB and cholera. However, none of these had such an impact on tourism as COVID-19. According to Mmamoloko Kubayi-Ngubane, the former Minister of Tourism in South Africa, COVID-19 "has undeniably been devastating for the tourism sector".[951] As a matter of fact, in the opinion of the UNWTO, tourism has been one of the most impacted industries affected by COVID-19.[952] Ironically, it was tourism that turned COVID-19 into a global pandemic as tourists are regarded as the carriers that are transmitting the virus from one country to another.[953]

There is currently no cure for COVID-19, but there are three authorised vaccines to prevent the virus, namely Pfizer-BioNTech, Moderna and Johnson and Johnson.[954] Despite the possible vaccines, many governments have closed their borders and imposed strict non-pharmaceutical interventions to try to minimise the spread of COVID-19, such as quarantine, lockdown, physical distancing, msk wearing, border control, travel restrictions and bans.[955] On 15 March 2020, Matamela Cyril Ramaphosa, the President of South Africa, declared a National State of Disaster based on the *Disaster Management Act*, 57 of 2002. During the same time, Ramaphosa established the National Command Council to coordinate all the aspects related to COVID-19 in South Africa.

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[951] The South African Government, 2020, <https://www.gov.za/speeches/minister-tourism-mmamoloko-kubayi-ngubane-coronavirus-covid-19-alert-level-2-tourism-sector>, access: 15 October 2020.

[952] UNWTO, 2020b, <https://www.unwto.org/tourism-covid-19>, access: 8 April 2020; C.M. Rogerson & J.M. Rogerson, 'COVID-19 and tourism spaces of vulnerability in South Africa', *African Journal of Hospitality, Tourism and Leisure* 9(4), 2020b, p. 383; UNWETO, 2020a, <https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism>, access: 5 October 2020; O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, p. 28.

[953] A. Wilder-Smith, 'Tourism and SARS', *in* J. Wilks *et al*. (eds.), *Tourism in turbulent times: towards safe experiences for visitors*, pp. 53, 55; A. Wilder-Smith, 'The severe acute respiratory syndrome: impact on travel and tourism', *Travel Medicine and Infectious Disease* 4(2), 2006, pp. 53, 55; M.E. Wilson, 'Travel and the emergence of infectious diseases', *Emerging Infectious Diseases* 1(2), 1995, pp. 39, 45; V.T.C. Middleton *et al*., *Marketing in travel and tourism*, p. 71.

[954] Centers for Disease Control and Prevention, 2021b, <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines.html>, access: 25 March 2021.

[955] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 1; A.F. Schiopu *et al*., 'Virus tinged? Exploring the facets of virtual reality use in tourism as a result of the COVID-19 pandemic', *Telematics and Informatics* 60(2), 2021, p. 3; O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, p. 27; S. Gössling *et al*., 'Pandemics, tourism and global change: a rapid assessment of COVID-19', *Journal of Sustainable Tourism* 29(1), 2020, p. 2; J. Millán-Oñate *et al*. 'A new emerging zoonotic virus of concern: the 2019 novel Coronavirus', *Infectio* 24(3), 2020, p. 53; World Health Organisation, 2020e, <https://www.who.int/health-topics/coronavirus>, access: 29 February 2020.

On 26 March 2020, he imposed a strict national lockdown, but has subsequently started to ease the lockdown by using a five-level COVID-19 alert system approved by the National Coronavirus Command Council.[956]

All over the world, the tourism sector has suffered significantly since governments implemented lockdowns, travel restrictions and bans. Based on a survey conducted in collaboration with the Department of Tourism, the Tourism Business Council of South Africa and the International Finance Corporation, 99% of the firms were impacted by COVID-19 as many stated that their revenues and occupancy capacity were down to 50% compared to 2019.[957] The Tourism Business Council of South Africa also estimates that the tourism industry loses approximately ZAR R748 million every single day during the national lockdown[958] since the industry is not considered an "essential service".[959]

This section discusses the impact of COVID-19 on the tourism industry in South Africa, namely the aviation industry, accommodation, the festival and event industry, the alcohol industry and small and medium-sized enterprises. The aviation industry in South Africa was majorly impacted by the pandemic. South African Airways (SAA), a state-owned flag carrier airline of South Africa, is in danger of collapsing due to COVID-19 and previous financial issues and mismanagement.[960] This is further compounded by the knock-on effect this has on the tourism industry. The reason is that some smaller airports in South Africa (i.e., the Kruger Mpumalanga International Airport, Skukuza Airport and Bisho Airport) and regions in the Southern African Development Community (i.e., Harry Mwanga Nkumbula International Airport (formally Livingstone International Airport) and Victoria Falls International Airport) will be crippled as a result of the impact if SAA ceases to exist.[961]

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[956] Times Live, 2020, <https://www.timeslive.co.za/politics/2020-04-23-five-level-plan-to-ease-sas-covid-19-lockdown-from-may-1-cyril-ramaphosa/>, access: 27 May 2020.
[957] Tourism Business Council of South Africa, Industry of South Africa Covid 19: Impact, Mitigation and the Future, Survey, April 2020, pp. 2-5.
[958] Tourism Business Council of South Africa, 2020, <https://tbcsa.travel/mass-retrenchments-looming-as-interprovincial-leisure-travel-remains-closed/>, access: 5 October 2020.
[959] C.M. Rogerson & J.M. Rogerson, 'COVID-19 tourism impacts in South Africa: government and industry responses', *Geo Journal of Tourism and Geosites* 31(3), 2020a, pp. 1081-1091.
[960] A. Chen & J. Munnik, 2020, <https://edition.cnn.com/travel/article/south-african-airlines-lockdown-flysafair-spc-intl/index.html>, access: 1 October 2020.
[961] G. Nhamo, *et al.*, *Counting the cost of COVID-19 on the global tourism industry*, p. 25.

Another blow to the aviation industry in South Africa is that many countries, such as Australia and the USA, are warning their citizens to "avoid travelling to South Africa" due to the new COVID-19 variant detected in South Africa.[962] As a result, the Board of Airline Representative of South Africa stated that less than half of the airlines that offered routes to South Africa before COVID-19 have resumed operations.[963]

Another industry to be affected by COVID-19 is the accommodation industry. According to the above-mentioned survey, the majority of accommodation firms stated that in March 2020, their occupation level and revenue were down by 50% in comparison with 2019. This is even more of an issue if one takes into consideration that in 2018, Cape Town and other cities in the Western Cape province experienced one of the worst drought outbreaks to hit the province. Therefore, many hotels and resorts in Cape Town had only recently started to recover.[964] Thus, major hotel brands, such as Sun International, Hilton Hotel, Marriott and Tsongo Sun, were forced to close some of their hotels and casinos in South Africa.[965]

Moreover, as elsewhere in the world, important events and festivals were cancelled. In South Africa, events such as the Klein Karoo Nasionale Kunstefees (the Klein Karoo Arts Festival), the Hermanus Whale Festival, the Comrades Marathon and the pilgrimage to the Zion Christian Church. The cancellation of these events and festivals is a serious drawback for the local communities as they contribute financially and socially to their economic survival and upliftment.[966]

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[962] Centres for Disease Control and Prevention, n.d., <https://wwwnc.cdc.gov/travel/notices/covid-4/coronavirus-south-africa>, access: 23 April 2021; Smart Traveller, n.d., <https://www.smartraveller.gov.au/destinations/africa/south-africa>, access: 23 April 2021.

[963] D. Oladipo, 2021, <https://edition.cnn.com/travel/article/south-africa-travel-struggles-cmd/index.html>, access: 23 April 2021.

[964] G. Nhamo *et al*., *Counting the cost of COVID-19 on the global tourism industry*, p. 198; R. George, *Marketing tourism in South Africa*, p. 666.

[965] N. Ngcobo, 2020, <https://www.sabcnews.com/sabcnews/hotels-hit-hard-by-covid-19-lockdown/>, access: 3 June 2020; S. Gössling *et al*., 'Pandemics, tourism and global change: a rapid assessment of COVID-19', *Journal of Sustainable Tourism* 29(1), 2020, p. 7; I. Mensah, 2020, <https://www.hospitalitynet.org/opinion/4098657.html>, access: 2 June 2020; Tourism Business Council of South Africa, Industry of South Africa Covid 19: Impact, Mitigation and the Future, Survey, April 2020, p. 5.

[966] C. Le Roux, 2020, <https://www.thesouthafrican.com/lifestyle/coronavirus-kknk-festival-cancelled-2020/>, access: 9 April 2020; A. de Beer, 2020, <https://www.oudtshoorncourant.com/News/Article/National/kknk-not-going-ahead-14-new-covid-19-cases-confirmed-in-sa-202003140625>, access: 27 May 2020; Hermanus Whale Festival, n.d., <https://hermanuswhalefestival.co.za/>, access: 5 October 2020; Fishing Industry News and Aquaculture, 2020, <https://www.fishingindustrynewssa.com/2020/09/23/hermanus-whale-festival-canned-

Another industry to feel the impact of COVID-19 national lockdown is the alcohol industry. From March 2020 under Lockdown Alert Level 5 the South African government imposed a ban on the sale of alcohol in order to reduce the load of alcohol-related accidents in hospitals. This was a huge blow to the tourism sector of the Western Cape Province, particularly the wineries. As a result, the wine industry lost about R2.5 billion in tourism revenue between March and July 2020.[967]

COVID-19 has also hit major businesses, especially small and medium-sized enterprises (SMEs). SMEs suffered particularly as they have limited cash reserves, a smaller client base and less capacity to manage commercial pressures than larger companies. SMEs have reported that their revenue has dropped drastically. Analysts are estimating that about 60% of SMEs will close their doors before the pandemic is over.[968] Here again a wide range of SMEs within the tourism sector have been financially damaged, if not ruined.

It is believed that as a result of the effects of COVID-19 and the national lockdown, many tourism companies will be unable to re-open once the national lockdown is lifted. The WTTC estimates that the COVID-19 pandemic could lead to 50 million jobs losses in the tourism industry. Of these, 30 million would be in Asia, seven million in Europe, five million in North and South America and the rest in other continents.[969] In terms of South Africa, a survey also supports this: 69% of companies stated that they will temporally close their doors, while 58% said that they will be downscaling their staff.[970] This is a major issue in South Africa as unemployment increased from 29% to 32.5% at the end of 2020, the highest rate since 2008. Unfortunately, the Chamber of

counting-continues/>, access: 15 October 2020; G. Nhamo *et al*., *Counting the cost of COVID-19 on the global tourism industry*, pp. 243, 263-264.

[967] B. Phakathi, 2020, <https://www.pressreader.com/>, access: 2 October 2020.; C.M. Rogerson & J.M. Rogerson 'COVID-19 tourism impacts in South Africa: government and industry responses', *Geo Journal of Tourism and Geosites* 31(3), 2020a, p. 1088.

[968] S. Kalidas *et al*., 2020, <https://www.mckinsey.com/featured-insights/middle-east-and-africa/how-south-african-smes-can-survive-and-thrive-post-covid-19>, access: 27 October 2020; D. Maylie, 2020, <https://www.ifc.org/wps/wcm/connect/region__ext_content/ifc_external_corporate_site/subsaharan+africa/news/south+africas+tourism+industry+next+stop+recovery>, access: 1 October 2020.

[969] J. Faus, 2020, <https://www.weforum.org/agenda/2020/03/world-travel-coronavirus-covid19-jobs-pandemic-tourism-aviation/>, access: 30 March 2020; Anon., 'Coronavirus-paniek: wat behels ons nuwe werklikheid?', *Huisgenoot*, 20 March, 2020.p. 15.

[970] Tourism Business Council of South Africa, Industry of South Africa Covid 19: Impact, Mitigation and the Future, Survey, April 2020, p. 3.

Commerce estimates that the unemployment rate could rise to 50% when the pandemic is over or has settled.[971]

The national lockdown caused countless destinations and attractions to temporarily close their doors. This forced them to find innovative ways to attract and entertain tourists.[972] For this reason, many of them moved to virtual platforms. For example, Western Cape Tourism in partnership with Wesgro, a tourism and trade agency, launched the "One Day" campaign to support the local tourism sector and to motivate tourists to travel to the province again "one day". Two main elements were used, namely virtual tours and podcasts. Local tourist guides conducted tours virtually to the West Coast, Overberg, Cape Town, the wine lands, the Garden Route and the Karoo by using podcasts, photography, video and Street View.[973] After joining a virtual tour, tourists were requested to donate money to the tourist guide by using ScapScan. Podcasts were used to "paint pictures of specific places in listeners' minds and get them to imagine what it would feel like to actually visit these places - one day".[974] The campaign reached over 8 million people and recorded 1.3 million engagements across podcasts and virtual tours.[975]

In addition, many game reserves in South Africa reverted to virtual platforms. An example of this is the live-stream safari game drives provided by &Beyond, a luxury travel company, and WildEarth, a South African wildlife broadcaster. Tourists were taken on a live-stream safari through &Beyond Ngala Private Game Reserve, &Beyond Phina Private Game Reserve, Djuma Private Game Reserve, Tswalu and Pridelands Conservancy. In addition, tourists also had the opportunity to ask questions as if they were in the actual game drive by using YouTube or

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[971] A. Meldrum, 2020, <https://www.ctvnews.ca/health/coronavirus/in-fight-against-virus-south-africa-expects-a-long-wait-1.4952219>, access: 26 May 2020; EyeWitness News, 2021, <https://ewn.co.za/2021/02/23/sa-unemployment-rate-increased-to-32-5-in-q4-of-2020-stats-sa>, access: 9 April 2021.

[972] A. Chen, 2020, <https://www.nationalgeographic.com/travel/2020/04/can-virtual-reality-replace-real-tourism-during-pandemic-and-beyond/>, access: 28 April 2020; B. Ciecko, 2020, <https://www.aam-us.org/2020/03/25/4-ways-museums-can-successfully-leverage-digital-content-and-channels-during-coronavirus-covid-19/>, access: 1 April 2020; C. Moodley, 2020a, <https://www.iol.co.za/travel/africa/pics-5-african-attractions-after-covid-19-impact-on-the-continent-45811681>, access: 28 April 2020.

[973] C. Moodley, 2020b, <https://www.iol.co.za/travel/south-africa/sa-hotels-to-remain-closed-during-lockdown-levels-but-does-industry-have-what-it-takes-to-survive-47555619>, access: 3 June 2020; D. Hes, 2020, <https://www.vukuzenzele.gov.za/become-virtual-tourist-your-armchair>, access: 16 October 2020; Bizcommunity., 2021, <https://www.bizcommunity.com/Article/196/860/216310.html>, access: 4 June 2021.

[974] Bizcommunity, 2021, <https://www.bizcommunity.com/Article/196/860/216310.html>, access: 4 June 2021.

[975] Bizcommunity, 2021, <https://www.bizcommunity.com/Article/196/860/216310.html>, access: 4 June 2021.

Twitter.[976] Moreover, tourists could also "book" a private virtual session with a field guide. The guide interprets a recording of the latest WILDwatch Live episode and tourists were also able to ask questions.[977] The live-stream tours have become so popular that &Beyond and WildEarth broadcasts on BBC, a British free-to-air television broadcasting channel; CGTN, a cable TV news service; SABC 3, a South African free-to-air television network; and DSTV, a sub-Saharan African direct broadcasting satellite service.[978]

On the downside, as mentioned, many festivals and events were either cancelled or postponed, and therefore also turned to virtual platforms. For example, South Africa's National Science Festival, Scifest Africa, was online from October 2020 until March 2021. The program offered workshops, demonstrations, webinars, lectures, interviews, competitions and shows on a range of topics, such as climate change, agriculture and recycling.[979] In addition, the KwaZulu-Natal Tourism and the Southern Africa Tourism Services Association partnered to host Virtual Fams, an online "indaba" (meeting). The aim was to showcase the province's accommodation, scenery, tourist activities and food offers to tourists and trade partners.[980]

6.7 Benefits of VR in South African tourism

In Chapter 5, Guttentag's six main benefits of VR in tourism were considered (marketing; sustainability and preservation; tourism planning; accessibility; education and entertainment). The Chapter also indicated that VR offers the tourism industry more benefits than what Guttentag suggests, such as training, experiences and risks. This section focuses on Guttentag's six areas, as well as the other benefits that have emerged as VR has developed, namely VR as a democratising

[976] E. Taylor, 2020, <https://www.businessinsider.co.za/virtual-safari-from-home-spot-animals-big-5-real-time-2020-4>, access: 28 April 2020; M. Simpson, 2020, <https://www.thesouthafrican.com/travel/virtual-travel-experiences-to-help-satisfy-your-wanderlust-during-lockdown/>, access: 28 April 2020; &Beyond, 2020, <https://www.andbeyond.com/andbeyond-tv/wildwatch-live/>, access: 16 October 2020.
[977] &Beyond, n.d.(a), <https://www.andbeyond.com/virtual-experiences/my-wildwatch-live-classic/>, access: 10 April 2021.
[978] A. Thompson, 2020, <https://www.businessinsider.co.za/a-sa-company-is-live-streaming-the-great-migration-to-thousands-of-viewers-around-the-world-2020-8>, access: 10 April 2021.
[979] Grahamstown and Frontier country, 2020, <https://www.grahamstown.co.za/news/sci-fest-goes-online-09-2020-28>, access: 5 October 2020.
[980] Anon., 'Online indaba helps KZN tourism showcase offerings', *The Witness*, 29 July, 2020, p. 3.

tool, revenue generator, a benefit for health, complying with physical distancing, safety as well as security in the context of South Africa.[981]

It has been noted that tourism scholars praise VR as a superior marketing tool compared to traditional marketing media. It is believed that the "try before buy" concept will play a pivotal role once the pandemic is over or has passed because VR might motivate tourists to travel again to destinations, such as South Africa.[982] In fact, research has indicated that COVID-19 has increased the use of VR for marketing in tourism.[983] Therefore, many South African destinations used VR as a marketing tool in order to market their destinations to potential tourists. For example, the above mentioned, &Beyond and WildEarth marketed safari tourism to potential tourists by offering them live-stream safari tours of famous games reserves.

