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The Smart Tourist

– in a smart destination context

Master's Thesis in Governance of Digitalisation

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Introduction

In this study, I would like to explore what are the characteristics of smart tourists are. Currently, there exists only a concept of smart tourists and there is no evidence yet that smart tourists as such exist as a market segment (Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A., 2018). Based on the concept of a smart tourist in a smart destination context, I am interested to study their needs and preferences as research in this field is still needed. Moreover, it would be interesting to see if the results of this study match with a similar study which has been conducted by Femenia-Serra, F., Perles-Ribes, J. F., & Ivars-Baidal, J. A. (2018) studying a group of tech-savvy Spanish millennials.

The topic itself relates quite well to studies in digitalization. Tourism is one of the biggest industries globally and understanding the behavior of a smart tourist could help to understand smart tourists better.

New products and services could be created in the future based on the smart tourists needs and preferences to create a positive travel experience for them. Smart services could be offered where the tourist can personalize its service experience. This also creates “numerous opportunities for startups and small and medium-sized enterprises providing complete smart services or developing individual modules and enablers” (Kagermann, 2015).

Moreover, smart tourists could also have an active role in deciding how they want their smart destination to be so that they would enjoy a more positive travel experience (Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A., 2018). New smart services, platforms and business models also offer the opportunity to create new jobs also called “smart talents” while replacing old jobs not needed anymore.

1.1. Research Problem

Digitalization is affecting Tourism Destinations and Tourists. Tourists are better informed using ICT and digital technologies enables tourism destinations and tourists to co-create new services. e.g. sharing experiences by means of text, pictures or videos either on the website of the service provider or on social media.

Moreover, digital technology also improves the capability of tourists in their decision making, connecting to family, friends or followers who are even able to follow live the travel experiences. Digital technology can also improve the way on how tourists behave. For example, a satellite messenger allows rescue teams to find a tourist in an area which is not covered with a cellular network in an emergency. This device may give the tourist the self-confidence to go on remote trips. The digital device gives the tourist a feeling of being connected and closeness.

Digitalization may also help a tourist to explore destinations in more detail as digital information (e.g. offered by a smart tourist destination) may reveal features which the tourist may have not been aware of without such a device or service.

In general, there is a need to understand the needs of a smart tourists to enable smart destinations to improve their travel experience.

1.2. Research Gap

Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2018) states that “the proposed smart tourist conceptualization needs to be supported by a broader empirical research to strengthen its validity to further comprehend tourists in the smart paradigm, and to address the still pending knowledge gaps around the tourist in this scenario”.

1.3. Objective of the study

The main objective of this study is to assess the characteristics of smart tourists in the hiking segment. The characteristics of smart tourists in a smart destination are outlined in Figure 1 by Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2018) and will be used in this study to formulate research questions.

1.4. Research Questions

The research questions are based on the objective of the study.

R1: How do Smart Technologies help to enhance the tourist experience?

“The technological gap or divide constitutes a notable barrier” (Gretzel, Reino et al., 2015 cited by Femenia-Serra et al., 2019) and “counterproductive results of a technology-based experience such as information overload, excessive cognitive effort or loss of authenticity” (Femenia-Serra et al., 2019).

If “smart technologies are accepted, the willingness of the tourist to use them for interacting and dynamically co-creating with other stakeholders in the SDs becomes the third and final determining factor that shapes the smart tourist” (Femenia-Serra, et al., 2019).

Smart technologies offer an “experience personalisation and co-creation through ubiquitous Connectivity” (Neuhofer, et al., 2015 cited by Femenia-Serra et al., 2019) and they can “create new levels of human machine interaction, using different devices and updated information, that may transform experiences and businesses” (Gretzel, Zhong, & Koo, 2016 cited by Femenia-Serra et al., 2019).

R2: How are tourists willing to share data in exchange for personalized experience?

“Concerns about privacy and personal security have been proved to be a main issue in the current digital tourism ecosystem” (Buhalis & Law, 2008 cited by Femenia-Serra et al., 2019). However, “the whole smart tourism idea relies greatly on the assumption that tourists are open to sharing their data in order to obtain better services and experiences” (Gretzel, Reino, et al., 2015 cited by Femenia-Serra et al., 2019).

R3: How are tourists interested to interact and co-create the experience with the smart destination or service providers?

Non-traditional actors (social media platforms, etc.) are now playing a critical role (Gretzel, Werthner, et al., 2015). New relationships between customers, manufacturers and intermediaries needs to be built to allow value co-creation between them (Gretzel, Sigala, et al., 2015 cited by Femenia-Serra et al., 2019).

2. Literature Review

In this section, I am going to review the main aspects related to this study which is based on the framework (figure 1) which has been developed by Femenia-Serra, Neuhofer and Ivars-Baidal (2018). The framework shows the characteristics of a smart tourist within a smart destination setting such as:

- Shares data with stakeholders
- Use smart technologies for experience
- Interact and co-creates the experience through smart destinations.

These characteristics will also form my research questions.

First, I would like to give some definitions regarding the term's smart tourists and smart destinations.

There are a couple of definitions available which are describing a smart destination, such as the one from Siddle J. as cited by Masseno M.D. et al., 2018, p. 300 who describes a Smart Destination as

“an innovative tourist destination, built on an infrastructure of state-of-the-art technology guaranteeing the sustainable development of tourist areas, accessible to everyone, which facilitates the visitor's interaction with and integration into his or her surroundings, increases the quality of the experience at the destination, and improves residents' quality of life”.

While Bulchand-Gidumal, J., 2015 describes a smart destination as

“A destination where companies, administrations and tourists constantly interact to perform three activities continuously and iteratively:

- 1) Collection of data about the activities that take place at the destination, collected from all possible sources of data (some of which already are available and others that will be implemented specifically for this aim).

2) Analysis of the wide variety of data collected using various intelligent algorithms to detect patterns of tourist behavior and of operations at the destination, in order to allow proposal of measures to improve both the management of the destination and tourist satisfaction.

3) Implementation of measures that pass an analysis of economic, technical and financial feasibility to improve the destination, making it more sustainable and adaptable to the needs and tastes of tourists who can even customize their experiences—as a result, tourists obtain a more satisfying stay while improving the efficiency and effectiveness of the destination.”

A smart tourist is “The tourist who, by being open to sharing his or her data and making use of smart technologies, interacts dynamically with other stakeholders, co-creating in this way an enhanced and personalized smart experience. This tourist is open to innovations, social and proactive and finds his or her natural environment in the smart tourism ecosystem and the smart destination” Femenia-Serra, Neuhofer and Ivars-Baidal (2018). However, there is a broader empirical research is needed to support the smart tourist conceptualization Femenia-Serra, Neuhofer and Ivars-Baidal (2018) as outlined in figure 1.

Moreover, there seems to be also a digital divide among tourists which leads to a different degree of smartness of a tourist (see figure 1: Shades of smartness) such as the unattractiveness of new technology, no possession of digital devices / network connection, lack of skills or lack of usage opportunities (van Dyck and Hacker, 2003).

It is also possible to create some sort of typology of tourists representing the degrees on how tourists the smart tourist role based on how they comply with the smart tourist characteristics shown in the framework in Figure 1 (Femenia-Serra, Neuhofer, & Ivars-Baidal, 2018). Individuals may use smart technologies in different ways and may for example not be willing to share all the data with the smart destination.

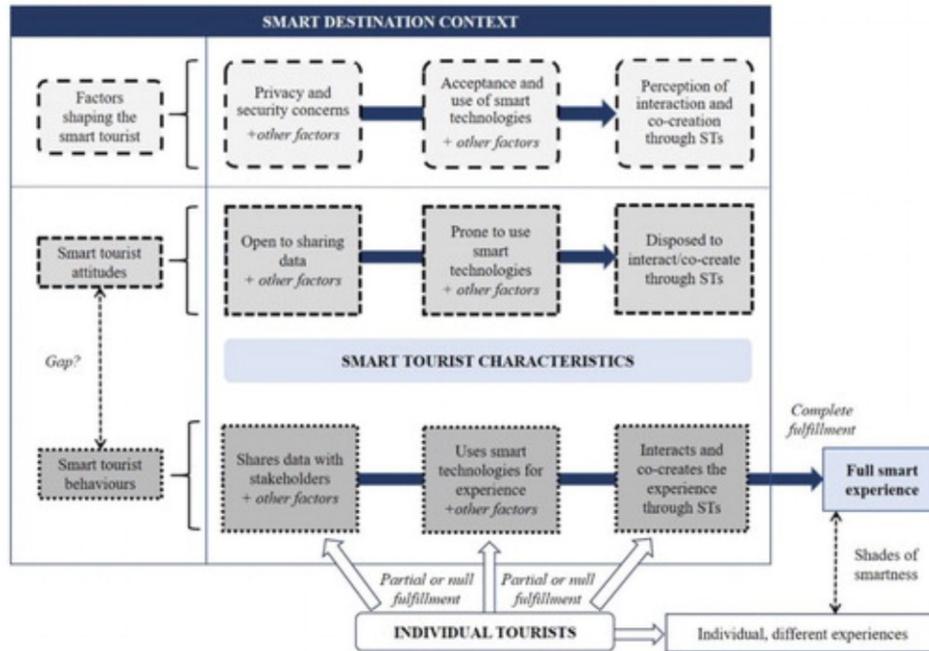


Figure 1: The smart tourist. Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2018)

Table 1 shows the evidence for the research questions where I have added a third column to the table of under-researched technological factors shaping tourists in the smart destination by Femenia-Serra et al (2018).

Table 1: Identification of under-researched technological factors shaping tourists in the smart destination. Femenia-Serra, Francisco & Neuhofer, Barbara & Baidal, Josep. (2018).

Critical factors	Evidence in Literature	Evidence for Research Question
1) Privacy and security concerns regarding data sharing	Buhalis & Amaranggana, 2014, 2015;	
	González-Reverté et al., 2018;	“the tourists surveyed saw privacy risk as having a major negative impact on the tourist experience, although it did not affect their perceived utility value and future use of mobile devices.”
	Reino, et al., 2015;	“This is tightly connected to trust and privacy concerns that are undoubtedly high for smart tourism.”
	Gretzel, Sigala, et al., 2015;	”Privacy is therefore an obvious concern in the context of smart tourism.”
	Gretzel, Werthner, et al., 2015;	“Privacy concerns, the effects of technology-mediated life, information

		overload/the value of information, trust in smart technology and enjoyment of technology-enriched experiences are only some of the many issues that need to be researched.”
	Huang, Goo, Nam, & Yoo, 2017;	”By adopting the framework of exploration and exploitation and identifying the antecedents that advance and prohibit such uses, we find that the attributes of smart tourism technologies promote both explorative and exploitative use, while user’s security and privacy concerns have a negative effect.”
	Xiang & Fesenmaier, 2017	
2) Acceptance and use of smart technologies	Buonincontri & Micera, 2016;	“The arrows show that an integrated and coordinated implementation of the three smart technological components in the 6A’s of the destination allows to increase the experience co-creation at all the phases of the experiential process acting on the three antecedents of experience co-creation.”
2) Acceptance and use of smart technologies 3) Perception of interaction and co-creation with stakeholders through smart technologies	González-Reverté et al., 2018;	“... tourists have greatly increased their acceptance of and trust in the use of mobile phones when on holiday.” “Our research places these two risk dimensions in relation to different variables of acceptance of the use of technology in order to examine how they influence the perception of the value of present, hedonic, and future use.”
	Gretzel, 2011;	“Driven by the overuse of the Technology Acceptance Model (TAM) (Venkatesch & Davis, 2000) in tourism and technology-related studies, there is also a great bias toward investigating intentions to use and not enough research on actual use,

		use patterns, and, most importantly, non-use.”
	Gretzel, Reino, et al., 2015;	<p>“Not all tourists have the skill or the will to constantly interact with information.”</p> <p>“It depends on tourists having smart devices that can run these applications in order to deliver smart services.”</p>
	Gretzel, Sigala, et al., 2015;	“The smart tourists and their digital selves (or data bodies) use smartphones to tap into information infrastructures provided at the destination or virtually in order to add value to their experiences.”
	Gretzel, Werthner, et al., 2015;	“Touristic and residential consumers produce data through social media activities or the use of location-based services and consume data produced by other species or the physical environment, often made palatable through mobile apps.”
	Liberato, et al., 2018	<p>“ICT has become an integral part of the experience because tourists use different devices as primary tools to plan their trip, enjoy the destination experience, and share it on their return (Wang <i>et al.</i>, 2013, 2014).”</p> <p>“In this sense, the results achieved highlight the importance of internet access in the destination, especially in places such as airports and hotels, since tourists primarily use mobile devices and computers while traveling.”</p>
	Boes et al., 2015, 2016;	“... Smart Tourism Destinations can be perceived as places utilising the available technological tools and techniques to enable demand and supply to co-create value, pleasure, and experiences for the tourist and wealth, profit, and benefits for the organisations and the destination.”

<p>3) Perception of interaction and co-creation with stakeholders through smart technologies</p>	<p>Buhalis & Amaranggana, 2014, 2015;</p>	<p>“To date, tourists mainly use their ICT devices to seek for information to help them form decisions in regard with their trip.”</p> <p>“Concerns namely rely too much to technology, less interaction with people, errors in given information, not experiencing destination as it is, difficulties for older people and losing job as tour guide.”</p> <p>“clear communication with users on how destination would use and protect their data to benefits them is needed to build trust bond between tourists and destinations.”</p> <p>“Applying smartness concepts within destinations is deemed necessary to potentially enhance tourism experience through advance feedback loop, enhanced access to real-time information and advance customer service through Internet of Things ...”</p>
	<p>Buonincontri & Micera, 2016;</p>	<p>“Findings also show a positive influence of the smart approach adopted by the two destinations on the tourism experience co-creation: the technological tools implemented by Salzburg and Venice in the dimensions which characterize a destination are able to improve direct interaction, to encourage active participation, and to support the sharing of the experience with a wide network of subjects.”</p> <p>“quantitative studies will be carried out in the future, aimed at investigating how much a smart approach influences the tourism experience co-creation and at confirming the direct interaction with tourism services providers, the active participation, and the sharing of the</p>

		experience as main “antecedents” of the experience co-creation.”
	Choe & Fesenmaier, 2017;	
	Gretzel, Werthner, et al., 2015;	<p>“A smart tourism ecosystem (STE) consequently can be defined as a tourism system that takes advantage of smart technology in creating, managing and delivering intelligent touristic services/experiences and is characterized by intensive information sharing and value co-creation.”</p> <p>“Privacy concerns, the effects of technology-mediated life, information overload/the value of information, trust in smart technology and enjoyment of technology-enriched experiences are only some of the many issues that need to be researched.”</p>
	Micera et al., 2013;	
	Xiang et al., 2015	<p>“... younger generations tend to use fewer paper-based materials for trip planning, which is likely to be due to the higher adoption rate of mobile technology among these age groups.”</p> <p>“Different generations use slightly different channels for information and transaction.”</p>

2.1. Mobile Technology use

Mobile technologies such as smartphones, tablets and mobile applications (apps) which combines ICTs with mobility, are probably the most important devices for users to access the Internet and also in their daily life (Wang Park, & Fesenmaier, 2012 cited by Law, R. et al., 2018).

