Virtual Reality – a solution for sustainable travel?

A quantitative study of Virtual Reality as a means for environmentally sustainable travel

RICKARD LUNDGREN & JOHANNA LÖÖV

Lund University
The Department of Strategic Communication
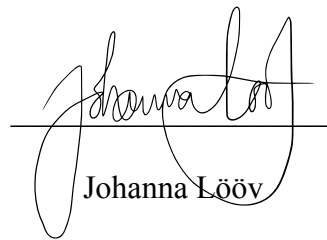Bachelor's thesis

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Rickard Lundgren   Johanna Lööv

Abstract

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The purpose of this study is to examine how Generation Y, a cohort characterized by environmental care, technology utilization, and traveling, perceives the advanced mode of multisensory communication Virtual Reality (VR) from a perspective of traveling and environmental sustainability. The aim is to understand what important factors and drivers exist for Generation Y to accept and use VR-traveling as well as how it is regarded as an environmentally sustainable substitute for conventional travel. Previous research on Generation Y, sustainability, tourism, and virtual reality has been reviewed. Following a deductive research design to examine the cause-effect relationship between the study's variables, the Unified Theory of Acceptance and Use of Technology II (UTAUT II) was modified and adopted as the theoretical framework for the study. The study sample consists of 156 members of Generation Y that were obtained via convenience sampling. Covering UTAUT II's variables featuring the acceptance and usage of VR-traveling, the data was collected using a seven-point Likert scale and was tested with multiple regression analysis. The findings suggest that performance expectancy, hedonic motivation, and price value are the most important factors and drivers that impact the behavioral intention to use VR-traveling. Furthermore, results obtained from univariate and bivariate analyses imply that a majority of Generation Y believe VR-traveling could be an option for more environmentally sustainable traveling, yet almost none express willingness to replace conventional traveling with virtual traveling. By conducting this study, contributions have been made to a previously disregarded area of research within the field of strategic communication.

Keywords: Generation Y, Virtual Reality, sustainable tourism, UTAUT2, virtual tourism, strategic communication, digital communication

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Sammanfattning

Virtual Reality - en lösning för hållbart resande?

Denna studie har som syfte att undersöka hur Generation Y, en demografisk grupp som kännetecknas av miljöomtanke, teknologianvändning och resande betraktar den avancerade och multisensoriska kommunikationsformen Virtual Reality (VR) ur ett perspektiv av resande och hållbarhet. Målet är att förstå vilka faktorer som påverkar Generation Y att acceptera och använda VR för resande, samt att undersöka huruvida fenomenet anses vara ett miljömässigt hållbart alternativ till konventionellt resande. Tidigare forskning om Generation Y, hållbarhet, turism och VR granskas. Studien följer en deduktiv forskningsansats för att undersöka orsaks- och effektförhållandet mellan studiens olika variabler, och en modifierad version av Unified Theory of Acceptance and Use of Technology II (UTAUT II) antas som det teoretiska ramverket för studien. Studiens urval består av 156 respondenter från Generation Y som erhållits genom ett bekvämlighetsurval. Datan har samlats in med en sjugradig Likert-skala och testades med en multipel regressionsanalys. Resultaten visar att *förväntningar på prestanda, hedonisk motivation* och *prisvärde* är de viktigaste drivkrafterna som påverkar den beteendemässiga avsikten att resa i VR. Fortsättningsvis visar resultat erhållna från uni- och bivariata analyser att en majoritet av Generation Y uppfattar VR-resande som ett miljömässigt hållbart alternativ till konventionella resor. Samtidigt uttrycker endast ytterst få villighet att ersätta konventionellt resande med virtuellt resande. Genomförandet av denna studie har bidragit med kunskaper och insikter till ett tidigare ignorerat forskningsområde inom strategisk kommunikation.

Nyckelord: Generation Y, Virtual Reality, hållbar turism, UTAUT2, virtuell turism, strategisk kommunikation, digital kommunikation

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Table of content

1. Introduction

This section will provide information on the background of the subject in order to explain its relevance and interest as a subject of research. Furthermore, the research problem is defined, and the research questions are formulated.

When it comes to concerns about global warming and climate change, one demographic cohort stands out. Individuals of Generation Y, born between 1977-2003, are often termed citizens of the "Green Generation" as they grew up in a society where eco-consciousness was increasingly becoming a norm, and, as a result, a major shift towards green attitudes and sustainable behavior has taken place (Rogers, 2013). Somewhat paradoxically, despite claiming immense concern of global warming, Generation Y is also the one demographic cohort who are spending the most money and time on traveling (Benckendorff, Moscardo, and Pendergast, 2009) - an activity which is widely recognized as incompatible with sustainability goals (Luzecka, 2016). Contrary to previous findings, which indicate that members of Generation Y are characterized by ideologies of sustainability and environmental care, is Generation Y, in reality, the major driving force for growth in the travel industry; constituting a huge market which already accounts for approximately 40% of all travel expenditure (Varrichio, Kosciulek & Stickles, 2019; CBI Ministry of Foreign Affairs, 2020).

The negative environmental impacts entailed with a globally growing tourism industry has led to an increasing need for more sustainable solutions, and, as a result, multiple suggestions and approaches from researchers as well as practitioners have emerged. A predominant orientation within research proposes the integration of innovation and technology as a potential means to achieve a more sustainable tourism growth (Guttentag, 2010; Loureiro, 2019; Katkuri, Mantri & Anireddy, 2019). An example of a contemporary technological development which recently have gained a lot

1

of ground within the tourism sector is that of virtual reality (VR) (Tussyadiah, Wang & Jia, 2017; Disztinger, Schlögl & Groth, 2017; Beck & Egger, 2018; Trunfio, Campana & Magnelli, 2020). In essence, VR is an advanced and immersive mode of multisensory digital communication that enables the user to experience computer-simulated 3D worlds and alternative virtual environments (Desai, Desai, Aimera, & Mehta, 2014). While industries and major companies increasingly integrate VR technologies in their supply chains and offers, and with consumers' adoption rates on the rise, the overall VR market is expected to substantially grow in the years to come (Herz & Rauschnabel, 2019; Rauschnabel, Felix, & Hinsch, 2019). In the context of tourism, VR, with its technological power lying in the simulated and immersive realism it can produce, can hypothetically provide new sustainable opportunities to travel and explore the world with a minimal environmental impact. Ultimately, this could offset greenhouse gas emissions and ease the burden on overcrowded destinations' infrastructure while still providing travelers with captivating tourism experiences.

Members of Generation Y are expressing changes in personal lifestyles as a big part of the solution for climate issues (Kantar Sifo, 2019). They are also exceptionally comfortable with technology and are often among the early adopters of new technological innovations (Fenich, Scott-Halsell, Ogbeide & Hashimoto, 2014; Sox, Kline, & Crews, 2014; Benckendorff et al., 2009). Further, they are renowned travelers who use technology to communicate or consume tourism products and while traveling (CBI Ministry of Foreign Affairs, 2020). Therefore, their attitudes toward implementing virtual reality as a potential means of environmentally sustainable tourism makes for an interesting subject to study - a field that is currently unexplored.

1.1 Problem definition

It can be concluded that Generation Y is of two minds concerning the environment and traveling, creating a clear misalignment between ideology and reality in which the research problem of this study resides. The focus of existing research on virtual reality within tourism is primarily done from a perspective of business and management, highlighting how VR provides many new opportunities for the tourism industry as the fields of application are manifold. The most researched application is the marketing of

destinations with VR (Guttentag, 2010), where it is recognized as a powerful marketing tool that allows tourism marketers to communicate with prospective travelers in a new and engaging way (Beck & Egger, 2018). Further findings suggests that VR can help reduce the uncertainty associated with purchasing a tourism product as it provides additional sensory and visual information to prospective tourists: a characteristic of special significance in the tourism domain as most tourism products are defined as confidence goods (Brehm, Rauscher & Humpe, 2020; Disztinger et al., 2017). There are, however, limited studies of virtual reality in tourism that incorporates a user perspective, and none of these have an emphasis on the possibilities of sustainable traveling it provides for. Therefore, this thesis responds to the calls for a more consumer-situated understanding of virtual tourism from a perspective of environmental sustainability.

In brief, Generation Y is a demographic cohort characterized by environmental care, immense traveling, and technological adoption. Thus, it is interesting to examine their attitudes towards VR-traveling from an approach of technological acceptance. In addition, as several researchers suggest the integration of innovation and technology to achieve a more sustainable tourism growth, it is of relevance to explore whether VR-traveling is viewed by Generation Y as an environmentally sustainable alternative to conventional traveling.

As VR essentially can be summarized as a complex mode of communication, it is assumed it can also be used strategically, and, in line with Falkheimer and Heide's (2014) definition of strategic communication, contribute to the achievement of overall and strategic goals. In this regard, if VR is utilized as a medium for strategic communication it has the inherent potential to modify behaviors that, hypothetically, can contribute to individuals traveling more environmentally sustainable. Therefore, the study contributes to the field of strategic communication with important insights into how a contemporary digital communications technology can provide a potential solution to an urgent global issue.

1.2 Purpose and research question

The purpose of this study is to provide knowledge about the user perception of virtual reality-traveling as well as how it is regarded as an environmentally sustainable alternative conventional traveling among Generation Y. The results will provide empirical evidence for tourism and sustainability literature that helps understand Generation Y's behaviors and emphasizes the perspectives of adept travelers towards technological tourism and the environment. Furthermore, the findings will help practitioners, marketers, and strategic communicators of both the tourism and technology industry to identify and better understand the market segment to which, and how, they should communicate their products and services. To fulfill the purpose of the study, the following research questions are formulated:

RQ1: *What are the most important factors and drivers for Generation Y to accept and use virtual reality-traveling?*

RQ2: *From a perspective of environmental sustainability, how does Generation Y perceive virtual reality-traveling as an alternative to conventional travel?*

To answer these questions, a quantitative study of the attitudes of Generation Y toward virtual reality-traveling and sustainability will be performed in the form of a descriptive survey study. This will be further explained in section 3.

1.3 Delimitations

In regards to the purpose of the thesis, only Generation Y will be included in the study meaning the results will not necessarily be applicable to other demographic cohorts. This delimitation is made based on previous empirical findings that point out certain characteristics within Generation Y that make the demographic of particular interest for the study. However, it is important to point out that there is no empirical support for this group sharing sets of social values or attitudes, and that disregarding diversity within a generation can lead to important misjudgements of certain segments of a generation (Benckendorff et al., 2009). Furthermore, only Swedish citizens are included in the

study. This delimitation is made since Sweden is the top-ranked EU member state in the overall European Innovation Scoreboard, being titled a pioneer country for new techniques and ideas (Government Offices of Sweden, 2017). Thus, as Swedish citizens are recognized as early adopters of new products and services, the results of the study can provide a meaningful indication of how VR traveling may be received in the rest of the world. Moreover, as the focus of the research problem and its affiliated research questions represent only a particularity of a broader phenomenon, certain interesting aspects or questions discovered may be neglected as they are of irrelevance for the purpose of the study. In addition, the adopted scientific perspective, as well as the theoretical and/or methodological framework, implicates a natural delimitation as they only allow for specific discoveries of a certain aspect.

2. Previous research and theoretical framework

The following section will provide an overview of current research of the disciplines of Generation Y, sustainability, tourism, and virtual reality. Thus, it will deliver insights on relevant concepts and associated theories that will provide valuable means to successfully conduct the research. Furthermore, the theoretical framework which constitutes the base of our analysis will be introduced, and, lastly, the hypotheses will be presented.

2.1 Generation Y

Generation Y, also known as *Millennials*, the *Digital Generation,* or *Nexters,* comprises people born between 1977 and 2003 (Benckendorff et al., 2009). Altogether, Generation Y makes up almost 20% of the world's total population and are expected to comprise three-quarters of the global workforce by 2025 (International Labour Organization, 2016; EY, 2015). As most members of this generation are either at the beginning or the middle of their careers they are regarded as an important driving force of the economy in the decades to come (The Obama White House, 2014). The variations between Generation Y's behaviors and attitudes and those of other generations have been studied by sociologists and historians. For example, Generation Y is known to be civic-minded and socially conscious employees and consumers (Buckingham & Buckingham, 2012). They have an overall focus on brands, self-fulfillment, friendship, and they value digital culture, teamwork, and collaboration (Benckendorff et al., 2009). They are known to be self-centered and demanding, with high career expectations and aspirations which are mainly centered on the development of their personal career (Maxwell, Ogden & Broadbridge, 2010). Furthermore, Generation Y epitomizes the term 'digital natives' as

they have grown up in a world where they are surrounded by technology. This has resulted in a generation of digitalized multitaskers who value the networks made possible by the Internet, and are heavily influenced by friends and peers (Benckendorff et al., 2009).