Despite tourism being a benefit to South Africa, it also poses a threat to heritage sites, especially the rock art and engraving sites of the first people, the San. Tourists often damage rock art and engravings by chipping pieces of rock for commercial or medical reasons, drawing graffiti, splashing soft drinks or urinating on paintings in order to make them "more visible".[984] Most scholars believe that tourists do not intend to harm sites, but damage is caused due to a lack of knowledge or ignorance.[985] VR can play an important role in terms of the sustainability and preservation of rock art and engraving sites. For example, at the earlier mentioned Origin Centre,

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[981] This section does not discuss all the benefits mentioned in the previous chapter because they are generalised or they do not apply to the South African tourism context, such as risks and training.

[982] O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism'. *Journal of multidisciplinary academic tourism* 6(1), 2021, p. 30; D. Buhalis, *eTourism: information technology for strategic tourism management*, p. 92; D.A. Guttentag, 'Virtual reality: applications and implications for tourism', *Tourism Management* 31(5), 2010, p. 641; I.P Tussyadiah *et al*., 'Virtual reality, presence, and attitude change: empirical evidence from tourism', *Tourism Management*, 2018, p. 141; T. Griffen *et al*., 'Virtual reality and implications for destination marketing' (paper presented at the Travel and Tourism Research Association International Conference, Quebec City, Canada, 2017), p. 3; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 236; S. Rogers, 2020a, <https://www.forbes.com/sites/solrogers/2020/03/18/virtual-reality-and-tourism-whats-already-happening-is-it-the-future/#70a1d50228a6>, access: 1 June 2020; R. Yung *et al*., 'Virtual reality and tourism marketing: conceptualizing a framework on presence, emotion, and intention', *Current issues in Tourism*, 2020, p. 1; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 8; N. Moorhouse, 2020, <https://www.phocuswire.com/can-virtual-reality-help-tourism-destinations-recover-covid-19>, access: 6 October 2020.

[983] R. Yung *et al*., 'Virtual reality and tourism marketing: conceptualizing a framework on presence, emotion, and intention', *Current issues in Tourism*, 2020, p. 1; Lbbonline, 2020, <https://www.lbbonline.com/news/why-virtual-reality-may-be-the-saviour-of-the-travel-and-tourism-industry>, access: 2 June 2020.

[984] Anon., 'Africa's rock-art heritage threatened', *Star*, 27 July, 2001, p. 9.

[985] V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), pp. 5, 121.

tourists can partake in a virtual experience of rock art and engravings. Thus, tourists can learn and enjoy the rock art and engraving site without going to the actual site and, hence, not damaging it.

As stated in Chapter 5, local communities are often ignored in the tourism scheme. This is also the case in South Africa. For example, research has shown that many local communities, some of those in the Cape Flats, do not understand what tourism is about and consider it as a "white man's business" because they feel that they are excluded in the marketing, decision-making and development of the local tourism industry.[986] It is critical to address the misunderstanding by involving them in the development of local tourism. Thus, VR can involve the local community as it can be used to explain the development of tourism to communities in a less complicated manner. The community will then feel connected and involved in the tourism projects. As a result, the community will support the tourism project.[987]

As mentioned to in Chapter 5, accessibility means "the cost, speed and convenience at which the destination can be reached".[988] Based on this definition, this section focuses on PwDs and inaccessible sites. Research has shown that PwDs want to travel to South Africa, but they usually face barriers that prevent them, one of which is physical access.[989] Although South Africa does not have an act that solely deals with PwDs, sections of the *National Building Regulations and Building Standard Act*, 103 of 1977 were put in place to address the need for access for PwDs.[990]

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[986] T. Ehrenreich, 'Tourism must showcase the real city', *Cape Times*, 6 December, 2011, p. 9.
[987] T. Ehrenreich, 'Tourism must showcase the real city', *Cape Times*, 6 December, 2011, p. 9.
[988] P. Van Dyk, *Introduction to tourist guiding*, p. 11.
[989] B. Lovelock & K. Lovelock, *The ethnics of tourism: critical and applied perspectives*, p. 372; M. Murray & J. Spoats, 'The disabled traveller: tourism and disability in Australia', *Journal of Tourism Studies* 1(1), 1990, p. 10; V. Eichhorn & D. Buhalis, 'Accessibility: a key objective for the tourism industry', *in* D. Buhalis & S. Darcy (eds.), *Accessible tourism: concepts and issues*, p. 50; H. Münch & R. Ulrich, 'Inclusive tourism', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 161; D. Buhalis & E. Michopoulou, 'Information-enabled tourism destination marketing: addressing the accessibility market', *Current Issues in Tourism* 14(2), 2011, pp. 147-158; J.S.P. Hobson & A.P. Williams, 'Virtual reality: a new horizon for the tourism industry', *Journal of Vacation Marketing* 1(2), 1994, p. 132; C.A. Bisschoff & T.F. Breedt, 'The need for disabled friendly accommodation in South Africa', *African Journal of Business Management* 6(41), 2012, p. 10535; T.F. Breedt, 'The need for disabled friendly accommodation in South Africa', (Honours dissertation, North-West University, 2007), p. 2; T. Makuyana *et al*., 'Profiling disabled people as unrealised potentially lucrative tourism market segment in South Africa', *African Journal of Hospitality, Tourism and Leisure* 9(5), p. 879; V. Eichhorn & D. Buhalis, 'Accessibility: a key objective for the tourism industry', *in* D. Buhalis & S. Darcy (eds.), *Accessible tourism: concepts and issues*, p. 50;
[990] T.T. Khumalo & J. Ndlovu, 'Access to hospitality services in Durban: improving the experiences of wheelchair users in Bed and Breakfast facilities', *African Journal of Hospitality, Tourism and Leisure* 6(4), p. 2; O. Chikuta & F. Kabote, 'Disability and tourism in Southern Africa: a policy analysis', *in* T. Chataika (ed.), *The Routledge handbook of disability in South Africa*, p. 274.

However, many tourism venues are still inaccessible to PwDs.[991] For example, Fort Wonderboompoort, the waterfall and the caves at Wonderboom Nature Reserve in Pretoria are out-of-reach for wheelchair visitors, parents with baby carriages and the elderly.[992]

Unfortunately, the physical barriers cannot always be removed because the building or infrastructure was constructed before the legislation was in force, or some sites or attractions are too fragile and it is sometimes too expensive to remove the barriers.[993] Hence, VR is a beneficial tool for PwDs because it enables them to have a tourist experience by removing the physical barriers.[994] For example, PwDs are not able to visit the aforementioned Dinaledi Chamber as the cave is not easily accessible. With the earlier mentioned Dinaledi Experience App, PwDs also have the opportunity to experience the history of *Homo Naledi* without going to the actual site.[995] Another benefit is that VR also provides PwDs a preview of the destination beforehand in order for them to determine whether it is suitable for their needs.[996] For example, Google Maps has a feature that allows PwDs to find destinations that are suitable for wheelchairs.[997] Moreover, VR allows PwDs to lead a normal life, give them a sense of escapism, be free from the role of "objects of care",[998] and to experience something that they might never be able to do again in real life or in

[991] N. Kotze & S. Dippenaar, 'Accessibility for tourists with disabilities in the Limpopo Province, South Africa', *in* C.M. Rogerson & G. Visser (eds.), *Tourism and development issues in contemporary South Africa*, p. 367; C.A. Bisschoff & T.F. Breedt, 'The need for disabled friendly accommodation in South Africa', *African Journal of Business Management* 6(41), 2012, p. 10534; T.F. Breedt, 'The need for disabled friendly accommodation in South Africa', (Honours dissertation, North-West University, 2007), p. 1.

[992] V.A. Verkerk, 'The potential of Wonderboom Nature Reserve as an archaeotourism destination', (Master dissertation, University of Pretoria, 2017), p. 120.

[993] V. Eichhorn & D. Buhalis, 'Accessibility: a key objective for the tourism industry', *in* D. Buhalis & S. Darcy (eds.), *Accessible tourism: concepts and issues*, p. 52; D. Buhalis & E. Michopoulou, 'Information-enabled tourism destination marketing: addressing the accessibility market', *Current Issues in Tourism* 14(2), 2011, pp. 147, 159; O. Chikuta *et al*., 'Accessibility expectations of tourists with disabilities in national parks', *Tourism Planning & Development* 16(1), 2019, p. 80; H. Münch & R. Ulrich, 'Inclusive tourism', *in* A. Papathanassis (ed.), *The long trail of tourism: holiday niches and their impact on mainstream tourism*, p. 166.

[994] M. Gonzale, 2017, <https://www.thegenius.ca/steady-rise-affordable-accessible-disabled-friendly-virtual-reality/>, access: 24 March 2020; M.A. Özdemir, 'Virtual reality (VR) and augmented reality (AR) technologies for accessibility and marketing in the tourism industry', *in* C. Eusébio *et al*. (eds.), *ICT tools and applications for accessible tourism*, p. 278; V. Eichhorn & D. Buhalis, 'Accessibility: a key objective for the tourism industry', *in* D. Buhalis & S. Darcy (eds.), *Accessible tourism: concepts and issues*, p. 53; T.D. Vila *et al*., 'Accessible online resources: a Northern European perspective', *Scandinavian Journal of Hospitality and Tourism* 19(2), p. 146.

[995] Anon., 'Homo naledi was written in stars', *Cape Argus*, 11 September, 2015, p. 1.

[996] M.A. Özdemir, 'Virtual reality (VR) and augmented reality (AR) technologies for accessibility and marketing in the tourism industry', *in* C. Eusébio *et al*. (eds.), *ICT tools and applications for accessible tourism*, p. 278.

[997] S. Blair-Goldensohn, 2020, <https://blog.google/products/maps/wheelchair-accessible-places-google-maps/>, access: 22 April 2021.

[998] B. Lovelock & K. Lovelock, *The ethnics of tourism: critical and applied perspectives*, p. 360.

conventional tourism.[999] For example, after a wheelchair user used a surfing simulator, the user claimed he "felt as though he was standing up and riding the surf just like anyone else".[1000]

In South Africa, numerous sites are considered inaccessible for tourists due to weather, such as Table Mountain. The cable cars that go up the mountain are usually closed when the "Cape Doctor", a local name given to a strong south-easterly wind, is "stronger on top of the mountain than on the ground".[1001] In fact, in 2014, one of the famous cable cars was destroyed as a result of the strong winds.[1002] Thus, means that tourists sometimes do not have access to Table Mountain, but by using a VR platform, such as Google Maps, tourists can still experience Table Mountain as well as its views, despite the unfavourable weather or strong winds.

Lastly, a major access concern in South Africa is that in some places the road system is in a seriously poor condition, particularly to remote areas in rural regions. This has had a serious impact on the tourism industry in South Africa. For example, the Bentley Rally was cancelled in 2006 due to potholes on the road between Mooi River and Giant's Castle. It was a huge blow for the Ezemvelo KZN Wildlife hotel as it cost them about R80 000 in cancelled accommodation fees.[1003] Some accommodation establishments on the R74 highway, which links the Free State and KwaZulu-Natal, had to close due to a decline in tourist numbers as a result of potholes.[1004] It can, therefore, be argued that even though a road is in a poor condition, tourists using VR are still able to "travel" to these unreachable destinations.

Guttentag states that VR also has educational benefits. In South Africa, some institutions included VR in their exhibits for educational purposes and to enhance the tourism experience. For example, the already mentioned Dinaledi Experience App allows tourists to learn more about the origins of

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[999] J. Eddings, *How virtual reality works*, pp. 143-144; Virtual Reality Society, 2017g, <https://www.vrs.org.uk/virtual-reality-healthcare/disabled.html>, access: 22 June 2020; Eye Spy 360, 2017, <https://www.eyespy360.com/en-us/blog/Bringing_Accessibility_To_The_Disabled_With_Virtual_Tours.html>, access: 15 May 2020; M. Gonzale, 2017, <https://www.thegenius.ca/steady-rise-affordable-accessible-disabled-friendly-virtual-reality/>, access: 24 March 2020.

[1000] M. Gonzale, 2017, <https://www.thegenius.ca/steady-rise-affordable-accessible-disabled-friendly-virtual-reality/>, access: 24 March 2020.

[1001] Table Mountain, n.d., <https://www.tablemountain.net/blog/entry/windy_days_dont_give_us_down_time>, access: 24 May 2021.

[1002] News24., 2014, <https://www.news24.com/news24/travel/PICS-Table-Mountain-Heritage-Cableway-blown-over-by-Cape-Doctor-20141203>, access: 24 May 2021.

[1003] C. Bishop, 'Potholes put the brakes on KZN tourism growth', *Witness*, 10 November, 2006, p. 6.

[1004] P. Govender, 2013, <https://www.timeslive.co.za/sunday-times/lifestyle/2013-03-31-neglect-sees-scenic-route-become-the-road-to-ruin/>, access: 11 June 2021.

ancient people, such as *Homo Naledi*. Another example is the VR experience at the Origin's Centre, where VR enables visitors to acquire more information on South Africa's rich and complex history.

During the national lockdown, many people became extremely bored. According to D. Shichang's *et al*. study, boredom stemming from limited activities led to an increase in sensation-seeking.[1005] This led to people turning to VR for entertainment and so many attractions and destinations provided virtual tours. Therefore, many of these used VR in order to provide a form of entertainment to tourists. During the national lockdown, tourists were able to "undertake" a live-stream virtual safari by &Beyond and WildEarth's or viewed Ayrton King's, a keeper at the Two Oceans Aquarium, images and videos of the penguins exploring the aquarium, while they where at home.[1006] With the outbreak of the Covid-19 pandemic in 2020, the University of Pretoria Campus Tours, a student-managed simulated business venture, introduced interactive virtual campus tours. These tours enabled the public and potential students to view the campus and learn about the different faculties of the University from the "safety of their home" via Zoom. The virtual participants (tourists) had the opportunity to ask the tourist guide questions as if they are were really on campus.[1007]

One of the major societal problems in South Africa, is the huge gap in terms of wealth. Evidence of this is apparent in a study by the Southern Centre for Inequality Studies at the University of Witwatersrand. The study found that 0.1% of the total population of South Africa from 1994 to 2018 had a net worth of "more than 90% of the bottom earners", while the bottom 50% has a negative net wealth of -R16 000.[1008] However, some scholars are of the opinion that VR can bridge the wealth gap and democratise the tourism industry by opening up tourism to everyone. VR in particular provides people with an equal opportunity to experience travel to a destination.[1009] For

[1005] S. Deng *et al*., 'Perceived severity of COVID-19 and post-pandemic consumption willingness: the roles of boredom and sensation-seeking', *Frontiers in psychology* 11, 2020, p. 2439.
[1006] J. Caboz, 2020, <https://www.businessinsider.co.za/two-oceans-penguins-2020-5>, Access: 30 October 2021.
[1007] ATLAS, 'ATLAS Partnership Webinar - University of Pretoria Campus Tours - Before, During and After COVID-19', December, 2, 2020, YouTube video, 46:2, <https://www.youtube.com/watch?v=TA20RPA2u3U>.
[1008] T. Monama, 'Large number of people still poor', *Pretoria News*, 13 May, 2020, p. 2.
[1009] J.P. Vanderlei, 2021, <https://www.tourism-review.com/post-covid-tourism-is-to-make-greater-use-of-virtual-tours-news11854>, access: 17 May 2021; J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*. (eds.), *Handbook of e-Tourism*, p. 14.

example, less privileged tourists who have access to the internet can go on a virtual safari in South Africa free of charge through watching &Beyond and WildEarth's live-stream videos on YouTube.