Mobile technologies have an impact on how tourists experience a destination and use travel-related products and share their travel experiences with others (Law, R. et al., 2018) as they offer possibilities to access services anywhere and at any time while traveling (Rey-López, et al., 2011).

Mobile devices such as smartphones, tablets, smartwatches, etc. have transformed the way people travel through all stages of a trip by connecting their life as a tourist to their ordinary life (Gretzel,

2010; Pearce & Gretzel, 2012; Tussyadiah & Fesenmaier, 2009; Wanget al., 2012,2014a cited by Fesenmaier et al., 2017). They use mobile technologies mainly for communication, social media, entertainment, and information acquisition (Wang et al., 2016a cited by Law, R. et al., 2018) but tourists may also feel more secure as they can instantly connect to their friends and family while traveling (Wang et al.,2016 cited by Law, R. et al., 2018). It also enhances the social support among campsite tourists as they can ask for travel assistance in various ways (Dickinson et al. (2017) cited by Law, R. et al. (2018). However, tourists are more likely to share their experiences on-site to communicate with their friends and family rather than sharing their experiences or providing feedback to the service providers when they return home (Wang et al., 2014; Zhang, Omran, & Cobanoglu, 2017 cited by Law, R. et al., 2018). However, the service environment should also encourage customers to use mobile technologies to consume travel-related products by making bookings, socializing and ask for help (Morosan & DeFranco, 2014b; Wang et al., 2014 cited by Law, R. et al., 2018). Information content and coupons seem to be the most important attributes for destination mobile applications while the location-aware feature is rated as the lowest Rivera, Croes, and Zhong (2016) cited by Law, R. et al. (2018).

Personalization seems to be the most important feature that tourists expect but are currently not satisfied with (Dickinson et al., 2014 cited by Law, R. et al., 2018). Moreover, the instantaneous nature of mobile technologies also integrates consumer efforts in the pre- and post-trip stages together during the trip (Wang et al., 2014 cited by Law, R. et al., 2018). For example, tourists may plan less before the trips as they already know that the information is available through their mobile devices as long as they have access to the Internet (Wang et al., 2014) making them more reliant on tablets and smartphones than other devices when they search for information (Murphy et al., 2016 cited by Law, R. et al., 2018).

2.2. Smart technologies for enhanced tourist experiences

The development of Smart Destinations benefits both, the Tourist Destination and the Tourist alike by providing easy access to centralized data platforms Zhu et al. (2014) cited by Buhalis D. & Amaranggana A (2015). Participants of a smart tourism ecosystem should work towards an enhanced tourism experience which is of high-value, sustainable and meaningful (Buhalis & Amaranggana, 2014). Gretzel et al. (2015) defines the smart tourism ecosystem as

“a tourism system that takes advantage of smart technology in creating, managing and delivering intelligent touristic services/experiences and is characterized by intensive information sharing and value co-creation”.

Gretzel et al. (2015) describes "smart" as technological, economic, and social development fueled by new technologies. Destinations are increasingly equipped with a technological infrastructure which offers a digital environment supporting the collaboration between stakeholders which enables sharing and transferring of knowledge (Baggio and Del Chiappa 2013, 2014). The term “smartness” relates to increase efficiency, cost savings and to offer more sustainable and enjoyable solutions and in tourism this means to facilitate stakeholder value co-creation across the smart service ecosystem by enhancing the tourist experience through state-of-the-art technologies and big data exploitation (Gretzel, Sigala, Xiang and Koo, 2015; Xiang and Fesenmaier, 2017 cited by

Neuhofer et al., 2018 cited by Neuhofer et al., 2018). The term “smart technology”, which “describes a new product, referring to the environment, condition or motion of technology that adapts to certain functions or is tailored to specific circumstances” (Worden et al. 2003). Gretzel, Reino, et al. (2015); Huang et al.; (2017) cited by Femenia-Serra (2018) mention for example AR (Augmented Reality), VR (Virtual Reality), NFC (Near-Field Communication), Wi-Fi connectivity, iBeacons, smart tags, mobile apps, smart cards, latest generation websites, social networks and chatbots as examples of smart technologies which could assist as tourist experience enhancers.

Smart products, such as smartphones could be implemented into smart destinations (e.g. traffic lights, cameras, etc.) or in hotels (e.g. heating system, TVs, conference rooms, etc.) and used by smart tourists. Smart products could collect data and share it on a single marketplace, networking site or app (Internet of Things). Kagermann et al. (2015) describes the term as “objects, devices and machines that are equipped with sensors, controlled by software and connected to the Internet. They collect all types of data (Big Data), analyze them and share them with other devices”. The analyzed data is then known as smart data which would give a deeper insight about the smart product itself but also about the tourist using the smart product to the service provider or manufacturer of the smart product. The technological platform which offers a smart approach consists of three technological components: cloud computing services, internet of things, and end-user devices (Zhang et al. 2012; Wang et al. 2013).

The model in figure 2 explains the requirements and processes of smart technologies which are necessary for personalized experiences to be facilitated (Neuhofer et al., 2015). Smart technologies enable a more dynamic service encounter in which experiences are co-created and where information is collected for future encounters. As such, smart technologies may enhance tourist experiences (Neuhofer et al., 2015 cited by Femenia-Serra et all 2018).

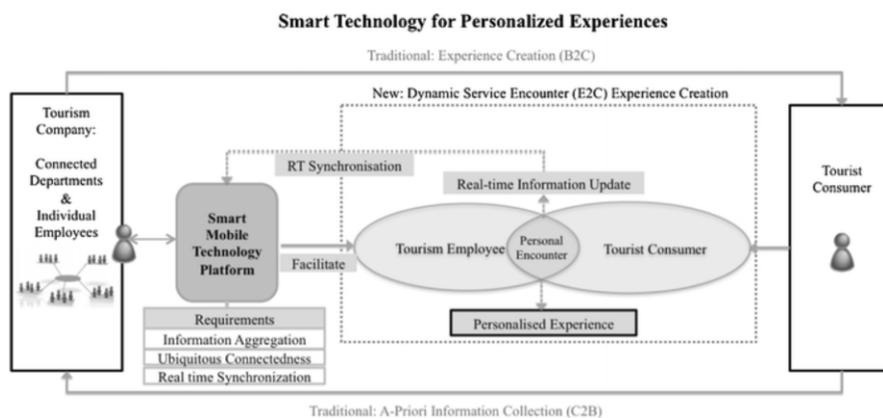


Figure 2: Smart Technology for Personalized Experiences. Neuhofer B., Buhalis D., Ladkin A. (2015)

Beside smart products there are also smart services. Kagermann et al. (2015) describe smart services as “individually configured bundles of products and services” which will probably slowly replace off-the-shelf services also in the tourism service industry ranging from eConcierges, digital mobility service providers or smart restaurants where customers can customize their meals

according to their wishes. It is the “right combination of products and services to meet the needs of their current situation, anytime, anywhere” such as shown in Figure 3. Those services can also be combined on digital platforms becoming individual smart services. Destination Management Organizations could try to orchestrate different service providers of the Destination to share ideas and work together to build a suitable platform which could be used by both - the tourists and the service providers alike. Alternatively, destination management organizations could also provide services which are provided by third parties.

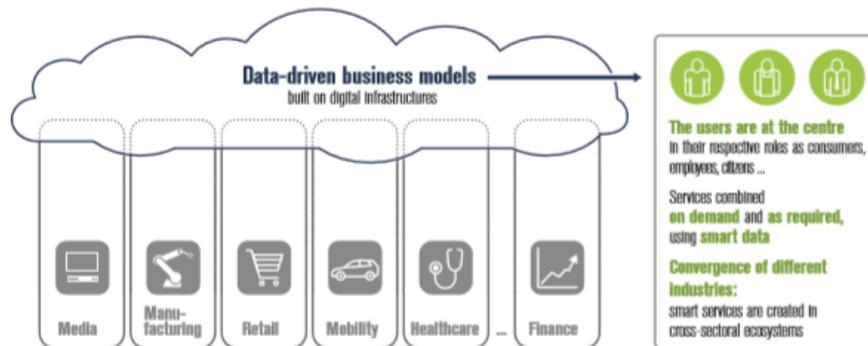


Figure 3: Smart services: the user is at the centre. Deutsche Post DHL cited by Kagermann et al. (2015)

Connecting the real with the virtual world is an ongoing trend. Kagermann et al. (2015) describes that every single aspect in our economy is transforming due to digital technology and that the Smart Service Welt is centered around users (such as tourists) with their preferences and need while machines, systems and factories in the Smart Service Welt can be connected through a “plug & use approach” to the Internet. Moreover, companies can control the entire value chain if they control the service platform (Kagermann et al., 2018).

A smart experience is one part of the components and layers of smart tourism (figure 4) developed by Gretzel et al. (2015), where smart destinations refers to the integration of ICTs into physical infrastructure, smart experience relates to technology-mediated tourism experiences through personalization and context-awareness and real-time monitoring while the last component smart business refers to the business ecosystem which allows the exchange of touristic resources and the co-creation of the tourism experience. There is a need to provide tourists with unique experiences (Pine and Gilmore, 1999 cited by Neuhofer et al., 2018) and ICT offers the possibility to enhance those experience throughout the entire customer journey (Neuhofer, Buhalis and Ladkin, 2012; Tussyadiah and Fesenmaier, 2009 cited by Neuhofer et al., 2018). The use of ICT has also blurred the barriers between life and travel, home and away, work and leisure and daily life and tourist experiences (Uriely, 2005 cited by Neuhofer et al., 2018).

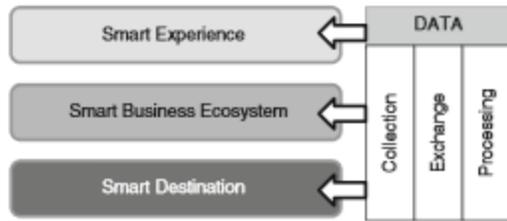


Figure 4: Components and Layers of Smart Tourism

Having a look at the experience hierarchy (figure 5) developed by Neuhofer, B., Buhalis, D., Ladkin, A. (2014) may give a better understanding on what experience is based on the level of technology used. It describes four levels of experience and explains how co-creation experience and value increases with technology and companies can access their current and future experiences and value propositions.

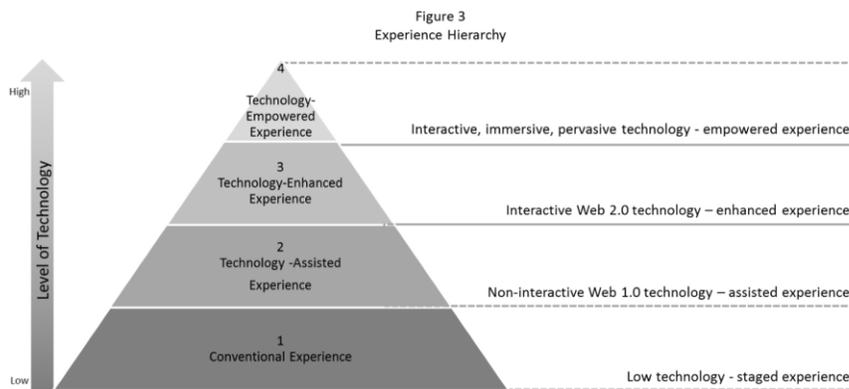


Figure 5: Experience hierarchy. Neuhofer, B., Buhalis, D., Ladkin, A. (2014)

At the very bottom is the conventional experience which involves low technology and staged experience which is mainly delivered by the company which is offering the service. The consumer is hardly involved in the creation of the experience. The next stage is the technology-assisted experience where some technology is involved such as booking systems or use of email. These technologies are mainly assisting the consumer but does not allow the tourist to interact. Third, there is the technology-enhanced experience where the tourist uses for example social media to share their experience allowing to enhance the co-creation of the experience. Last, there is the technology-empowered experience which involves a high level of experience and where technology plays a supporting role and is needed to make the experience happen and is available throughout all stages of the travel and the consumer value through technology-empowerment can be maximized (Neuhofer, B., Buhalis, D., Ladkin, A., 2014) and tourism experience can be enhanced during all travel stages of the customer journey (pre-travel, during travel and post travel stage) by implementing ICT (Neuhofer et al.,2015).

Smart ICT is the key component of information systems that supplies tourists and service providers with more relevant information, better decision support, greater mobility and in general a more enjoyable tourism experience (Gretzel 2011; Werthner 2003; Sigala and Chalkiti 2014 cited by Grezel U. et al., 2015). Personalized services should be offered within Smart Tourism Destinations before (e.g. VR, interactive websites, social media such as Instagram, Facebook, YouTube, etc.), during (e.g. mobile applications or applications which take the location and context in consideration such as Augmented Reality (AR) or QR codes which can be scanned to receive more information about an object) and after the trip (sharing experiences in social media or on review websites such as TripAdvisor. Some destinations have also developed mobile applications which show the most interesting places to visit at the destination based on Facebook check-ins.) in order to enhance the experience of tourists (Buhalis D. & Amaranggana A, 2015).

Consumers are interested to interact with companies and to co-create value which was not possible in the past ICTs offer where the market was traditionally company-centered (Prahalad and Ramaswamy, 2004a cited by Neuhofer et al., 2018). Tourists are now able to create socially their experiences with technological tool. (Gretzel and Jamal, 2009 cited by Neuhofer et al., 2018) and they also actively support the sharing of personal experiences with others by using comments, pictures and video and other user-generated content (UGC) (Xiang and Gretzel, 2010 cited by Neuhofer et al., 2018). Users also help potential consumers and relatives and stay socially connected by sharing their experiences in social media (Munar and Jacobsen, 2014 cited by Neuhofer et al., 2018) which is also supported by the advancements in mobile technology through their manifold functions that allow tourists to feel better connected, informed and to have fun while getting higher value (Wang, Xiang and Fesenmaier, 2014 cited by Neuhofer et al., 2018). Moreover, augmented reality applications (Yovcheva, Buhalis and Gatzidis, 2013 cited by Neuhofer et al., 2018) and mobile apps (Wang et al., 2012 cited by Neuhofer et al., 2018) can enhance tourist experiences.

Tourists equipped with a device can access online services at any place and at any time hence expanding the service encounters from physical to virtual experiences. Tourists may see their mobile device as a travel companion which enhances their travel experiences (Tussyadiah and Wang, 2016 cited by Law R. et al. 2018). Smart tourism experiences are about having a technological base which are enhanced by smart technology (in combination with wi-fi or mobile connectivity) and big data which allows to add value to the experience by adding context driven recommendations (Gretzel, 2014). “Smart tourism experiences can be created through personalization, context-awareness and real-time monitoring” (Buhalis & Amaranggana, 2015). Moreover, “information aggregation, ubiquitous connectedness and real-time synchronization as the main factors of smart tourism experiences” (Neuhofer, Buhalis and Ladkin, 2015). Data about tourists which has been collected or exchanged with other stakeholders could be used to predict the needs of tourists and to develop new business models, smart product, smart services or even smart spaces accordingly which may be operated by smart talents.