Generation Y has distinctive cohort group patterns of behavior and attitudes that distinguish them from other generations (Huh & Frye, 2011). One of the most prominent of these characteristics is their environmental consciousness. Ballew, Marlon, Rosenthal, Gustafson, Kotcher, Maibach, and Leiserowitz' (2019) showcase how Generation Y is more likely than older generations to view global warming as personally important and/or express a willingness to engage in climate activism. Further research indicates that Gen Y-ers are more environmentally engaged than preceding generations on several measures. For instance, Huh and Chang (2017) found that Generation Y workers would sacrifice, on average, 6.2% of their wages to work for an environmentally friendly firm while environmentally friendly baby boomers (born approximately between 1946-1964) would sacrifice only 2.5%. In accordance, Kuppa (2018) found that almost 70% of Generation Y express that they are "very worried" or "somewhat worried" about global warming, which Keve and Bryzek (2019) found to be aligned with the way they approach consumerism, where long-lasting products of high quality frequently are favored over disposable items with a larger ecological footprint. These results match the findings of Nastu (2007), which highlights how 69% of Generation Y:ers consider a company's social and environmental commitment when deciding where to shop, and 83% clarify how they trust a company more if it is socially and environmentally responsible. Furthermore, almost 50% of the respondents stated that they would be willing to pay more for environmentally friendly services, products, or brands (Nastu, 2007).

2.1.1 Generation Y, traveling and tourism

Generation Y is the one demographic cohort who are spending the most money and time on traveling (Benckendorff et al., 2009). Annually generating an estimated USD 118 billion, and are expected to become the largest business and leisure traveler segment in the US, it can be concluded that Generation Y is the primary driver for growth in the travel industry for years to come (Richards, 2007; Huh & Chang, 2017; Varrichio,

Kosciulek & Stickles, 2019). Furthermore, according to the latest report on trends in global millennial travel, Generation Y is expected to reach its peak in earning and spending power during the next decade (Research and Markets, 2019). This makes Generation Y a strong driver for the tourism sector in the coming years, and thus a very lucrative target market for travel and tourism businesses.

Many characteristics separate Generation Y from preceding generations regarding traveling. Primarily, Generation Y travels more frequently than any other generation, averaging 35 days per year (Expedia Group, 2017). They enjoy booking spontaneous weekend holidays and are often inclined to extend their stays for cultural immersion. Furthermore, tourism experiences are commonly valued over material objects, and as a proportion of their income, Generation Y spends more than any other group on international travel (Pendergast, 2009). In travel and tourism, Generation Y consumers value authenticity, fulfillment, and sustainability in personalized experiences suited to their tastes and preferences, over postcard or must-see destinations (CBI Ministry of Foreign Affairs, 2020). They are known to be intrepid travelers who are constantly hungry for new experiences and are enthusiastic about exploring remote destinations (Richards, 2007). Technology and the Internet are integral parts of their lives which influence how they communicate, travel, and consume tourism products (CBI Ministry of Foreign Affairs, 2020). They do extensive research online before they complete a booking, use technology to manage social interactions and networks while traveling, and to share travel experiences (Richards, 2007).

Generation Y avoids tourism products that appear false, fake, or staged for tourists: they want to get the most out of their travel and seek a range of genuine experiences, often involving everyday life and culture of places visited, including contact with local people (CBI Ministry of Foreign Affairs, 2020; Pendergast, 2009). They do not look for quality only, but for premium personalized services for a reasonable price. Gen Y-ers do not appreciate the limitations imposed by traditional tourism products but rather seek freedom of choice (CBI Ministry of Foreign Affairs, 2020). They prefer to relax, to unplug from the world and have fun, and favor to choose destinations and experiences on their bucket lists. Traveling increases their desire to travel more, serving as a stimulus to learn and develop, including developing a greater cultural understanding (Pendergast, 2009). Enabled by their ubiquitous mobile devices,

Generation Y does research on the go to take advantage of the best travel opportunities and modify them to meet their tastes (CBI Ministry of Foreign Affairs, 2020). Notably, Generation Y also expresses concerns about the environmental impact of their traveling and acknowledges and values green business practices (Moscardo & Benckendorff, 2009; CBI Ministry of Foreign Affairs, 2020).

2.2 Sustainability and tourism

The International Union for Conservation of Nature (2020) defines sustainability as the capacity to improve the quality of human life while living within the carrying capacity of the Earth's supporting ecosystems. Accordingly, the concept of sustainable tourism is defined as tourism that "takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities" (UNWTO, 2020).

Tourism is one of the world's biggest economic activities, driving wealth, employment, and regional development. In 2018, total export earnings from international tourism reached USD 1.7 trillion, accounting for 29% of the world's services exports and 7% of overall exports of goods and services (UNWTO, 2019). For the seventh consecutive year, growth in tourism exports (+4%) was greater than the growth in merchandise exports (+3%) (UNWTO, 2019). Despite these results, the long-term sustainability of the tourism industry faces important challenges in terms of making the growth model compatible with sustainable development goals. As the perpetual expansion of tourism growth heavily contributes to pollution, overcrowding, and over-development, congruity with goals regarding environmental degradation and climate change are vital.

According to the Intergovernmental Panel on Climate Change (2007), much of the literature suggests that the majority of scientists are in agreement that the world's climate is warming. The climate change is proceeding at a rate at which there will be inevitable impacts on the tourism sector, and, consequently, what we are seeing today is the increasing interfacing of sustainability and tourism. At present, concerns for conserving and managing the natural and built environments have become one of the most crucial strategies for the future growth and advancement of the tourism industry.

Edgell (2016) argues that if international tourism is not properly planned for, implemented, and managed well, the destruction of not only the natural environment but also the built environment is probable. It is very clear that sustainable tourism is today an integral part of an overall shift that recognizes that orderly economic growth, combined with concerns for the natural and built environment and quality-of-life social values, is the driving force for long-term progress in tourism planning, development, and policies (Edgell, 2016). In essence, managing sustainable tourism is dependant on future-oriented policies, thorough strategic planning, innovative marketing concepts, and sound management philosophies that include building harmonious relationships among local communities, the private sector, non-profit organizations and governments regarding developmental practices that protect the natural and built environments while being compatible with economic growth (Edgell, 2016). The perception of utilizing sustainable tourism development to stimulate economic growth and at the same time preserve the natural and built environments is gaining greater recognition in both research, industry, government, and with consumers. From an approach of sustainability, tourism consumers are today demanding greater quality in their tourism products: new and different destinations, greater diversity, and more flexibility in their travels, as well as to ensure that future generations can enjoy a wide variety of tourism products (Edgell, 2016).

The emphasis on integrating sustainability in tourism can also be found reflected in the media report of climate- and environment issues, where the focus of the coverage to a large extent addresses the rather easily feasible changes in lifestyle choices that are required to reduce our carbon footprints and global emissions (Kantar Sifo, 2019, p. 16). A large topic within the debate of sustainability revolves around personal transportation and traveling, where themes of "flight shaming" and carbon taxes have become prominent components in the discussion (Kantar Sifo, 2019, p. 16). However, in spite of the palpable debates on climate change, one can conclude that travel practices, in reality, have not seen a noticeable change. On the contrary, the results from Reasebarometern, an annual revision of Swedish traveling habits, conclude that low-budget airlines continually gain market shares and that 65% of all Swedish international tourism is done with flight - a procedure which is broadly understood as directly conflicting with sustainability goals (Andersson, 2018; Luzecka, 2016).

According to Aghamn and Horvatovic (2018), when the major modes of tourism mobility are ranked according to their CO2-emissions, it can be affirmed that aviation is widely regarded as the least environmentally friendly option while transportation by train is the ablest. However, an exact measurement of the cumulative emissions from the various modes of contemporary tourism transportation is difficult as factors such as vehicle life-length, person capacity, and fuel all come into play. Moreover, statistics from UNWTO (2019) indicate that international tourist arrivals in 2019 have gained 4% to reach a total of 1,5 billion. In other words, we are continually traveling internationally more each year, regardless of claiming sustainability as one of the most important issues in modern day, and possessing an extensive knowledge of the negative environmental effects caused by contemporary tourism mobility. This is a behaviour which characterizes the Swedish population as well as international citizens at large (Andersson, 2018; UNWTO, 2019).

To achieve long-term quality growth for the tourism industry, it is argued that governments, organizations, and tourism consumers alike must all act in unison to support sustainable tourism principles and practices (Edgell, 2016). The literature emphasizes that to secure a favorable future for tourism development, challenges of sustainability must be faced as soon as possible on a local, national, and international scale to sustain tourism-dependent resources for future generations to enjoy (Edgell, 2016; Farrell & Twining-Ward, 2008). However, to preserve environmental resources, to positively impact the social values of the community, and to add to the quality of life of local citizens worldwide while simultaneously obtain favorable economic benefits for tourism, is an immensely complex exercise.

2.3 Virtual reality

The constant development of virtual reality hardware and software as well as emerging research areas and numerous fields of application has lead to an irregular use of the term "VR" (Beck & Egger, 2018). Although exact VR definitions are not entirely concordant and often descriptive, they essentially all depict a technologically generated communicative representation of a 3D environment with the main goal of creating an illusion of being in a believable environment where users interact efficiently in

performing specific tasks (Makhkamova, Exner, Greff & Werth, 2020; Disztinger et al., 2017). Desai et al. (2014, p. 175) describes VR as a "computer simulated 3D environment which gives the user the experience of being present in that environment". Guttentag (2010, p. 638) explicates further with a definition of VR as "the use of a computer-generated 3D environment - called a 'virtual environment' (VE) - that one can navigate and interact with, resulting in real-time simulation of one or more of the user's five senses".

Sherman and Craig (2003) define four key elements of virtual reality: *a virtual world, immersion, sensory feedback*, and *interactivity.* The *virtual world* is described as the content of, or within, a given medium; it may exist solely in the mind of its originator or be broadcast in such a way that it can be shared with others (Sherman & Craig, 2003). In the context of this study, the virtual world is understood as a computer-based virtual world that provides a description and representation of objects within a digital simulation. When this world is accessed via a system, - a head-mounted display (HMD) -, which brings these objects and interactions to the user in a physically immersive and interactive presentation, they are experiencing it via virtual reality. *Immersion* is the sense of being present and actively involved in the experience rather than just observing the virtual world from the outside (Makhkamova et al., 2020). In other terms, physical immersion refers to the degree to which a user is isolated from reality. Additional stimuli, such as 3D-sound, can heighten the perception of psychological presence which refers to the sensation of being in a virtual environment rather than in the place the user's physical body is located (Gutiérrez, Vexo, & Thalmann, 2008; Sanchez-Vives & Slater, 2005). Ultimately, the user gains the sensation of *being* in the virtual reality and immerses in the new world. Her/his attention shifts to the new reality and is encapsulated from external stimuli and effects (Disztinger et al., 2017). In the literature, this is often characterized as transportation as users frequently connect feelings of immersion in VR with the sensation of arriving in the artificial world (Schuemie, van der Straaten, Krijn & van der Mas, 2001). Thereby, immersion describes - on a subjective level - the extent to which the user is feeling present in the virtual environment (Disztinger et al., 2017). *Sensory feedback* based on user input, such as visual or haptic, is critical to the immersion provision of sensational information of the virtual environment (Makhkamova et al., 2020). Lastly, *interactivity*

is the characteristic of a virtual world to be responsive to user input. For virtual reality to seem authentic it should respond to user actions: an ability to affect the virtual world and to be affected by it in exchange (Guttentag, 2010; Makhkamova et al., 2020).