According to J. Zhao *et al*. and J. Zhao *et al*., tourism companies in South Africa can also use VR to earn revenue.[1010] Tourism companies and destinations can place advertisements on their websites.[1011] Another method is through sales of virtual currencies and goods. Tourists can induct transactions of virtual travel equipment by exchanging of virtual currencies, for instance, to create a villa and hotel in the travel destination.[1012] Tourists can also donate money to the tourism companies and destinations or the tourist guide who conducts the virtual tour. For example, tourists are able to make a donation to the Voortrekker Monument, in Pretoria, through the virtual version.[1013] Furthermore, tourism companies and destinations can use VR games for an income. For example, tourists can try the game out free of charge in order to decide whether it is worth paying for it. If they decide to pay for the game, they are then able to customise their experience, move through levels quicker or eliminate advertisements. As an example, in 2014, "Clash of Clans", the mobile game, generated a revenue of US$1.3 billion, even though only 4.4% of gamers paid for the game.[1014] Moreover, tourism companies and destinations have the opportunity to gain an income by using SL. SL enables residents to earn real money by acting as tourist guides for new residents.[1015] Lastly, at some virtual destinations/attractions tourists have to pay upfront before they are allowed to explore the destination/attractions by using PayPal, an online payment method, or Paywall, an online website that only gives access to users once they have paid. Tourists

[1010] J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 209; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 6.
[1011] J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approaches*, p. 209; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 6.
[1012] J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* M. Lytras *et al*. (eds.), *Digital culture and e-tourism: technologies, applications and management approache*s, pp. 209-210; J. Zhao *et al*., 'Virtual tourism: functions, profit modes and practices in China', *in* J. Zhao *et al*. (eds.), *Global hospitality and tourism management technologies*, p. 7.
[1013] Voortrekker Monument, n.d., <https://vtm.org.za/en/home/>, access: 3 November 2020.
[1014] C. Fink, 2018, <https://www.forbes.com/sites/charliefink/2018/01/02/how-are-people-making-money-in-vr-or-when-will-they/#580f923875d7>, access: 19 October 2020.
[1015] Reuters Events, 2015, <https://www.reutersevents.com/travel/social-media-and-marketing/virtual-tourism-pathway-promotion-or-profit>, access: 15 April 2021.

can "book" their private virtual safari session with a &Beyond field guide through using the PayPal payment method.[1016]

Not unlike other parts of the world, COVID-19 has also had a huge impact on South African society's mental health as a result of quarantine, the national lockdown, physical distancing and job losses.[1017] According to the Human Sciences and Research Council, 33% of South Africans were depressed, 45% were fearful and 29% felt lonely during the national lockdown.[1018] In addition, the South African Depression and Anxiety Group have received more calls on their mental helplines during the pandemic compared to pre-COVID-19 times.[1019] It is predicted that COVID-19 may lead to other mental health issues among South Africans, such as post-traumatic stress disorder, mood disorders, anxiety, phobias and obsessive-compulsive disorders.[1020] However, as mentioned in Chapter 5, VR can be beneficial to the mental well-being of tourists. As a matter of fact, VR has contributed to a positive impact on the mental wellbeing of people during the lockdown.[1021] The reason is that VR gives tourists a relaxing experience by providing them with a temporary sense of escapism from COVID-19.[1022] For example, South Africans can use the international Woebot app, an artificial intelligent emotional assistant. It allows users to vent and send messages. The chatbot is also trained in cognitive behavioural treatment and checks in with

[1016] B. Louw (Chief Executive Officer, VR Events), interview with author, 6 August 2021; &Beyond, n.d.(b), <https://www.andbeyond.com/virtual-experiences/frequently-asked-questions/>, access: 22 May 2021.
[1017] A. Fiorillo & P. Gorwood, 'The consequences of the COVID-19 pandemic on mental health and implications for clinical practice', *European Psychiatry*, 63(1), 2020, p. 32; A. Siani & S.A. Marley, 'Impact of the recreational use of virtual reality on physical and mental wellbeing during the Covid-19 lockdown', *Health and Technology* 11(2), 2021, p. 426; M.J. Kim & M.C. Hall, 'A hedonic motivation model in virtual reality tourism: comparing visitors and non-visitors', *International Journal of Information Management* 46, 2019, p. 23; V. Schaffer *et al*., 2018, <https://phys.org/news/2018-10-vr-technology-holidaying-home-substitute.html>, access: 17 May 2019; S. Price, 2020, <https://www.healtheuropa.eu/could-virtual-reality-ease-the-burden-of-coronavirus-isolation/99566/>, access: 28 April 2020; S. Nguse & D. Wassenaar, 'Mental health and COVID-19 in South Africa', *South African Journal of Psychology* 51(3), 2021, p. 307.
[1018] S. Nguse, & D. Wassenaar, 'Mental health and COVID-19 in South Africa', *South African Journal of Psychology* 51(3), 2021, p. 307.
[1019] C. Geach, 'Mental health problems on the rise', *Saturday Argus*, 19 July, 2020, p. 8.
[1020] S. Nguse, & D. Wassenaar, 'Mental health and COVID-19 in South Africa', *South African Journal of* Psychology 51(3), 2021, p. 307.
[1021] A. Siani & S.A. Marley, 'Impact of the recreational use of virtual reality on physical and mental wellbeing during the Covid-19 lockdown', *Health and Technology* 11(2), 2021, p. 431.
[1022] O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, pp. 28, 29; D. Sarkady *et al*., 'Virtual reality as a travel substitution tool during COVID-19', *in* W. Wörndl *et al*. (eds.), *Information and communication technologies in tourism 2021*, p. 459.

the user regularly. The app is beneficial as it provides people the opportunity to talk to someone "professionally".[1023]

Similar to other countries, South Africa also imposed physical or social distancing. As stated in Chapter 5, physical distancing has been a major blow for the tourism industry as it ruins the tourist experience because it limits human interaction.[1024] For this reason, VR can be regarded as a benefit as tourists are allowed to virtually interact with other tourists/hosts in a virtual destination while complying with physical distancing regulations.[1025] For example, tourists can experience the Dinaledi Chamber with friends and family, while still adhering to physical distancing through the Dinaledi Experience App.

Another benefit that can be ascribed to VR as regards the physical distancing is the use of online shopping for tourism-related products as a safer option compared to physical shopping. Shopping centres are public spaces where people often have to stand in long queues and can be exposed to the virus.[1026] In addition, innovative technology is also used widely in the tourism domain with contactless check-in and payments. [1027]

Furthermore, already since the terrorist attacks on 11 September 2001 in New York,[1028] safety and security have become a major concern to the tourism industry as tourists showed an increase in the fear of travelling.[1029] P.E. Tarlow defines security as "protection of a person, place, thing,

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[1023] Anon., 'Vital tech to get you through lockdown', *City Press*, 29 March, 2020, p. 16.
[1024] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 3.
[1025] O.S. Itani & L.D. Hollebeek, 'Light at the end of the tunnel: visitors' virtual reality (versus in-person) attraction site tour-related behavioral intentions during and post-COVID-19', *Tourism Management* 84(4), 2021, p. 3; S. Rogers, 2020b, <https://www.forbes.com/sites/solrogers/2020/03/26/coronavirus-has-made-wfh-the-new-normal-heres-how-virtual-reality-can-help/#5b2de5e561d5>, access: 3 June 2020; O. Atsiz, 'Virtual reality technology and physical distancing: a review on limiting human interaction in tourism', *Journal of multidisciplinary academic tourism* 6(1), 2021, pp. 28-29.
[1026] N. Tshuma, 'Online grocery shopping skyrockets', *Cape Argus*, 17 September, 2020, p. 3.
[1027] J.P. Vanderlei, 2021, <https://www.tourism-review.com/post-covid-tourism-is-to-make-greater-use-of-virtual-tours-news11854>, access: 17 May 2021.
[1028] C.M. Hall *et al*., 'Security and tourism: towards a new understanding?', *in* C.M. Hall *et al*. (eds.), *Safety and security in tourism: relationships, management, and marketing*, p. 3; P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 17.
[1029] M.E. Korstanje, 'The fear of traveling: a new perspective for tourism and hospitality', *Anatolia* 22(2), 2011, pp. 222-223; A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 23; R. Donaldson & S.L.A. Ferreira, 'Crime, perceptions and touristic decisionmaking: some empirical evidence and prospects for the 2010 World Cup', *Politikon* 34(3), 2007, p. 355; R. George, 'Tourist's perceptions of safety and security while visiting Cape Town', *Tourism Management* 24(5), 2003, pp. 578, 584; P Brunt *et al*., 'Tourist victimisation and the fear of crime on holiday', *Tourism Management* 21(4), 2000, p. 418.

reputation, or economy against someone (or someone's tool) that seeks to harm";[1030] and safety as "protecting of people's (or places, things, reputations, or economy) against unintended consequences of an involuntary nature".[1031] The 9/11 event not only had a serious impact on leisure travel and tourism by contributing to the increase fear of travel, but also compounded the travel process with the increase of security measures at, for example, airports.[1032]

In times of crises, such as terrorism, pandemics, crime and political instability, health, safety and security are important factors that prospective tourists consider regarding the decision to travel to a particular destination.[1033] Tourists are increasingly choosing destinations based on personal health, safety and security factors.[1034] If tourists experience a high level of anxiety or feel unsafe, they will distrust the destination and cancel their holiday.[1035] This leads to the cancellation of flights, hotel reservations and other scheduled events, which have serious direct and indirect economic impacts across the sector. Tourists demand to feel safe and secure, but it is impossible for the tourism industry to guarantee this 100%,[1036] especially during the COVID-19 pandemic. To some extent, VR provides tourists a more risk-free solution.[1037]

[1030] P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 14.
[1031] P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 14.
[1032] Due to the 9/11 terrorist attack, the airline industry lost US$1.1 billion. G. Blalock *et al*., 'The impact of post-9/11 airport security measures on the demand for air travel', *The Journal of Law & Economics* 50(4), 2007. p. 731.
[1033] C.M. Rogerson & J.M. Rogerson, 'COVID-19 and tourism spaces of vulnerability in South Africa', *African Journal of Hospitality, Tourism and Leisure* 9(4), 2020b, p. 382; Y. Reisinger & F. Mavondo, 'Travel anxiety and intention to travel internationally: implications of travel risk perception', *Journal Travel Research* 43(3), 2005, pp. 213-214; B.O. Adeleke *et al*., 'Impacts of xenophobia attacks on tourism', *IFE Psychologia – Special Issue: Xenophobia* 16(2), 2008, p. 144; C.R. Goeldner & J.R.B Ritchie, *Tourism: principles, practices, philosophies*, p. 256.
[1034] A. Pizam *et al*., 'Making tourists feel safe: whose responsibility is it?', *Journal of Travel Research* 36(1), 1997, p. 23.
[1035] Y. Reisinger & F. Mavondo, 'Travel anxiety and intention to travel internationally: implications of travel risk perception', *Journal Travel Research* 43(3), 2005, pp. 213-214; O. Lee & J.E. Oh, 'The impact of virtual reality functions of a hotel website on travel anxiety', *Cyberpsychology and Behavior* 10(4), 2007, p. 584; O. Lee & J. Ahn, 'Embedded virtual reality for travel security' (paper presented at the International Conference on Information Science and Applications (ICISA 2012), Suwon, South Korea, 23 May – 25 May 2012), p. 1; J.C. Ahn *et al*., 'Virtual reality to help relieve travel anxiety', *KSII Transactions on Internet and Information Systems* 7(6), 2013, p. 1435; O. Lee & J.E. Oh, 'The impact of virtual reality functions of a hotel website on travel anxiety', *Cyberpsychology and Behavior* 10(4), 2007, p. 584.
[1036] P.E. Tarlow, *Tourism security: strategies for effectively managing travel risk and safety*, p. 18; A. Spencer & P. Tarlow, *Tourism safety and security for the Caribbean*, p. 90; I. Mensah, 2020, <https://www.hospitalitynet.org/opinion/4098657.html>, access: 2 June 2020.
[1037] G. Nhamo *et al., Counting the cost of COVID-19 on the global tourism industry*, p. 201.

6.8 Barriers of VR in South African tourism

VR also has many drawbacks in tourism in South Africa. The following section discusses some of the drawbacks (mentioned in Chapter 5), namely loss of revenue, technological issues, digital divide and access issues in the context of South Africa.[1038]

As indicated, in South Africa, many people were forced to be confined to their homes as a result of the national lockdown. Thus, their home became the "new tourism destination" as VR enabled tourists to escape to numerous locations, such as Machu Pichu and the rainforests of Borneo. However, VR might discourage tourists from physically traveling to South Africa once the pandemic is over or more settled. For South Africa, this is problematic because tourism companies, particularly SMEs, have suffered tremendously due to the impact of COVID-19 and has led to increasing unemployment. Moreover, fewer tourists to South Africa will also impact the neighbouring African countries as they base their marketing strategies on that of South Africa.[1039]

One of the first and most sensitive drawbacks is related to the cultural and spiritual realm. South Africa has numerous sacred sites that are often prohibited to tourists, such as Lake Fundudzi one of the only natural lakes in South Africa located in the Limpopo Province. As stated in Chapter 5, with VR, tourists can gain access to these sites. This is problematic for the Vha-Venda people because Lake Fundudzi is considered an extremely sacred site for them due to its religious legends.[1040] If VR makes this accessible, it is intrusive and contrary to these peoples beliefs.

Another drawback is that South Africa faces many technological challenges. The country cannot afford to purchase exorbitant VR technology and, therefore, it is rated as being behind in terms of some technological innovations.[1041] Another drawback is that South Africa has a shortfall of ICT skills, particularly in the areas of system analysts, programmers, maintenance experts and

[1038] This section will not discuss some of the drawbacks mentioned in the previous chapter because many of them are generalised and also apply to South Africa, such as health issues, privacy and security issues and other drawbacks.
[1039] M. Saayman & A. Saayman, 'International and African tourism markets for South Africa: an economic analysis', *Africa Insight* 33(1), 2004, p. 97.
[1040] G.A. Anyumba & M. Nkuna, 'Lake Fundudzi: a sacred lake in South Africa that is not open for tourism development', *African Journal of Hospitality, Tourism and Leisure* 6(4), 2017, pp. 1-2, 14-13; M. Gray, 2020, <https://sacredsites.com/africa/south_africa/lake_fundudzi.html>, access: 27 May 2021.
[1041] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, pp. 4117-4118; J. Swarbrooke, *The development and management of visitor attractions*, pp. 90, 361.

consultants.[1042] Furthermore, some stakeholders in tourism are sometimes resilient to adopting additional technologies because they are uneducated or unaware of how the new technologies operate.[1043]

Related to technological challenges is also the issue of the supply of electricity. The Electricity Supply Commission (ESCOM), the main electricity supplier in South Africa, regularly implements load shedding (or load reduction) in order to protect the power system from a total blackout.[1044] Load shedding impacts VR technology because it sometimes depends on electricity for functionality, especially HMDs (i.e., the Vive and Rift), which rely on computers to operate.[1045] The issue is that if the power returns after two hours of load shedding, it comes with a momentary surge which often harms the equipment needed for the development and maintenance of VR offerings.[1046] Load shedding also influences the cell towers of major mobile operator companies, namely MTM, Vodacom and Telkom. Cell towers usually have a spare battery for load shedding, but it only lasts six to twelve hours. If load shedding occurs regularly, the battery does not always fully charge as it takes about 12 to 18 hours. This results in degraded network connectivity and in most cases, this impacts the VR experience for tourists because the application requires a huge amount of data and a strong network.[1047]

Although ICTs are used in the development of tourism, there are still inequalities in terms of access, skills, use of ICTs and services,[1048] particularly in South Africa as it faces the so-called "digital divide". Based on a study conducted by the School of Literature, Language and Media at

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[1042] M.A. Anwar *et al*., 'The diffusion and impacts of information and communication technology on tourism in the Western Cape, South Africa', *Urban* 25(4), 2014, p. 537; P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4118; E. Mascho & N. Singh, 'Virtual tourism: use of "second life" for destination marketing', *Anatolia – An International Journal of Tourism and Hospitality Research* 25(1), 2014, pp. 142-143.

[1043] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa', *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4118.

[1044] H. Steenkamp *et al*., 'The influence of load shedding on the productivity of hotel staff in Cape, South Africa', *Expert Journal of Business and Management* 4(2), 2016, p. 70; ESKOM, n.d.(a), <https://loadshedding.eskom.co.za/LoadShedding/Description>, access: 7 October 2020.

[1045] I. Chirisa *et al*., 'Scope for virtual tourism in the times of COVID-19 in select African destinations', *Journal of Social Sciences* 64(1), 2020, p. 7.

[1046] P. Ankomah & T. Larson, 'Virtual tourism and its potential for tourism development in Sub-Saharan Africa'. *in* M. Khosrow-Pour (ed.), *Encyclopedia of Information science and technology*, p. 4118; ESKOM, n.d.(b), <https://loadshedding.eskom.co.za/LoadShedding/FAQ#section8>, access: 7 October 2020.

[1047] T. Mastrangelo, 2016, <https://www.blog.adva.com/en/virtual-reality-check-are-our-networks-ready-for-vr>, access: 22 April 2021; A. Kubheka, 'Load shedding has a knock-on effect on cellphone reception', *Daily News*, 9 December, 2019, p. 1.