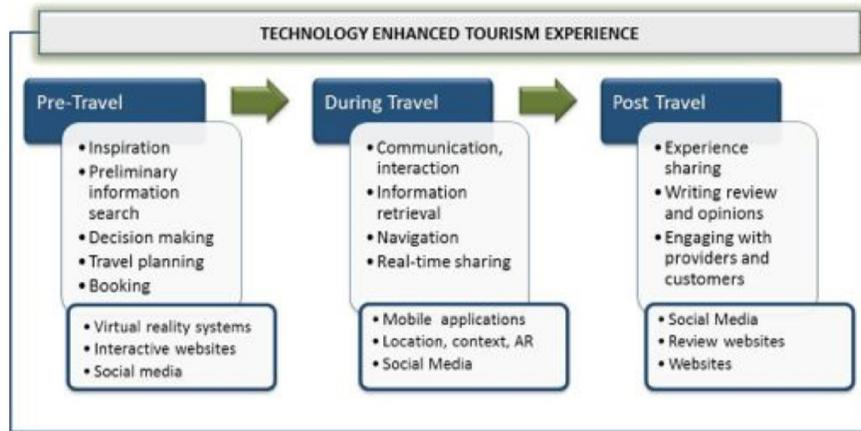


Figure 6: Technology Enhanced Tourism Experience. Neuhofer & Buhalis (2014)

For remote destinations where there is no internet available, new IoT Application such as the ones based on FatBeacons protocol could be used to improve the experience of tourists. Through a FatBeacons protocol it is possible to send html files which could include information for tourists from such a beacon through Bluetooth Low Energy (BLE) to the smartphone of a tourist. Such FatBeacons could be installed for example on a POI (Point of Interest), waypoints, etc. Websites, blogs, travel diaries, travel review websites, virtual communities, on-line booking systems, applications, on-line travel guides, etc. are mentioned by Gretzel and Jamal (2009), Tussyadiah and Fesenmaier (2009) as technological tools which can support the experience co-creation in the tourism context. Moreover, the use of these tools depends on the tourist's needs, the experience phases the tourist is living and the place where the tourist is (Gretzel and Jamal 2009; Tussyadiah and Fesenmaier 2009 cited by Buonincontri, Piera & Micera, Roberto 2016).

The competitiveness of destinations increases thanks to co-creation (Binkhorst and Den Dekker 2009; Neuhofer et al. 2012). The framework in figure 7 combines the elements of tourism experiences, experience co-creation and multiple ICTs which can be used for further tourism research according to Neuhofer & Buhalis (2012) and which is also a base for this thesis. Neuhofer & Buhalis (2012) concluded that there are varying types of technology-enhanced tourism experiences and that technology is a central element in the enhancement of the experience.

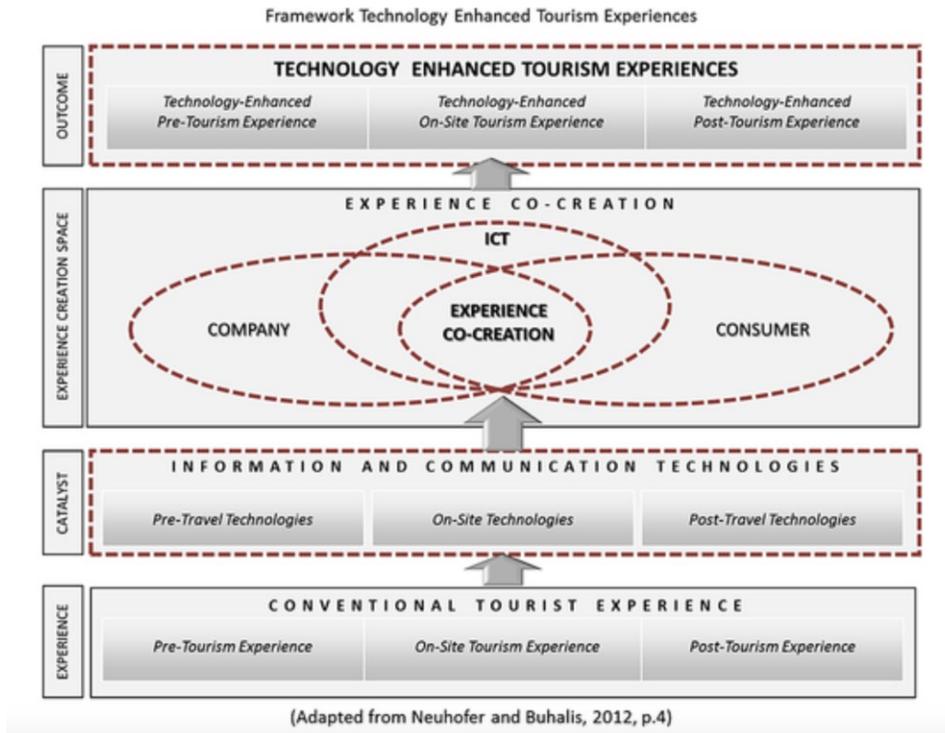


Figure 7: Framework technology-enhanced tourism experiences. Neuhofer B., Buhalis D., Ladkin A.(2012)

In the past, value was created within the firm without the consumers where the market had the role to exchange the value and where the communication in this concept was solely from firm to consumer. Figure 8 illustrates how the traditional concept of a market source worked.

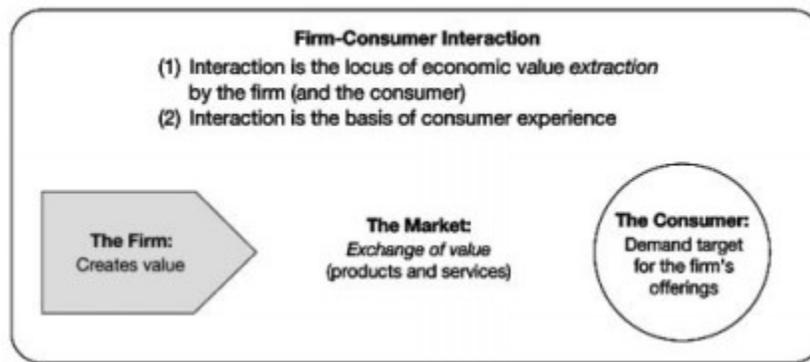


Figure 8: The Traditional Concept of a Market Source: Prahalad and Ramaswamy (2004)

However, there is a trend that value is more and more the result of negotiation between consumer and the firm as globalization and deregulation make it possible to have more competitors in the market offering similar products while the customer will choose the offering which offers the best value for the lowest price. Communities of connected, informed, empowered, and active consumers are more a challenge to the firm-centric view than competition (Prahalad and Ramaswamy, 2004). A solution for this problem is that companies and consumers co-create unique

values (figure 9) and experiences (Prahalad and Ramaswamy, 2004) and where the market is a forum for co-creation experiences. An example of such co-creation could be a self-checkout in the supermarket.

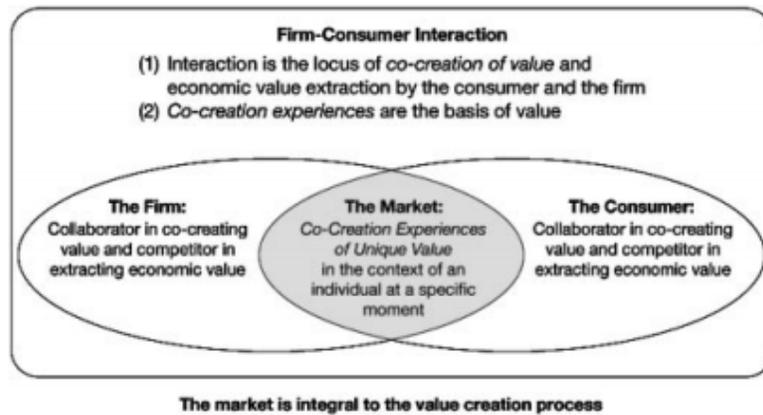


Figure 9: The Emerging Concept of the Market: Prahalad and Ramaswamy (2004)

Improving co-creation and technology is needed in an increasing competitive environment regarding tourism experiences. Information generated by cloud computing and interactions supported by social media makes tourism “smart” and to some extent smart tourism is a direct extension of e-Tourism where e-tourism is about digital connections while smart tourism about connecting the digital and the physical world. The smart tourism experience is “co-created mostly by traveling through interaction with smart technology and the wider smart tourism experience”. (Gretzel et al., 2015). The co-creation of tourism experience is a process that includes tourists and other possible stakeholders in the definition of unique and personal experiences, with the goal of generating value (Salvado et al., 2011)

The creation of tourist experiences should be better supported by tourism management by building the “experience resource environment” required so that tourists can access online services during the pre/during/post travel process (figure 6) in order to co-create their experience with the service provider (e.g. the tourist destination) and their own social networks (Neuhofer et al., 2015). While for example hoteliers may provide online services on a micro level such as an eConcierge solution where tourists can explore, plan and book their in-stay experience it is also up to destination management organizations to provide Wi-Fi networks in public places to enable tourists to use online services and applications.

2.3. Data Sharing for personalized experience

There are concerns regarding the privacy of information collection and retention (Shen and Ball, 2009), how much the consumer should be integrated in the experience co-creation (Baron and Harris 2008) and the risk of overuse and over visibility of technology in the service encounter (Beckendorff et al. 2015) which are cited by Neuhofer et al. (2015). Since personalization requires the collection of personal customer information it also raises customer privacy concerns (Andrade,

Kaltcheva, & Weitz, 2002) as their private information is being collected and tracked without their knowledge (Phelps, Novak, Ferrell, 2000; Sheehan & Hoy, 2000 cited by Lee, C. et al. 2011) creating negative feelings about personalization (Andrade et al, 2002 cited by Lee, C. et al. 2011).

Personalization can deliver tailored messages to a specific target group to increase positive feelings about interactions with service providers and is used as a marketing technique in e-commerce (Alatalo & Siponen, 2001). Personalization is about delivering the right content to the right person in the right format in time (Ho and Tam (2005) cited by Lee, C. et al. 2011). Personalization can also create convenience, efficiency, and individualization and could increase the intentions to purchase (Lee, C. et al. 2011).

A network of decentralized components which are connected through the internet exchanging a big amount of sensitive data comes with its own security risks for each component. The fact that several software components are connected to each other across different companies means that there is a much bigger target for cyber-attacks attacks – increasing the number of targets for cybercrime and cyberterrorism. IT security and data protection are therefore key to the success of the Smart Service Welt. Thus, trustworthy and secure platforms are vital to digital ecosystems. Since there are many components in the “Smart Service Welt” which are connected to the internet there is also a big amount of data traffic flow involved. Many components also offer a higher risk of security and a higher potential of attacks and that 100% security is only available in closed systems according to Kagermann et al. (2018).

Neuhofer et al. (2015) mention several studies which have found concerns regarding privacy of Information collection and retention. Shen and Ball (2009) argues that Customers found that it does not improve the performance image nor enhance the perception of the firm’s value and that intrusions on privacy could have a negative effect on all other items which could be personalized.

The customized value should be higher than the customization cost and that the process should be not too inconvenient. Customers with lower privacy concerns might be more willing in personalization and they may see it as an increase in the value proposition. Too much communication with the customer however may give the impression that the company want to milk the customer. However, Shen and Ball (2009) argue that “each successful personalization should lead to greater customer perceptions of value, performance quality, and benevolence” to build customer loyalty thus it is important to understand customer’s needs, preferences and goals to provide personalized service. Kagerman (2015) also highlights a trend towards personalized decisions which will not just take a few factors into account but the whole context requiring decision learning. Moreover, smart services will most like be more accepted if adaptive user interfaces are designed such as AR applications for smartphones or wearables replacing even smartphones.

E-commerce web sites for example are trying to mitigate the perceived risk in order to increase the perceived value of a service (Awad and Krishnan, 2006 cited by Lee, C. et al. 2011). Businesses should take those concerns into account when they decide on how much they would like to integrate consumer and technology to create the perfect personalized experience for and with the tourist (Neuhofer et al., 2015). According to Kagermann (2015) users should know how their data

is being used and that usability can create the transparency needed for the consumer to decide which amount of and offers a certain amount of security.

3. Method and Material

3.1. Quantitative vs. Qualitative research

The quantitative approach uses numbers to understand the social world for example by collecting data through surveys in which every one of the samples is asked the same set of questions. The results of a quantitative study are used for predicting the future, describing trends and for explaining the relationship between variables (Gerrish & Lacey, 2010). The qualitative approach on the other hand makes use of images or words for example through in-depth interviews. The questions are however tailored according to the previous answers of the respondent while the interview proceeds. The goal of qualitative research is to understand processes, experiences and meanings people assign to things (Kalof et al., 2008). They are individuals own interpretation of their experiences. A researcher may use several methods and techniques during a semi- structured or open-ended interview to obtain data (Choy, 2014). However, it does not allow the generalization of findings (Carr, 1994).

3.2. Advantages and Disadvantages of Online Surveys

According to Wright K (2017) there are several advantages and disadvantages when conducting online surveys. Advantages are the access to unique populations, time savings and lower costs than filling out a paper survey. Another advantage may be that online surveys may also be easily shared in social media. One disadvantage is sampling issues such as the characteristics of people in online communities and how reliable their information is. Another disadvantage is that Online communities may include lurkers who do not participate in discussions. This may have an impact towards the sampling frame or inaccurate population characteristics. Finally, Incentives may increase the response rate but may also false the result as some participant may participate several times in order to increase their chance to win.

Wright (2017) also argues that replication - conducting several online surveys with the same or similar types of Internet communities - may help to get a more accurate result.

3.3. Data collection method

In this study I reviewed literature related to smart tourists, conduct a quantitative research by collecting primary data which Kalof et al. (2008) describes as first-hand observations to answer the research questions. The questionnaire has been adapted from a similar study by Femenia-Serra et al. (2018) which examined Spanish millennials the and was in some sections refined.

3.3.1. Sampling frame and process

The questionnaire had been published in different Facebook groups related to destinations and tourism and also sent to my friends in Facebook and a few connections on LinkedIn with a request to forward it to their own network by sharing a link to the questionnaire which has been created on the SurveyMonkey website. My connections on Facebook and LinkedIn are in the age group

between 30 and 50 years. Moreover, I have also contacted a few tourist offices if they would be interested to forward or to fill out the survey.

3.4. Survey Design

In this survey I have applied a five-point Likert scale. Dichotomic choice (YES/NO) was used for the part of the survey which covers the preference of data sharing.