With the rapid advancement of virtual reality technology, it can today be used for a growing number of tasks and has thus become increasingly integrated into consumers' lives. Consequently, VR has also been studied from several different perspectives and with various theoretical starting points. Makhkamova et al. (2020) highlight how ideas of its use for educational purposes has been introduced since the very beginning of the VR-era as the technology enables possibilities to train skills in a safe and interactive environment; allowing to recreate authentic real-world situations or even create new worlds and experiences. This makes VR very attractive for extensive use in learning, which has been confirmed through several studies. For instance, Yıldırım, Yıldırım, and Dolgunsöz (2019) found that integrating VR in education has a significant positive effect on long-term retention. As the success of VR ultimately is dependent on user acceptance, Nguyen, Hite, and Dang (2018) adopted a user perspective and discovered with their study that students to a large degree exhibit technological acceptance by not only learning and implementing VR as an educational tool in a short time, but also displaying an increase in demonstrating creativity and problem-solving skills. In accordance with these findings, Makhkamova et al., (2020) concluded that students' attitudes and impressions of VR as an educational medium generally are highly positive. Additionally, VR has been studied in a context of marketing and business management, where findings indicate that branded VR games can improve implicit brand memory (van Berlo, van Reijmersdal, Smit & van der Laan, 2020); that VR can be combined with storytelling to create immersive marketing campaigns which very successfully generate buzz and positive PR impressions (Disztinger et al., 2017); or as a new way for businesses to promote their products with "try-before-you-buy" tours (Parker, 2015**)**.

2.3.1 Virtual reality in Tourism

Various technological developments have continuously been affecting the tourism and travel industry. Today, this is particularly apparent in how the Internet, smartphones and interactive smart devices have come to perpetually influence the whole customer

journey for both tourists and tourism practitioners alike (Beck & Egger, 2018). Guttentag (2010) argues that emerging information- and communication technologies, such as VR, are capable of re-engineering the way tourism products are managed, placed and promoted on the market. VR creates an advantageous distinction from other media as it not only offers information but also an experience to the consumer; providing rich perceptual and cognitive information as well as the opportunity to immerse oneself within an interactive and multisensorial digital environment. Thus, the users are enabled to gain information in an experiential manner (Beck & Egger, 2018). Accordingly, it is argued that VR can provide users with an immersive virtual presentation that could make marketing experiences more realistic and thus more closely resemble the direct onsite products and services, and, as a result, reduce the level of perceived risk and allow for better-informed decisions than that of non-users (Cho & Fesenmaier, 2001; Cho, Wang & Fesenmaier, 2002; Lui, Piccoli, Ives, 2007; Huang, Backman, Backman & Moore, 2013; Huang, Backman, Backman, & Chang, 2015; Beck & Egger, 2018). Additional suggested advantages of VR applications in tourism are the creation of destination awareness as well as the capacity to generate curiosity and willingness to view a promotional experience of a destination with tourists and prospects (Guttentag, 2010; Marchiori, Niforatos & Preto, 2017); influence information searching and travel decision-making processes (Huang et al., 2015); provide possibilities to preview and sample tourism destinations and products (Tussyadiah et al., 2017), which can enhance the intention to visit the real destination (Huang et al., 2013); and impact the location's image in tourist's minds (Pantano & Servidio, 2009). Upon a systematic literature review on virtual reality in tourism research, Yung and Khoo-Lattimore (2019) concluded that VR has immense potential in the various sub-sectors of tourism; whether it is in the context of marketing, cultural heritage, education or sustainability, the technology offers novel and interactive opportunities for dissemination of information that has previously been impossible. However, research in the field of virtual tourism is particularly lacking in how virtual traveling compares to real-world visits and whether this fulfills tourists' needs and expectations. With the increasing emergence and utilization of VR in various tourism settings, this has become an increasingly important question, but little research has been devoted to the topic so far.

14

2.3.2 Virtual reality as a means of sustainable tourism

Several studies have been done where concepts of VR have been analyzed through the context of tourism and tourism management. There are, however, limited studies that incorporate a perspective of sustainability. In assumption, VR can facilitate sustainable travel in the sense that it allows users to virtually experience rather than physically visit, which, consequently, can reduce the carbon footprints affiliated with travel and thus help minimize global warming. In this regard, VR could provide a more environmentally sustainable alternative to conventional travel and tourism. As tourism's global carbon footprint is increasing more than four times more than previously estimated, accounting for nearly 8% of global greenhouse gas emissions (Lenzen, Sun, Faturay, Ting, Geschke & Malik, 2018), progression in the field of sustainable tourism is pivotal for achieving more long term compatibility with environmental sustainability goals. Nonetheless, the acceptance of virtual tourism as a substitute for conventional travel will ultimately be determined by tourists' attitudes toward authenticity and her or his motivations and constraints; its' success contingent on satisfying the same set of customer needs as those associated with "real" travel (Guttentag 2010; Lehdonvirta, 2009). For virtual tourism to gain user acceptance, Han and Jung (2018) mean certain important criteria must be met: simplicity, relevant and updated information, speed, safety and security, accessibility, social functions, personalization, power efficiency, context-awareness, and reliability. Nonetheless, there are limited empirical evidence of user attitudes that can confirm these assumptions.

Pro-environmental attitudes as potential motivations for the acceptance of virtual tourism via feelings of immersion in VR have not yet been comprehensively covered in the tourism literature (Kask, 2018). While studies support the idea of virtual consumption as a substitute for real goods (Lehdonvirta, 2009; Lehdonvirta, Wilska & Johnson, 2009), it is notwithstanding questionable whether virtual consumption theory may be applied to virtual tourism. Nevertheless, it is argued that VR may enhance the sustainability of tourism on numerous measures (Dewailly, 1999; Guttentag, 2010; Kask, 2018; Barrado-Timón & Hidalgo-Giralt, 2019). Dewailly (1999) posits that recourse to VR-travel could alleviate tourist pressures and contribute to a more sustainable tourism management, as part of VR's inherent utility as a preservation tool

15

stems from its ability to create virtual experiences that may be accepted as alternative means for real visitation to threatened sites. Guttentag (2010) explicates further that this may be greatly helpful for heritage preservation, and asserts that the virtual traveling application may offer a significant solution for destinations where sightseeing of local natural attractions incurs the risk of damage through human exploitation. Furthermore, Kask (2018) presents virtual travel as a possible methodology for implementing sustainable tourism and as an alternative to real visits into the natural environment, which, arguably, could provide a solution in the development of more sustainable tourism. According to tourism managers participating in Kask's study, virtual travel was suggested as a particularly valuable tourism option in areas where visitors are likely to surpass the carrying capacity of sensitive ecosystems, as virtual travel could potentially replace real visits to nature sightseeing areas and henceforth protect them (Kask, 2018). Additionally, virtual tourism was proposed as a realistic solution at locations where the local population experience negative impacts of tourism (Kask, 2018). In line with these findings, Barrado-Timón and Hidalgo-Giralt (2019) highlight that VR could be regarded as a significant tool for the safeguarding and conservation of heritage tourist destinations. The authors declare that VR has the potential to overcome the physical limitations of tourist attractions, and in that way, play an important role in the contribution to achieving global sustainability goals.

Interestingly, even though virtual tourism is broadly proposed as an alternative to traveling to real destinations, it is simultaneously largely criticized by tourism managers with the general agreement that "tourists would prefer real visits to virtual ones" (Kask, 2018, p. 36). It was suggested that a significant reason for rejecting virtual travel is that people prefer real visits because these let them *feel* true experiences. In all cases, participating tourism managers of Kask's (2018) study evaluated tourists' virtual visits as "not satisfying" or even "bad visits". At large, virtual visits were regarded as "non-visits" while real visits were perceived as normal, appreciated for their "naturalness", "originality", and "authenticity" (Kask, 2018, p. 36). There are, nevertheless, no actual empirical evidence or research on users' attitudes on virtual tourism as a substitute for conventional tourism that supports these standpoints.

2.4 Theoretical framework: UTAUT

Venkatesh, Morris, Davis, and Davis (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) with the aim of explaining factors that affect the acceptance and usage in the scope of technology. The model is proposed on the experimental combination of eight distinct theoretical models taken from sociological and psychological theories utilized in the literature to explain the acceptance and use of a new technology (Venkatesh et al., 2003). These eight models and theories are:

    (1)   *The Theory of Reasoned Action* (TRA)*;*

    (2)   *The Technology Acceptance Model* (TAM)*;*

    (3)   *The Motivational Model* (MM)*;*

    (4)   *The Theory of Planned Behavior* (TPB)*;*

    (5)   *A Model Combining TAM and TPB* (C-TAM-TPB)*;*

    (6)   *The Model of PC Utilization* (MPCU)*;*

    (7)   *The Innovation Diffusion Theory* (IDT)*;* and

    (8)   *The Social Cognitive Theory* (SCT).

By applying the theoretical and methodological framework of UTAUT, managers are, primarily in an organizational context, granted the possibility of evaluating the likeliness of acceptance and adoption of new technological introductions by employees. The UTAUT builds on four key constructs that determine user acceptance and user behavior: *performance expectancy, effort expectancy, social influence,* and lastly, *facilitating conditions*. A closer description of each key construct will follow in section 2.4.2. In addition, the model includes four moderating key relationships that work as integral features; *gender*, *age*, *voluntariness*, and *experience* (Venkatesh et al., 2003).

      As the focus of our thesis is on Generation Y's attitudes towards VR-traveling from an approach of technological acceptance and environmental sustainability, the UTAUT can provide us with interesting and significant knowledge as it is developed to understand factors and drivers to use new technology. Through understanding acceptance as a positive reception of an idea, not only as reactive tolerance but in the

sense of active willingness, it stands as a complex interaction of cognitive and emotional processes, which could lead to adoption - or rejection - of an innovation (Disztinger et al., 2017). With this in mind, the UTAUT-model can contribute with comprehensive insights that may explain individuals' intentions to use VR-traveling and subsequent usage behavior as it constitutes a framework of several common driving factors to adopt new technology. Previous research of VR has, with a few exceptions, mainly focused on the immersive factor (hedonic motivation) (Lee, Kim & Choi, 2019; Ch'ng, Li, Cai & Leow, 2020; Herz & Rahe, 2020). The UTAUT-model, however, considers multiple additional components. This means that the theoretical and methodological framework will not only assist in understanding the empirical material on a more ubiquitous level, but also allow for nuanced comparisons of how the conclusions drawn from our analysis correspond to previous research.

2.4.1 UTAUT II

The UTAUT was developed as a comprehensive integrated model for a better understanding of consumer acceptance towards new technology or systems. Since its inception, the model has been applied in several studies, in both organizational and non-organizational settings, and has been utilized in contexts of new technologies, new user populations, or new cultural settings. Upon reviewing what body of work that has adopted the UTAUT, Venkatesh, Thong, and Xu (2012) understood the need for further development and the increasing integration of a consumers' perspective. As the authors examined more related consumer behavior of studies, the UTAUT-model was adjusted by altering the prior perspective from organizations to individuals. This established a new prediction framework, namely, UTAUT II, which thereafter frequently has been employed for exploring various issues such as self-technology service, smart mobile device adoption, learning management software acceptance, and healthcare industry (Huang & Kao, 2015). In sum, the main objective of the UTAUT II is to adapt the UTAUT specifically to the consumer use context by understanding and incorporating the fundamental constructs that influence the consumer and the relationships between those constructs. By doing so, the model is significantly enhanced from the preceding version for explaining variances in users' technology intention, and, as a result, is more applicable in non-organizational settings. Since the purpose of this study is to explore

the possible factors influencing individual users' adoptions of virtual reality-traveling, the UTAUTII framework can provide more enhanced insights and, thus, is adopted as the research model of this thesis.

2.4.2 Key Constructs of UTAUT II

The original UTAUT includes four principal determining elements of behavioral intention or usage behavior on the acceptance of the technology: *performance expectancy*, *effort expectancy, facilitating conditions,* and *social influence*.

The first construct, *performance expectancy* (PE), is the strongest predictor of intention and is a direct determinant of intention to use. It is identified as a measurement of to which degree an individual believes she or he can benefit from using technology in her or his professional position. The second construct, *effort expectancy* (EE) determines the degree to which consumers believe that using technology will be simple and effortless, and is a direct determinant of intentions to use. The third construct, *social influence* (SI)*,* refers to the degree to which an individual perceives that important people in her or his social sphere influence whether she or he should use the technology in question. Social influence is a direct determinant of intention to use. The fourth construct, *facilitating conditions* (FC), directs focus to the extent to which consumers believe infrastructures and organizations can support the specific technology, and is a direct determinant of intention to use.

