Employed Technological Trends for Enhancing the Tourist Experience in Vienna: A Benchmark Approach

Bachelor Thesis for Obtaining the Degree

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Submitted to Lidija Lalicic

Isabella Postl

1411035

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Affidavit

I hereby affirm that this Bachelor's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed.

The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

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Abstract

The integration of new technologies within the tourist experience design is illustrating an increasingly important demand factor for tourists. In today's time, the ultimate goal for tourists is not the delivery and consumption of products and services itself, but rather to create memorable experiences, through receiving a unique transmission, that underlines and authenticates the particular product or service (Walls, Okumus, Wang, & Kwun, 2011). This phenomenon can exert huge challenges on destinations and their respective DMMOs. Likewise, incorporating ICT also possesses great potential to open up a broad variety of new possibilities concerning the creation of innovative experiences. However, little is known about the current state and progress of technological implementation within popular tourism destinations. As Vienna is the city of interest in this dissertation, the central focus was on discovering how the destination is making use of multiple ICT for enhancing the tourists' on-site experience. In addition, a benchmarking analysis was employed, which was intended to assist in uncovering the technological trends currently offered by four European destinations. Subsequently, the thesis provides suggestions for further improvement to the Vienna Tourist Board.

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List of Abbreviations

Apps   Mobile Applications

AR   Augmented Reality

DMO   Destination Management/Marketing Organization

DMMO   Destination Management and Marketing Organization

ICT   Information Communication Technologies

IT   Information Technologies

POI(s)   Point(s) of Interest

VR   Virtual Reality

1   Introduction

1.1   Tourism & Technology

Without doubt, technology has changed the face of tourism (Rodríguez Vázquez, Rodríguez Campo, & Rodríguez Fernández, 2016). In just a few decades, technology has become a fundamental component of tourism (Neuhofer, Buhalis, & Ladkin, 2014). Buhalis (2013) states that technology and tourism are highly interrelated nowadays. Even though technology exerts huge challenges on the tourism industry, including the continuing emergence of new technological trends and innovations, the fast progress in development and the rapid and constantly changing environment. However, it also unlocks new possibilities and potential at the same time (Neuhofer et al., 2014). It hereby illustrates a major tool for destinations to stay competitive on a global scale (Jung, & Han, 2014).

The emergence of Information Technologies (IT), particularly the Internet, and Information Communication Technologies (ICT) have stimulated a complete transformation of travel behavior (Lamsfus, Wang, Alzua-Sorzabal, & Xiang, 2014). The way information is obtained prior to a trip, the planning (Buhalis 2003, cited in Neuhofer et al., 2014) and booking process, as well as the sharing of travel experiences, such as on social media platforms (i.e., Facebook) after a trip have undergone a striking change (Bilgihan, Barreda, Okumus, & Nusair, 2016; Buhalis, & Law, 2008; Chung, & Buhalis, 2008; Hays, Pays, & Buhalis, 2013; Xiang, & Gretzel, 2010, cited in Mariani, Di Felice, & Mura, 2016). In this regard, technologies are intended to support customers with the planning and the making of travel related decisions (Xiang et al., 2015, cited in Wang, So, & Sparks, 2016). The latter, sharing travel experience, is enabling users to constitute virtual travel communities, that are assisting tourists in obtaining information, sustaining and developing connections and relationships, as well as with making decisions concerning the travel (Ayeh, Au, & Law, 2013; Stepchenkova, Mills, & Jiang, 2007; Wang, Yu, & Fesenmaier, 2002, cited in Mariani, et al., 2016). The influences on travel behavior is regarded to be even more substantial if travelers make use of mobile technologies, as it creates a highly dynamic environment with a constant social connection (Lamsfus, et al., 2014).