The survey has been adapted from Femenia-Serra et. Al (2018) which has been compiled by adapting surveys from Wang, D et. Atl., (2014; 2016) related to mobile technology use in travel context, types of devices used, purpose of use and intensity of use while the use of mobile technologies in relation to specific situations has been adapted from Buhalis and Amaranggana, (2014; 2015; Gretzel et al. 2015; Gretzel et al. 2015, among others) and preference of data sharing which has been adapted from Lee and Cranage, (2011). Moreover, questions are included based on a list of available smart technologies for destinations through previous research done by Buonincontri and Micera (2016), INVATTUR and IUIT (2014), Ivast et al., (2016), Koo et al., (2016) and SEGITTUR (2015).

Moreover, I refined the question if tourists prefer communication through an App or face to face in order to be able to evaluate if there is a preference towards digital communication or not.

The survey is structured as following:

- Demographic data & Economic data.
- Participants' willingness to use mobile technologies at destination for selected situations.
- Respondents' willingness to share different personal data with tourism public and private organizations to obtain personalized experiences.
- Participants' perception of smart technologies as potential experience enhancers.

4. Results and Analysis

4.1. Data Analysis Techniques

The collected data has been analyzed by performing a Principal Component Analysis with Varimax rotation and Kaiser normalization in SPSS for the sections covering the perception of smart technologies as potential experience enhancers and the section covering the participants willingness to use mobile technologies at destination for selected situations. The other sections were analyzed by comparing frequencies.

The Principal Component Analysis was chosen to narrow down the questions with correlated or pattern in data to a data set of lower dimension. It creates index variables, also called components, which are based on measured variables as can be seen in figure 20 where a component is based on different Y variables each having a different weight towards the component. Those data sets (Y variables in figure 10) which follow a certain pattern were then named according to the theme (C in figure 10) which all questions related to this data set have in common.

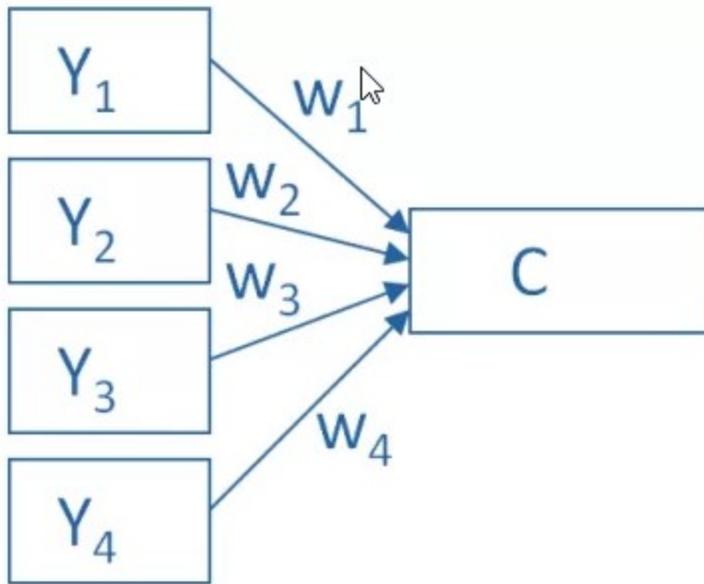


Figure 10: Principal Component Analysis – Karen Grace-Martin (2019)

After data has been collected through SurveyMonkey, I reviewed and cleaned the data quality in Microsoft Excel and imported the data into IBM SPSS Statistics 2.5.

In the next step, I tested the scale construct validity or how the data is unrelated and unsuitable for structure detection by conducting a Bartlett test of Sphericity and Kaiser-Meyer Olkin (KMO) for each of the scales related to Research Question 1 and 2. Sperry et al. (2013) also describes the scale construct validity as the extent to which it can be said to measure a specific construct and that the scale leads to the results that are consistent with theoretical expectations.

The Bartlett Test of Sphericity explains that small values with less than 0.05 of the significance levels are an indication that a Principal Components Analysis may be useful. Since the Sig. row (p-value) indicates 0, a Principal Component Analysis can be conducted.

The Kaiser-Meyer Olkin Measure of Sampling Adequacy explores the sufficiency of the sample or how suitable the data is for Principal Components Analysis. A high value (close to 1.0) may indicate that factor analysis may be useful with the data. Question 21 and 23 were analyzed by measuring frequencies in descriptive statistics in SPSS while a principal component analyses has been done with the remaining data except the demographic data.

Finally, I conducted a Cronbach's Alpha Test with SPSS to test the internal consistency of the scale.

4.2. Sample

The survey had 430 respondents. However, 87 respondents only filled out the demographic part of the survey. Since those 87 responses did not bring any value to the research questions as such they have not been taken into consideration for further analysis. A Principal Component Analysis with

Varimax rotation was performed with the remaining 343 responses to determine the scale construct validity.

As can be seen in table 2 the sample study consisted of 192 males, 184 females, 2 other gender and 1 person indicating no gender at all.

Table 2: Respondents' gender

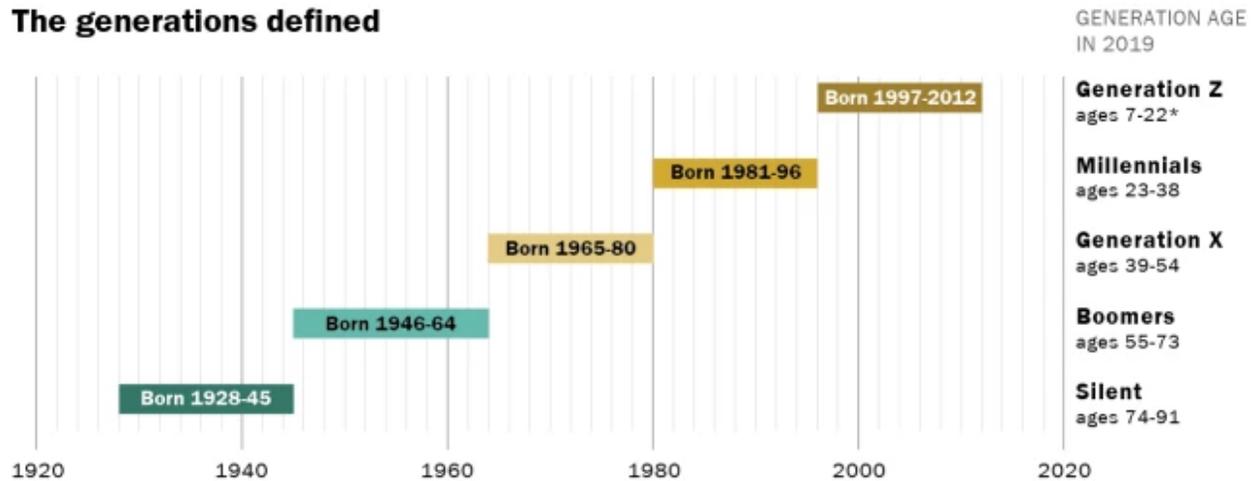
		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Male	192	56.0	56.0	56.0
	2 Femal	148	43.1	43.1	99.1
	3 Other	2	.6	.6	99.7
	430	1	.3	.3	100.0
	Total	343	100.0	100.0	

In order to be able to define the different age groups, I was referring to a study of the PEW Research Center (figure 21) which identified the age groups for Generation Z, Millennials, Generation X, Boomers and Silent. Most of the respondents were in the age group 23-38 (Millennials) followed by 39-54 years (Generation X) old. Generation Z represents the ages 7-22 (I have included also the ages below 7 into this age group). Millennials representing the ages 22-38, Generation X represents the ages 39-54, Boomers represents the ages from 55-73 and the Silent group defines ages between 74 and 91.

Table 3: Respondents' age group

		Agegroup Age Group			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-22 (Generation Z)	13	3.8	3.8	3.8
	23-38 (Millennials)	140	40.8	40.9	44.7
	39-54 (Generation X)	147	42.9	43.0	87.7
	55-73 (Boomers)	41	12.0	12.0	99.7
	74-91 (Silent)	1	.3	.3	100.0
	Total	342	99.7	100.0	
Missing	System	1	.3		
Total		343	100.0		

The generations defined



*No chronological endpoint has been set for this group. For this analysis, Generation Z is defined as those ages 7 to 22 in 2019.

PEW RESEARCH CENTER

Figure 11: Generations defined by PEW Research Center

Most of the respondents in my survey were from the Millennials and Gen X generation. The characteristics of Millennials and Gen X generations can be seen in figure 11. Both generations – Millennials and Gen X - use and adapt to technology. The study ‘Multi-generation travel trends’ which has been conducted by Expedia Media Solutions in 2017 with a sample size of 3000 people from UK, Germany and France came to the following results related to Millennials and Gen X:

Millennials where characterized by taking more trips than other generations and book their trips by using search engines and directly on the service provider website and they are interested in once in a lifetime experience. Posts and hashtags on social medias as well as blog posts inspires the Millennials. They are also inspired by videos posted by experts. Millennials prefer to use smartphones somewhat more than Gen X during the trip.

Gen X is the generation which travels most after the Millennials. They also use travel review sites for travel planning. However, they spend less time on reading blogs and on social media than Millennials. Gen X is also less likely to use a travel agent compared to Millennials when planning the trip, however they are more likely to book their trip through an online travel agent compared to Millennials. Moreover, they are tending somewhat more on using tablets before and during a trip compared to Millennials.

Moreover, it seems that younger people prefer to visit unique locations that produce photos. Younger people also looking for ideas and inspiration regarding their destination. Both generations get inspired by travel pictures and videos posted by friends. Reviews and content seem to be important as well when choosing a destination. Further, both generations use mainly desktop computers for planning and booking the trip.

Figure 3.2

What Makes Your Generation Unique?

Millennial	Gen X
Technology use (24%)	Technology use (12%)
Music/Pop culture (11%)	Work ethic (11%)
Liberal/Tolerant (7%)	Conservative/Traditional (7%)
Smarter (6%)	Smarter (6%)
Clothes (5%)	Respectful (5%)
Boomer	Silent
Work ethic (17%)	WWII, Depression (14%)
Respectful (14%)	Smarter (13%)
Values/Morals (8%)	Honest (12%)
"Baby Boomers" (6%)	Work ethic (10%)
Smarter (5%)	Values/Morals (10%)

Note: Based on respondents who said their generation was unique/distinct (n=1,205). Items represent individual, open-ended responses. Top five responses are shown for each age group.

Source: Pew Research Center survey, Jan. 2010, N=2,020 US adults

Figure 12: What makes your generation unique. PEW Research Center survey.

Table 4 shows the highest level of education and most of the respondents (130) had a graduate degree, 102 had a bachelor’s degree, 32 had a PhD or some college but no degree, 12 visited a high school or equivalent while 2 didn’t visit high school at all.

Table 4: Respondent's level of education

What is the highest level of education?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Less than high school	2	.6	.6	.6
	2 High school degree of equivalent	22	6.4	6.4	7.0
	3 Some college but no degree	32	9.3	9.4	16.4
	4 Associate degree	22	6.4	6.4	22.8
	5 Bachelor degree	102	29.7	29.8	52.6
	6 Graduate degree	130	37.9	38.0	90.6
	7 PhD	32	9.3	9.4	100.0
	Total	342	99.7	100.0	
Missing	System	1	.3		
Total		343	100.0		

Moreover, most of the respondents were employed working either 1-39 hours per week (116) or more than 40 hours per week (118) while 45 were self-employed, 20 were retired, 16 were not

employed and looking for work, 12 were not employed and were not looking for work while 15 didn't indicate their employment status (e.g. students) as can be seen in table 5.

Table 5: Respondent's economic situation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Employed, working 1-39 hours per week	116	33.8	33.9	33.9
	2 Employed, working 40 or more hours per week	118	34.4	34.5	68.4
	3 Not employed, looking for work	16	4.7	4.7	73.1
	4 Not employed, NOT looking for work	12	3.5	3.5	76.6
	5 Retired	20	5.8	5.8	82.5
	7 Self-employed	45	13.1	13.2	95.6
	8 Other (please specify)	15	4.4	4.4	100.0
	Total	342	99.7	100.0	
Missing	System	1	.3		
Total		343	100.0		

Finnish citizens (70) responded most to the survey as can be seen in table 6, followed by U.S. (46), UK (36), Germans (34) and Canadians (16) citizens. The high response rate from Finnish citizens is probably related to the fact that I have many contacts in Finland.

Table 6: Respondent's nationality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	0.3	0.3	0.3
	Finland	70	20.4	20.4	39.4
	USA	46	13.4	13.4	100
	UK	36	10.5	10.5	86.6
	Germany	34	9.9	9.9	51.6
	Canada	16	4.7	4.7	14.9
	Austria	15	4.4	4.4	6.4
	Other	14	4.1	4.1	67.3
	Sweden	11	3.2	3.2	75.5

	Belgium	8	2.3	2.3	9.3
	Netherlands	8	2.3	2.3	60.9
	Norway	8	2.3	2.3	63.3
	Denmark	7	2	2	18.1
	France	7	2	2	41.4
	Australia	6	1.7	1.7	2
	Lithuania	6	1.7	1.7	56.9
	Poland	5	1.5	1.5	69.1
	Russia	5	1.5	1.5	70.8
	Italy	4	1.2	1.2	54.2
	Brazil	3	0.9	0.9	10.2
	India	3	0.9	0.9	52.8
	Macedonia	3	0.9	0.9	58
	Spain	3	0.9	0.9	72.3
	Japan	2	0.6	0.6	54.8
	Switzerland	2	0.6	0.6	76.1
	Bangladesh	1	0.3	0.3	6.7
	Belarus	1	0.3	0.3	7
	Chile	1	0.3	0.3	15.2
	Colombia	1	0.3	0.3	15.5
	Costarica	1	0.3	0.3	15.7
	Czech Republic	1	0.3	0.3	16
	English	1	0.3	0.3	18.4
	Estonia	1	0.3	0.3	18.7
	Fiji	1	0.3	0.3	19
	Georgia	1	0.3	0.3	41.7
	Hungary	1	0.3	0.3	51.9
	Israel	1	0.3	0.3	53.1
	Kazakhstan	1	0.3	0.3	55.1
	Luxembourg	1	0.3	0.3	57.1
	Malaysia	1	0.3	0.3	58.3
	Mozambique	1	0.3	0.3	58.6
	Pakistan	1	0.3	0.3	67.6
	Romania	1	0.3	0.3	69.4
	Slovakia	1	0.3	0.3	71.1
	Slovenia	1	0.3	0.3	71.4
	Total	343	100	100	

Finally, most of the respondents indicated Finland as a country of residency (100) followed by U.S. (52), UK (36), Germany (24) and Sweden (15) as can be seen in table 7.