In addition, three new key constructs are included in the UTAUT II: *hedonic motivation*, *price value*, and *habit and experience* (Venkatesh et al., 2012). *Hedonic motivation* (HM) is defined as the pleasure or enjoyment derived from using technology. As suggested in previous research, hedonic motivation is a primary and vital factor for the acceptance of new technology (Lee et al., 2019; Ch'ng et al., 2020; Herz & Rahe, 2020)*. Price value* (PV) is defined as the trade-off between the perceived benefits of technologies and the monetary costs of using them. Lastly, *habit and experience* (HA)*,* centers to the extent to which individuals tend to perform behaviors automatically due to previous experiences and habits of learning technology. To summarize, the UTAUT II model reflects that an individual's intention to use a technology is determined by seven factors:

(1) *Performance expectancy (PE)*

(2) *Effort expectancy (EE)*

(3) *Facilitating conditions (FC)*

(4) *Social influence (SI)*

(5) *Hedonic motivation (HM)*

(6) *Price value (PV)*

(7) *Habit (HA)*

2.5 Model development and hypotheses

In this study, the UTAUT II-model was applied to analyze Generation Y's attitudes and intentions to use VR as a mode of travel and to examine the technology from a perspective of environmental sustainability. However, to better fit in the context of this study, the model and its integrated constructs were adjusted. Firstly, one of the dependent constructs, user behavior, was disregarded as VR-traveling is a contemporary phenomenon that presumably few people have tried. Thus, existing behavioral patterns are uncommon and irrelevant for the purpose of the study. Secondly, as the study aimed to examine VR in the context of leisure travel, the construct of *performance expectancy* (PE) was modified to focus on the perceptions of to what extent virtual reality-traveling can contribute to a richer traveling experience. Thirdly, the construct of *price value* (PV) was adjusted to measure how the additional values obtained by, or correlated to, the usage of VR-traveling is perceived in relation to the connected monetary costs. Moreover, the four moderating key relationships, *gender*, *age*, *voluntariness*, and *experience,* included in the original model have not been taken into consideration. This delimitation is made with two reasons in mind: firstly, gender and age are excluded as the aim of the study is to find generalizing features for the demographic Generation Y as a whole regardless of associated individual gender or age. Secondly, as the scope of the study implied a limited time frame, voluntariness and experience were excluded as it would require a larger quantity of respondents to the survey to draw generalizable conclusions. Lastly, the independent construct of *habit* (HA) was not included in this study. This limitation is motivated, as with aforementioned dependent construct of user

behavior, by the fact that virtual reality-traveling is a rather new technology which the majority of people likely have not tried, and, consequently, habits have not yet been developed.

Taking into account the relationships and constructs of the UTAUT II model, and the literature reviewed in section 2, the following hypotheses are derived:

H1: *Performance Expectancy (PE) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR-traveling.*

H2: *Effort Expectancy (EE) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR-traveling.*

H3: *Social Influence (SI) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR traveling.*

H4: *Facilitating Conditions (FC) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR traveling.*

H5: *Hedonic Motivation (HM) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR traveling.*

H6: *Price Value (PV) has a statistically significant positive influence on the Behavioral Intention (BI) to use VR traveling.*

Furthermore, as this study aimed to examine Generation Y's perceptions of VR-traveling as an environmentally sustainable alternative to conventional traveling, and as much of previous research on Generation Y indicates the demographic is characterized by environmental care (see section 2.1), a construct regarding *sustainability awareness* (*SA*) was included. This allowed us to better study the apparent conflict found in the literature on Generation Y which revealed the paradoxical relationship between their traveling habits and their environmental concern. Accordingly, the following hypothesis was put forward:

H7: *SA has a statistically significant positive influence on the Behavioral Intention (BI) to use VR traveling.*

Figure 1 Research model and compilation of hypotheses
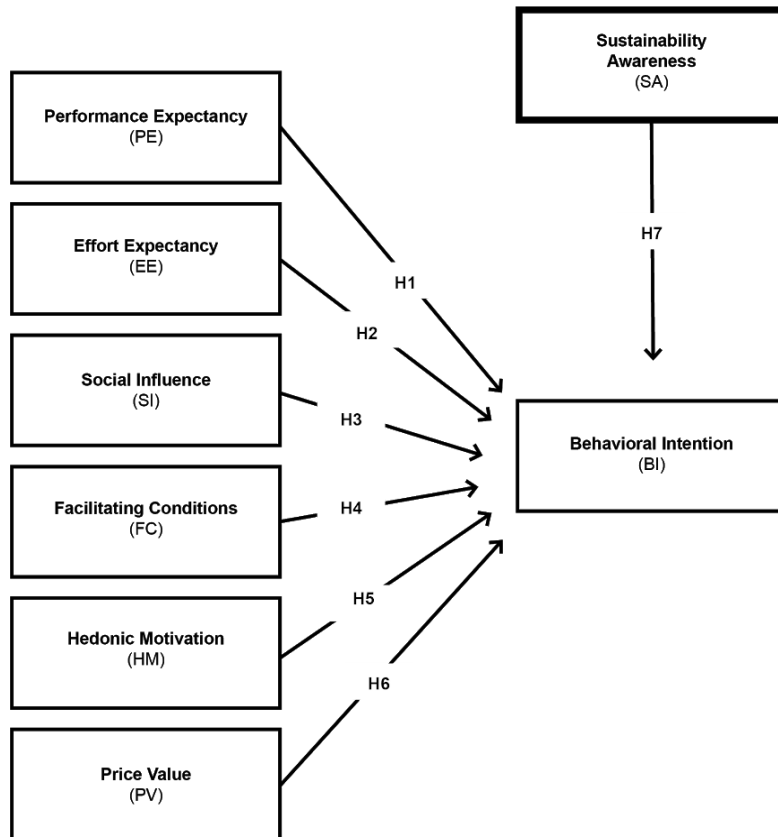
The figure above illustrates the adopted research model's constructs, the independent variables, and their hypothesized influence on the dependent variable behavioral intention (BI).

3. Method

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The following section will initially give an account of the scientific approach from which this study departs from. Thereafter, a presentation of the research design will follow, as well as a description of the analysis strategy used to draw conclusions from the results. Lastly, there will be a reflection addressing the choice of methods and how the study meets the criteria for quantitative research.

3.1 Scientific philosophical assumptions

This study was executed within the framework of the field of strategic communication and departed from an ontological starting point of positivism which established the structure of how the empirical material was to be studied and analyzed. Therefore, we presupposed the position that there is a single objective reality to any research phenomenon regardless of the researcher's perspective or belief. The epistemological foundation was of the assumption that knowledge, including knowledge of reality, derives from experience and is gained through quantifiable observations that lead to statistical analyses (6 & Bellamy, 2012). This implies that models and theories are no more than reductions or summaries of what has been experienced. A positivist approach was suitable for our study since we are investigating objective data, and, therefore, we were not interested in incorporating certain interests or beliefs to interpret the results (Bryman, 2012). Lastly, this study followed a deductive approach as it examined the research questions from several hypotheses that have emerged from previous research (6 & Bellamy, 2012).

3.2 Research design and analysis strategy

To examine and analyze the attitudes within Generation Y toward VR-traveling, a descriptive, quantitative survey has been conducted. Departing from UTAUT II, where

the theoretical framework and the methodological guidelines are intertwined, the questionnaire was built upon the constructs presented in section 2.4.2. The set of measurement items in respect of technology acceptance literature (the UTAUT and UTAUT II-model) were modified to the specific context of this study on the acceptance and usage of VR-traveling (see section 2.5). Further, to better understand how the traveling habits of the respondents correspond to the literature, a section on *Current Traveling Habits* was added to the survey. All of the survey items can be found in Appendix 1.

The introductory demographics are measured in nominal scale (gender), ratio scale (age), and ordinal scale (educational level). The subsequent section, *Current Traveling Habits*, is measured in absolute scale (number of travels), nominal scale (purpose for traveling), and ordinal scale (modes of traveling). Following the procedure described in section 2.4, a total of 27 items were obtained as shown in Appendix 1. It can be seen that the performance expectancy and facilitating conditions are measured using four items each. Effort expectancy, social influence, hedonic motivation, and sustainability are all measured using three items respectively. The behavioral intention construct is measured by five items, whereas price value comprises two items. The responses of the survey participants to each of the items are measured in an ordinal, seven-point Likert scale, ranging from 1 (strongly agree) to 7 (strongly disagree). This was chosen partly to measure the attitudes with high precision, but also because it is the same scale used in the original UTAUT-model (Venkatesh et al., 2012). Following Bryman's (2012) guidelines concerning ethics, all of the respondents were guaranteed full anonymity and were provided with all the necessary information regarding the survey before partaking. Moreover, all respondents were informed of their right to discontinue the survey whenever they desired (see Appendix 1).

By using the statistical software Statistical Package of Social Science (SPSS), both univariate, bivariate, and multiple regression analyses were conducted. The univariate and bivariate analyses were used to examine respondents' demographics, current traveling habits, and important results related to the variables of *Sustainability Awareness* (SA) and *Behavioral Intention* (BI), while multiple regression analysis was used to test the hypotheses. The univariate and bivariate analyses provided essential knowledge of attitudes towards VR-traveling from a perspective of environmental

sustainability. The multiple regression analysis contributed to discovering patterns and connections between the different variables, and, by doing so, expose whether support for the hypotheses existed or not.

3.3 Sample

The sampling for the study was based on an unbound, random convenience selection. The survey was constructed in Google Forms and the gathering of data was done online through distributing the survey on platforms such as Facebook and LinkedIn. Furthermore, the survey was shared in our social media feeds as well as in different online-based groups and networks outside of our sphere. Lastly, as the focus of our study is on the demographic cohort of Generation Y, only people who were born between 1977 and 2003 were requested to participate in the survey.

3.4 Validity and reliability

The validity of the study concerns the theoretical and conceptual relevance of the research as a whole, assessing how well the survey items are correlated to what the study aims to answer. Failure to convert the adopted theoretical framework into empirically measurable assertions will, thus, result in systematic errors (Djurfeldt, Larsson & Stjärnhagen, 2018, p. 104). The items in the survey were based on the methodological guidelines provided by UTAUT II which is a known model that has proven validity (Venkatesh et al., 2012). However, as the questionnaire was modified to fit the context of the study, and to ensure the respondents fully would understand VR-traveling, a three-minute YouTube-video was attached in the survey where the technology was thoroughly presented. The video can be found in Appendix 1. As a result of the measures taken, we regard the validity of the study to be high.

Reliability, on the other hand, does not pertain to the relevance of the survey items but rather how they are measured and the accuracy of the instrument. In summation, reliability regards the extent to which a research instrument consistently has the same results if it is used in the same situation on repeated occasions. Inadequate reliability can, for example, be contingent on poorly formulated items or ambiguous ways to respond to a item (Djurfeldt et al., 2018, p. 104). Consequently, to secure the

reliability of our thesis, a pilot study was carried out to identify whether there were any ambiguities or incomprehensible units within the questionnaire (see section 3.4.1). A further presentation of factors of validity and reliability explicitly tied to the UTAUT II constructs can be found in section 4.2.1.

3.4.1 Pilot study

The respondents participating in the pilot study were randomly selected from our circle of friends. To obtain a good degree of reliability and validity, the selection of respondents was made from various levels of education and range of ages within Generation Y. The pilot study produced useful feedback that was taken into consideration when adjusting and revising the questionnaire, which resulted in the final version used in this study (see Appendix 1).

3.5 Methodological reflections and limitations

UTAUT II, and the theoretical and methodological framework it provides for, may assist in revealing otherwise hidden notions or aspects of our chosen research phenomenon as it aids in comprehensively understanding factors and drivers for users to accept new technology. In our case, the choice of adopting the model can contribute to uncovering some of the starting points and attitudes that make up the foundation of how Generation Y views virtual reality-traveling. It also differentiates itself from other methods by allowing the acceptance and adoption of VR-traveling technology to be seen through a broader context as the empirical material is holistically examined. Therefore, UTAUT II may allow a deeper knowledge of the important factors and drivers for Generation Y to accept VR-traveling, as well as insights of how it is perceived as an environmentally sustainable alternative to conventional travel, and thereby contribute to answering the overall research questions.

Nevertheless, it is possible to argue that some methodological limitations maintain as a quantitative survey study, and the framework of UTAUT II, only allows for generalizing findings of overall attitudes in lieu of a more profound knowledge of why these beliefs exist. In this regard, we are granted a broader perspective which includes some truths of the phenomena at hand, while at the same time exclude others. In addition, it has to be acknowledged that a limitation of this study is the sampling

strategy as it follows the principles of convenience sampling rather than that of strategic sampling. This was done on the basis of two reasons: firstly, we did not have access to any demographic register of Swedish citizens of Generation Y which is a prerequisite for strategic sampling (Trost & Hultåker, 2016). Secondly, due to limited time and resources, we did not have the opportunity to ensure the sample was stratified or weighted, and, as a result, the generalizability and validity of our study are affected (Djurfeldt et al., 2018, p. 123). Notwithstanding, we are of the opinion that the quality of the study as a whole remains high and is not noticeably impaired by the aforementioned deficiencies.