Besides the change in travel behavior, also tourist experiences have been completely revolutionized through the implementation of new technologies (Wang, et al., 2016). Walls, Okumus, Wang, and Kwun (2011) point out that consumers are not attempting to obtain a product or service solely with the delivery and consumption, but are striving to create memorable experiences through demanding exclusive ways of transmission that substantiate the respective product or service. Through the usage of, for instance, smartphones and podcasts, travelers are enabled to solve problems immediately on-site. In addition, these tools can lead to increased learning results, better understanding, improved satisfaction and high quality experiences (Kang, & Gretzel, 2012a, 2012b; Wang, Xiang, & Fesenmaier, 2016, cited in Wang, et al., 2016), as well as to greater efficacy, comfort and control (Buell, Campbell, and Frei 2010, cited in ibid.).

Thus, the integrated use of ICT opens up various new possibilities of tourism marketers designing new experiences. For example, the emergence of new touristic attractions that have the ability to reform classical experiences, but also to create completely new types of tourist experiences. Thereby technology can either take over the role of a mediator or the main experience itself in a tourist destination (Neuhofer et al., 2014). In both cases, these new experiences are anticipated to be offered via various media, such as virtual- and augmented reality, gamification or mobile phone applications. This can lead to affectionate attitudes of tourists, as well as to a transformation of tourist experiences being inherently richer in nature (Gretzel, & Jamal, 2009, cited in ibid.). For this reason, it is of a high importance for destinations to start to effectively integrate ICT in order to provide tourist products and services that offer a unique value and memorable experiences and subsequently higher levels of competitive advantages (Neuhofer, Buhalis, & Ladkin, 2012).

1.2 Aim of Research

Without controversy, technology has the ability to relieve and enhance the daily routine in several different ways. Hence, this fact may also apply for tourists and their experiences when visiting and exploring a remote destination. However, little is known about what technological trends are applied to enhance the tourist experience within a destination. Consequently, the primary purpose of this thesis is to uncover and examine the technological trends the city of Vienna and its various

stakeholders are currently employing, in order to enhance the tourist on-site experience. The main research question in this thesis is as follows:

How is Vienna currently implementing technological trends in order to enhance the tourists experience on-site?

Furthermore, the thesis is also interested in how the city of Vienna is performing in comparison to other European cities. Therefore, the second question central in this thesis is as follows:

How is Vienna competing with other European tourism destinations with regards to technological trends in tourists experience design?

In doing so, the thesis aims to provide an overview on the current state of technological implementation within the tourist experience design in the respective destinations. Thereupon, it is intended to make suggestions for improvement, further development and innovations concerning the technological tourist offers in Vienna. For this purpose, this study will employ a benchmarking analysis, conducted with three other popular European destinations – Amsterdam, Barcelona, and Berlin. Even though the tourist experience is a fundamental part of the literature review and of a high importance for the overall subject, it is not aimed to discover how the technological trends introduced in this paper are perceived by tourists.

2 Literature Review

2.1 Destination Management & Marketing

As this paper is mainly dealing with the city of Vienna, but also with other European cities, it is important to first clarify the subsequent terms to create the basis for understanding the main part of this paper.

2.1.1 Definition of Destination Management, Destination Marketing & DMMO

In 2007, the UN World Tourism Organization (UNWTO) issued their first publication on destination management. In this, destination management is defined as "the co-ordinated management of all the elements that make up a destination", that are "attractions, amenities, access, human resources, image and character, marketing and pricing" (UNWTO, 2007, p. 1,4). For realizing this "co-ordinated management", as well as for ensuring and fostering the connection and relationship between the often dispersed entities, the implementation of a strategic long-term (Morrison, 2013) approach is required (UNWTO, 2007). The partnership and collaboration between the various bodies and organizations within a destination, as well as them having shared interests, are of an utmost importance for successfully working towards and achieving a destination's visions and goals (UNWTO, 2007; Morrison, 2013). Moreover, an amalgamation of management can be beneficial for preventing work done being ineffective and inefficient, concerning the "promotion, visitor services, training, and business support" (UNWTO, 2007, p. 4), but also for giving assistance in detecting gaps existing in the management (UNWTO, 2007).