Table 7: Respondent's country of residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	0.3	0.3	0.3
	Finland	101	29.5	29.5	44.6
	USA	52	15.2	15.2	100
	UK	36	10.5	10.5	84.8
	Germany	24	7	7	51.9
	Sweden	15	4.4	4.4	73.8
	Canada	12	3.5	3.5	11.1
	Norway	12	3.5	3.5	65.3
	Netherlands	11	3.2	3.2	60.6
	Austria	9	2.6	2.6	4.7
	Denmark	9	2.6	2.6	14.3
	Belgium	7	2	2	7.3
	Australia	6	1.7	1.7	2
	Lithuania	6	1.7	1.7	56.9
	Russia	6	1.7	1.7	68.8
	New Zealand	4	1.2	1.2	61.8
	Poland	4	1.2	1.2	67.1
	Chile	2	0.6	0.6	11.7
	France	2	0.6	0.6	44.9
	India	2	0.6	0.6	53.1
	Ireland	2	0.6	0.6	53.4
	Italy	2	0.6	0.6	54.5
	Japan	2	0.6	0.6	55.1
	Other	2	0.6	0.6	65.9
	Switzerland	2	0.6	0.6	74.3
	Bahrain	1	0.3	0.3	5
	Belarus	1	0.3	0.3	5.2
	Brazil	1	0.3	0.3	7.6
	Estonia	1	0.3	0.3	14.6
	Fiji	1	0.3	0.3	14.9
	Hungary	1	0.3	0.3	52.2
	Israel	1	0.3	0.3	53.6
	Italia	1	0.3	0.3	53.9
	Luxembourg	1	0.3	0.3	57.1
	Macedonia	1	0.3	0.3	57.4
	Slovenia	1	0.3	0.3	69.1

	Spain	1	0.3	0.3	69.4
	Total	343	100	100	

4.3. RQ 1 - How do Smart Technologies help to enhance the tourist experience?

Participants of the survey were most interested in sharing experiences with friends and family (88%), receiving information about activities (81%), tourist attractions and places (80%) and events (80%) at the destination while they are less interested to receive personalized adverts (31%) or interact with other tourists at the destination through an App (31%) according to table 8.

Table 8: Respondents willingness to use mobile technologies at the destination

	Yes	Yes %
Sharing experience with friends and family	304	88.889
Receiving information about activities at the destination	280	81.871
Receiving information about tourist attractions and places at the destination	274	80.117
Receiving information about events at the destination	274	80.117
Interact with the tourism office at the destination face to face	225	65.789
Interact with businesses at the destination face to face	219	64.035
Sharing information for getting discounts and offers?	217	63.45
Interact with the tourism office at the destination through an App	195	57.018
Interact with businesses at the destination through an App?	187	54.678
Review businesses and services at the destination	185	54.094
Pay with your mobile device (e.g. smartphone) at the destination	171	50
Interact with other tourists at the destination face to face	170	49.708
Interact with other tourists at the destination through an App	109	31.871
Receive personalized adverts at the destination	109	31.871

Figure 13 shows a scree plot of eigenvalues plotted against their factor numbers and I used factors for this analysis where the eigenvalue is ≥ 1 to determine the final number of factors to give each component a name. The scree plot in figure 13 shows that the scale has four factors as their eigenvalue is 1 or more.

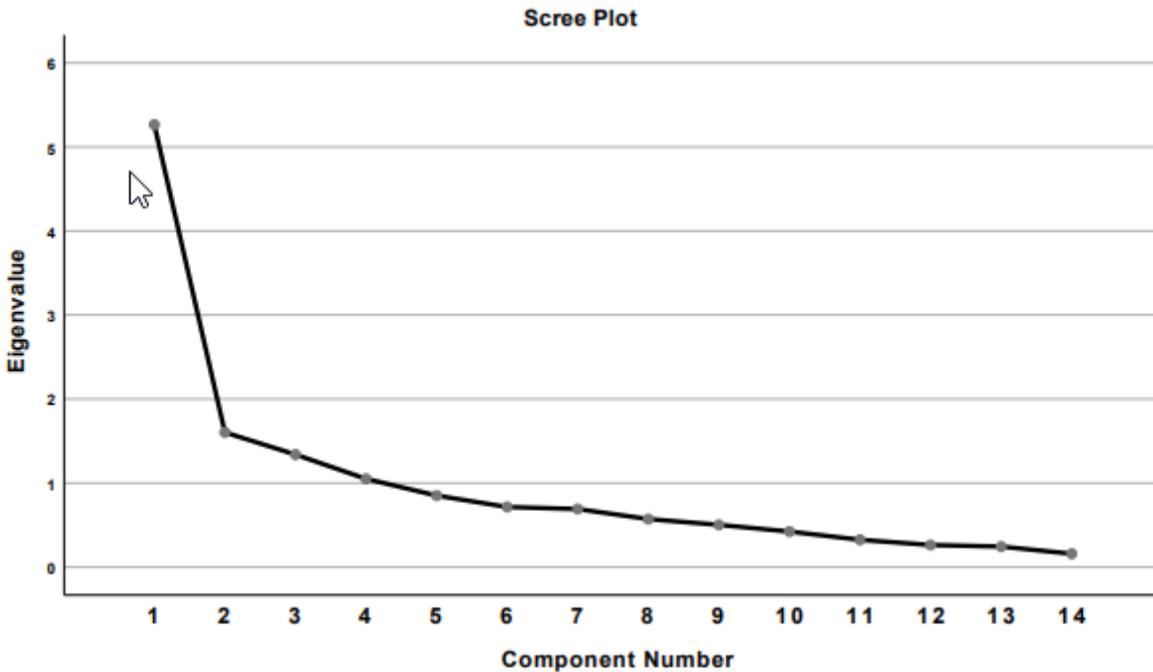


Figure 13: Scree Plot – RQ1 - How do Smart Technologies help to enhance the tourist experience.

The ‘Total’ column of table 14 contains all the components which I extracted during the Principal Component Analysis. Since I used 14 variables, I had 14 components available. The column ‘% of variance’ shows the variance related to the factor in the same row. There were four factors (or components) which I interpreted since they had an Eigenvalue of 1 or higher and they explained 66% of the data. The first component contributed more to the variance, followed by the second component, and so on.

4.3.1. Reliability and validity

The Cronbach’s Alpha Test which measures the internal consistency of the scale showed that the scale may be useful as the Cronbach’s Alpha with a value of 0.862 is higher than 0.7 as can be seen in table 9.

Table 9: Research Question 1 - Cronbach's Alpha for measuring the scales internal consistency

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.865	14

Table 10 shows the result of the Kaiser-Meyer Olkin (KMO) Measure of Sampling Adequacy which measures how suitable the data is for Principal Component Analysis. The KMO for this scale shows 0.831 which is adequate to perform a Principal Component Analysis since the value is between 0.8 and 1.

The p-value (Sig.) of the Bartlett's Test of Sphericity indicates 0 which allows to perform a Principal Component Analysis as the variances are equal for all samples (homoscedasticity).

Table 10: Research Question 1 – Measuring suitability of data for Principal Component Analysis.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.831
Bartlett's Test of Sphericity	Approx. Chi-Square	2085.098
	df	91
	Sig.	.000

Table 11 shows the Cronbach's Alpha values for every variable in the scale. It can be used to determine if a variable should be taken into consideration when naming factors during the Principal Component Analysis. However, none of the variables seem to have a significant impact on the Cronbach's Alpha if it would be deleted.

Table 11: Research Question 1 – Cronbach's Alpha for each variable

Item–Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item–Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q7 How likely do you want to receive information about activities at the destination?	44.34	165.979	.588	.714	.850
Q8 How likely do you want to receive information about tourist attractions and places at the destination?	44.22	164.367	.597	.757	.849
Q9 How likely would you want to receive information about events at the destination?	44.14	165.384	.611	.639	.849
Q10 How likely would you want to share your experience with friends and family?	44.67	177.717	.371	.242	.860
Q11 How likely would you want to share information for getting discounts and offers?	43.56	163.943	.531	.430	.852
Q12 How likely would you want to interact with businesses at the destination face to face?	43.70	168.218	.515	.434	.853
Q13 How likely would you want to interact with businesses at the destination through an App?	43.26	161.256	.623	.575	.847
Q14 How likely would you want to review businesses and services at the destination?	43.22	161.050	.620	.430	.847
Q15 How likely would you want to interact with the tourism office at the destination through an App?	43.27	161.619	.598	.575	.849
Q16 How likely would you want to interact with the tourism office at the destination face to face?	43.73	174.907	.338	.315	.862
Q17 How likely would you want to interact with other tourists at the destination through an App?	42.37	160.399	.593	.519	.849
Q18 How likely would you want to interact with other tourists at the destination face to face?	43.15	172.679	.336	.381	.863
Q19 How likely would you want to receive personalized adverts at the destination?	42.17	159.301	.619	.448	.847
Q20 How likely would you pay with your mobile device (e.g. smart phone) at the destination?	42.95	168.490	.332	.218	.867

4.3.2. Principal Component Analysis

Research Question 1 has been analyzed by using the Principal Component Analysis to reduce the amount to factors that explain 66% of the variance as can be seen in table 12.

Table 12: Total Variance Explained - How do Smart Technologies help to enhance the tourist experience.

Total Variance Explained						
Component	Total	Initial Eigenvalues		Rotation Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.265	37.605	37.605	2.853	20.378	20.378
2	1.603	11.451	49.056	2.771	19.795	40.173
3	1.339	9.566	58.622	2.017	14.406	54.580
4	1.050	7.499	66.121	1.616	11.541	66.121
5	.851	6.076	72.197			
6	.715	5.107	77.304			
7	.691	4.933	82.237			
8	.571	4.080	86.317			
9	.502	3.588	89.906			
10	.423	3.019	92.925			
11	.325	2.320	95.245			
12	.263	1.878	97.123			
13	.244	1.744	98.868			
14	.159	1.132	100.000			

Extraction Method: Principal Component Analysis.

Table 13: Rotated Component Matrix - How do Smart Technologies help to enhance the tourist experience.

Rotated Component Matrix^a

	Component			
	1	2	3	4
Q7 How likely do you want to receive information about activities at the destination?	.881	.168	.148	.066
Q8 How likely do you want to receive information about tourist attractions and places at the destination?	.902	.181	.122	.072
Q9 How likely would you want to receive information about events at the destination?	.818	.201	.237	.040
Q10 How likely would you want to share your experience with friends and family?	.076	.039	.793	.032
Q11 How likely would you want to share information for getting discounts and offers?	.360	.189	.670	.002
Q12 How likely would you want to interact with businesses at the destination face to face?	.130	.182	.624	.396
Q13 How likely would you want to interact with businesses at the destination through an App?	.216	.742	.205	.108
Q14 How likely would you want to review businesses and services at the destination?	.248	.446	.457	.245
Q15 How likely would you want to interact with the tourism office at the destination through an App?	.314	.698	-.002	.249
Q16 How likely would you want to interact with the tourism office at the destination face to face?	.226	.037	-.007	.835
Q17 How likely would you want to interact with other tourists at the destination through an App?	.135	.756	.099	.244
Q18 How likely would you want to interact with other tourists at the destination face to face?	-.143	.197	.306	.713
Q19 How likely would you want to receive personalized adverts at the destination?	.380	.496	.309	.112
Q20 How likely would you pay with your mobile device (e.g. smart phone) at the destination?	-.013	.711	.091	-.188

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The rotated component matrix (table 13) shows the correlations between the variables and the four components. A high load factor indicates a high correlation between the variable and the component. In my case, I have decided to take all variables into account which have factor loadings of around .700 and higher to find a suitable name for the components.

Component 1 explains 20% of the variance and is most highly correlated with how likely a person wants to receive information about activities at the destination (.891), about tourist attractions and places at the destination (.902) and about events at the destination (.818) and is most likely linked to ‘Receiving information about the destination’.

Component 2 explains 19% of the variance and is most highly correlated with how likely a person wants to interact with businesses at the destination through an App (.742), with the tourism office at the destination through an App (.698), with other tourists at the destination through an App (.756) and would pay with a mobile device (e.g. smart phone) at the destination (.711) and is most likely linked to ‘Mobile application usage’.

Component 3 explains 14% of the variance and is most highly correlated with how likely a person wants to share experiences with friends and family (.793), share information for getting discounts and offers (.670) and is most likely linked to ‘Sharing information’.

Component 4 explains 11% of the variance and is most highly correlated with how likely a person wants to interact with the tourism office at the destination face to face (.793) and to interact with other tourists at the destination face to face (.670) and is most likely linked to ‘Face-to-face communication’.

4.4. RQ 2: How are tourists willing to share data in exchange for personalized experience?

Research Question 2 consists of two questions and was analyzed by comparing Frequencies and outputting the sum and the percentage for each item in each question. SurveyMonkey which I used to collect the answers provided a summary of the responses which can be found in table 14. Frequency analysis is a descriptive statistical method that shows the number of occurrences of each response chosen by the respondents (California State University, 2013: 7 cited by de Dieu Basabose, J., 2019).

Most respondents were willing to share their age (57%), hobbies and personal preferences (57%), gender (53%) and nationality (42%) with private companies while they were less willing to share their social media profiles (6%) and smartphone search history (0.6%) based on table 14.

Table 14: Data which tourists are willing to share with private companies to obtain personalized experiences

ANSWER CHOICES	RESPONSES	
Age	57.57%	175
Hobbies and personal preferences	57.89%	176
Gender	53.95%	164
Nationality	42.43%	129
Name	20.39%	62
Relationship status	10.86%	33
Specific expenses in each place and service	8.22%	25
Sexual orientation	5.92%	18
Real time position	10.53%	32
Social media profiles	6.58%	20
Smartphone search history	0.66%	2
None	22.37%	68
Other (please specify)	1.64%	5
Total Respondents: 304		

Moreover, respondents gave similar answers when asked how willing they are to share data with private companies. Respondents were most willing to share age, hobbies and personal preferences, gender and nationality with public agents but were less likely to share social media profiles and their smartphone history as can be seen in table 15.

Table 15: Data respondents are you willing to share with public agents (e.g. Tourism Offices, etc. ...) to obtain personalized experiences?

ANSWER CHOICES	RESPONSES	
Age	56.91%	173
Hobbies and personal preferences	59.54%	181
Gender	50.66%	154
Nationality	43.75%	133
Name	22.70%	69
Relationship status	10.86%	33
Specific expenses in each place and service	9.54%	29
Sexual orientation	3.95%	12
Real time position	8.88%	27
Social media profiles	5.59%	17
Smartphone search history	0.99%	3
None	21.71%	66
Other (please specify)	0.99%	3
Total Respondents: 304		

Respondents may not be willing to share their social media profiles with private or public companies since it may also raise customer privacy concerns as highlighted by Andrade, Kaltcheva, & Weitz (2002). Public and Private organizations may need to find ways to build trust with their users in order to obtain such data as personalization should lead to greater customer perceptions of value, performance quality, and benevolence as stated by Shen and Ball (2009). Concerns regarding social media and the potential risk of overuse and over visibility of technology in the service encounter may also be issues why customers don't want to share data (Benckendorff et al. 2005).

4.5. RQ 3: How are tourists interested to interact and co-create the experience with the smart destination or service providers?

This section discusses the results of the analysis of the research question on how tourists interested to interact and co-create the experience with the smart destination or service providers.