[1048] V. Minghetti & D. Buhalis, 'Digital divide in tourism', *Journal of Travel Research* 49(3), 2010, p. 267.

the University of Witwatersrand and Research ICT Africa, the main reason for a lack of VR usage is that the majority of people do not have access to the internet.[1049] In South Africa, the internet is confined to "city-dwellers relatively affluent and well educated". [1050] Based on the statistics, 39% of the White population have access to the internet, while only 5% of African South Africans have access to the internet.[1051] This is in a total population comprising, 80% of Black South Africans and 7.9% of White South Africans.[1052] According to the above-mentioned study, many participants do not understand what the internet is and how to use it.[1053] Another reason is that many people struggle to grasp concepts for which no terminology exists in their mother tongue.[1054] It is estimated that in South Africa eight million people struggle to read and write in English, however, only 3% of the eight million use the internet.[1055] This is a major challenge as it can lead to digital and social exclusion. As a result, people cannot benefit from arising opportunities with VR and tourism. Furthermore, the digital divide also impacts tourism competitiveness. V. Minghetti and Buhalis state that this creates and/or deepens economic and social inequalities between destinations and tourists.[1056]

6.9 Concluding remarks

The aim of this chapter was to consider VR in a South African context. It focused on how South Africa went from being a popular tourism destination among international tourists and tourists from Africa after 1994 and how tourist numbers declined in recent years. This is ascribed to crime, political instability and health issues all of which impacted on tourists' decision-making process. In addition, the media also contributed to a negative image of South Africa. The situation was further compounded by the COVID-19 pandemic.

[1049] L. Ferreira, '15% van webgebruikers is Afrikaans, wys studie', *Beeld*, 29 November, 2012, p. 10.
[1050] P. Blignaut, 'A bilateral perspective on the digital divide in South Africa', *Perspectives on Global Development and Technology* 8, 2009, p. 583.
[1051] P. Blignaut, 'A bilateral perspective on the digital divide in South Africa', *Perspectives on Global Development and Technology* 8, 2009, p. 589.
[1052] M.C. Alexander, 2018, <https://southafrica-info.com/people/south-africa-population/>, access: 3 November 2021.
[1053] L. Ferreira, '15% van webgebruikers is Afrikaans, wys studie', *Beeld*, 29 November, 2012, p. 10.
[1054] P. Blignaut, 'A bilateral perspective on the digital divide in South Africa', *Perspectives on Global Development and Technology* 8, 2009, p. 595.
[1055] L. Ferreira, '15% van webgebruikers is Afrikaans, wys studie', *Beeld*, 29 November, 2012, p. 10.
[1056] V. Minghetti & D. Buhalis, 'Digital divide in tourism', *Journal of Travel Research* 49(3), 2010, p. 271.

It is for this reason that it was argued that VR could play a critical role in the tourism industry in South Africa. As indicated by the examples discussed earlier, the idea of VR is not new in the South African tourism context. VR offers the South African tourism industry many benefits, including marketing; sustainability and preservation; tourism planning; accessibility; education and entertainment, as well as VR as a democratising tool, revenue provider, benefit to health, and dealing with physical distancing, safety and security. In terms of marketing VR could play a key role as it might encourage tourists to visit South Africa again, especially when COVID-19 passes or settles. Another benefit is that VR offers poor and wealthy tourists an equal opportunity to experience a destination. Moreover, with VR, PwDs also have the opportunity to experience the country as it removes physical barriers. However, on the downside VR in terms of South Africa faces numerous drawbacks, such as loss of revenue, technological issues, the digital divide and access issues, which prevents many of its citizens to participate. Based on the results mentioned in this chapter, VR can be embraced in South Africa, but cannot develop to its full potential because of the numerous challenges that still need to be addressed.

Chapter 7: Virtual reality and conventional tourism models

7.1 Introduction

Over the past half century as tourism has evolved as a topic of intense academic research, a plethora of tourism-related models have been developed by tourism scholars. In Chapter 7, it will be argued that many of these models correspond in some way with VR. This chapter focuses on a selection of the most renowned of these tourism models and uses them as tools to assess VR in the context of conventional tourism. The models selected for this analysis include: C.A. Gunn's (1972) functioning tourism system model; N. Leiper's (1979) tourism system model; A. Mathieson and G. Wall's (1982) tourist decision-making process model; RW. Butler's (1980) destination life-cycle model and finally S.L.J Smith's (1994) tourism product model. Chapter 7 is divided into two sections. In section one, it explains these tourism models, while the second section discusses to what degree VR aligns with these models. This then presents another perspective of how VR complies with or deviates from the key components expounded in these models.

7.2 Conventional tourism models

In 1972, Gunn developed the "functioning tourism system" which comprises of two key components – a demand-side and a supply-side (See Figure 8).[1057] The first component is the demand-side that refers to "who" is buying the product, that is to say, the tourist.[1058] Gunn's model shows that tourists must essentially have the desire to travel, the necessary funds, time and physical ability.[1059]

[1057] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1058] J. Fletcher *et al*., *Tourism: principles and practice*, p. 14.
[1059] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.

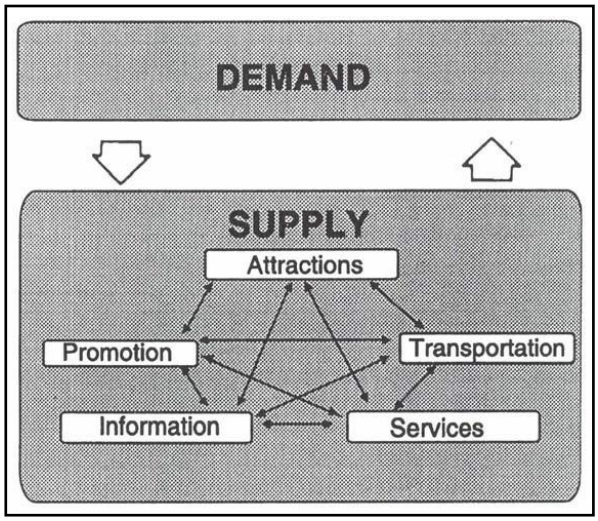

Figure 8: Gunn's original model of 1972

From: University of Idaho, n.d. <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.

The second and main component is the supply-side, which refers to "what" is being produced to meet the demand of the market, in other words, the tourism-related services, products or experiences.[1060] According to Gunn, the five main elements of the supply-side are attractions, services, transportation, information and promotion.[1061] "Attractions" are a key element in the supply-side as they aim to "pull" or draw tourists away from their homes.[1062] Scholars do not have a universal definition for the word "attraction",[1063] but Gunn defines them as "developed locations that are planned and managed for visitor interest, and enjoyment",[1064] while J.C. Holloway defines them as "any site that appeals to people sufficiently to encourage them to travel there in order to visit it".[1065] Conventional tourism attractions can range from the most iconic, for instance, the

[1060] J. Fletcher *et al*, *Tourism: principles and practice*, p. 14; S.J. Page & J. Connell, *Tourism: a modern synthesis*, p. 110.
[1061] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1062] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021; C.A. Gunn, *Vacationscape designing tourist regions*, p. 20.
[1063] J.C. Holloway, *The business of tourism*, p. 214.
[1064] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1065] J.C. Holloway, *The business of tourism*, p. 215.

Eiffel Tower, in France, to those off the beaten track, for example, the Drakensberg Mountain range, in South Africa.

The second important element in Gunn's model is "services" (or the hospitality service industry).[1066] The service sector is a vital component in conventional tourism as it is a service-intensive industry. Although Gunn uses the terms "services" he does not define it as such. The word "service" is however a complicated word.[1067] For B. Sparks, "service" can be interpreted as "the service provided in the delivery of a tangible product to the customer or the product itself (such as travel bookings)".[1068] The *Cambridge Dictionary* defines "service" as "a government system or private organisation that is responsible for a particular type of activity or for providing a particular thing that people need".[1069] A service can be either intangible (i.e., the tourist cannot take the physical product home), perishable (i.e., if the product is not sold soon, it will decay), heterogeneous (i.e., the offerings are variable) or inseparable (i.e., the tourist and the developer have to be present).[1070] Some services in conventional tourism include travel agencies, tour busses, car hires and airlines,[1071] as well as accommodation, packaged tours and curios.

Attractions and services are of little value without "transportation".[1072] Tourism and transport are inseparable as it is impossible for tourism to function without transportation.[1073] This is because transportation connects the destination with tourists.[1074] Another reason is that it also allows tourists to consume the products and experiences.[1075] In addition, transportation gives destinations access to the tourist markets.[1076]

[1066] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1067] A. Zehrer *et al*, 'Services research in tourism: advocating the integration of the supplier side', *Journal of Vacation Marketing* 20(4), 2014, p. 355; C.A. Gunn, *Vacationscape designing tourist regions*, p. 20.
[1068] B. Sparks, 'Service', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 846.
[1069] Cambridge Dictionary, 2021c, <https://dictionary.cambridge.org/dictionary/english/service>, access: 24 June 2021.
[1070] B. Sparks, 'Service', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 846.
[1071] L.J. Lickorish & C.L. Jenkins, *An introduction to tourism*, p. 5.
[1072] C.A. Gunn, *Vacationscape designing tourist regions*, p. 20.
[1073] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 96; C. Cooper, *Essentials of tourism*, p. 221.
[1074] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1075] S.J. Page & J. Connell, *Tourism: a modern synthesis*, p. 142.
[1076] C. Cooper, *Essentials of tourism*, p. 222.

Another important element is "information" as Gunn argues that tourists might never reach their destination without it.[1077] As indicated in Chapter 1, tourism is an information-intensive industry, and, therefore, relies on information.[1078] The *Oxford English Dictionary* defines the word "information" as the "imparting of knowledge in general".[1079] In terms of tourism, Gunn states that "information" is used to create maps, guide books, videos, magazine articles, tourist guides' narratives, brochures, the internet and tourists' memories.[1080]

The last element of Gunn's tourism model is "promotion". In tourism, promotion is a vital element because it has linkages to the other components in the tourism model. Promotion consists of four important activities: namely advertising (paid); publicity (unpaid); public relations and incentives (gifts and discounts).[1081]

Leiper's conventional tourism model is also popular among tourism scholars due to his holistic framework to understand and manage tourism. In 1979, Leiper developed what he called the "tourism system" (See Figure 9). This tourism model comprises of tourists, geographical elements and the tourism industry.[1082] Similar to Gunn's model, Leiper's model also shows that tourists are vital actors as the tourism industry is a human experience.[1083] In addition, tourists also "initiate the demand for travel for tourism purposes".[1084]

[1076] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1077] C.A. Gunn, *Vacationscape designing tourist regions*, p. 21.
[1078] Owlgen, 2020, <https://www.owlgen.in/discuss-the-role-of-information-in-tourism/>, access: 25 June 2021.
[1079] Oxford English Dictionary, 2021, <https://www-oed-com.uplib.idm.oclc.org/view/Entry/194624?rskey=lePZHU&result=1#eid>, access: 20 January 2021.
[1080] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021; C.A. Gunn, *Vacationscape designing tourist regions*, p. 21.
[1081] University of Idaho, n.d., <https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.
[1082] F. Serra, 'System', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 926; C. Cooper, *Essentials of tourism*, p. 11.
[1083] C. Cooper, *Essentials of tourism*, p. 11.
[1084] J. Fletcher *et al, Tourism: principles and practice*, p. 7.

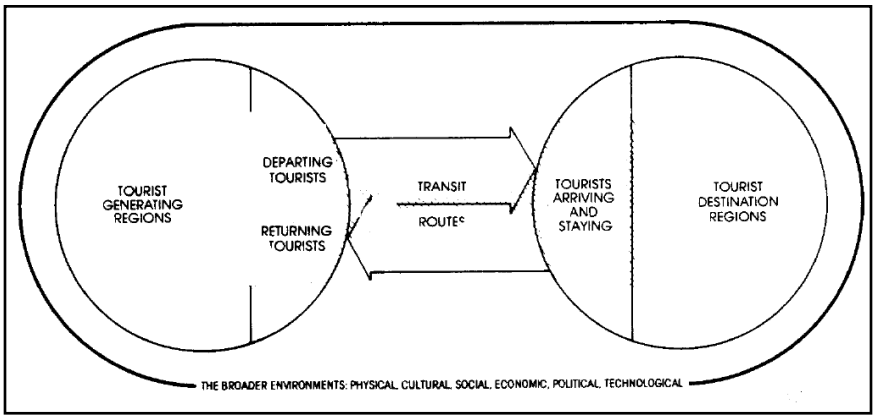

Figure 9: The conventional tourism system

From: N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 404.

The geographical elements consist of three main sections: the tourist generating region, the tourist destination region, and the transit and route region.

The "tourist generating region" is considered "the place where the tourist begins and ends" his/her journey, in other words, his/her home. It is at this stage that tourists search for information, book and depart from their homes.[1085] The "tourist destination region" is the area that attracts tourists to stay temporarily, namely the destination. It is at the tourist destination region where management and tourism strategies are implemented, as well as the full impact is experienced.[1086] In a sense, the tourist generating region and the tourist destination region align with G.M.S Dann's "push" factors (i.e., the reason tourists want to travel) and "pull" factors (i.e., features of the destination that encourage tourists to travel to the destination).[1087] In other words, the tourist destination region "pushes" tourists to travel, while the tourist destination region "pulls" them to it.[1088] The "transit and route region" are vital elements as they connect the tourist generating region with the tourist destination region and include destinations tourists visit on route. Thus, they provide access to the

[1085] N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 396; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 4; J. Fletcher *et al*, *Tourism: principles and practice*, p. 7.
[1086] N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 397; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 4; C. Cooper, *Essentials of tourism*, p. 12.
[1087] G.M.S. Dann, 'Tourist motivation an appraisal', *Annals of Tourism Research* 8(2), 1981, pp. 190-191.
[1088] J. Fletcher *et al*., *Tourism: principles and practice*, pp. 7-8.

destination and "influence the size and direction of tourist flows".[1089] Based on the model, and shown in Figure 9, tourists' travel journey begins at the tourist generating region, passes through the transit and route region and finally ends at the tourist destination region. The flow also works vice versa as the tourist returns.[1090]

In terms of the tourism industry, it includes all the tourism organisations, companies and facilities that are involved in meeting the demands and needs of tourists, such as tourist information centres and accommodation establishments.[1091] Lastly, according to Leiper's tourism system, there are five external factors[1092] that influence the elements, namely: physical, cultural, social, political and technological.[1093]

Another model that is popular among tourism scholars and also stood the test of time is the framework of Mathieson and Wall. They are well-known for their invention of the "tourist decision-making process" model developed in 1982. They provide five phases of the tourist's travel-buying behaviour, such as the felt need or travel desire; information collection and evaluation; travel decisions; travel preparations and travel experience; and travel satisfaction evaluation (See Figure 10).

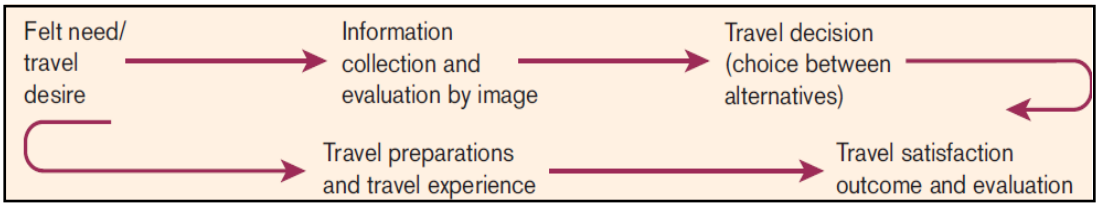

Figure 10: The conventional tourist-buying behaviour

From: J. Fletcher *et al*., *Tourism: principles and practice*, p. 58.

[1089] N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 397; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 4; J. Fletcher *et al*., *Tourism: principles and practice*, p. 8.
[1090] G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 5.
[1091] J. Fletcher *et al*, *Tourism: principles and practice*, p. 7; C. Cooper, *Essentials of tourism*, p. 13; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 5.
[1092] The study does discuss these factors, as they have been addressed in Chapters 5 and 6.
[1093] N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 404; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 4; J. Fletcher *et al*., *Tourism: principles and practice*, p. 5.

At the "felt need or travel desire phase", tourists want to travel and, therefore, weigh the reasons for and against the desires.[1094] Tourists will then move to the information collection and evaluation stage. During this second phase, tourists obtain information through travel agents, advertisements, brochures, other tourists, as well as friends and family. Tourists then assess the information against constraints, such as economic and time limitations, the cost of an alternative trip, accessibility and domestic pressures.[1095] Afterwards, in the travel decisions phase, tourist select the destination, transport method, accommodation and activities.[1096] The holiday then begins with the travel preparations and travel experience phase. At this stage, tourists then book and confirm the holiday, arrange clothing and equipment.[1097] The last phase of the model that tourists will experience is the travel satisfaction evaluation phase. In this last phase, tourists evaluate the tourist experience during and after the trip. This will determine if the tourist will travel again.[1098]

Mathieson and Wall determine that these phases are influenced by four main factors, namely the tourist profile; travel awareness; destination resources and characteristics; and trip features (See Figure 11).[1099]

[1094] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28; J. Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1095] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28.
[1096] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1097] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1098] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1099] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 28; Fletcher *et al*., *Tourism: principles and practice*, p. 58.