4. Results and analysis

The following section presents the results and the analysis of the empirical material. By departing from our two research questions, emphasis is put on the distinct aspects that will contribute to achieving the aim of the study. Firstly, the descriptive statistics will be examined, and secondly, focus is directed to the hypotheses testing and the multiple regression analysis.

A total of 158 people participated in the survey, whereas two submissions were later removed from the result since the same answers had been chosen throughout the entire survey (e.g *strongly agree* on all statements) which make them extreme outliers. As multiple regression analysis is sensitive to extreme outliers, the decision to remove the two submissions in question is motivated (Pallant, 2003**,** p. 151). Furthermore, it is important to have a large enough sample size to be able to generalize the result of the study. While it is hard to determine the exact quantity which is required for this, and many scientists disagree, a general guideline is that the more respondents, the better generalizability (Pallant, p. 150, 2003). Nevertheless, Tabachnick and Fidell (2007, p. 123) recommend the sample size N>50+8m, where m is the number of independent variables for standard multiple regression. Departing from this guideline, the sample size for this study should be at least 106 respondents (50+(8x7)), which is by far accomplished in this thesis.

4.1 Descriptive statistics

The descriptive statistics comprise mean, standard deviation, skewness and kurtosis as well as demographics, current traveling habits, and relevant results connected to the constructs of *Sustainability Awareness* (SA) and *Behavioral Intention* (BI). This section

provides necessary insights which are fundamental for answering the overall research questions. The results will be further discussed and contextualized in section 5.

4.1.1 Mean, standard deviation, skewness and kurtosis

To examine the central tendencies, as well as the amount of variation or dispersion between the studied set of values, an analysis of the arithmetic mean and the standard deviation was conducted. This illustrated both the central values of the separate items included in the survey and an indication of how these values are spread out over a wider range. Moreover, the distribution of scores on continuous variables were measured by examining skewness and kurtosis. The skewness value provides an indication of the symmetry of the distribution, whereas kurtosis describes the degree to which scores cluster in the tails or the peak of a frequency distribution (Pallant, 2003, p. 57). If there is a perfectly normal distribution among the answers, the skewness and kurtosis value should be 0 (Pallant, 2003, p. 57). As seen in Appendix 3, the skewness and kurtosis indicate small deviations in all indexes. The index which, in this regard, differentiates itself from the others is Sustainability Awareness (SA) as the kurtosis value suggests that there are too many submissions in the extremes, which may result in an underestimate of the variance within the index. All individual values of means, standard deviations, skewness and kurtosis can be found in Appendix 3.

4.1.2 Demographics

The initial part of the questionnaire consisted of items regarding demographics, and frequency analysis was used to provide an overview of the study participants' socio-demographic profiles. The complete results from this section can be found below in Table 1.

Table 1 Demographics

Demographic Characteristics		Frequency	Percentage
Gender	Female	82	52.6
	Male	70	44.9
	Other	4	2.5
Age	1977-1982	12	7.7
	1983-1988	23	14.7
	1989-1994	60	38.5
	1995-2000	59	37.8
	2000-2003	2	1.3
Education	Primary school	1	0.6
	Senior high school	63	40.4
	Vocational degree	10	6.4
	Bachelor's degree	57	36.5
	Master's degree	21	13.5
	Doctorate degree	1	0.6
	Other/prefer not to say	3	1.9

The distribution of the age of the respondents within Generation Y partaking in the survey is, arranged by frequency, constituted by 39% (n = 60) who are born between 1989-1994, 38% (n = 59) who are born between 1995-2000, 15% (n = 23) who are born between 1983-1988, 8% (n = 12) who are born between 1977-1982, and, lastly, 1% (n = 2) who are born between 2000-2003. This suggests that the distribution of age in our sample is somewhat skewed. This might be explained by the fact that the survey builds on a convenience sample and that our possibilities to reach people outside of our age range (1977-1982 and 2001-2003) were limited. Further, the survey was spread on Facebook and LinkedIn, and according to Internetstiftelsen (2019), the usage of these digital platforms decreases with younger age in Sweden which could explain the difficulties reaching the most juvenile segment of Generation Y. Furthermore, as seen in Table 1, the distribution of gender is almost equal between women and men, which creates an approximately accurate representation of the Swedish population (SCB, 2019).

4.1.3 Current traveling habits

The following segment composes the results from the items concerning the traveling habits of respondents, and are presented in Figures 2-5 below.

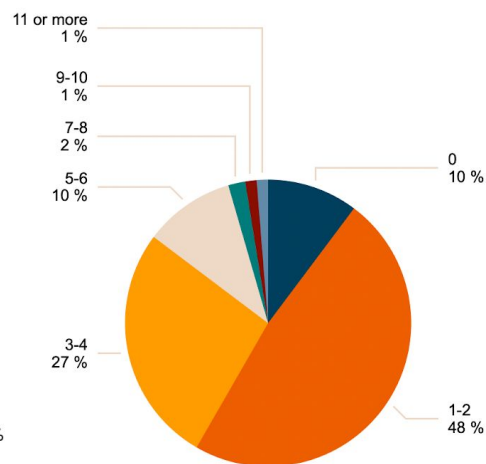**Figure 2** The most common reasons to travel abroad for leisure
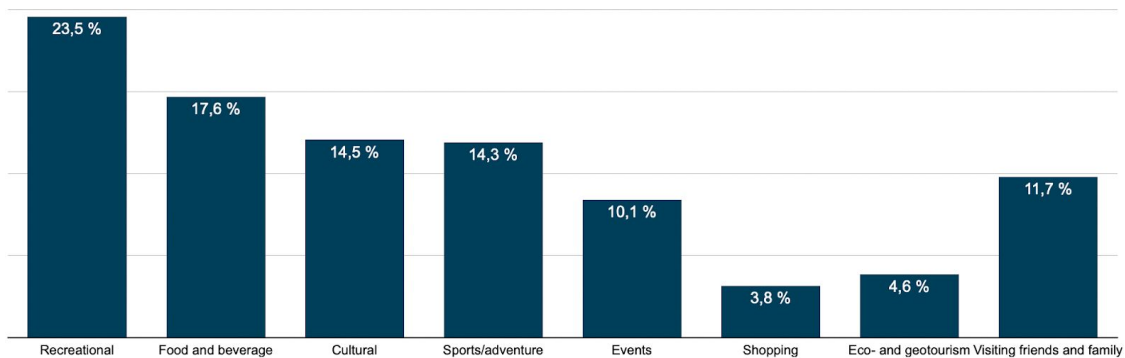
Illustrated in Figure 2, the most common reasons to travel abroad for leisure among the respondents were *recreational* (23.5%, n = 112), followed by *food and beverage* (17.6%, n = 84), and *cultural* (14.5%, n = 69). The participants were allowed to choose several alternatives from a range of different options in this item.

Figure 3 Average number of times traveling abroad for leisure per year;
Figure 4 Number of times traveling abroad for leisure in 2019
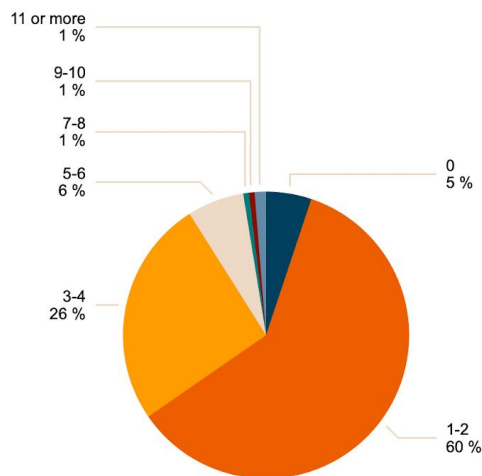
FIG 3: AVERAGE NUMBER OF TIMES TRAVELING ABROAD FOR LEISURE (PER YEAR)

FIG 4: NUMBER OF TIMES TRAVELING ABROAD FOR LEISURE 2019

Figure 3 depicts the average number of times the respondents travel abroad for leisure per year, whereas the most common value is 1-2 times per year (60%, n = 94), followed by 3-4 times (26%, n = 40) and 5-6 times (6%, n = 10). Upon asked of the number of

31

times respondents had been traveling abroad for leisure in 2019, the results in Figure 4 similarly reflect the findings in Figure 3. The most frequent value is 1-2 times during 2019 (48%, n = 75), succeeded by 3-4 times (27%, n = 42) , and, lastly, 5-6 times (10%, n = 16).

**Figure 5** Modes of traveling abroad for leisure
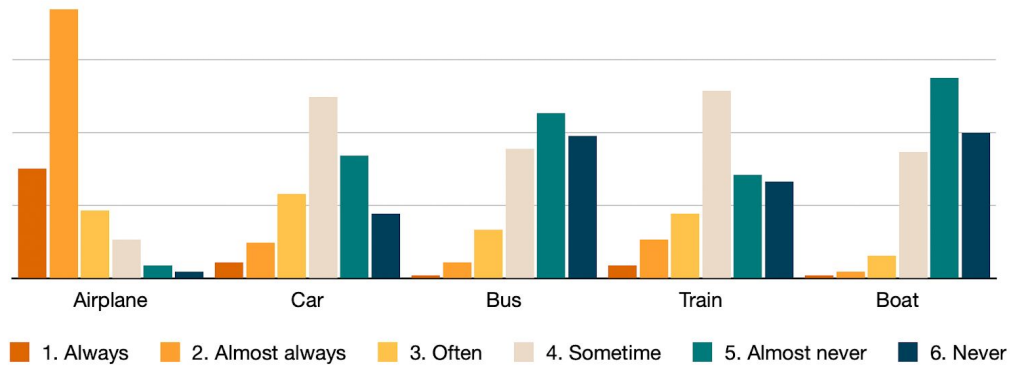
75% (n = 117) of respondents answered that they always, or almost always travel by airplane when traveling abroad. As illustrated in Figure 5 above, this was, ranked in order of frequency, followed by car, train, bus and boat.

4.1.4 Sustainability Awareness (SA) and Behavioral Intention (BI)

The subsequent part composes the results of selected items of relevance from *Sustainability Awareness* (SA) and *Behavioral Intention* (BI), which are presented in Figures 6-14 below.

Figure 6 Concerns about environmental sustainability issues (SA1);

Figure 7 Active decision-making in the daily life to reduce personal environmental impacts (SA2)
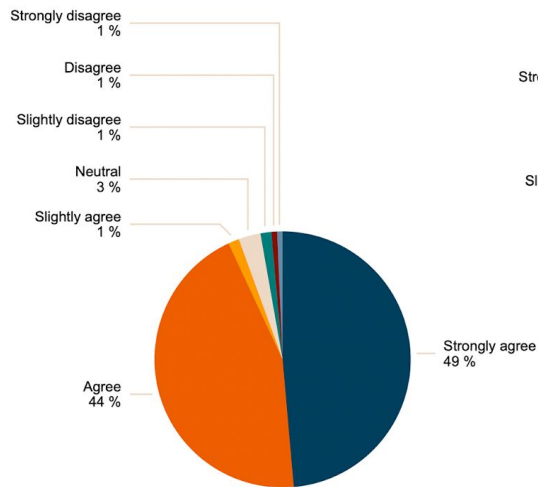
FIG 6: CONCERNS ABOUT ENVIRONMENTAL SUSTAINABILITY ISSUES
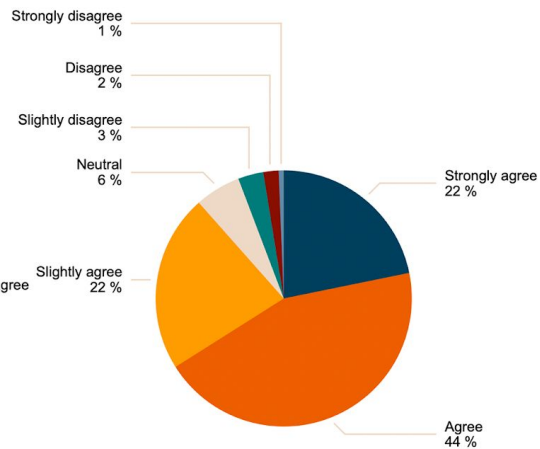
FIG 7: CONCERNS ABOUT ENVIRONMENTAL SUSTAINABILITY ISSUES

Upon asking whether the respondents express concerns about environmental sustainability issues, the vast majority (94%, n = 148) agreed with the statement in some way. Almost half (49%, n = 70) strongly agreed. Furthermore, as seen in Figure 7, the majority of respondents, 88% (n = 138), posit to in some extent actively making decisions in their daily life to reduce their personal environmental impact.