Table 16: Respondent's perception on smart technologies as potential experience enhancers

How do each of the following smart technologies improve your experience as a tourist?	Somewhat likely or better (%)
---	-------------------------------

Q26 How likely would the use of public free Wi-Fi improve your experience as a tourist?	96,0 %
Q24 Rich content can be video, audio and other elements that encourage viewers to interact and engage with the content. How likely would rich digital content improve your experience as a tourist?	88,8%
Q23 How likely would the use of the destination official website in several languages improve your experience as a tourist?	87,9%
Q25 How likely would direct booking possibilities improve your experience as a tourist?	87,8%
Q27 How likely would the use of interactive tourism office with Wi-Fi, touchscreens and dynamic information improve your experience as a tourist?	82,4%
Q28 A multipurpose tourism card could offer for example a package of discounts and free entries to museums, cultural institutions and restaurants. How likely would the use of a multipurpose tourism card improve your experience as a tourist?	82,4%
Q29 How likely would the use of the official destination accounts on social media improve your experience as a tourist?	70,3%
Q33 Touchscreens could provide information on nearby attractions, restaurants, shops or history. How likely would the use of touchscreens on destination streets improve your experience as a tourist?	67,6%
Q30 How likely would the use of the official destination App improve your experience as a tourist?	67,6%
Q40 Sometimes you may need information about the destination you are visiting. How likely would the use of online assistance (e.g. through Skype or an App) improve your experience as a tourist?	66,2%
Q32 How likely would the use of sensor-derived information about traffic, pollution, noise, etc. improve your experience as a tourist?	64,9%
Q39 How likely would the use of payment through smartphone improve your experience as a tourist?	62,2%
Q34 How likely would the use of video guides improve your experience as a tourist?	60,8%
Q31 How likely would the use of the booking platform of the destination tourist office compared to third party booking platforms improve your experience as a tourist?	56,8%
Q35 iBeacons enable smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon. How likely would the use of location-based information (through iBeacons, Bluetooth) improve your experience as a tourist?	51,4%
Q38 A barcode is a machine-readable optical label that contains information about the item to which it is attached. It can be read for example by an App on your Smartphone. How likely would the use of QR codes improve your experience as a tourist?	51,4%
Q36 Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. How likely would the use of augmented reality improve your experience as a tourist?	40,5%

Q43 Wearable technology can be any technology that you wear e.g. on your wrist or in a rucksack. It could for example track data, opening doors to attractions or facilitating transactions for drinks, meals or souvenirs. How likely would the use of wearable technologies improve your experience as a tourist?	36,5%
Q41 Holograms are 3-D images that have been projected and captured on a 2-D surface. Video mapping allows to fit any desired image onto the surface of an object. How likely would the use of video mapping and holograms improve your experience as a tourist?	36,5%
Q45 The aim of gamification in tourism is designing memorable experiences for guests. Dwarf hunt is one of the top things to do in Wroclaw (you can google it to read more about it). How likely would the use of Gamification improve your experience	28,4%
Q42 A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. How likely would the use of chatbots improve your experience as a tourist?	25,7%
Q37 Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. How likely would the use of virtual reality improve your experience as a tourist?	23%
Q46 How likely would you be willing to give face or fingerprint recognition to enter tourist attractions or hotels, pay for meals, etc.?	14,9%
Q44 How likely would the use of electronic money (bitcoin, etc.) improve your experience as a tourist?	13,5%

Table 16 shows the results where respondents evaluated how certain smart technologies could enhance the experience as a tourist while other smart technologies are less likely to enhance their experience. All respondents who answered, ‘somewhat likely’, ‘likely’ or ‘very likely’ were summed up to a single percentage factor.

Based on the responses in table 16, respondents believed that Wi-Fi improves the tourist experience most, followed by rich content, availability of several languages on the destination official website, direct booking possibilities, interactive tourism office or a multipurpose tourism card.

On the other hand, gamification, chatbots, virtual reality, fingerprint recognition to enter tourist attractions or pay for it or using electronic money such as bitcoin scored very low in enhancing the experience according to the respondents. Considering that most of the respondents are from the Generation X and Millennials generation which has a positive attitude towards using technologies, it seems that new technologies as such are not that important to enhance the experience.

Technologies which are considered as being experience enhancers can offer new business opportunities and should be utilized to develop new products and services in a tourist destination or a platform where different service providers of a tourist destination integrate their services. Smart products or technologies and smart services can offer new disruptive business models which

could enhance the tourist experience and the destination management must ensure to provide the required technological infrastructure (e.g. internet connection) to operate a smart space.

4.5.1. Reliability and validity

The Cronbach Alpha Test which measures the internal consistency of the scale shows that the scale may be useful as the Cronbach's Alpha with a value of 0.933 is higher than 0.7 as can be seen in table 17.

Table 17: Research Question 3 - Cronbach's Alpha

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.933	.932	24

The p-value (Sig.) of the Bartlett's Test of Sphericity in table 18 indicates 0 which allowed me to perform a Principal Component Analysis. The Kaiser-Meyer Olkin Measure of Sampling Adequacy has a value of .931 which indicated that the data might be useful to perform a Principal Component Analysis as the value is close to 1.

Table 28: Research Question 3 - Reliability Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.931
Bartlett's Test of Sphericity	Approx. Chi-Square	3509.660
	df	276
	Sig.	.000

The Cronbach's Alpha for each variable can be seen in table 19 and none of the variables had a significant influence on the Cronbach's Alpha of the scale. This information was considered when naming the factors as removing a variable in order to improve the internal consistency of the scale did not apply in this case.

Table 19: Research Question 3 - Reliability Test

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q23 How likely would the use of the destination official website in several languages improve your experience as a tourist?	85.68	555.141	0.315	0.294	0.934
Q24 Rich content can be video, audio and other elements that encourage viewers to interact and engage with the content. How likely would rich digital content improve your experience as a tourist?	85.34	533.249	0.599	0.590	0.930
Q25 How likely would direct booking possibilities improve your experience as a tourist?	85.85	548.323	0.518	0.473	0.931
Q26 How likely would the use of public free Wi-Fi improve your experience as a tourist?	86.22	552.742	0.403	0.355	0.932
Q27 How likely would the use of interactive tourism office with Wi-Fi, touchscreens and dynamic information improve your	85.12	537.348	0.590	0.496	0.930

experience as a tourist?					
Q28 A multipurpose tourism card could offer for example a package of discounts and free entries to museums, cultural institutions and restaurants. How likely would the use of a multipurpose tourism card improve your experience as a tourist?	85.37	538.128	0.536	0.502	0.931
Q29 How likely would the use of the official destination accounts on social media improve your experience as a tourist?	84.69	525.138	0.671	0.583	0.929
Q30 How likely would the use of the official destination App improve your experience as a tourist?	84.65	521.719	0.689	0.571	0.928

Q31 How likely would the use of the booking platform of the destination tourist office compared to third party booking platforms improve your experience as a tourist?	84.83	540.109	0.539	0.427	0.931
Q32 How likely would the use of sensor-derived information about traffic, pollution, noise, etc. improve your experience as a tourist?	84.94	541.244	0.493	0.335	0.931
Q33 Touchscreens could provide information on nearby attractions, restaurants, shops or history. How likely would the use of touchscreens on destination streets improve your experience as a tourist?	84.85	532.098	0.598	0.465	0.930
Q34 How likely would the use of video guides improve your experience as a tourist?	84.43	522.062	0.695	0.626	0.928

Q35 iBeacons enable smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon. How likely would the use of location-based information (through iBeacons, Bluetooth) improve your experience as a tourist?	84.33	523.906	0.692	0.556	0.928
Q36 Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. How likely would the use of augmented reality improve your experience as a tourist?	83.99	519.650	0.680	0.662	0.928
Q37 Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. How likely would the use of virtual reality improve your experience as a tourist?	83.37	526.767	0.608	0.616	0.930

Q38 A barcode is a machine-readable optical label that contains information about the item to which it is attached. It can be read for example by an App on your Smartphone. How likely would the use of QR codes improve your experience as a tourist?	84.28	522.691	0.680	0.533	0.928
Q39 How likely would the use of payment through smartphone improve your experience as a tourist?	84.43	520.193	0.610	0.489	0.930
Q40 Sometimes you may need information about the destination you are visiting. How likely would the use of online assistance (e.g. through Skype or an App) improve your experience as a tourist?	84.53	529.491	0.583	0.413	0.930

Q41 Holograms are 3-D images that have been projected and captured on a 2-D surface. Video mapping allows to fit any desired image onto the surface of an object. How likely would the use of video mapping and holograms improve your experience as a tourist?	83.82	521.119	0.696	0.548	0.928
Q42 A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. How likely would the use of chatbots improve your experience as a tourist?	83.25	526.063	0.625	0.526	0.929
Q43 Wearable technology can be any technology that you wear e.g. on your wrist or in a rucksack. It could for example track data, opening doors to attractions or facilitating transactions for drinks, meals or souvenirs. How likely would the use of wearable te	83.73	520.772	0.666	0.517	0.929

Q44 How likely would the use of electronic money (bitcoin, etc.) improve your experience as a tourist?	82.67	535.600	0.514	0.413	0.931
Q45 The aim of gamification in tourism is designing memorable experiences for guests. For example, dwarf hunt is one of the top things to do in Wroclaw (you can google it to read more about it). How likely would the use of Gamification improve your experience	83.29	530.280	0.531	0.416	0.931
Q46 How likely would you be willing to give face or fingerprint recognition to enter tourist attractions or hotels, pay for meals, etc.?	82.52	540.547	0.445	0.372	0.932

4.5.2. Principal Component Analysis

Research Question 3 was analyzed by using the Principal Component Analysis to reduce the amount to factors that explain 53% of the variance as can be seen in table 22.

Figure 22 shows a scree plot of eigenvalues plotted against their factor numbers and I used factors for this analysis where the eigenvalue is ≥ 1 to determine the final number of factors to give each component a name. The scree plot in figure 24 shows that the scale has three factors as their eigenvalue is 1 or more.

Component 1 explained 22% of the variance and is most highly correlated with how likely the use of augmented reality (.702), virtual reality (.706) and chatbots (.715) would improve the experience of a tourist and is most likely linked to ‘Innovative technologies.

Component 2 explained 18% of the variance and is most highly correlated with how likely the use of direct booking possibilities (.661), public free Wi-Fi (.664), interactive tourism office with Wi-Fi (.665), of a multipurpose tourism card (.668) and the use of the official destination accounts on social media (.650) would improve the improve the experience of a tourist and is most likely linked to ‘Technological infrastructure, Social Media and Multipurpose Tourism Card offered by DMO’.

Component 3 explained 11% of the variance and is most highly correlated with how likely the use of the destination official website in several languages (.651) and rich digital content (.679) would improve the experience of a tourist. This component is probably linked with the ‘Availability of content’.

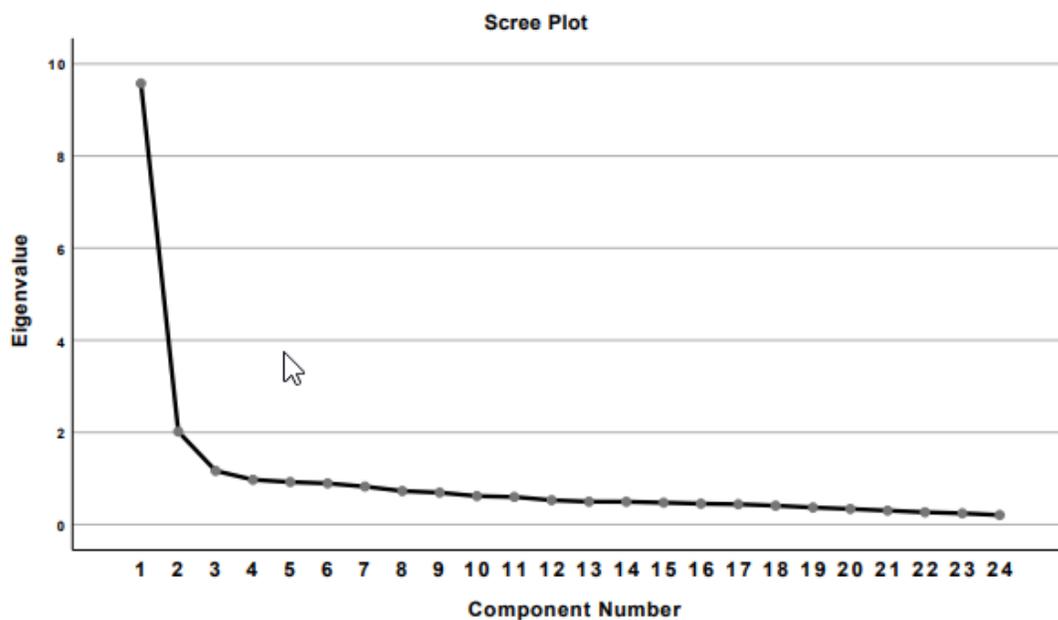


Figure 24: Scree Plot - How are tourists interested to interact and co-create the experience with the smart destination or service providers?

Table 30: Total Variance Explained - How are tourists interested to interact and co-create the experience with the smart destination or service providers?

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.576	39.898	39.898	9.576	39.898	39.898	5.426	22.608	22.608
2	2.017	8.404	48.302	2.017	8.404	48.302	4.461	18.589	41.198
3	1.165	4.852	53.154	1.165	4.852	53.154	2.870	11.957	53.154
4	.971	4.046	57.200						
5	.921	3.839	61.039						
6	.892	3.715	64.755						
7	.823	3.429	68.184						
8	.726	3.026	71.210						
9	.692	2.882	74.093						
10	.616	2.568	76.661						
11	.598	2.490	79.151						
12	.527	2.194	81.345						
13	.495	2.062	83.407						
14	.493	2.055	85.462						
15	.473	1.972	87.434						
16	.451	1.879	89.313						
17	.439	1.829	91.142						
18	.408	1.701	92.843						
19	.368	1.534	94.377						
20	.337	1.403	95.780						
21	.301	1.254	97.034						
22	.265	1.105	98.139						
23	.242	1.008	99.147						
24	.205	.853	100.000						

Extraction Method: Principal Component Analysis.

Table 21: Rotated Component Matrix - How are tourists interested to interact and co-create the experience with the smart destination or service providers?