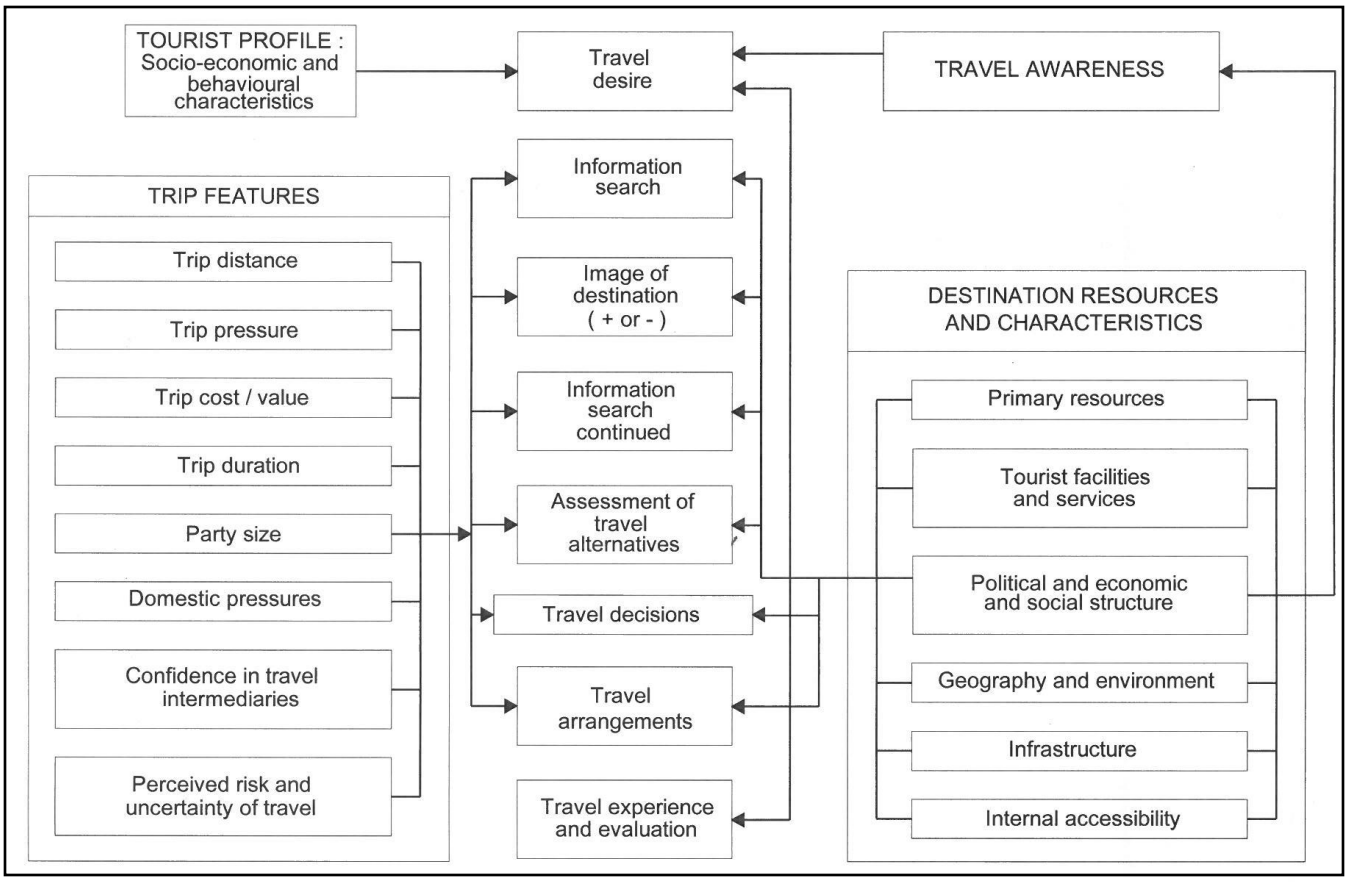

Figure 11: The conventional tourist decision-making process

From: A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 27.

The tourist profile consists of socio-economic and behaviour factors. The socio-economic characteristics include tourists' age, education, income, previous motivations and experiences that influence their decisions. For example, a low-income tourist cannot travel due to expensive transport costs, hotels and restaurants.[1100] Behaviour characteristics also influence the decision-making process, especially the needs, motivations, attitudes and values of tourists.[1101] For example, tourists might travel in order to satisfy their need for change or be motivated to travel to a cultural destination due to their interest in a particular folklore.[1102]

[1100] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 29; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1101] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 29; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1102] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, pp. 29, 30, 31.

The second factor in the model is travel awareness. If tourists are not informed about the destination, they will not travel. Therefore, as mentioned by Gunn, information plays a key role as it forms the image of the destination. Potential tourists obtain information either through formal (e.g., magazines, travel brochures, advertisements and travel agents) or informal sources (e.g., comments from other tourists, friends and family).[1103]

The next factor is destination resources and characteristics. According to Mathieson and Wall, resources and characteristics of the destination influence the decision-making process, particularly the attraction type, services, the condition of the environment and the host population, as well as, physical barriers (e.g., customs) and accessibility of the destination.[1104]

The final factor in the Mathieson and Wall model is trip features. The model shows that the following features influence tourists during the decision-making process: distance, trip duration, time constraints, the cost of the holiday, the size of the tour group, confidence in travel arrangements and travel agents, and perceived risk of the area.[1105]

Another often-cited model was developed by Butler in 1980. Butler devised the "TALC" model to indicate the different stages of a destination undergoes (See Figure 12). As is portrayed in the model, a destination passes through a number of key phases in its life-cycle: the exploration stage; the involvement stage; the development stage; the consolidation stage; the stagnation stage; the decline stage and finally the rejuvenation stage.[1106]

[1103] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 31; Fletcher *et al*., *Tourism: principles and practice*, p. 58.
[1104] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 32; Fletcher *et al*., *Tourism: principles and practice*, p. 59.
[1105] A. Mathieson & G. Wall, *Tourism: economic, physical and social impacts*, p. 32; Fletcher *et al*., *Tourism: principles and practice*, p. 59.
[1106] D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 12.

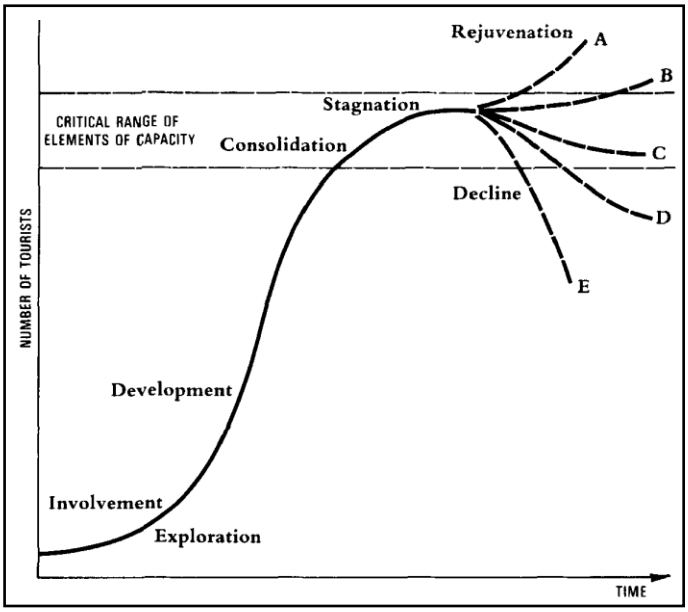

Figure 12: The conventional tourism destination life-cycle

From: R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, p. 7.

In the exploration stage, small groups of what Cohen terms "explorers"[1107] and S.C. Plog terms "allocentrics"[1108] visit the destination as it is still mostly unspoiled and underdeveloped. At this stage, according to Butler, there is physical interaction between visitors and locals. Moreover, the explorers and allocentrics will mostly use local facilities because the infrastructure during the exploration stage is not suitable for tourists as it has not been developed.[1109]

Following the exploration stage, is the involvement stage. During the involvement stage, the number of visitors begins to increase. There is still physical interaction between locals and visitors.

[1107] Explorers often select independently organised trips to get away from the 'beaten track' and prefer comfortable accommodation and reliable transport. Fletcher *et al*., *Tourism: principles and practice*, p. 49.
[1108] Allocentrics are adventurous and self-assured and prefer unspoiled and undiscovered destinations. Fletcher *et al*., *Tourism: principles and practice*, p. 46.
[1109] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, pp. 6-7; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 12; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 5; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

The locals begin to realise the potential of tourism and start to provide facilities for tourists. At this stage marketing and a tourism season start to emerge.[1110]

The next stage is the development stage when the destination gains popularity. It can also be noted that during the development stage, there are more tourists compared to locals. The type of tourist changes to what Plog calls "mid-centrics"[1111] and Cohen refers to as the "institutionalised tourist".[1112] However, the locals' involvement is now decreasing and they are being replaced by external organisations that bring in auxiliary facilities, update the existing facilities and import labour to cater for the tourists. They also advertise natural and cultural attractions and supplement them with imported facilities.[1113]

The fourth stage in Butler's TALC model is the consolidation stage when the destination is in its "heyday" phase. The number of tourists still increases and the destination's economy now depends heavily on tourism. Unfortunately, many tourists now consider the old facilities as outdated and so, external organisations start to replace old facilities, which leads to a situation where locals begin to oppose tourism.[1114]

The stagnation stage is the next stage in the Butler's TALC model and it is here that tourist numbers reach their peak. The type of tourist changes to what Cohen defines as the "organised mass

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[1110] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, pp. 7-8; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 13; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 6; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

[1111] Mid-centrics visit a destination during the destination's "heyday". H.J. Gibson, 'Tourist', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 958.

[1112] The institutionalised tourist prefers the tourist routine organised by tour operators, travel agents, hoteliers and transport operators. J. Fletcher *et al*., *Tourism: principles and practice*, p. 49.

[1113] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, p. 8; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 13; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 6; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

[1114] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, p. 8; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism*, p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 13; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 7; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

tourist"[1115] and Plog classifies as the "psychocentric tourist".[1116] The destination becomes old-fashioned and tourists no longer show interest in the destination. For this reason, the destination depends on repeat visitation and lower-income tourists. Furthermore, environmental, social and economic issues also now become noticeable. In addition, natural and cultural attractions deteriorate and are replaced with artificial facilities by external organisations.[1117]

After the stagnation phase, a destination can either pass through the decline phase or the rejuvenation phase, or both. This depends on how popular the destination is among tourists. Regarding the decline phase, the destination is considered in a tourism slump due to overuse of resources or war or disease or catastrophic events (as shown by Curves D and E). The locals' involvement increases again as they mostly visit the destination and purchase rundown facilities. Many of the facilities at the destination are replaced by the locals with non-tourist infrastructure, for example, hotels are sometimes turned into apartments or retirement homes.[1118]

The last alternate stage of the TALC model is the rejuvenation stage in which the destination can be restored to its former glory. This can be achieved by successful redevelopment, minor modification and adjustment to capacity levels and protection of resources, through renewal of policies and strategies, exploring new markets, using facilities for new purposes, upgrading facilities and adding human-made attractions (as shown in Curves A, B and C).[1119] Butler's model of a destination life-cycle remains relevant as it continues to be cited.

[1115] The organised mass tourist wants an organised tour, but with more flexibility in terms of scope and choice. They usually do not know the destination. Fletcher *et al*., *Tourism: principles and practice*, p. 49.

[1116] The psychocentric tourist prefers the "comfort of a well-developed and "safe destination". Fletcher *et al*., *Tourism: principles and practice*, p. 46.

[1117] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, pp. 8-9; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism* p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 14; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 7.

[1118] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, pp. 9, 10-11; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism* p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 14; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler (ed.), *The tourism area life cycle, vol. 1: applications and modifications*, pp. 7-8; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

[1119] R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, pp. 9, 11; D.F. Thiel-Ellul & E. Navarro-Jurado, 'Destination lifecycle', *in* J. Jafari & H. Xiao (eds.), *Encyclopedia of tourism* p. 246; P. Van Dyk, *Introduction to tourist guiding*, p. 14; R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *in* R.W. Butler

Scholars also rely on S.L.J Smith's "tourism product" model developed in 1994. In this model, a conventional tourism product consists of five elements: the physical plant; service; hospitality; freedom of choice; and involvement (See Figure 13).[1120] His model shows that at the core of a tourism product is the "physical plant" which refers to the site, a natural resource, a facility (e.g., a waterfall, wildlife and a resort), fixed property (e.g., a hotel), mobile equipment (e.g., a cruise ship) and conditions of the physical environment (e.g., the weather, water quality, crowding and the infrastructure). The physical design is a vital component because it influences the experience and provides tourists with natural and cultural resources on which tourism is constructed. To assess the quality, Smith argues that it is important to determine if the design of the product enhances the tourist experience, protects the environment and is accessible to PwDs.[1121]

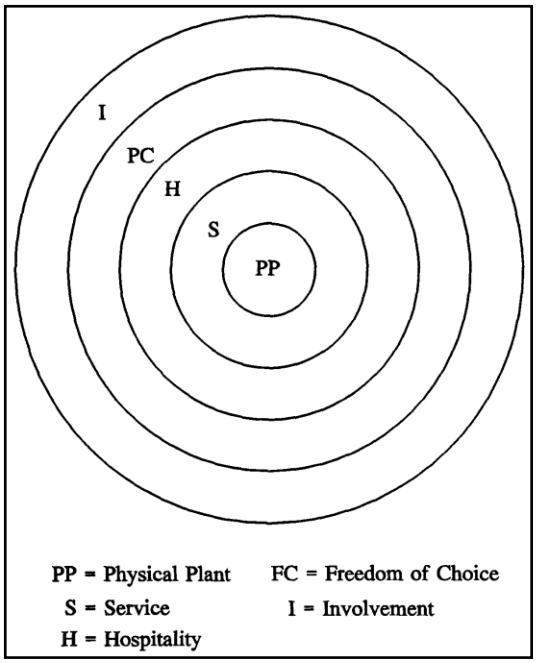


Figure 13: The conventional tourism product

From: S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 587.

(ed.), *The tourism area life cycle, vol. 1: applications and modifications*, p. 9; G. Lohmann & A. Panosso Netto, *Tourism theory: concepts, models and systems*, p. 217.

[1120] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 582.

[1121] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 588; S.L.J. Smith, 'The tourism product', *in* S. Williams (ed.), *Tourism: the nature and structure of tourism*, p. 235.

The second element in the tourism product is "services". In the context of the tourism product, "services" are the "performance of specific tasks required to meet the need of tourists".[1122] For example, for a hotel to function as a hotel, it needs management, front desk personnel, housekeeping, maintenance, as well as food and beverage provisions. According to Smith, to assess the quality of the tourism service, it is necessary to observe the "performance of employees against objective criteria that specify the types and level of technical knowledge".[1123]

The next element in the model is "hospitality". For Smith, hospitality is "the attitude or style in which the task is performed", for example, the "expression of welcome by local residents to tourists arriving in their community".[1124] It is more difficult to assess hospitality compared to services. The reason for this Smith argues is that hospitality is more subjective than services. However, managers can assess the quality of hospitality through solicited and unsolicited feedback questionnaires.[1125]

Following hospitality, is the "freedom of choice" which means that there must be various options for tourists to choose from in order to have a satisfactory tourist experience, but it also includes surprises and spontaneity. The degree of freedom depends on the type of tourism (i.e., pleasure, business or family), the budget, previous experience, knowledge, the travel agent and pre-packaged tours. It is vital to offer tourists options as it provides tourists a sense of control and satisfaction.[1126]

The last element in Smith's model is "involvement". In terms of tourism, involvement includes physical, intellectual and emotional, as well as the sense of engagement. Involvement also "takes the quality of "flow" in which the participant "loses" himself [herself] in an activity". This means tourists can focus on the activities associated with the trip. According to Smith, involvement combined with the other four elements, will guarantee quality and a satisfying tourism product.[1127]

[1122] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 588; S.L.J. Smith, 'The tourism product', *in* S. Williams (ed.), *Tourism: the nature and structure of tourism*, p. 235.
[1123] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 588; S.L.J. Smith, 'The tourism product', *in* S. Williams (ed.), *Tourism: the nature and structure of tourism*, p. 235.
[1124] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 588; S.L.J. Smith, 'The tourism product', *in* S. Williams (ed.), *Tourism: the nature and structure of tourism*, pp. 235-236.
[1125] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 588; S.L.J. Smith, 'The tourism product', *in* S. Williams (ed.), *Tourism: the nature and structure of tourism*, pp. 235-236.
[1126] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, pp. 589-590.
[1127] S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 591.

7.3 Virtual reality tourism models

This section assesses the similarities between VR and conventional tourism. In other words, it appraises the VR dimension in terms of the five conventional tourism models by Gunn, Leiper, Mathieson and Wall, Butler and Smith.

Gunn's functioning tourism system shows that VR is similar to conventional tourism because the elements mentioned in the model are identical to the VR tourism system (See Figure 14). In Gunn's model, as well as in Leiper's model, tourists are the key component in the tourism industry as they are part of the demand-side. This is also the case with VR. However, in VR conventional tourists transform to virtual tourists. Many tourism companies and organisations rely on virtual tourists to purchase and use their VR-related products and services. Therefore, VR tourism cannot function without virtual tourists.