Figure 8 Actively reflecting of how her or his actions may, directly or indirectly, damage the natural environment (SA3);

Figure 9 Making conscious changes in personal lifestyle in order to reduce waste (SA4)
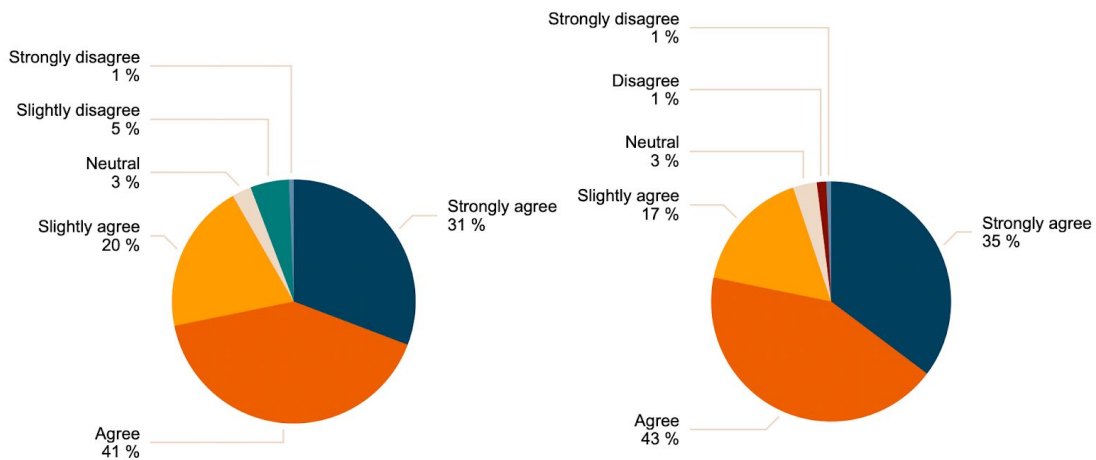
FIG 8: ACTIVELY REFLECTING OF HOW HER OR HIS ACTIONS MAY, DIRECTLY OR INDIRECTLY, DAMAGE THE NATURAL ENVIRONMENT

FIG 9: MAKING CONSCIOUS CHANGES IN PERSONAL LIFESTYLE IN ORDER TO REDUCE WASTE

As observed in Figure 8, the majority of participants, 92% (n = 143), reported that they, to some extent, actively reflect of how their actions may, directly or indirectly, damage the natural environment. Moreover, Figure 9 illustrates 95% (n = 148) of respondents make conscious changes in their lifestyles to reduce waste.
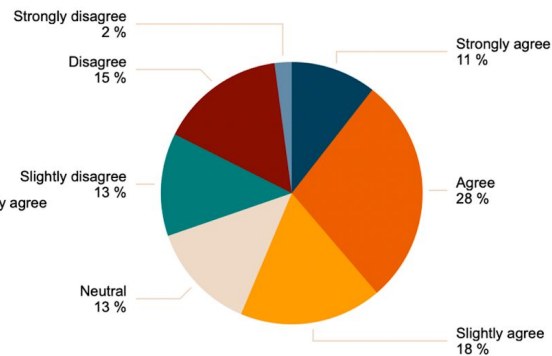
Figure 10 Awareness of the negative environmental consequences her or his traveling contributes to (SA5);

Figure 11 The environmental consequences of traveling have affected the choices made regarding traveling (SA6)
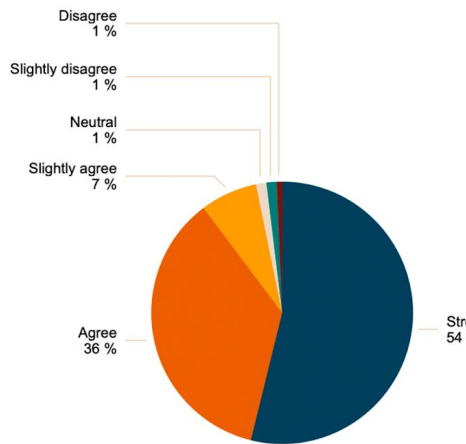
FIG 10: AWARENESS OF THE NEGATIVE ENVIRONMENTAL CONSEQUENCES HER OR HIS TRAVELING CONTRIBUTES TO

FIG 11: THE ENVIRONMENTAL CONSEQUENCES OF TRAVELING HAVE AFFECTED THE CHOICES MADE REGARDING TRAVELING

Figure 10 visualizes the respondents awareness of the negative environmental consequences their traveling contributes to, of which almost all participants, 97% (n = 151), expressed knowledgeability in the topic. 60% (n = 94) claimed the environmental consequences of traveling in some way have affected the choices made regarding travel, which can be seen in Figure 11 above.

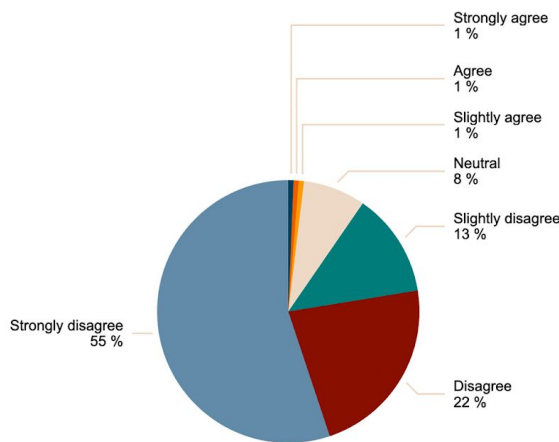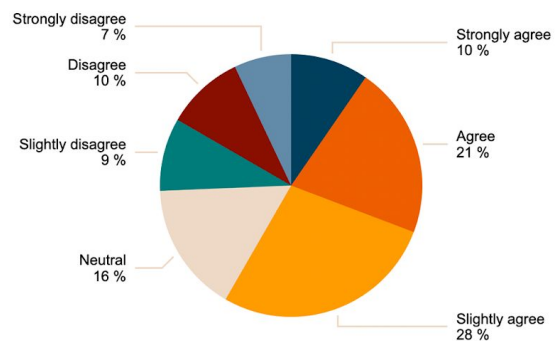**Figure 12** Intention to travel in virtual reality in the future
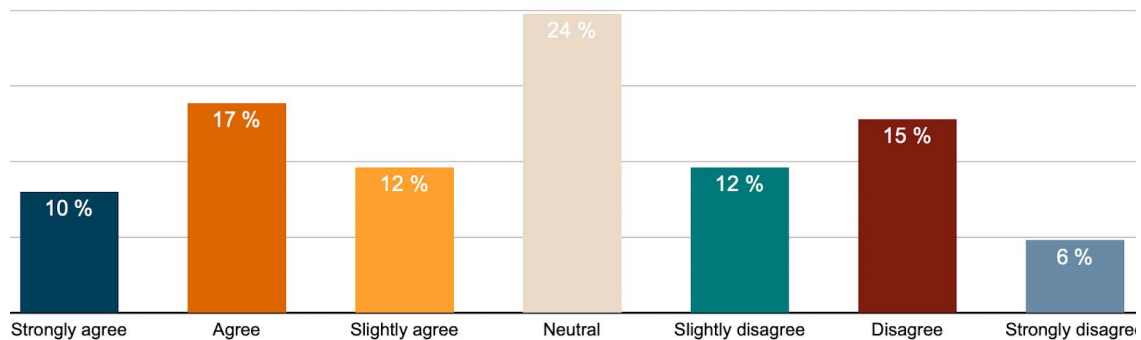
When inquired of intentions to travel in virtual reality in the future, 39% (n = 59) of the respondents answered positively and agreed with the statement in some way, while 33% (n = 51) in some way disagreed. 24% (n = 37) of the respondents expressed neutrality in the topic.

Figure 13 Intention to rather travel in virtual reality than conventional traveling (BI4);
Figure 14 Belief that virtual reality-traveling could be an option to travel more sustainably (BI5)

FIG 13: INTENTION TO RATHER TRAVEL IN VIRTUAL REALITY THAN CONVENTIONAL TRAVELING

FIG 14: BELIEF THAT VIRTUAL REALITY-TRAVELING COULD BE AN OPTION TO TRAVEL MORE SUSTAINABLY

As clearly shown in Figure 13, it can be understood that almost none of the respondents are willing to replace conventional traveling with virtual reality-traveling: 90% (n = 141) in some way disagreed with the statement, where 55% (n = 86) expressed strong disagreement. Only 3% (n = 3) agreed in some way, and 8% (n = 12) expressed neutrality. Lastly, the final item within the dependent construct of *Behavioral Intention (BI)* was directed to measure the attitudes and beliefs of respondents of whether virtual reality-traveling could be an option for more environmentally sustainable traveling. As illustrated in Figure 14, the majority (59%, n = 91) of respondents agreed to the statement and expressed positivity, whereas 26% (n = 40) disagreed in some way and 16% (n = 25) are neutral.

4.2 Hypotheses testing

Moreover, to test the hypotheses of the study, a standard multiple regression analysis has been conducted. All of the necessary steps for the analysis, as well as the results, are presented below.

4.2.1 Validity and Reliability of the Constructs

When analyzing the data associated with the UTAUT II model, the data was, first of all, reviewed in regards to Cronbach's Alpha. Cronbach's Alpha measures internal consistency, that is, how closely related the different items are, and therefore ensures that the respective items are measuring the same underlying construct. To secure that the internal consistency is good, Cronbach's Alpha should be at a minimum of 0.7, however, a value over 0.8 is preferable (Pallant, 2003, p. 97). Cronbach's Alpha for all of the constructs in the study is presented in Table 2 below.

Table 2 Cronbach's Alpha

Construct	PE	EE	SI	FC	HM	PV	SA	BI
Cronbach's Alpha	0.879	0.826	0.945	0.761	0.927	0.893	0.766	0.849

Moreover, Cronbach's Alpha can be increased or decreased depending on if low-scoring items are removed (Pallant, 2003, p. 100). In this case, the variations were overall small and, thus, the decision was made to not make any changes. Since Cronbach's Alpha exceeds 0.7 in all constructs, and 0.8 in all except for two, the constructs are regarded as acutely reliable.

Table 3 Multicollinearity test

Model	Tolerance	VIF
PE index	.448	2.230
EE index	.687	1.456
SI index	.691	1.447
FC index	.747	1.339
HM index	.478	2.094
PV index	.420	2.378
SA index	.973	1.028

Furthermore, if the independent variables are highly correlated, they will not compose for a good model for multiple regression analysis (Pallant, 2003, p. 158). Therefore, to ensure the independent variables in the model are not correlated, the data was subsequently run through a multicollinearity test. The data was indexed accordingly to the different constructs that constitute UTAUT II to be able to go through this test. Firstly, Pearson's correlation coefficient was measured. This provided information on the extent of the statistical relationship, or correlation, between the variables in the study, as well as the direction of the relationship (Pallant, 2003, p. 134). The results from the correlation test (see Appendix 2) indicated no Pearson correlation coefficient values above 0.7 between the independent variables. Moreover, *tolerance* and *VIF* was examined. Tolerance is an indicator of to what extent a singular independent variable is explained by the other independent variables in UTAUT II. A value of less than .10 is considered problematic and suggests that there might be multicollinearity. VIF, variance inflation factor, on the other hand, is the inverse tolerance value. A VIF-value larger than 10 indicates that there might be multicollinearity (Pallant, 2003, p. 158). The test confirms that the results from the survey are not affected by multicollinearity, which suggests that the used model is suitable for multiple regression analysis.