Rotated Component Matrix^a

	Component		
	1	2	3
Q23 How likely would the use of the destination official website in several languages improve your experience as a tourist?	-.108	.243	.651
Q24 Rich content can be video, audio and other elements that encourage viewers to interact and engage with the content. How likely would rich digital content improve your experience as a tourist?	.142	.424	.679
Q25 How likely would direct booking possibilities improve your experience as a tourist?	.100	.661	.222
Q26 How likely would the use of public free Wi-Fi improve your experience as a tourist?	.114	.664	-.060
Q27 How likely would the use of interactive tourism office with Wi-Fi, touchscreens and dynamic information improve your experience as a tourist?	.244	.665	.170
Q28 A multipurpose tourism card could offer for example a package of discounts and free entries to museums, cultural institutions and restaurants. How likely would the use of a multipurpose tourism card improve your experience as a tourist?	.123	.668	.240
Q29 How likely would the use of the official destination accounts on social media improve your experience as a tourist?	.278	.650	.319
Q30 How likely would the use of the official destination App improve your experience as a tourist?	.388	.541	.337
Q31 How likely would the use of the booking platform of the destination tourist office compared to third party booking platforms improve your experience as a tourist?	.190	.596	.235
Q32 How likely would the use of sensor-derived information about traffic, pollution, noise, etc. improve your experience as a tourist?	.258	.366	.338
Q33 Touchscreens could provide information on nearby attractions, restaurants, shops or history. How likely would the use of touchscreens on destination streets improve your experience as a tourist?	.326	.460	.343

Q34 How likely would the use of video guides improve your experience as a tourist?	.443	.327	.556				
Q35 iBeacons enable smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon. How likely would the use of location-based information (through iBeacons, Bluetooth) improve your experience as a tourist?	.576	.257	.434	Q39 How likely would the use of payment through smartphone improve your experience as a tourist?	.450	.471	.161
Q36 Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. How likely would the use of augmented reality improve your experience as a tourist?	.702	.078	.456	Q40 Sometimes you may need information about the destination you are visiting. How likely would the use of online assistance (e.g. through Skype or an App) improve your experience as a tourist?	.394	.440	.232
Q37 Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. How likely would the use of virtual reality improve your experience as a tourist?	.706	-.013	.417	Q41 Holograms are 3-D images that have been projected and captured on a 2-D surface. Videomapping allows to fit any desired image onto the surface of an object. How likely would the use of videomapping and holograms improve your experience as a tourist?	.650	.255	.327
Q38 A barcode is a machine-readable optical label that contains information about the item to which it is attached. It can be read for example by an App on your Smartphone. How likely would the use of QR codes improve your experience as a tourist?	.521	.339	.380	Q42 A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. How likely would the use of chatbots improve your experience as a tourist?	.715	.166	.185

Q43 Wearable technology can be any technology that you wear e.g. on your wrist or in a rucksack. It could for example track data, opening doors to attractions or facilitating transactions for drinks, meals or souvenirs. How likely would the use of wearable te	.654	.280	.215
Q44 How likely would the use of electronic money (bitcoin, etc.) improve your experience as a tourist?	.689	.236	-.125
Q45 The aim of gamification in tourism is designing memorable experiences for guests. For example, dwarf hunt is one of the top things to do in Wroclaw (you can google it to read more about it). How likely would the use of Gamification improve your experience	.655	.266	-.066
Q46 How likely would you be willing to give face or fingerprint recognition to enter tourist attractions or hotels, pay for meals, etc.?	.669	.183	-.178

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

5. Discussion and conclusion

Most of the respondents in this research have been part of the Millennials (40%) and Gen X (42%) age groups and where Finnish (20.4%) and US (13.4%) citizens, while 29.5% had their residence in Finland and 15.2% in the USA. The high response rate from those countries is probably related to the fact that I have many contacts from both countries which I asked to fill out the survey but also the Facebook groups where I posted the survey. 56% of the survey respondents were males while 44% were females. 37% reported to have a graduate degree while 29.7% have a bachelor's degree. 34% of the respondents work 40 hours or more per week and another 34% work 1-39 hours per week. 13% were self-employed.

Participants of the survey are most interested in sharing experiences with friends and family, receiving information about activities, tourist attractions and places and events at the destination while they are less interested to receive personalized adverts or interact with other tourists at the destination through an App.

The analysis of the survey highlights 4 components related to research question 1, where smart technologies help to enhance the tourist experience. The first component, which contributes to 20% of the variance when conducting the Principal Component Analysis, is about 'receiving information about the destination' such as events, activities, attractions and places. Next there is 'mobile application usage', which contributes to 19% of the variance when conducting the Principal Component Analysis, where tourists want to interact with businesses, tourist offices and other tourists at the destination through an App or pay with a mobile device at the destination. Third, there is the component of 'sharing information', which contributes to 14% of the variance when conducting the Principal Component Analysis, where tourists most likely want to share experiences with friends and family and to share information for getting discounts and offers. Finally, 'Face-to-face communication', which contributes to 11% of the variance when conducting the Principal Component Analysis, even so not considered as a smart technology, seems to be an important aspect between tourists and tourism offices and between tourists at the destination. It seems that tourists are interested to communicate with tourist offices, both through an App on their smart devices and face-to-face, while an App seems to be favored over face-to-face communication.

Moreover, most of the participants highlighted that they are interested to use smart technologies to share experiences with friends and family, receiving information about the destination such as events, tourist attractions and activities which is also in line with Wang et al. (2016) that tourists use their smartphones during the trips to find information, to document and share their experiences.

Tourists are however less interested to use smart technologies to receive personalized adverts at the destination or to interact with other tourists at the destination through an App. Pay with mobile devices was also just favored by 50% of the respondents. It could also be argued that even so digital technologies such as smartphones have become an important part in our life (Buhalis & Connor, 2005), tourists may use vacation to digital detox or disconnect digital (Schegg & Stangl, 2017; Smith & Puczkó, 2015) if Apps like mobile pay is low even so it is reported that Millennials (74%) and Gen X (65%) may also bring their work along a trip as 47% of the Millennials and 33% of the Gen Xers found staying connected with their employers is important (Gelfeld, V., 2018).

Regarding research question 2, Tourists were most willing to share data in exchange for personalized experience related to age, personal preferences, gender and nationality with both - private companies and public agents, while they were less willing to share specific expenses in each place and service, sexual orientation, social media profiles, real time position and smartphone search history with them. Moreover, tourists would additionally share their hobbies with public agents which indicates that tourist may not be that interested to use smart services offered by the destination or that smart tourists rather prefer to disconnect while they are on vacation. This could lead to the question on how smart a destination can be and how much the experience of a smart tourist can be enhanced if there is only limited data available from smart tourists. For example, Femenia-Serra, F. & Ivars-Baidal, J.A. (2018) argues that social media data is one of the main sources which smart destinations can use for improving their marketing activities.

Masseno M.D. et al. (2018) argues that tourists may reject services which they don't want to share personal data with and highlights the following risks for smart tourists when information such as

mobility data is conjoined with data from social media sites and blog entries: 1. Identification and re-identification of individuals from allegedly anonymized or pseudonymized data, 2. Profiling of individuals, 3. Repurposing of big data, 4. Surveillance under the guise of service provision and desensitizing effect, 4. Failed consent, 5. Imbalance, where data subjects are not aware what the consequences are if their data is being processed. Data governance might be an important issue for smart destinations as service providers need to understand how the personalized services and enhanced experiences can meet the data protection requirements (Masseno M.D. et al., 2018). Kaiser A.F. (2016) found that younger age groups are less concerned about privacy when using search engines than older age groups and that older age groups also seem to take better care of their personal data while searching online.

Service providers also must take GDPR into consideration when developing and offering a service. Individuals also need to be informed on how long their data is going to be stored, how it is processed and with whom the data it is shared with.

The third research question was about how tourists are interested to interact and co-create the experience with the smart destination or service providers and as has been also discovered by Femenia-Serra, F., Perles-Ribes, J. F., & Ivars-Baidal, J. A. (2018) that there are different shades of smart tourists. There were only some tourists interested in using innovative technologies such as virtual or augmented reality, gamification, chatbot, fingerprint recognition to enter tourist attractions or pay for it using electronic money such as bitcoin.

Holograms and wearable technologies were also not that important. Tourists seem to be more interested in public free Wi-Fi, rich content, availability of different languages on the official destination website, booking possibilities or an interactive tourism office with Wi-Fi, touchscreens and dynamic information. Reason that innovative technologies were not that important to tourists could be that they are too complicated. They may have difficulties to access, lack the necessary skills, or may just have a different attitude toward innovative technologies (Maurer C., 2014).

Tourists would rather enjoy the destination as such rather than being behind a VR google. Tourists may also try to disconnect. However, there is currently still a lack of understanding regarding tourists' wish to participate in smart destinations (Femenia-Serra et al., 2018).

6. Implications

This study was aimed to contribute to the validation of the smart tourist conceptualization within a smart destination context proposed by Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2018). This study found similar results as the study already done by Femenia-Serra, F., Perles-Ribes, J. F., & Ivars-Baidal, J. A. (2018) who researched Spanish University Millennials.

The findings can be used to design services, products and marketing activities in tourist destinations ranging from all travel stages of a tourist such as pre-travel, during travel and post travel (Neuhofer et al., 2015) since they are all accompanied by technology e.g. social media, online booking, etc. Clearly, a destination which responds to the needs to tourists can get a competitive advantage. It might also be necessary for destination managements to scan the technology landscape and the changing needs of tourists frequently in order to adapt to the needs.

Moreover, external players using ICT who are not directly connected to the destination as such may have an impact e.g. service providers like Airbnb could have an impact on where tourists stay overnight when visiting. Moreover, actors who are able to collect data within a destination may become important to a destination when designing services based on the collected data.

However, as this study revealed ICT may not be the most important aspect for tourists as the interest in innovative technologies was quite low compared to more established technologies such as the availability of Wi-Fi in a destination.

However, innovative technologies could be integrated into smartphones in the future which may increase the likelihood to use them while visiting the destination. Moreover, service providers must consider the privacy requirements of smart tourists when designing a service as they may not be used by tourists who are concerned about their privacy. Tourists are probably more willing to share their data with a trusted service provider and building trust will be an important aspect for service providers in a destination.

The results of this study show that a destination may currently benefit from offering public free Wi-Fi, direct booking possibilities, interactive tourism office with Wi-Fi, a multipurpose tourism card and the use of the official destination accounts on social media, the destination official website in several languages, and rich digital content while also trying to build trust with tourist in order to address any privacy issues which could arise for using a specific service.

To conclude, building a smart destination with the latest technologies may currently not be the most important aspect for a destination and a destination should evaluate the costs and benefits of implementing innovative technologies. The need of innovative technologies by destinations may depend on the tourists and what technologies they are using.

New technologies may also require the destination to train personnel to become smart talents to operate innovative technologies or to give advice to tourists regarding those technologies. New business models could be developed based on the needs of the tourists regarding innovative technologies where data is either collected directly or through third parties while tourists would probably be more willing to share data such as sharing specific expenses in each place and service, sexual orientation, social media profiles, real time position and smartphone search history with a party they trust in.

7. Limitation and further research

There are a couple of limitations regarding the outcome of the study. First of all, even so there was no limitation regarding the respondent's nationality or country of residence most respondents came from Finland or English-speaking countries due to the fact that requests to fill out the survey was mainly posted to English and Finnish speaking Facebook groups and that many personal connections are from those countries too and where more willing to fill out the survey. Thus, studies should be made which covers more countries and nationalities.

Moreover, most of the respondents were in the Gen X and Millennials age group and it would be interesting to know how other age groups would respond to this survey. Moreover, there needs to

be more research in terms of differences between different nationalities and their acceptance towards innovative technologies which was not possible to evaluate in this study since the sample size of different nationalities are too small. For example, (Meng, Elliott, and Hall 2009) found that Chinese are less optimistic about technologies ability to offer greater functionality compared to the Americans.

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Appendices

Appendix A: Research Question Matrix

Questionnaire Matrix		Variables	Statistical Tests
Demographic & Economic Data			
	Gender	Male, Female, Other	Single group tests
	What is your highest level of education?	Less than a high school, High school degree of equivalent, Some college but no degree, Associate degree, Bachelor's degree, Graduate degree, PhD	Single group tests
	Economic Situation	Employed, working 1-39 hours per week, Employed, working 40 or more hours per week, Not employed, looking for work, Not employed, NOT looking for work, Retired, Disabled, Not able to work, Self-employed	Single group tests
	Age	Text field	Single group tests
	Nationality	Text field	Single group tests
	Country of residence	Text field	Single group tests
R1: How do Smart Technologies help to enhance the tourist experience?			

	How likely do you want to receive information about tourist attractions and places?	Very likely ----- Very unlikely	Correlation
	How likely would you want to get proposals for activities and new plans?	Very likely ----- Very unlikely	Correlation
	How likely would you want to receive information about events at the destination?	Very likely ----- Very unlikely	Correlation
	How likely would you want to share your experience with known people?	Very likely ----- Very unlikely	Correlation
	How likely would you want to share information for getting discounts and offers?	Very likely ----- Very unlikely	Correlation
	How likely would you want to interact with businesses at the destination?	Very likely ----- Very unlikely	Correlation
	How likely would you want to review businesses and services at the destination?	Very likely ----- Very unlikely	Correlation
	How likely would you want to interact with the tourism office at the destination?	Very likely ----- Very unlikely	Correlation
	How likely would you want to interact with other tourists at the destination?	Very likely ----- Very unlikely	Correlation
	How likely would you want to receive personalized adverts at the destination?	Very likely ----- Very unlikely	Correlation

	How likely would you pay with your mobile device (e.g. smart phone) at the destination?	Very likely ----- Very unlikely	Correlation
R2: How are tourists willing to share data in exchange for personalized experience?			
	What kind of personal data are you willing to share with private companies to obtain personalized experiences?	Very likely ----- Very unlikely	Correlation
	What kind of personal data are you willing to share with public agents (e.g. Tourism Offices, etc. ...) to obtain personalized experiences?	Very likely ----- Very unlikely	Correlation
R3: How are tourists interested to interact and co-create the experience with the smart destination or service providers?			
	How likely would the use of the destination official website in several languages, with rich digital content and direct booking possibilities improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation

	Rich content can be video, audio and other elements that encourage viewers to interact and engage with the content. How likely would rich digital content improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would direct booking possibilities improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of public free Wi-Fi improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of interactive tourism office with Wi-Fi, touchscreens and dynamic information improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of a multipurpose tourism card improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of the official destination accounts on social media improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of the official destination App improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation

	How likely would the use of the destination central booking platform improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of sensor-derived information about traffic, pollution, noise, etc. improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of touchscreens on destination streets improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of video guides improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	iBeacons enable smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon. How likely would the use of location-based information (through iBeacons, Bluetooth) improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. How likely would the use of augmented reality improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation

	Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. How likely would the use of virtual reality improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	A barcode is a machine-readable optical label that contains information about the item to which it is attached. It can be read for example by an App on your Smartphone. How likely would the use of QR codes improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	Sometimes you may need information about the destination you are visiting. How likely would the use of online assistance (e.g. through Skype or an App) improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of payment through smartphone improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	Holograms are 3-D images that have been projected and captured on a 2-D surface. Videomapping allows to fit any desired image onto the surface of an object. How likely would the use of	Very likely ----- Very unlikely	Correlation

	videomapping and holograms improve your experience as a tourist?		
	A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. How likely would the use of chatbots improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	Wearable technology can be any technology that you wear e.g. on your wrist or in a rucksack. It could for example track data, opening doors to attractions or facilitating transactions for drinks, meals or souvenirs. How likely would the use of wearable technologies improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	How likely would the use of electronic money (bitcoin, etc.) improve your experience as a tourist?	Very likely ----- Very unlikely	Correlation
	The aim of gamification in tourism is designing memorable experiences for guests. For example, dwarf hunt is one of the top things to do in Wroclaw (you can google it to read more about it). How likely would the use of	Very likely ----- Very unlikely	Correlation