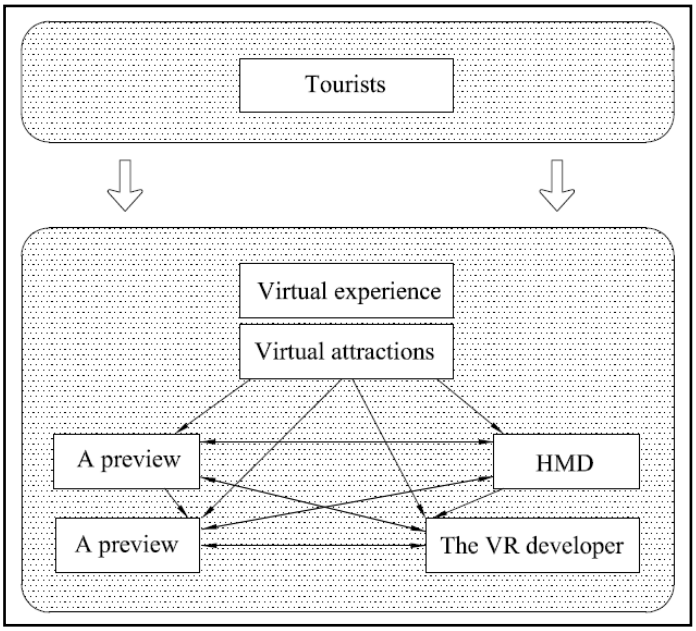


Figure 14: The VR tourism functioning system

From: University of Idaho, n.d.,<https://www.webpages.uidaho.edu/css386/Readings/Gunn_Var_Ch2_Tourism_as_System.pdf>, access: 7 July 2021.

The next vital component in Gunn's model is the supply-side. The five elements of the supply-side can be related to VR. In comparison to conventional tourism, attractions are also a critical element in VR as. tourists mainly use VR to "visit" the virtual version of the actual attractions.

The second element that applies to VR is transportation as in VR, transportation is important because it also links tourists and destinations with one another. As mentioned in Chapter 3, the "transport method" tourists use to access the virtual destination is through an HMD. Although an HMD is not considered the conventional tourism transport method (e.g., tour bus, airline and train), it also "transports" tourists from their home to the destination. The HMD creates the illusion that tourists feel like they are being transported to an alternative world and once they remove it, they are transferred back to their reality. There are also other VR "transport methods". These include drones, the internet, films and television series, games, smartphone apps, and 360° videos and images. For example, as discussed in Chapter 4, Google Maps and Street View transfer tourists automatically to the Kruger National Park, where they are able to view the wildlife as if they were on an actual tour bus because it allows them to navigate from any direction.

The following element of Gunn's model is services. It is argued that VR developers are regarded as the service providers in VR because they provide the product that the tourist needs, in other words, the VR experience. This means that VR is considered an intangible service because tourists are unable to physically touch the VR product or take it home. For example, tourists are unable to physically "touch" Groot Constantia in VR. As a result, they are only able to experience the VR product virtually.

The next two elements of Gunn's model that also apply to VR are information and promotion. As stated in Chapter 5, VR is a superior marketing and information tool due to the "try before buy" concept. With VR, tourists obtain more information about the real destination, such as Robben Island, by exploring the virtual version of the destination. This might motivate them to visit the physical destination. As a result, the real destination is promoted. Therefore, it is noted that VR has a dual function here as it provides information and also motivates the tourist to visit the actual destination.

It is also apparent that the VR tourism system is similar to Leiper's conventional tourism model (See Figure 15). As shown by Gunn's model, Leiper's model also indicates that tourists are a critical aspect of VR as it relies on tourists and, therefore, cannot function without them.

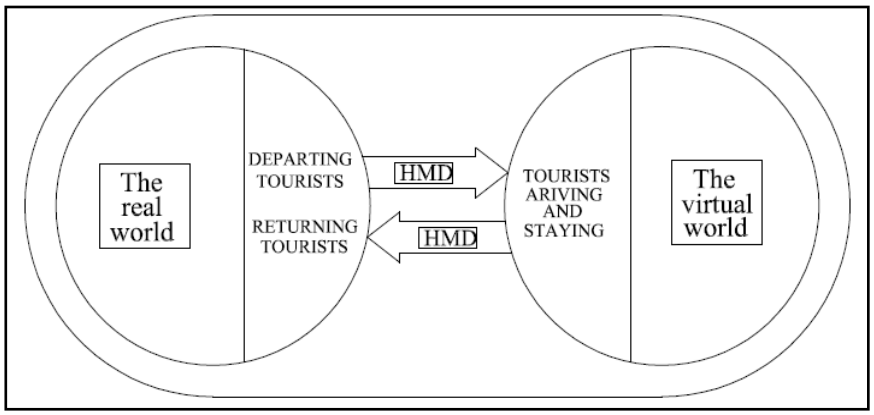


Figure 15: The VR tourism system

Adapted from: N. Leiper, 'The framework of tourism towards a definition of tourism, tourist, and the tourist industry', *Annals of Tourism Research* 6(4), 1979, p. 39.

In terms of geographical elements, VR also comprises of a similar three elements. The tourist generating region in VR is considered as the "real world". It is in the tourist generating region where the tourist has to face reality and the issues associated with it, especially crime, political instability and health-related problems. Hence, these issues "push" tourists away from their reality to the tourist destination region. The "virtual world" is the equivalent of the tourist destination region and "pulls" tourists towards it. As mentioned in Chapter 5, the virtual world provides tourists with a sense of escapism as it allows them a temporary escape from their reality and its issues. The reason is that the HMD that takes tourists through the transit and route region to the virtual destination and back to their reality. Thus, according to the model, tourists travel from the tourist generating region (i.e., their reality) pass through the transit and route region through an HMD and end at the tourist destination region (i.e., the virtual destination, such as Dinaledi Chamber) (See Figure 15).

Leiper's third aspect, the tourism industry, also shows that VR has similarities. In VR, the tourism industry consists of tourism organisations and companies that order VR-related services and products from VR companies to offer tourists the VR tourist experience. For example, Western Cape Tourism has asked Wesgro, the developer, to develop the "One Day" campaign to promote the region ahead of the post-COVID-19 tourism period. It can therefore be argued that Leiper's model shows that the VR is similar to conventional tourism.

The third model of Mathieson and Wall's conventional tourist decision-making process can also be applied to VR as it also indicates similarities between conventional tourism and VR (See Figure 16). This is also supported by a study by J. Bulchand-Gidumal and E. William. According to their study, VR assists tourists during their decision-making process. VR provides a preview of the country so that tourists can decide if South Africa, for example, is worth the visit, especially during the felt need or travel desire phase, and information collection and evaluation phase.[1128] This allows tourists to check whether the destination, transport method and activities meet their specific needs. At the travel decisions phase, and the travel preparations and travel experience phase, tourists can physically select and book a trip to South Africa, as well as the transport method, accommodation and activities associated with the holiday.[1129] This leads to the last phase, namely the travel satisfaction evaluation phase. Bulchand-Gidumal and William state that VR is useful in the post-travel phase[1130] in particular, once COVID-19 has settled or has passed. In the travel satisfaction evaluation phase, the tourist is constantly evaluating the tourist experience which they often share with others on VR platforms, such as YouTube, Vimeo, Facebook, Instagram and Kuula.[1131] Here VR is essentially used in tandem with conventional tourism to enhance the process and reflect on the tourist experience.

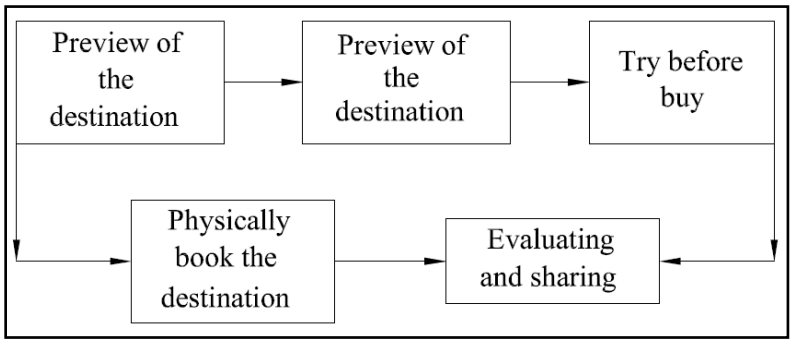


Figure 16: The virtual tourist buying behaviour

Adapted from: J. Fletcher *et al*., *Tourism: principles and practice*, p. 58.

[1128] J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*., (eds.), *Handbook of e-Tourism*, pp. 6, 8.
[1129] J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*., (eds.), *Handbook of e-Tourism*, pp. 6, 8.
[1130] J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*., (eds.), *Handbook of e-Tourism*, pp. 7, 9.
[1131] J. Bulchand-Gidumal & E. William, 'Tourists and augmented and virtual reality experiences', *in* Z. Xiang *et al*., (eds.), *Handbook of e-Tourism*, p. 9.

As noted, the four factors that influence the phases according to Mathieson and Wall are the tourist profile, travel awareness, destination resources and characteristics, and trip features (See Figure 17).

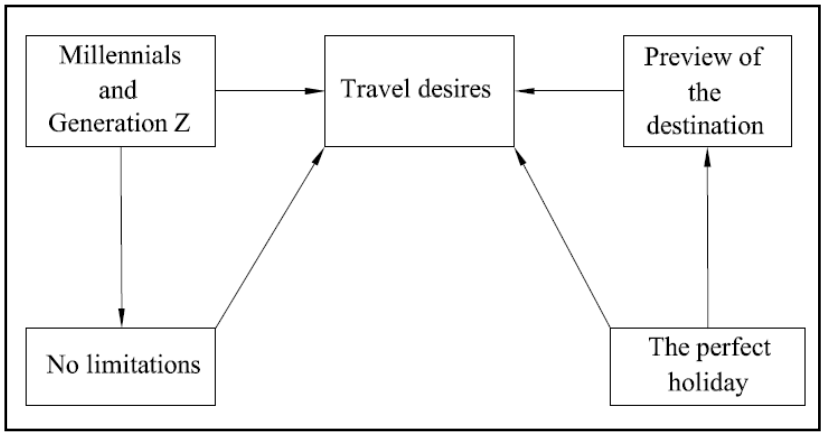


Figure 17: The virtual tourist decision-making process

Adapted from: A. Mathieson and G. Wall, *Tourism: economic, physical and social impacts*, p. 27.

In terms of the tourist profile, it is argued that VR is popular among Millennials and Generation Z (1997-2012) population groups. In fact, according to Statistics South Africa, Millennials and Generation Z consist of 35% of the total South African population.[1132] Due to the young population, VR is increasing in popularity.[1133] A reason for this is that Millennials and Generation Z are known as the "digital nomad population[s]"[1134] as they have grown up with ICT technologies and the internet, therefore, they perform all the stages of tourism through their smartphones and the internet.[1135] This despite the earlier discussed digital divide and wealth gap.

As discussed earlier, travel awareness is also a key factor. Information plays an important role because it forms the image tourists have about a destination such as South Africa. VR provides information by allowing tourists to preview the country virtually.

[1132] J. Evans, 2018, <https://www.news24.com/news24/SouthAfrica/News/south-africa-is-young-and-female-stats-sa-report-20180723>, access: 12 July 2021.
[1133] S. Monaco, 'Tourism and the new generations: emerging trends and social implications in Italy', *Journal of Tourism Futures* 4(1), 2018, p. 11.
[1134] I. Slivar *et al*., 'Leisure travel behavior of generation Y and Z at the destination and post-purchase', *E-Journal of Tourism* 6(2), 2019, p. 152.
[1135] E. Ketter, 'Millennial travel: tourism micro-trends of European Generation Y', *Journal of Tourism Futures* 7(2), 2020, p. 195.

The next two factors are the destination resources and characteristics and then trip features. Regarding these factors, VR provides tourists with the "perfect" holiday. As mentioned in Chapter 5, tourists do not have a negative tourist experience as in VR there are no distances, time constraints, other tourists and risks. For example, tourists are able to explore Robben Island virtually, without any barriers, such as accessibility and weather concerns. Moreover, tourists also have the opportunity to choose from a range of attractions and destinations. Lastly, tourists do not have to be concerned about destroying the environment as VR is considered a sustainable tool. For example, through the Dinaledi Experience App, tourists can explore the fragile archaeological site, Dinaledi Chamber, without causing any destruction to the actual excavation site. Visuals can also be shared of areas that are physically inaccessible and hard-to-reach.

Another model that shows that VR is related to conventional tourism is Butler's well-recognised TALC model (See Figure 18). Similar to a conventional tourism destination, a VR destination also does not pass through all the phases as will be evident in the following discussion. First-up, the exploration stage, the virtual destination[1136] is not well-known among people. Based on Cohen's explorers and Plog's allocentrics, the type of tourist interested in the virtual destination is called the "curious visitor"[1137] who by boredom or chance found the virtual destination on the internet. This is not unlike the limited number of tourists in the first phase of conventional tourism. However, there is one major difference with conventional tourism and that is that in VR there is no interaction between the visitor and the local VR company in this initial exploration stage.[1138] In terms of infrastructure, the quality of the virtual destination will be poor. The reason is that during the exploration stage, many tourism organisations and companies offer a basic or elementary virtual tour as it is cheaper for a start-up. The virtual destination portrayed requires further development and finances to evolve into a more specular virtual tourist experience. An example of this stage is the virtual tour of Robben Island and the Voortrekker Monument.

[1136] In terms of the study, the virtual destination consists of a simple 360° video/image or live-stream tour of an actual or fabricated destination.
[1137] The curious visitor has an eagerness to explore the virtual destination due to his/her curiosity.
[1138] For this study, "locals" refer to VR developers (company or individual-based) that develop services and products for tourism companies and organisations.

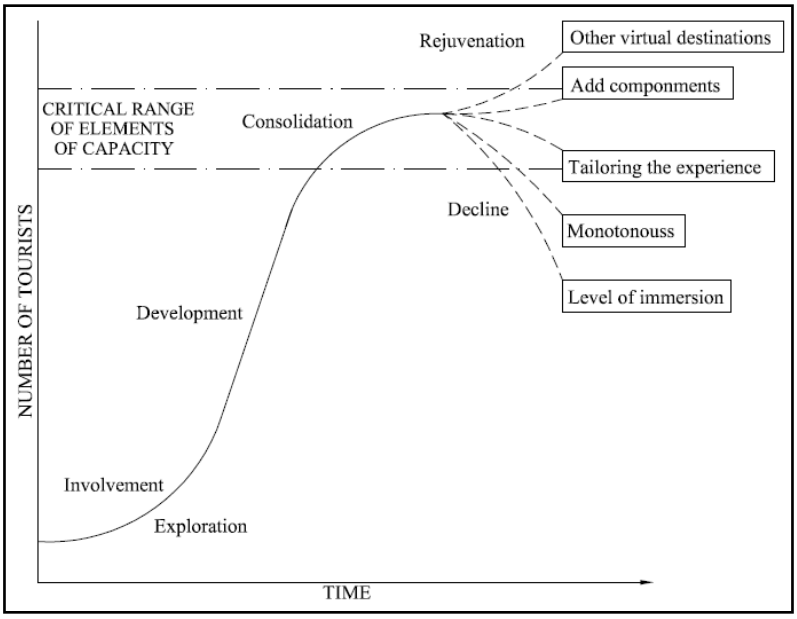


Figure 18: The virtual destination life-cycle

Adapted from: R.W. Butler, 'The concept of a tourist area cycle of evolution: implications for management of resources', *Canadian Geographer* 24 (1), 1980, p. 7.

After the exploration phase, is the involvement phase. During the involvement phase, locals begin to enter the tourism domain as tourist guides or narrators. In terms of VR, local VR companies also start to improve the infrastructure of the virtual destination to cater to tourists by adding other elements, such as improved sound to the virtual tour. They also begin to advertise the virtual destination through, for instance, virtual advertisements on the internet. This will then increase the popularity and the number of tourists. Again, Western Cape Tourism and Wesgro's "One Day" campaign is an example of this. As mentioned in Chapter 6, the local tourist guides conduct tours of famous attractions by using podcasts, photography, video and Street View, all of which are elements of VR.

Following the involvement phase, is Butler's development phase and it is here that the virtual destination is in its prime due to its popularity. The type of tourist changes to the so-called "virtual tourist".[1139] However, the popularity leads to some issues. As a result of the destination's popularity, there are more tourists compared to the number of local VR companies. In fact, VR has the potential to attract more tourists compared to conventional tourism. The reason is that, for

[1139] A virtual tourist is a person that enjoys exploring virtual destinations.

instance, an app of the virtual tour can be downloaded by many tourists in comparison to conventional tourism which only allows a certain limited number of tourists. As a result, local VR companies' involvement begins to decrease and they are then replaced by international VR developers. The international VR developers will change the virtual environment by upgrading the virtual destination and adding new components, such as an HMD. An example of this stage is the virtual walking tours offered by G Adventures, an international travel company.

The development phase leads to the consolidation phase when it can be argued that the virtual destination remains favoured among tourists. This can be seen and tracked in the number of downloads or viewers. The virtual destination also relies on tourism as the international VR developers are starting to charge entrance fees to tourists to view the destination. The virtual destination is changed from a basic 360° video/image virtual tour to a more immersive tour as they add new components, such as movement (e.g., touch) and sound. This leads to tourists ignoring the old 360° video/image virtual tour. As a result, local VR companies feel left out and retreat and often go bankrupt. It is argued that &Beyond and WildEarth's virtual safaris are now at the consolidation phase. The reason is that they are now extremely popular among tourists due to the COVID-19 pandemic and because of their offering of a private virtual session with a field guide.