Destination management and destination marketing are highly interconnected when it comes to tourism. More precisely, destination marketing functions as an instrument in the broad field of destination management (Morrison, 2013). It is intended to promote the destination and its charms to potential visitors, to attract them to actually visit the destination, but also to provide services within the destination to make sure the expectations of tourists are met (UNWTO, 2007).

Destination management and destination marketing is executed by particular tourism destination organizations (Morrison, 2013), that are complementing one another (Adeyinka-Ojo, Khoo-Lattimore, & Nair, 2014). These are known as Destination Management Organizations (DMO), Destination Marketing Organizations (DMO), and Destination Management and Marketing Organizations (DMO or DMMO). When analyzing already existing literature about these organizations, Adeyinka-Ojo, Khoo-Lattimore, and Nair (2014) have noticed the interchangeable, distinct, but also joint use of these terms, as well as of their abbreviation (Bhat, & Gaur, 2012; Wang, 2011, cited in Adeyinka-Ojo et al., 2014, also see Morrison, 2013). To better illustrate this dispersion among the tourism researchers writing about these subjects, a table (Table 1) from Adeyinka-Ojo, Khoo-Lattimore, and Nair (2014) is adopted, who abbreviate destination management and marketing organizations as DMMOs.

Using the abbreviation DMO when referring to the term destination *management* organization, is not acknowledged by all experts. Pike and Page (2014) criticize the approach to entitle a DMO a destination *management* organization instead of a destination *marketing* organization. They state, that this terminology is unsuitable and deceptive for reasons of "management" suggesting "control". They argue, that most of the DMOs existing nowadays do not possess this "control" for managing their destinations effectively. Fyall (2011, cited in ibid.) points out the difficulty of controlling and influencing the quality and progress of a destination, but also the path a destination should follow, if all elements are not featured by one and the same entity.

However, even though a traditional DMOs main task has been to market a destination, it is important to understand that the role of a DMO in today's time has to go far beyond just destination marketing (Presenza, Sheehan, & Ritchie, 2005; UNWTO, 2007). In fact, for staying competitive and for sustaining the success of a destination, destination marketing organizations have to transform into destination management organizations. This is about becoming tourism destination developers and strategic leaders (Presenza et al., 2005; UNWTO, 2007).

Authors	Year	Theme
Pearce	1992	Destination Marketing Organization
Ritchie & Ritchie	1998	Destination Management Organization
Buhalis	2000	Destination Management Organization
Ritchie & Crouch	2003	Destination Management Organization
Pike	2004,2009	Destination Marketing Organization
Blain, Levy & Ritchie	2005	Destination Management Organization
Presenza, Sheehan & Ritchie	2005	Destination Management Organization
Manente & Minghetti	2006	Destination Management Organizations/Actors
World Tourism Organization	2007	Destination Management Organization
Ford & Pepper	2008	Destination Marketing Organization
Hassan, Hamid & Al Bohairy	2010	Destination Marketing Organization
Bornhorst, Ritchie & Sheehan	2010	Destination Management Organization
Wang	2011	Destination Marketing and Management Organization
Fyall	2011	Destination Management Organization
Bhat & Gaur	2012	National Tourism Organization used for both (Destination Management and Marketing)
Zach	2012	Destination Marketing Organization
Muller & Berger	2012	Destination Management Organization
Fyall, Garrod & Wang	2012	Destination Marketing Organization
Morgan, Hastings & Pritchard	2012	Destination Management Organization
Vogger & Pechlaner	2014	Destination Management Organization
Pike & Page	2014	Destination Marketing Organization
Cox, Gyrd-Jones & Gardiner	2014	Destination Management Organizations and Operators

Table 1. Destination Management and Marketing Organizations (DMMOs)

(adopted from Adeyinka-Ojo, Khoo-Lattimore, & Nair, 2014, p. 153)

In contrast to Pike and Page (2014), the UNWTO (2007), states that the role of a DMO is not about controlling the activities of their stakeholders, but about consolidating and co-ordinating resources and knowledge among them. Satisfying the need for strong leadership, fostering communication among the stakeholders, is vital for creating an environment of stakeholder involvement (Bornhorst, Ritchie, & Sheehan, 2010).