	Gamification improve your experience as a tourist?		
	How likely would you be willing to give face or fingerprint recognition to enter tourist attractions or hotels, pay for meals, etc.?	Very likely ----- Very unlikely	Correlation

Appendix B: Survey Responses

Q7 How likely do you want to receive information about activities at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	98	22.7	28.7	28.7
	2	108	25.0	31.6	60.2
	3	74	17.1	21.6	81.9
	4	27	6.3	7.9	89.8
	5	12	2.8	3.5	93.3
	6	15	3.5	4.4	97.7
	7	8	1.9	2.3	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q8 How likely do you want to receive information about tourist attractions and places at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	88	20.4	25.7	25.7
	2	113	26.2	33.0	58.8
	3	73	16.9	21.3	80.1
	4	17	3.9	5.0	85.1
	5	25	5.8	7.3	92.4
	6	17	3.9	5.0	97.4
	7	9	2.1	2.6	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q9 How likely would you want to receive information about events at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	68	15.7	19.9	19.9
	2	117	27.1	34.2	54.1
	3	89	20.6	26.0	80.1
	4	23	5.3	6.7	86.8
	5	22	5.1	6.4	93.3
	6	14	3.2	4.1	97.4
	7	9	2.1	2.6	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q10 How likely would you want to share your experience with friends and family?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	117	27.1	34.2	34.2
	2	116	26.9	33.9	68.1
	3	71	16.4	20.8	88.9
	4	20	4.6	5.8	94.7
	5	12	2.8	3.5	98.2
	6	6	1.4	1.8	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q11 How likely would you want to share information for getting discounts and offers?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	52	12.0	15.2	15.2
	2	82	19.0	24.0	39.2
	3	83	19.2	24.3	63.5
	4	42	9.7	12.3	75.7
	5	31	7.2	9.1	84.8
	6	33	7.6	9.6	94.4
	7	19	4.4	5.6	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q12 How likely would you want to interact with businesses at the destination face to face?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	44	10.2	12.9	12.9
	2	85	19.7	24.9	37.7
	3	90	20.8	26.3	64.0
	4	70	16.2	20.5	84.5
	5	24	5.6	7.0	91.5
	6	16	3.7	4.7	96.2
	7	13	3.0	3.8	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q13 How likely would you want to interact with businesses at the destination through an App?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	30	6.9	8.8	8.8
	2	74	17.1	21.6	30.4
	3	83	19.2	24.3	54.7
	4	61	14.1	17.8	72.5
	5	40	9.3	11.7	84.2
	6	30	6.9	8.8	93.0
	7	24	5.6	7.0	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q14 How likely would you want to review businesses and services at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	31	7.2	9.1	9.1
	2	68	15.7	19.9	28.9
	3	86	19.9	25.1	54.1
	4	56	13.0	16.4	70.5
	5	46	10.6	13.5	83.9
	6	29	6.7	8.5	92.4
	7	26	6.0	7.6	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q15 How likely would you want to interact with the tourism office at the destination through an App?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	35	8.1	10.2	10.2
	2	67	15.5	19.6	29.8
	3	93	21.5	27.2	57.0
	4	49	11.3	14.3	71.3
	5	44	10.2	12.9	84.2
	6	27	6.3	7.9	92.1
	7	27	6.3	7.9	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q16 How likely would you want to interact with the tourism office at the destination face to face?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	45	10.4	13.2	13.2
	2	92	21.3	26.9	40.1
	3	88	20.4	25.7	65.8
	4	54	12.5	15.8	81.6
	5	39	9.0	11.4	93.0
	6	13	3.0	3.8	96.8
	7	11	2.5	3.2	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q17 How likely would you want to interact with other tourists at the destination through an App?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	4.6	5.8	5.8
	2	39	9.0	11.4	17.3
	3	50	11.6	14.6	31.9
	4	59	13.7	17.3	49.1
	5	57	13.2	16.7	65.8
	6	65	15.0	19.0	84.8
	7	52	12.0	15.2	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q18 How likely would you want to interact with other tourists at the destination face to face?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	33	7.6	9.6	9.6
	2	65	15.0	19.0	28.7
	3	72	16.7	21.1	49.7
	4	62	14.4	18.1	67.8
	5	50	11.6	14.6	82.5
	6	39	9.0	11.4	93.9
	7	21	4.9	6.1	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q19 How likely would you want to receive personalized adverts at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	2.1	2.6	2.6
	2	37	8.6	10.8	13.5
	3	63	14.6	18.4	31.9
	4	52	12.0	15.2	47.1
	5	48	11.1	14.0	61.1
	6	57	13.2	16.7	77.8
	7	76	17.6	22.2	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q20 How likely would you pay with your mobile device (e.g. smart phone) at the destination?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	44	10.2	12.9	12.9
	2	76	17.6	22.2	35.1
	3	51	11.8	14.9	50.0
	4	36	8.3	10.5	60.5
	5	32	7.4	9.4	69.9
	6	49	11.3	14.3	84.2
	7	54	12.5	15.8	100.0
	Total	342	79.2	100.0	
Missing	System	90	20.8		
Total		432	100.0		

Q23 How likely would the use of the destination official website in several languages improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	82	19.0	27.0	27.0
	2	111	25.7	36.5	63.5
	3	58	13.4	19.1	82.6
	4	31	7.2	10.2	92.8
	5	8	1.9	2.6	95.4
	6	7	1.6	2.3	97.7
	7	7	1.6	2.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q24 Rich content can be video, audio and other elements that encourage viewers to interact and engage with the content. How likely would rich digital content improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	64	14.8	21.1	21.1
	2	90	20.8	29.6	50.7
	3	77	17.8	25.3	76.0
	4	36	8.3	11.8	87.8
	5	13	3.0	4.3	92.1
	6	15	3.5	4.9	97.0
	7	9	2.1	3.0	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q25 How likely would direct booking possibilities improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	87	20.1	28.6	28.6
	2	114	26.4	37.5	66.1
	3	59	13.7	19.4	85.5
	4	34	7.9	11.2	96.7
	5	5	1.2	1.6	98.4
	6	4	.9	1.3	99.7
	7	1	.2	.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q26 How likely would the use of public free Wi-Fi improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	159	36.8	52.3	52.3
	2	80	18.5	26.3	78.6
	3	33	7.6	10.9	89.5
	4	20	4.6	6.6	96.1
	5	2	.5	.7	96.7
	6	9	2.1	3.0	99.7
	7	1	.2	.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q27 How likely would the use of interactive tourism office with Wi-Fi, touchscreens and dynamic information improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	40	9.3	13.2	13.2
	2	83	19.2	27.3	40.5
	3	92	21.3	30.3	70.7
	4	47	10.9	15.5	86.2
	5	23	5.3	7.6	93.8
	6	14	3.2	4.6	98.4
	7	5	1.2	1.6	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q28 A multipurpose tourism card could offer for example a package of discounts and free entries to museums, cultural institutions and restaurants. How likely would the use of a multipurpose tourism card improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	72	16.7	23.7	23.7
	2	76	17.6	25.0	48.7
	3	85	19.7	28.0	76.6
	4	30	6.9	9.9	86.5
	5	22	5.1	7.2	93.8
	6	13	3.0	4.3	98.0
	7	6	1.4	2.0	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q29 How likely would the use of the official destination accounts on social media improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	32	7.4	10.5	10.5
	2	64	14.8	21.1	31.6
	3	81	18.8	26.6	58.2
	4	62	14.4	20.4	78.6
	5	22	5.1	7.2	85.9
	6	27	6.3	8.9	94.7
	7	16	3.7	5.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q30 How likely would the use of the official destination App improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	29	6.7	9.5	9.5
	2	74	17.1	24.3	33.9
	3	78	18.1	25.7	59.5
	4	47	10.9	15.5	75.0
	5	28	6.5	9.2	84.2
	6	29	6.7	9.5	93.8
	7	19	4.4	6.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q31 How likely would the use of the booking platform of the destination tourist office compared to third party booking platforms improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	27	6.3	8.9	8.9
	2	73	16.9	24.0	32.9
	3	70	16.2	23.0	55.9
	4	94	21.8	30.9	86.8
	5	15	3.5	4.9	91.8
	6	16	3.7	5.3	97.0
	7	9	2.1	3.0	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q32 How likely would the use of sensor-derived information about traffic, pollution, noise, etc. improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	31	7.2	10.2	10.2
	2	81	18.8	26.6	36.8
	3	89	20.6	29.3	66.1
	4	56	13.0	18.4	84.5
	5	19	4.4	6.3	90.8
	6	16	3.7	5.3	96.1
	7	12	2.8	3.9	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q33 Touchscreens could provide information on nearby attractions, restaurants, shops or history. How likely would the use of touchscreens on destination streets improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	36	8.3	11.8	11.8
	2	69	16.0	22.7	34.5
	3	86	19.9	28.3	62.8
	4	55	12.7	18.1	80.9
	5	23	5.3	7.6	88.5
	6	24	5.6	7.9	96.4
	7	11	2.5	3.6	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q34 How likely would the use of video guides improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	24	5.6	7.9	7.9
	2	59	13.7	19.4	27.3
	3	73	16.9	24.0	51.3
	4	59	13.7	19.4	70.7
	5	38	8.8	12.5	83.2
	6	31	7.2	10.2	93.4
	7	20	4.6	6.6	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q35 iBeacons enable smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon. How likely would the use of location-based information (through iBeacons, Bluetooth) improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	17	3.9	5.6	5.6
	2	49	11.3	16.1	21.7
	3	83	19.2	27.3	49.0
	4	73	16.9	24.0	73.0
	5	30	6.9	9.9	82.9
	6	26	6.0	8.6	91.4
	7	26	6.0	8.6	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q36 Augmented reality (AR) adds digital elements to a live view often by using the camera on a smartphone. How likely would the use of augmented reality improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	21	4.9	6.9	6.9
	2	34	7.9	11.2	18.1
	3	73	16.9	24.0	42.1
	4	56	13.0	18.4	60.5
	5	41	9.5	13.5	74.0
	6	41	9.5	13.5	87.5
	7	38	8.8	12.5	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q37 Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. How likely would the use of virtual reality improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	1.6	2.3	2.3
	2	26	6.0	8.6	10.9
	3	51	11.8	16.8	27.6
	4	54	12.5	17.8	45.4
	5	48	11.1	15.8	61.2
	6	56	13.0	18.4	79.6
	7	62	14.4	20.4	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q38 A barcode is a machine-readable optical label that contains information about the item to which it is attached. It can be read for example by an App on your Smartphone. How likely would the use of QR codes improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	4.6	6.6	6.6
	2	44	10.2	14.5	21.1
	3	91	21.1	29.9	51.0
	4	54	12.5	17.8	68.8
	5	32	7.4	10.5	79.3
	6	38	8.8	12.5	91.8
	7	25	5.8	8.2	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q39 How likely would the use of payment through smartphone improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	45	10.4	14.8	14.8
	2	52	12.0	17.1	31.9
	3	63	14.6	20.7	52.6
	4	47	10.9	15.5	68.1
	5	27	6.3	8.9	77.0
	6	36	8.3	11.8	88.8
	7	34	7.9	11.2	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q40 Sometimes you may need information about the destination you are visiting. How likely would the use of online assistance (e.g. through Skype or an App) improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	4.6	6.6	6.6
	2	68	15.7	22.4	28.9
	3	98	22.7	32.2	61.2
	4	33	7.6	10.9	72.0
	5	34	7.9	11.2	83.2
	6	26	6.0	8.6	91.8
	7	25	5.8	8.2	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q41 Holograms are 3-D images that have been projected and captured on a 2-D surface. Videomapping allows to fit any desired image onto the surface of an object. How likely would the use of videomapping and holograms improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	2.5	3.6	3.6
	2	39	9.0	12.8	16.4
	3	54	12.5	17.8	34.2
	4	74	17.1	24.3	58.6
	5	41	9.5	13.5	72.0
	6	47	10.9	15.5	87.5
	7	38	8.8	12.5	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q42 A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. How likely would the use of chatbots improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	1.6	2.3	2.3
	2	23	5.3	7.6	9.9
	3	44	10.2	14.5	24.3
	4	53	12.3	17.4	41.8
	5	53	12.3	17.4	59.2
	6	57	13.2	18.8	78.0
	7	67	15.5	22.0	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q43 Wearable technology can be any technology that you wear e.g. on your wrist or in a rucksack. It could for example track data, opening doors to attractions or facilitating transactions for drinks, meals or souvenirs. How likely would the use of wearable te

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	17	3.9	5.6	5.6
	2	29	6.7	9.5	15.1
	3	58	13.4	19.1	34.2
	4	62	14.4	20.4	54.6
	5	46	10.6	15.1	69.7
	6	44	10.2	14.5	84.2
	7	48	11.1	15.8	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q44 How likely would the use of electronic money (bitcoin, etc.) improve your experience as a tourist?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	1.4	2.0	2.0
	2	15	3.5	4.9	6.9
	3	20	4.6	6.6	13.5
	4	50	11.6	16.4	29.9
	5	39	9.0	12.8	42.8
	6	61	14.1	20.1	62.8
	7	113	26.2	37.2	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q45 The aim of gamification in tourism is designing memorable experiences for guests. For example, dwarf hunt is one of the top things to do in Wroclaw (you can google it to read more about it). How likely would the use of Gamification improve your experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	2.1	3.0	3.0
	2	22	5.1	7.2	10.2
	3	58	13.4	19.1	29.3
	4	51	11.8	16.8	46.1
	5	32	7.4	10.5	56.6
	6	55	12.7	18.1	74.7
	7	77	17.8	25.3	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Q46 How likely would you be willing to give face or fingerprint recognition to enter tourist attractions or hotels, pay for meals, etc.?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	1.2	1.6	1.6
	2	18	4.2	5.9	7.6
	3	19	4.4	6.3	13.8
	4	31	7.2	10.2	24.0
	5	43	10.0	14.1	38.2
	6	59	13.7	19.4	57.6
	7	129	29.9	42.4	100.0
	Total	304	70.4	100.0	
Missing	System	128	29.6		
Total		432	100.0		

Table 4: The Kaiser-Meyer Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.831
Bartlett's Test of Sphericity	Approx. Chi-Square	2085.098
	df	91
	Sig.	.000

The result of the Cronbach's Alpha test (Table 5) was .854 and gives an internal consistent picture for the scale used in this study which can be interpreted as scale being reliable as the score should be .7 or higher to allow for a high internal consistency of the questionnaire.

Table 5: SPSS Cronbach's Alpha

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
854	933	42