As mentioned, conventional tourism does also not undergo all of Butler's life-cycle stages. Therefore, it is argued that the stagnation phase does not generally apply to VR. In contrast to a conventional tourism destination, the virtual destination will certainly not experience its peak in tourist numbers, destruction and issues (i.e., environmental, social and economic). The reason is that the destination is "virtual", in other words, it is non-existent, therefore not tangible or destructable. This means that the virtual destination can have numerous tourists and cannot be physically destroyed or face any similar issues. Moreover, the virtual destination does not have to rely on repeat visitation and lower-income tourists as can remain popular until the VR developer decides to remove it or update or change it so that it remains a trend.

As indicated earlier, after the stagnation phase, a destination can either pass through the decline phase or the rejuvenation phase, or both. This also applies to a virtual destination. In a sense, the virtual destination does not always experience the decline phase. As mentioned, the reason for this is that the virtual destination does not exist. But the virtual destination might start to lose tourists

if its popularity decreases. This can be due to the experience becoming monotonousness and boring or the level of immersion being limited (as shown by Curves D and E).

If the virtual destination experiences the decline phase, it can attract tourists again in the rejuvenation phase. International VR developers can offer tourists another aspect of the virtual destination, make the virtual tour more immersive by adding other components or tailor the experience according to the need of the tourist (as shown in Curves, A, B and C). It is noted that the VR destination can be seen to undergo the same phases as a conventional tourism destination according to Butler's TALC model.

Finally, based on Smith's tourism product model, there are similarities between conventional tourism and VR tourism (See Figure 19). The elements mentioned in the model by Smith are related to VR. The core aspect of Smith's tourism product is the physical plant and even though the physical plant is tangible, it can be applied to VR. The reason is that the physical plant has now changed to the "virtual plant". A virtual plant can be anything from a virtual waterfall, a virtual version of an actual hotel (e.g., Mount Nelson Hotel) to a fictional destination. The quality of the virtual plant can be assessed by determining if the design of the virtual plant is immersive enough to enhance tourists' experience.

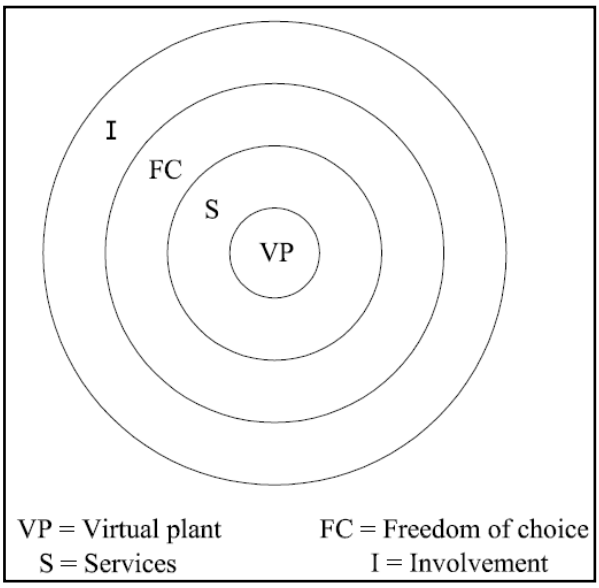


Figure 19: The virtual tourism product

Adapted from: S.L.J. Smith, 'The tourism product', *Annals of Tourism Research* 21(3), 1994, p. 587.

The second important element in Smith's model is services. As stated earlier in Gunn's model, services refer to the VR developers. Smith states that in order to assess the quality of the tourism service it is important to observe the performance of employees. However, in VR it changes as the tourism company or organisation has to check the VR developer's quality of the virtual experience. This can also be evaluated by the usage hits and online comments (i.e., tourism-related blogs, Twitter and Facebook).

The third element in Smith's model is hospitality. Although there is a human element (the VR developer) in VR, hospitality is not realistically applicable. The key reason is due to the fact that it does not allow any real human interaction, as discussed in Chapter 5. This underlines one of the key components that VR has yet to address. Another reason is that the virtual people, if there are any, do not show facial expressions. For instance, the avatars at Table Mountain in SL only indicate the facial expressions developed by the user. Regardless, it still is possible to assess the quality by sending electronic questionnaires to tourists. This enhances the tourist experience as the VR developer can improve the product to meet the need of the tourists, for example, through adding other visuals or additional sound.

Freedom of choice is the next element in Smith's model, where he claims that in order to enhance the tourism product, it is important to give tourists various options. With VR, tourists have a plethora of options. Moreover, VR developers can also add a surprise factor to the product while offering a range of options that allows tourists to select. For example, while tourists view a beach in Durban, they can be surprised by virtual birds flying towards them suddenly or dolphins appearing in the waves. Unlike conventional tourism, VR allows tourists to travel to South Africa at any time, including at a moment's notice regardless of the seasons, costs or risks. However, similar to conventional tourism, it is noted that the degree of freedom in VR depends on the type of tourist and their technological experience, and access to the VR technology.

The last element is involvement which is also a critical element in Smith's model. Even though VR does not provide tourists with total control of the product, they do have some control over the tourism product. This is because they can navigate the tourism product and select from a range of options depending on their particular requirements or interests. For example, Google Maps allows tourists to zoom in and out of the virtual Robben Island. As a result, tourists feel "present" at

Robben Island. Alternatively, they can choose between a more historical tour as opposed to a natural one and then select the tour option of their choice.

7.4 Concluding remarks

This chapter assessed the well-known tourism models by Gunn, Leiper, Mathieson and Wall, Butler and Smith as benchmarks of what conventional tourism entails. According to the results from this analysis, the models overwhelmingly correspond with VR. In the case of Gunn's model, VR has similar elements to what he sets out, namely the tourist (i.e., Millennials and Generation Z), attractions (i.e., virtual destinations), services (i.e., the VR developer), transportation (i.e., the HMD), and information and promotion (i.e., a preview of the destination). Leiper's model shows similarities, for example, virtual tourists also have to pass through the tourist generating region (i.e., their reality), the tourist destination region (i.e., the virtual world), and the transit and route region (i.e., HMDs). In the model by Mathieson and Wall, and supported by Bulchand-Gidumal and William, VR plays a vital role during tourists' decision-making process because it provides them with a preview of the destination. In addition, a virtual destination also passes through most of the phases in Butler's TALC model. Lastly, based on Smith's model, VR is considered as a tourism product it is similar to conventional tourism, as it has the same elements: the physical plant (i.e., virtual plant), service (i.e., the VR developer), freedom of choice (i.e., various options) and involvement (i.e., VR provides tourists a sense of control). This comparative analysis makes VR appear a more viable component of the spectrum of tourism offerings.

Chapter 8: A virtual reflection

8.1 Introduction

This thesis set out to explore a new trend in the tourism industry, namely VR. It utilised various methods and approaches to consider a number of aspects related to VR and its impact on the tourism industry in general terms, as well as in South Africa specifically. After considering how VR has been researched in the past, it presented a historical overview of the development of VR since its inception in the mid-twentieth century. Subsequent chapters considered its advantages or benefits, while others considered its shortcomings or barriers within the realm of tourism. Another assessment was made using models for conventional tourism and considering how VR either complied or fell short of these traditional tourism structures. In the context of this, this concluding chapter sets out to answer the initial research question, namely is VR considered as a new frontier or the end of conventional tourism?

The study has shown that tourism has increasingly relied on technology to process information as it is an information-intensive and information-driven industry and one such technology is VR. VR as we know it was only brought to the attention of the general public during the 1960s by Sutherland and other virtual pioneers, such as Link, Heilig, Krueger, Gibson and Luckey. From then on, VR has become one of the most significant technological advancements in the field of tourism, even though it was not specially developed for the industry. Therefore, it can be argued that VR has transformed the tourism industry radically.

In reflecting on VR within the tourism sector and to answer the key research question, this final chapter will consider how it has and could further transform the tourism industry from three distinct perspectives, which one can argue occurred chronologically. Initially, VR essentially enhanced existing conventional tourism, that is by merely improving the way tourism always functioned. The second perspective portrays the way in which VR transforms or changes conventional tourism by offering new and different dimensions to the usual way tourism operated or was practised. The third perspective goes even further, and is one which makes VR a type of tourism in its own right, and considers it as a possible new tourism niche.

8.2 Phase 1: Improvement phase

The first phase is known as the improvement phase (See Table 3). According to the *Cambridge Dictionary*, the word "improve" (or enhance) means "to (cause something to) get better".[1140] In terms of VR, "improve" is defined as adding something to the existing tourist experience to advance it, that is to make it work or function better. In this context, VR offered ways in which the conventional tourism product remained essentially the same, but was improved in terms of process.

From the very outset, VR improved the tourist experience as it adds to the tourism marketing domain. Tourism literature has shown that VR is considered as a superior marketing tool in comparison with the traditional conventional tourism media, which often provide outdated and unauthentic information to tourists. This is mainly due to the fact that VR gives tourists an up-to-date sensory experience which is an important factor as it gives them the necessary information to determine whether the country will meet their expectations and/or needs. For example, a family with small children might be motivated to consider traveling to the Voortrekker Monument when they see the range of entertainment options the Monument has for children; or a nature lover might be enticed by the breath-taking view and extant of Table Mountain; or PwDs can check, for instance, whether the establishment can cater to their specific requirements. This VR exposure might encourage tourists to physically book a holiday trip to the country. This VR viewing would be beneficial for South Africa as the country is often associated with images of crime and political instability and sometimes also health-related issues.

In addition, through the "try before buy" concept is critical to advancing tourism. This improvement to tourism provides potential tourists the advantage of getting a better idea of what a prospective tour or trip would entail. In a sense, the "try before buy" concept is a marketing tool that can entice and encourage potential tourists to make a booking and actually engage in the tourism product. In other words, tourism companies and organisations are able to offer tourists a preview of the destination, for example, visiting Cape Town.

Another improvement VR has made to conventional tourism relates to services. The service sector plays a vital role in the tourist experience. Unfortunately, many establishments are not able to train

[1140] Cambridge Dictionary, 2021b, <https://dictionary.cambridge.org/dictionary/english/improve?q=improves >, access: 26 July 2021.

their personnel professionally due to the cost and time involved. VR is an efficient and effective training tool and is beneficial for tourism establishments as it provides a more real-life scenario to show staff how to deal with tourists. As a matter of fact, VR as a training tool has proved to be very successful as it is evident in the case mentioned of the Best Western Hotel that used VR to train their staff and reported a sharp decrease in customer complaints.

VR also has the potential to improve the link between rural and urban indigent communities and tourism planners. As shown, these communities are usually overlooked or side-lined by planners as they often use 2D blueprints to explain tourism-related plans to these rural and urban indigent community. As a result, the rural and urban indigent community does not fully understand the tourism plan and often restricts or obstructs tourism. Through VR, planners can better showcase their plans in an easier and more realistic manner, which will result in the rural and urban indigent community embracing tourism. However, in terms of countries in the global South, including South Africa, many rural and urban indigent communities do not have access to the technology, to facilitate VR.

8.3 Phase 2: Transformational phase

The second phase can be termed the transformational phase (See Table 3). In general terms, the word "transform" (or change) means "to change completely the appearance or character of something or someone, especially so that thing or person is improved".[1141] In VR, "transform" can be interpreted as changing the tourism industry in order to improve the tourist experience for tourists.

Tourists often face many negative factors in conventional tourism, such as poor weather conditions. It is, therefore, argued that VR transforms the tourist experience as it gives tourists the so-called "perfect holiday". The reason is that VR removes the negative factors, such as weather, associated with conventional tourism. Thus, even if it actually rains outside, VR will always offer tourists a "fun in the sun" experience.

[1141] Cambridge Dictionary, 2021d, <https://dictionary.cambridge.org/dictionary/english/transform>, access: 26 July 2021.

In terms of conventional tourism, tourists cannot travel everywhere. For this reason, VR transforms the tourist experience as tourists can explore any destination, within a place such as South Africa or the galaxy, without ever leaving the comfort of their home. Tourists only have to wear an HMD, watch a film or 360° video on the internet, use a drone or play a tourism-related game app to be virtually "transported" to the destination. This is beneficial as tourists will then feel "present" at the destination. As a result, they will have a more enjoyable tourist experience.

In addition, VR transforms conventional tourism by making tourism more accessible to a wider range and class of people. This is especially true of poor tourists as they do not have financial resources to physically travel to the country, and so VR can be seen as beneficial for them to share in the tourist experience. In a sense, Dewaily states that poor tourists now have to be content with the VR experience, while only rich tourists use VR for a preview of the destination to which they will then physically travel to.

Moreover, the literature highlights that PwDs who want to travel, encounter many physical challenges. In some cases, the attraction/destination is unable to cater to PwDs being situated in a physically inaccessible area. For this reason, it is argued that VR transforms the tourist experience for PwDs by removing these physical barriers. Thus, PwDs have the chance to experience something they would never have been be able to do in conventional tourism, such as climbing Table Mountain or particate in a dangerous activity, such as bungee jumping. Another benefit is that PwDs can temporarily escape their physical limitation and feel "normal", which enhances their tourist experience.

VR also has the potential to improve the safety and security of tourists in conventional tourism. Many countries in the global South, including South Africa, face many challenges in terms of safety and security. As discussed earlier, safety and security are important factors for tourists to consider because they will decide not to travel to a destination if they regard it as unsafe. In this regard, VR is beneficial since it eliminates the threat aspect as tourists do not have to physically travel to the destination and can, therefore, view the destination from the safety of their homes. But on the other hand, this has a major impact on SMEs and other stakeholders in the tourism sector. If tourists prefer the virtual tour over the physical tour, these entities and individuals will suffer economically as they depend on the revenue obtained from tourism.

Furthermore, many tourism scholars are of the opinion that VR improves conventional tourism since it is considered the ultimate sustainable tool. As highlighted in Chapters 5 and 6, many conventional tourism destinations and sites are destroyed as a result of tourism visitation and over-tourism. In VR, tourists have access to sensitive and fragile destinations/sites because it eradicates the negative impact caused by physical tourism. Hence, no harm will be done to the actual destination/site as tourists do not really travel to or visit it. Additionally, tourists have the opportunity to do something that they would normally be prohibited to do, for example, touching an archaeological artefact. With VR, tourists are able to navigate a 360° virtual video/image, which enables them to feel like they are "touching", for example, San rock art. As a result, the lack of tourists will indirectly contribute to the preservation of fragile destinations and artefacts.

Additionally, some conventional tourism destinations are in remote areas and the roads leading to these destinations are often in a poor condition, making it impossible for tourists to travel to access them. Based on the study, VR transforms conventional tourism as tourists can still "travel" to remote destinations. This is because VR brings remote destinations to tourists.

Another way VR transforms the tourist experience is by attracting more tourists compared to conventional tourism. For example, a film on climbing Table Mountain can be viewed by several thousand tourists at the same time, while only a few tourists are able to physically access the mountain at a particular time because admissions are capped.

In South Africa, as elsewhere, tourists are prohibited from entering certain sacred sites, for instance, Lake Fundudzi mentioned above. Hence, VR transforms the tourist experience as tourists gain access to sacred sites and as a result, the local community will be protected from intrusion. But, on the other hand, VR can also pose a threat to the local community's culture as only certain members have the right or privilege to enter the sacred site. To give tourists access to sacred sites virtually is considered insensitive and might induce a negative culture change in the community.

Tourists sometimes test their limits when they are on holiday, which often results in them getting hurt or being fatally injured. However, as mentioned, VR can eliminate the risk factor. For this reason, tourists can partake in any dangerous or life-threatening activities, for example climbing Table Mountain without ropes, knowing they will not be physically injured.

Lastly, COVID-19 is regarded as one of the worst pandemics in the history of tourism. Governments around the world implemented non-pharmaceutical measures (i.e., physical distancing), lockdowns, travel restrictions, and closure of borders to curb the spread of the pandemic. These restrictions have eliminated the physical interaction between humans, which in turn affected people's mental health. To a certain extent VR enabled tourists to temporarily escape the pandemic and virtually interact with other people, places and experiences, while still adhering to the physical distancing regulations. Moreover, the national lockdowns led to boredom and isolation. For this reason, many people began exploring the numerous virtual destinations and attractions to be both entertained and informed.

8.4 New niche phase?

As highlighted in the study, VR has a dual role in tourism by adding or improving conventional tourism, or changing, transforming and supplementing conventional tourism. There is, however, a third role that can be considered. Williams and Hobson and other scholars have questioned whether VR is only a form of entertainment or can it be considered as a tourism niche. This study argues that VR can for all intent and purposes be regarded as a tourism niche in its own right, even if only as a futuristic prospect (See Table 3).