Figure 15 Scatterplot matrix
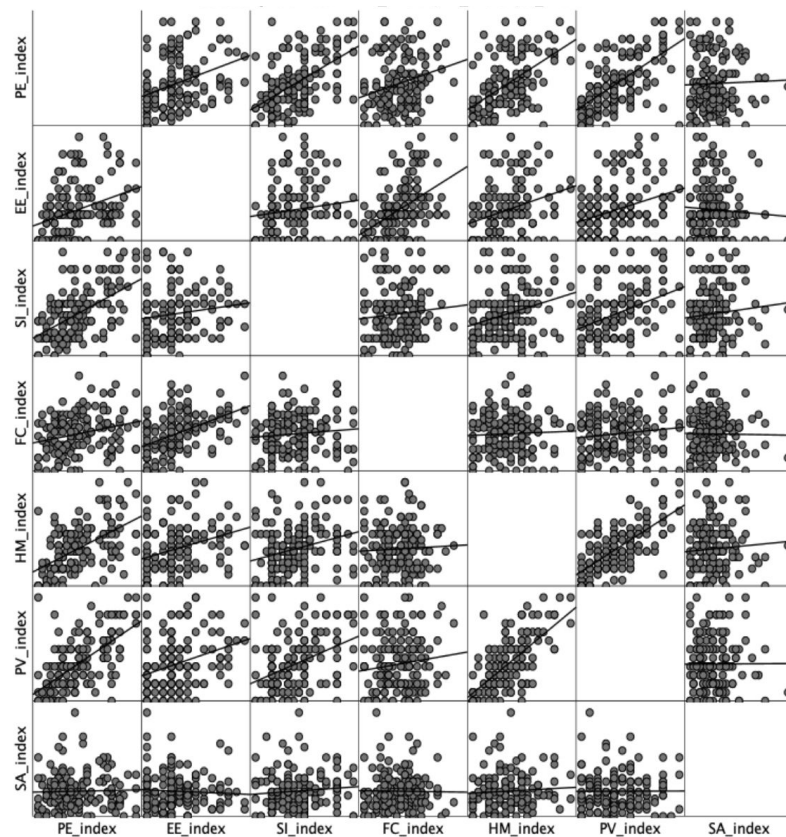
A scatterplot matrix was made to visualize how there is very little or no regression between the different independent constructs. If regression would exist between the independent variables, the dots would appear as a definite clumping of scores around the straight line (Pallant, 2003, p. 74), and, as seen in Figure 15, this is not the case.

4.2.2 Standard multiple regression analysis

The final step of the analysis, the multiple regression analysis, was conducted to be able to understand and evaluate which of the independent constructs have a significant impact on the dependent construct, and thereby, answer which of the study's hypotheses that can be confirmed or rejected. In standard multiple regression analysis, each independent variable is individually evaluated to discover what predictive power it holds to prognosticate the dependent variable.

Table 4 Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.821a	0.675	0.659	0.71600	0.675	43.863	7	148	0.000

a. Predictors: (Constant), PV_index, SA_index, FC_index, SI_index, EE_index, HM_index, PE_index

R Square (R^2) demonstrates how much of the variance in the dependent variable *behavioral intention* (BI) can be explained by the adopted research model. Although, when having a small sample, it is more suitable to apply the Adjusted R^2 value since R^2 might be too optimistic (Pallant, 2003, p. 160). As a result of the analysis, the adjusted R^2 exhibits a value of 0.659. Thus, 65,9% of the dependent variable *behavioral intention* (BI) can be explained by the adopted research model model.

Table 5 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	157.406	7	22.487	43.863	.000b
1	*Residual*	75.873	148	0.513		
	Total	233.279	155			

a. Dependent Variable: BI index
b. Predictors: (Constant), PV index, SA index, FC index, SI index, index, HM index, PE index

To further evaluate the research model and to assess the statistical significance of the results, an ANOVA-test was conducted. This test indicates whether the research model is statistically significant or not, whereas the model is significant if p<.05 (Pallant, 2003, p. 161). As demonstrated in Table 5, the Sig.-value (p-value) is .000b, and hence, it can be concluded that the adopted research model is significant.

Table 6 Coefficients

	Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B	
	B	Std. Error	Beta (β)	t	Sig.	Lower Bound	Upper Bound
(Constant)	1.793	0.267		6.715	0.000	1.266	2.321
PE index	0.309	0.057	0.382	5.453	0.000	0.197	0.420
EE index	−0.099	0.070	−0.080	−1.410	0.161	−0.238	0.040
SI index	0.029	0.047	0.034	0.604	0.547	−0.065	0.122
FC index	0.091	0.058	0.086	1.576	0.117	−0.023	0.206
HM index	0.204	0.062	0.225	3.311	0.001	0.082	0.325
PV index	0.263	0.058	0.329	4.554	0.000	0.149	0.377
SA index	0.052	0.068	0.036	0.767	0.444	−0.082	0.187

a. Dependent Variable: BI index

The results of the structural model testing are presented above in Table 6. To further evaluate the independent constructs and to discover to what degree they impact the dependent variable, focus is directed to the Standardized Coefficients Beta-column (β). The higher the value, the higher the impact the construct holds (Pallant, 2003, p. 161), and, as illustrated in Table 6, *Performance Expectancy* (PE) (β = 0.382)*, Price Value* (PV) (β = 0.329)*,* and *Hedonic Motivation* (HM) (β = 0.225) are subsequently the constructs with the highest values. To ensure the construct's impact on the dependent variable is of statistical significance, the values in the column *Sig.* (p-value) must be examined, where P>.05 is of no statistical significance (Pallant, 2003, p. 161). As observed in Table 6, it can be deduced that *Performance Expectancy* (PE)*, Hedonic Motivation* (HM), and *Price Value* (PV) are the three independent constructs that have a statistically significant effect on predicting the dependent variable *Behavioral Intention* (BI)*.* As a result, it can be concluded that H1, H5, and H6 can significantly explain 65,9% (adjusted R^2 = 0.659) of the variance in the dependent variable, and thereby confirm H1, H5, and H6, while H2, H3, H4, and H7 are rejected.

5. Discussion and conclusions

In this section, the results and the hypotheses of the study will be discussed in relation to the previous research. Further, contributions to the research field of virtual reality and sustainable tourism will be presented. Lastly, the section will be concluded with suggestions for further research on the topic.

Considering the urgent need to face challenges of sustainability in tourism, this study set out to examine what important factors and drivers that exist for Generation Y to accept and use virtual reality-traveling (*RQ1*) by using UTAUT II as the theoretical base. The findings indicate that the significant predictors of Generation Y's intentions to use VR-traveling in order of relevance are *performance expectancy, hedonic motivation,* and *price value*. Thus, intentions to use VR-traveling depend on the users' enhanced level of performance expected by its usage, the fulfillment of hedonic motives, and on the monetary costs in relation to the additional values obtained by or connected to its usage. Moreover, as a predominant orientation within research proposes the integration of innovation and technology as a potential means to achieve a more sustainable tourism growth (Guttentag, 2010; Loureiro, 2019; Katkuri et al., 2019), the study aimed to examine how VR-traveling is perceived by Generation Y as an environmentally sustainable alternative to conventional traveling (*RQ2*). The findings imply that a majority of respondents (59%, n = 91) believe VR-traveling could facilitate a more environmentally sustainable travel (see Figure 14), yet only a small fraction (1,8%, n = 3) express willingness in substituting conventional travel with virtual travel (see Figure 13).

Out of the seven derived hypotheses in this study, three were supported (H1, H5, and H6) and four were rejected (H2, H3, H4, and H7). The complete results of the structural model and hypotheses testing are presented in Table 7 below.

Table 7 Hypotheses

No	Hypothesis	β-value	t-value	p-value
H1	*Performance Expectancy → Behavioral Intention*	0.382	5.453	0.000
H2	*Effort Expectancy → Behavioral Intention*	-0.080	-1.410	0.161
H3	*Social Influence → Behavioral Intention*	0.034	0.604	0.547
H4	*Facilitating Conditions → Behavioral Intention*	0.086	1.576	0.117
H5	*Hedonic Motivation → Behavioral Intention*	0.225	3.311	0.001
H6	*Price Value → Behavioral Intention*	0.329	4.554	0.000
H7	*Sustainability Awareness → Behavioral Intention*	0.036	0.767	0.444

5.1 Supported hypotheses

H1 was hypothesizing that Generation Y's performance expectancy influences their intentions to use VR-traveling significantly. The results show strong support for this hypothesis (H1: β 0.382, t 5.453, p 0.000). This implies that performance expectancy of Generation Y has an essential influence on their intentions to use VR-traveling. Noteworthy, these findings are in contrast with the previous studies discussing the relationship between performance expectancy and behavioral intentions (Lee et al., 2019; Herz & Rahe, 2020). Lee et al. (2019) used the "Technology Acceptance Model" (TAM) to study how the introduction of social network characteristics as a diffusion strategy for virtual reality devices affect consumers' intention to use. The results indicate that social interactions and strength of the social ties increase perceived enjoyment, and perceived enjoyment has a more significant effect on the intention to use than perceived usefulness. In other words, users were found to primarily adopt VR for entertainment rather than for performance or usefulness. In another study, Herz and Rahe (2020) re-analyzed an existing dataset from a quantitative study with 611 German consumers to assess their perceived applicability of virtual reality glasses in various tasks. The researchers found that consumers rate the usability of VR-glasses to fulfill tasks rather limited and restrained, and, in accordance with Lee et al. (2019), instead

suggest that VR is viewed as an application mainly for fulfilling entertainment functions. Nevertheless, in this study, performance expectancy (PE) was proven to be the most important factor and driver for Generation Y to accept and adopt the technology of VR-traveling.

Moreover, support was also found for H5 hypothesizing the significant effect of the hedonic motivation on Generation Y's intentions to use VR-traveling (H5: β 0.225, t 3.311, p 0.001). With the acceptance of this hypothesis, it has been observed that hedonic motivation has a considerable effect on Gen Y: ers behavioral intention. This may be explained by the fact that virtual traveling can provide users with captivating tourism experiences of exclusive destinations that they previously were not able to visit. In this sense, VR can be said to generate additional factors of pleasure and enjoyment when compared with conventional travel. A further explanation of these results might lie in that VR-traveling, in its essence, consists of two major hedonic components - *immersive technology* and *travel* -, which both respectively have been put forward as two characterizing features of Generation Y (see Section 2.1). Altogether, these results are in line with the aforementioned findings of Lee et al. (2019) and Herz and Rahe (2020), who emphasizes that the hedonism embedded in VR is a core factor that both directly and indirectly influences the intention to use the technology. Furthermore, Lehdonvirta et al. (2009) examined virtual consumerism from a perspective of sociology with the aim to understand what motivations individuals have for engaging in virtual commodities. Their results suggest that hedonic motivation is a fundamental driver that may include motives of personal push factors, such as the desire to escape daily routines, find excitement or novelty, or engage in virtually-based social interaction. In the case of our study, these factors could also be likely determinants to why hedonic motivation plays such an important role in Generation Y's intentions to use VR-traveling. To be able to draw these conclusions, however, further research on the topic must be conducted.

Lastly, support was found for H6 that was hypothesizing that price-value influences Generation Y's intentions to use VR-traveling significantly (H6: β 0.329, t 4.554, p 0.000). Given the results obtained, it can be said that price-value plays a relevant role as a significant driver of Generation Y's intention to use VR as a means to travel. It suggests that the greater the chance of obtaining the best service or experience

for a given price and associated recognized benefits, the higher will be the intentions to use those services. Contextually, for Gen Y-ers to develop intentions to use VR-traveling, the required hard- and software must be reasonably priced in relation to the experiences and the additional value they can obtain with the technology. These results correlate well with those of Gupta, Dogra, and George (2018), who in another context of technology and tourism discovered price value, or price-saving orientations, to positively influence tourists' behavioral intention to adopt smartphone apps when making travel purchases.

5.2 Generation Y, VR-traveling and environmental sustainability

In line with the findings of previous studies on the traveling habits of Generation Y (Benckendorff et al., 2009; Varrichio et al., 2019; Expedia Group, 2017), this study confirms the notion that Generation Y comprises frequent travelers (see Figure 3 & 4). The results indicate that a high frequency of traveling has become a customary practice for Generation Y. Moreover, the study found that the most common reasons for Generation Y to travel abroad for leisure, ranked accordingly, are *recreational*, *food and beverage*, and *cultural* (see Figure 2). While VR can provide users with immersive and multisensorial travel experiences, they are, notwithstanding, merely virtual simulations of real-life experiences. In this sense, VR, and what is possible with the technology, will always be contingent upon the limitations that are inevitable with simulations. For instance, the study's two most popular motives for leisurely travel, recreational and gastronomic tourism, may never be possible through VR as visiting a beach for sunbathing or a vineyard for its cuisine would require the individual's actual physical presence. On the one hand, VR can facilitate tourism in the form of virtual tours of museums, world heritage sites, architecture, and other cultural attractions, and thereby potentially satisfy cultural motives. However, as these simulations principally are audio-visual representations of tourism settings, it can be argued that they only provide a fragment of what composes an entire travel experience. Conclusively, following our findings, the majority of the aforementioned reasons for recreational tourism are not possible with VR today. As the literature emphasizes how Generation Y value authenticity, fulfillment, and genuine experiences when traveling (CBI Ministry of

Foreign Affairs, 2020), the indisputable restrictions of VR may create important acceptance barriers that could be difficult to overcome. This is further recognized by Guttentag (2010) who argues that the acceptance of virtual travel substitutes will ultimately be determined by tourists' attitudes toward authenticity, motivations, and constraints. In all, these perspectives reflect those of Disztinger et al. (2017), which highlight how VR, in the context of travel planning, is still a (small) step away from mass-market acceptance. The authors suggest that additional improvements regarding VR's usefulness and enjoyment factor, as well as technical upgrades with respect to technology immersion, could, however, clear the path to success. Nevertheless, until the technology can generate travel experiences that holistically support Generation Y's current traveling habits, the substantial challenges for the mass-market acceptance of VR-traveling are likely to remain.