"Niche tourism" is a relatively new concept in tourism literature. According to M. Robinson and M. Novelli, the concept is borrowed from "niche marketing"[1142] in the economic and finance sector. It is believed that the word "niche" was first used in 1957 by ecologist G. Hutchinson in ecology.[1143] In its broadest sense in this field, the concept "niche" is "an optimum location, which an organism can exploit in terms of resources in the presence of its competitors".[1144] In the world of marketing, a "niche" has two inter-related ideas - "a place in the market for a product" and "an audience for this product".[1145] In terms of tourism, "niche" implies a "more sophisticated set of

[1142] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, pp. 1, 4, 5.
[1143] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 4; C.L. Bunghez, 'The emerging trend of niche tourism: impact analysis", *Journal of Marketing Research and Case Studies* 2021(2021), 2021, p. 1.
[1144] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 4.
[1145] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 4.

practices that distinguishes and differentiates [kinds of] tourists".[1146] For D. Marson, "niche tourism" is defined as "catering to the needs of specific markets by focusing on more diverse tourism products".[1147] C.L. Bunghez also adds to the definition by stating that "niche tourism" "can be linked to the particular natural and anthropogenic resources of a region, to the characteristic lifestyle of the tourist that engages in this type of activity and to their social status and their financial resources".[1148] Niche tourism consists of a "niche market", which is defined as a "group whereby the individuals in the group are identifiable by the same specialised needs or interests and are defined as having a strong desire for the products on offer".[1149] Robinson and Novelli state that there are no rules on "what can, or cannot, be referred to as niche tourism".[1150] A tourism niche can also be broken down into macro-niches, such as cultural tourism, rural tourism and sport tourism. The macro-niches can further be divided into micro-niches, such as geo-tourism, gastronomy tourism and cycling tourism.[1151] Examples of niche tourism include pink tourism, adventure tourism and religious tourism.[1152]

Based on the definition of niche tourism, it is argued here that VR can be considered as a tourism niche. Firstly, VR has a niche market. In Chapter 7 it was indicated that "Millennials and Generation Z" are considered as the niche market for VR. This is because these groups are "techno-savvy" as they have grown up with technology. Another reason is that Millennials and Generation Z no longer have the desire to visit a destination physically – with the COVID-19 pandemic having further endorsed this.[1153] Moreover, VR can also be divided into macro-niches and micro-niches, such as drone tourism, e-tourism, film and television tourism, gamification tourism, smartphone and app tourism, space tourism and virtual video tourism (360° images and videos).

[1146] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 1.
[1147] D. Marson, 'From mass tourism to niche tourism', *in* P. Robison *et al*. (eds.), *Research themes for tourism*, p. 9.
[1148] C.L. Bunghez, 'The emerging trend of niche tourism: impact analysis", *Journal of Marketing Research and Case Studies* 2021(2021), 2021, p. 1.
[1149] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 5.
[1150] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, p. 5.
[1151] M. Robinson & M. Novelli, 'Niche tourism: an introduction', *in* M. Novelli (ed.), *Niche tourism: contemporary issues, trends and cases*, pp. 5-6.
[1152] D. Marson, 'From mass tourism to niche tourism', *in* P. Robison *et al*. (eds*.), Research themes for tourism*, p. 10.
[1153] S. Muslin & G. Pigel, 'Can tourism be replaced by virtual reality?', *in* W. Schertler *et al*. (eds.), *Information and communication technologies in tourism 1994*, p. 88; R. Cheong, 'The virtual threat to travel and tourism', *Tourism Management* 16(6), 1995, p. 420.

In terms of the conventional models presented by Gunn and Leiper, it is evident that tourism and VR are similar. According to their tourism models, conventional tourism consists of three key components: tourists, attractions and transportation. This study argues that a VR tourism model also comprises of the same three components (See Figure 20). The first component is the virtual tourist, the heart of VR tourism industry. Virtual tourists purchase and use the virtual experiences, services and products. The second component of the model is attractions. A virtual tour of a real destination and an imagined attraction are some examples of what can be considered as virtual attractions. Virtual tourists primarily "travel" to virtual attractions to be "pulled" away from their reality to escape to a new and better "reality". Virtual tourists cannot reach the virtual attraction without transportation. The main "transport method" in VR is HMDs as they "transport" real tourists from their reality (i.e., their home/the real world) to an "improved reality" (i.e., the virtual world).

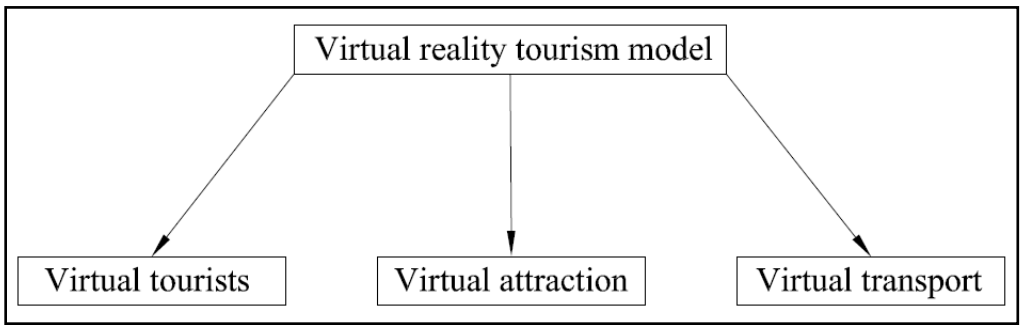


Figure 20: The virtual reality tourism model

In addition, the other three models by Mathieson and Wall, Butler and Smith have also elements that highlight similarities between conventional tourism and VR tourism. Regarding the model by Mathieson and Wall, it is noted that in comparison to conventional tourism, the tourist's decision-making process and buying behaviour of virtual tourists follow the same steps. In terms of Butler's well-known model, a virtual destination also passes through many of the phases, namely the exploration stage; the involvement stage; the development stage; the consolidation stage; the decline stage and finally the rejuvenation stage. Lastly, Smith's model shows that a virtual tourism product has the same core elements as a conventional tourism product: the virtual plant (e.g., a virtual waterfall); services (e.g., the VR developer); freedom of choice (i.e., numerous options); and involvement (e.g., navigation).

Lastly, the definition of conventional tourism also has some similarities with VR. According to the generally accepted definition of tourism by the UNWTO:

> tourism comprises the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and or other purposes.[1154]

Even though tourists do not physically move in VR, it does "remove" them from their "usual environment". The reason is that VR tricks the brain into believing that tourists are being "removed" from their so-called "usual environment" (i.e., reality). In conventional tourism, tourists are only allowed to stay "for not more than one consecutive year". However, VR allows tourists to stay in a virtual world for as long as they want or have time for. Based on the definition of conventional tourism, tourists mainly travel for "leisure, business, and or other purposes". Compared to VR, tourists can travel for various reasons, but the main reason they use it for is to escape their current reality and issues they have to face, such as crime, political instability and COVID-19. Thus, the definition of conventional tourism by UNWTO can be adapted to and adopted by VR. According to the new definition:

> VR tourism comprises of people virtually travelling to and staying in the virtual world outside of their real-world for as long as they want to in order to escape their reality.

The following table provides a representation of VR's impact on conventional tourism.

Table 3: A diagrammatical representation of VR's impact on conventional tourism

Phases	**The impact of VR on conventional tourism**
1. **Improvement phase** (Adding or improving)	• Marketing • "Try before buy" concept • Training • Improves tourism planning
2. Transformational phase (Transforming, changing or supplementing)	• Poor weather conditions • Access any destination/site

[1154] C.R. Goeldner & J.R.B. Ritchie, *Tourism: principles, practices, philosophies*, p. 7; C. Cooper *et al*., *Tourism principles and practice*, p. 13; S. Medlik, *Dictionary of travel, tourism and hostility*, p. vii; A. Beaver, *A dictionary of travel and tourism terminology*, p. 310; B. Boniface & C. Cooper, *Worldwide destinations: the geography of travel and tourism*, p. 5; P. Mura *et al*, ''Authentic but not too much': exploring perceptions of authenticity of virtual tourism' *Information Technology Tourism* 17(2), 2017, p. 149.

	• Accessible to a wider class range • PwDs • Safety and security • Sustainable • Access to remote areas • Increase number of tourists (avoids over-tourism) • Access to sacred sites and attractions • Risk factor • COVID-19 (boredom and isolation)
3. New niche phase (Stand alone)	• Millenniums and Generation Z (virtual tourists) • Models (tourists, attraction and transport) • Definition • Concerns

8.5 Concluding remarks

There are three major concerns that must be addressed in order for VR to be considered as a tourism niche (See Table 3). The first setback that needs to receive attention is that VR is essentially an individual activity. Human interaction is a key component in the conventional tourist experience, both from the travel companion or group dimension, as well as in terms of the encounter between the tourist and host community. It is therefore vital to develop a VR tourist experience for tourists that offers them an opportunity to interact with hosts and other tourists. The reason is that tourism is for social beings and interaction results in memorable tourist experiences. The second concern that has to be focused on is for VR to provide a full sensorial experience. Although VR developers are trying to invent a full sensorial and authentic experience as in the case of HaptX Gloves, VR is unable to give a full sensorial experience as it is impossible to simulate all of the five senses, especially taste and smell. A full sensorial experience will result in a more authentic experience for tourists. A third concern which is critical to the industry is the question of revenue, while the VR company or destination may charge fees, by removing the tourist from the actual destination,

the range of formal and informal stakeholders are removed from partaking in the generation of income.

These concerns are not in themselves obstacles, but rather aspects that require further consideration and technological development to address them. As technology progresses and transforms, these aspects might be addressed. Thus, despite these setbacks, this study concludes that VR is not the end of the journey - but it is also not quite yet a new frontier.

APPENDIX 1

A SUMMARY OF THE VAST LITERATURE ON VR AND TOURISM

Date	Author(s)	Marketing	Virtual Worlds 360 and	Sustainability	Applications	Tourism Niches	Experiences and effects	Future of tourism	Substitution and authenticity	Literature reviews	Drawbacks and benefits	COVID-19	Other topics
1994	Muslin & Pigel								X				
1994, 1994, 1995, 1997	Williams & Hobson				X			X			X		
1995	Cheong										X		
1996	Horan				X								
1999	Bristow			X									
1999	Dewailly			X									
1999, 2012	Kurtzman & Zauhar					X							
2000	Sung *et al*.												X
2000	Sussmann & Vanhegan								X				
2002	Prideaux							X					
2004	Laing & Crouch					X							
2005, 2007, 2008	Cooper & MacNeil	X											
2005	Anwar & Hamilton							X					
2005	Arnold				X						X		
2005	Prideaux & Singer					X							
2007	Gurău				X						X		
2008	Chiou *et al*.	X											
2008	Stangl & Weismayer	X	X										
2009, 2012	Goeldner & Ritchie		X	X									
2009	McCabe		X	X									
2009	Penfold		X			X							
2010	Georgakopoulos					X							
2010, 2020	Guttentag	X		X	X				X		X		

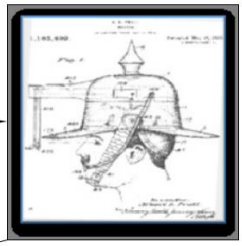
2011	Ali & Carson		**X**	**X**									
2011	Plunkett		**X**				**X**						
2012, 2016	Cooper		**X**	**X**									
2012, 2013(a) (b), 2016	Huang *et al*.	**X**	**X**										
2012	Hwang *et al*.					**X**							
2013	Ali & Frew		**X**	**X**									
2013	Deale		**X**			**X**					**X**		
2013	Zarzuela *et al*.					**X**							
2014	Aziz & Siang				**X**						**X**		
2014	Mascho & Singh	**X**	**X**										
2015	Petropoulos			**X**									
2015	Tavakloli & Mura												**X**
2016	Tussyadiah *et al*.	**X**											
2016	Urriza *et al*.				**X**								
2017	Griffen *et al*.	**X**											
2017	Jung *et al*.						**X**						
2017	Marchiori *et al*.												**X**
2017	Martins *et al*.	**X**											
2017	Mura *et al*.								**X**				
2017	Tussyadiah *et al*.						**X**						
2017	Yung & Khoo-Lattimore									**X**			
2018	Beck & Egger	**X**											
2018	Gibson and O'Rawe	**X**											
2018	Guttentag *et al*.	**X**							**X**				
2018	Kulakoğlu-Dilek *et al*.				**X**				**X**		**X**		
2018	Marasco *et al*.	**X**											
2018	Nayyar *et al*.				**X**				**X**				
2018	Pantelidis *et al*.						**X**						
2018	Wagler & Hanus		**X**										**X**
2019	Beck *et al*.									**X**			
2019	Damjanov & Crouch					**X**			**X**				
2019	Kim & Hall						**X**						
2019	Li & Chen	**X**											
2019	McFee *et al*.	**X**											
2019	Pasanen *et al*.	**X**											

2019	Wei									**X**			
2020	Hopf *et al*.												
2020	Loureiro *et al*.									**X**			
2020	Sarvan and Pestek									**X**			
2021	Atsiz								**X**			**X**	
2021	Losada *et al*.								**X**				
2021	Itani & Hollebeek											**X**	
2021	Sarkady *et al*.								**X**			**X**	
2021	Schiopu *et al*.								**X**			**X**	

APPENDIX 2

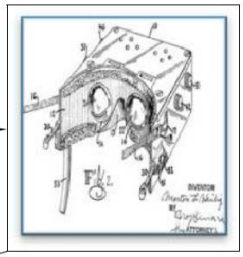
A VIRTUAL HIS(STORY)

A virtual representationof a San engraving (50 000 to 39 000 years ago)



The "Weapon" (1916)

The Link Flight Simulator (1920)

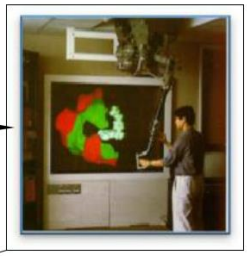


The Telesphere Mask (1960)

Headsight HMD (1960)

Heilig's Sensorama (1962)

Sutherland's Sketchpad (1963)

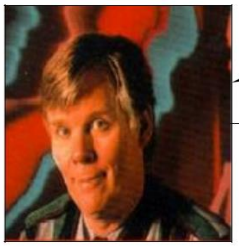


The Grope Project (1967)

Sutherland's HMD (1968)

Pong game (1972)

Myron Krueger coined "artificial reality" (1973)



The Sayre Glove (1977)

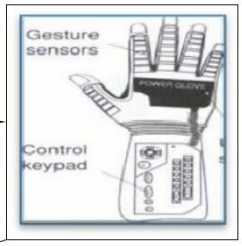
Gibson's *Neuromancer* (1984)

The DataGlove (1985)

Videoplace (1985)

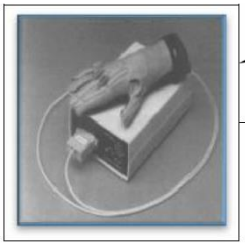
The BOOM (1989)

Lanier coined "virtual reality" (1989)



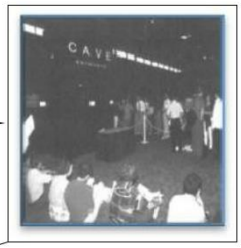
The Power Glove (1989)

The Cyberglove (1990)



Virtuality (1990)

CyberEdge Journal (1991)

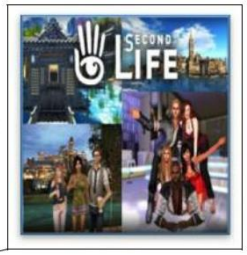


The CAVE system (1992)

Virtual Reality Society (1993)

The Virtual Boy (1993)

DisneyQuest (1998)



Second Life (2003)

Wii (2006)

Oculus Rift HMD (2010)

Google's Cardboard (2014)

Samsung's Gear VR (2010)

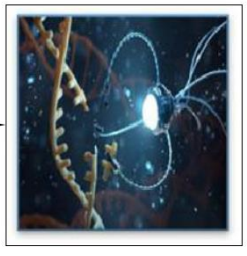
HTC Vive HMD (2015)

PlayStation VR (2016)

The FOVE (2016)

The HTC Vive Pro Eye HMD (2016)

The HaptX Gloves (2018)



The nanobot?

APPENDIX 3

RESEARCH ETHICS APPROVAL

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

30 November 2018

Dear Ms Verkerk

Project:	**Virtual Tourism: The new frontier or the end of the journey?**
Researcher:	**V Verkerk**
Supervisors:	**Prof KL Harris**
Department:	**Historical and Heritage Studies**
Reference number:	**10592483 (GW20181127HS)**

Thank you for the application that was submitted for ethical consideration.

I am pleased to inform you that the above application was **approved** by the **Research Ethics Committee** at a meeting held on 29 November 2018. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely

Prof Maxi Schoeman
Deputy Dean: Postgraduate Studies and Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail:tracey.andrew@up.ac.za

CC: Prof KL Harris (Supervisor and HoD)

Research Ethics Committee Members: **Prof MME Schoeman** (Deputy Dean); Prof KL Harris; Mr A Bizos; Dr L Blokland; Dr K Booyens; Dr A-M de Beer; Ms A dos Santos; Dr R Fasselt; Ms KT Govinder Andrew; Dr E Johnson; Dr W Kelleher; Mr A Mohamed; Dr C Puttergill; Dr D Reyburn; Dr M Soer; Prof E Taljard; Prof V Thebe; Ms B Tsebe; Ms D Mokalapa

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DECLARATION

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I declare that this dissertation is my own original work. Where secondary material is used, this has been carefully acknowledged and referenced in accordance with university requirements.

I understand what plagiarism is and am aware of university policy and implications in this regard.

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Victoria-Ann Verkerk Date

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