Following the literature on environmental concerns within Generation Y (Ballew et al., 2019; Kuppa, 2018), our study affirms environmental consciousness as one of the most prominent characteristics of the demographic. This was observed in each of the items that measured the sustainability awareness of the respondents. Almost all participants, 94% (see Figure 6), expressed concerns about environmental sustainability issues, and the vast majority actively make decisions and changes in their daily lives that reduce their environmental impact (see Figure 8 & 9). It was, nevertheless, noted that these attitudes are absent in the context of traveling. When gauged with the most commonly used mode of tourism transportation, 75% of respondents asserted this was done always, or almost always, by mode of aviation (see Figure 5). Notably, this is done despite declaring an awareness of the negative environmental consequences this contributes to; 97% of respondents agreed in some way to being aware of how their traveling is affecting the environment negatively (see Figure 10). As a result, it can be concluded from our results that Generation Y is well aware of the negative environmental effects their contemporary tourism mobility contributes to, yet nevertheless does not pursue an alternative mode of travel. Emitting from this notion, the paradoxical relationship between the cohort's environmental concern and traveling habits, which was highlighted and discussed in section 2.1 and 2.1.1, is confirmed as it can be found thoroughly manifested throughout the empirical material.

Further, a majority of respondents recognized VR-traveling as an alternative for more environmentally sustainable travel (see Figure 14). Thus, these results show support, from a user perspective, of the approach in the literature which suggests that VR may enhance the sustainability of tourism (Dewailly, 1999; Guttentag, 2010; Kask, 2018; Barrado-Timón & Hidalgo-Giralt, 2019). However, it was observed that almost none of the respondents are willing to replace conventional traveling with virtual traveling: 90% (n = 141) in some way disagreed with the statement, of which 55% (n = 86) expressed strong disagreement (see Figure 13). Respectively, as observed in Table 7, the results of the hypothesis testing showed no support of sustainability awareness having a statistically significant positive influence on the behavioral intention to use VR-traveling (H7: β 0.036, t 0.767, p 0.444). This implies that the sustainability awareness of Generation Y does not influence their intentions to use VR-traveling. Consequently, while VR-traveling is acknowledged by Generation Y from a perspective of environmental sustainability, it is nevertheless repudiated when compared with conventional travel.

5.3 Conclusions and suggestions for further research

This thesis has investigated the factors and drivers affecting Generation Y's acceptance and use of virtual reality-traveling in terms of the relationships among determinants of the UTAUT II-model and behavioral intention. Moreover, VR-traveling was studied and discussed from a perspective of environmental sustainability. It is believed that the findings obtained from the study will provide a useful foundation that will help practitioners, researchers, and strategic communicators of both the tourism and the technology industry to identify and better understand the market segment to which, and how, they should communicate their products and services. In addition, the study can provide practitioners and researchers alike with unique contributions of how the demographic of Generation Y poses to VR, traveling, and environmental sustainability. This is an area of research that previously has been disregarded.

Nevertheless, like all other research, this study has its limitations which lay the groundwork for future research. For instance, future studies may want to continue to investigate the construct *habit* and the moderating relationships (*age, gender,*

voluntariness, and *experience*) in the UTAUT II-model which were excluded in the adopted research model. Besides, this study only considered the factors included in the framework of UTAUT II. Therefore, it is suggested that future studies should focus on analyzing the significance of other external constructs on Generation Y's acceptance and usage of virtual tourism technologies. These constructs could, for example, include Generation Y's knowledge of the technology in question, individual personality attributes, and technology self-efficacy. By including some of these variables the prediction of both the acceptance and usage of VR-traveling may be improved. Furthermore, to obtain a more holistic understanding of how Generation Y perceives VR-traveling as an alternative to conventional traveling, it would be of interest to explore attitudes and motivations on a deeper level by adopting a qualitative research method. For example, this can be done by conducting personal interviews or with focus groups. As VR-traveling is a relatively modern phenomenon which, presumably, few people have tried, it would be an interesting approach in broadening the knowledge within the subject to allow respondents to test the technology and then measure whether the attitudes change succeeding the experience. Although the accumulated findings established that Generation Y highly values environmental care, VR-traveling - in its current form - proved not to be the ideal solution for them to travel more environmentally sustainable. Therefore, it could be interesting to apply similar theory and methodology to other demographics, with other desires of traveling, to examine if virtual reality-traveling could be a more successful application in those specific market segments.

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Appendices

Appendix 1 Survey

A. *Survey Introduction*

This survey provides the basis for our, Rickard Lundgren and Johanna Lööv's, bachelor thesis in Strategic Communication and Digital Media. The purpose of the study is to contribute with knowledge of attitudes and user perception of Virtual Reality-traveling as a substitute for ordinary traveling among Generation Y (people born between 1977-2003). Therefore, you need to be within this age range to participate in this survey. All of the statements in the survey builds on the Unified Theory of Acceptance and Use of Technology II.

The submissions will be treated confidentially and will not be possible to trace to a specific person. If you do not wish to complete the survey, you can quit at any time. It takes approximately 8 minutes to complete the survey.

If you have any additional questions, please contact either one of us:

Johanna Lööv, jo1177lo-s@student.lu.se
Rickard Lundgren, ri8004lu-s@student.lu.se

Thank you for contributing to our bachelor thesis!

B. *Link to the YouTube-video included in the survey*

[These Virtual Reality Apps Let You Travel The World Without Ever Leaving Home | Mach | NBC News](#)

C. Survey Items

Subscale	No. of items	Items
Performance Expectancy (PE)	4	PE1: *I believe Virtual Reality traveling could be a part of my everyday life.* PE2: *I believe traveling in Virtual Reality could increase my chances of visiting places I want to visit.* PE3: *I believe traveling in Virtual Reality could increase my chances of experiencing destinations I want to visit within a sooner future.* PE4: *I believe traveling in Virtual Reality could allow me to travel more often and thus discover more places in the world.*
Effort Expectancy (EE)	3	EE1: *I believe learning how to use Virtual Reality traveling would be easy for me.* EE2: *I believe Virtual Reality traveling is easy to use.* EE3: *I believe it is easy for me to become skillful at Virtual Reality traveling.*
Social Influence (SI)	3	SI1: *I believe I would use Virtual Reality traveling if people who are important to me think I should.* SI2: *I believe I would use Virtual Reality traveling if people who influence my behavior think I should.* SI3: *I believe I would use Virtual Reality traveling if people whose opinions I value think I should.*
Facilitating conditions (FC)	4	FC1: *I think I have the necessary resources to use Virtual Reality traveling.* FC2: *I think I have the necessary knowledge to use Virtual Reality traveling.* FC3: *Virtual Reality traveling is compatible with other technologies I use.* FC4: *I can get help from others when I have difficulties using Virtual Reality for traveling.*
Hedonic motivation (HM)	3	HM1: *I believe using Virtual Reality traveling is fun.* HM2: *I believe using Virtual Reality traveling is enjoyable.* HM3: *I believe using Virtual Reality traveling is very entertaining.*
Price value (PV)	2	PV1: *I believe I would use Virtual Reality traveling if the equipment (hard- and software) is reasonably priced.* PV2: *I believe I would use Virtual Reality traveling if it provides good value for the money.*
Sustainability Awareness (SA)	3	SA1: *I am concerned about environmental sustainability issues.* SA2: *I actively make decisions in my daily life to reduce my personal environmental impact.* SA3: *I think about how my actions may, directly or indirectly, damage the natural environment.* SA4: *I make conscious changes in my personal lifestyle in order to reduce waste (e.g. throwing away less food, recycling, or not wasting materials).* SA5: *I am aware of the negative environmental consequences my traveling contributes to.* SA6: *The environmental consequences of traveling have affected the choices I make regarding traveling.* SA7: *Pricing has an impact on whether I make environmentally sustainable choices when traveling.*
Behavioral Intention (BI)	5	BI1: *In the future, I intend to travel in Virtual Reality.* BI2: *In the future, I intend to travel in Virtual Reality frequently.* BI3: *In the future, I intend to travel in Virtual Reality in my daily life.* BI4: *In the future, I would rather travel in Virtual Reality than traditional traveling.* BI5: *I believe Virtual Reality traveling could be an option for me to travel more sustainably.*
Current traveling habits		1. *How many times do you usually travel abroad for leisure per year?* 2. *During 2019, how many times did you travel abroad for leisure?* 3. *For what purpose do you mainly travel abroad for leisure?* 4. *How often do you use the following modes of transportations while traveling to your tourist destination abroad? (Airplane, car, bus, train, boat)*
Demography		● *Age* ● *Gender* ● *Education*

Appendix 2 Correlations

		PE index	EE index	SI index	FC index	HM index	PV index	SA index	BI index
PE index	Pearson Correlation	1	.351**	.537**	.253**	.545**	.631**	0,030	.725**
	Sig. (2-tailed)		0,000	0,000	0,001	0,000	0,000	0,712	0,000
	N	156	156	156	156	156	156	156	156
EE index	Pearson Correlation	.351**	1	0,140	.463**	.304**	.313**	−0,059	.268**
	Sig. (2-tailed)	0,000		0,081	0,000	0,000	0,000	0,461	0,001
	N	156	156	156	156	156	156	156	156
SI index	Pearson Correlation	.537**	0,140	1	0,096	.275**	.394**	0,098	.431**
	Sig. (2-tailed)	0,000	0,081		0,234	0,001	0,000	0,225	0,000
	N	156	156	156	156	156	156	156	156
FC index	Pearson Correlation	.253**	.463**	0,096	1	0,047	0,125	−0,015	.199*
	Sig. (2-tailed)	0,001	0,000	0,234		0,563	0,121	0,850	0,013
	N	156	156	156	156	156	156	156	156
HM index	Pearson Correlation	.545**	.304**	.275**	0,047	1	.691**	0,071	.652**
	Sig. (2-tailed)	0,000	0,000	0,001	0,563		0,000	0,377	0,000
	N	156	156	156	156	156	156	156	156
PV index	Pearson Correlation	.631**	.313**	.394**	0,125	.691**	1	0,004	.725**
	Sig. (2-tailed)	0,000	0,000	0,000	0,121	0,000		0,960	0,000
	N	156	156	156	156	156	156	156	156
SA index	Pearson Correlation	0,030	−0,059	0,098	−0,015	0,071	0,004	1	0,072
	Sig. (2-tailed)	0,712	0,461	0,225	0,850	0,377	0,960		0,372
	N	156	156	156	156	156	156	156	156
BI index	Pearson Correlation	.725**	.268**	.431**	.199*	.652**	.725**	0,072	1
	Sig. (2-tailed)	0,000	0,001	0,000	0,013	0,000	0,000	0,372	
	N	156	156	156	156	156	156	156	156

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix 3 Mean, standard deviation, skewness and kurtosis

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PE index	156	1,00	7,00	3,4231	1,51807	0,514	0,194	−0,579	0,386
EE index	156	1,00	5,00	2,1902	0,98818	0,837	0,194	0,201	0,386
SI index	156	1,00	7,00	3,4295	1,46109	0,606	0,194	−0,226	0,386
FC index	156	1,00	6,50	3,1378	1,14874	0,193	0,194	−0,189	0,386
HM index	156	1,00	7,00	3,1432	1,35314	0,461	0,194	−0,039	0,386
PV index	156	1,00	7,00	3,1410	1,53748	0,562	0,194	−0,439	0,386
SA index	156	1,00	6,00	2,2051	0,85694	1,235	0,194	2,518	0,386
BI index	156	1,00	7,00	4,5974	1,22679	−0,225	0,194	−0,326	0,386