According to UNWTO (n.d.):

> *"A Destination Management/Marketing Organization (DMO) is the leading organizational entity which may encompass the various authorities, stakeholders and professionals and facilitates tourism sector partnerships towards a collective destination vision."* (UNWTO, n.d., p. 13)

As Adeyinka-Ojo et al. (2014), this paper believes that DMOs in today's time take on functions, roles and activities of both, destination management and destination marketing. Therefore it is aimed to amalgamate these two terminologies and refer to them as destination management and marketing organizations, abbreviated as DMMO(s).

DMMOs have a lifetime of already more than 100 years (Morrison, 2013). Today, there are more than 10,000 destination and marketing organizations existing worldwide (Pike et al., 2014), that can be categorized as follows (UNWTO, 2007, p. 3):

- National Tourism Authorities (NTAs) or Organizations (NTOs)
- Regional, provincial or state DMOs (RTOs)
- Local DMOs

Destination management is a very complex issue (UNWTO, 2007; see also Neuhofer et al., 2014), that fosters competition among destinations on a global scale (Presenza et al., 2005; Bornhorst, et al., 2010). For overcoming the challenges the rapidly evolving tourism industry is posing on DMMOs, as well as for staying sustainably successful, it requires DMMOs to always think ahead and manage all aspects of the tourism destination efficiently and effective (Soteriades, 2012; Bornhorst et al., 2010). Moreover, it is of an utmost importance for DMMOs to clearly position themselves, as well as to differentiate their destination from others for attracting tourists plus being able to deliver a distinct value and experience to them (Neuhofer et al., 2014). Destinations are the places to deliver these experiences in form of various tourism products and services. However, in today's time it is not enough anymore to just build and rely on the tangible and intangible assets of a destination alone, meaning, for instance, attractions, nature, culture or inhabitants (Hudson, & Ritchie, 2009, cited in Neuhofer et al., 2012). In order to be able to offer long lasting and extraordinary experiences to the more and more demanding tourists, but also to

successfully sustain on the competitive market of tourism, DMMOs must find innovative ways to differentiate their destination and its offerings (Neuhofer et al., 2012). This can be done through actively integrating technology into the tourist experience. The next section will explain this in more detail.

2.2 Technology enhanced tourist experience

Since the past few decades, tourists are increasingly searching for experiences (Pine, & Gilmore, 1999, cited in Neuhofer et al., 2014). Hence, the creation of memorable experiences is considered as the fundamental basis of tourism (Neuhofer et al., 2012, 2013). The following sections are aimed to provide a more detailed insight on this.

2.2.1 Tourist experience

Over the years, a multitude of, sometimes very distinct, definitions on what an experience constitutes have come into existence (Neuhofer et al., 2012; Neuhofer et al., 2014). The same phenomena occurs with the terms tourist experience and tourism experience, as they are defined in multiple ways. In this regard it has to be noted, that the terms "tourist experience" and "tourism experience" are mostly used interchangeably and with the same frequency, but are intended to express the same meaning (Ritchie, & Tung, 2011, cited in Zátori, 2013). However, "tourism experience" is better to be used in an organizational context, while "tourist experience" is referring more to consumers perspectives (Zátori, 2013). For reasons of this paper being about what technological trends the destination of Vienna is offering in order to enhance the on-site experience for tourists, the term "tourist experience" is perceived to be more appropriate to use here.

Before discussing the topic tourist experience, it is important to clarify the term experience. In 1990, the psychologist Mihaly Csikszentmihalyi first described the meaning of, what he called, the "optimal experience". He states that it is the state when people have a feeling of exhilaration and profound enjoyment which is long lastingly valued. After experiencing, the memory on this special feeling is becoming a guideline for "what life should be like" (Csikszentmihalyi, 1990, p. 3). Moreover he argues, that the best moments and optimal experiences are not created and arising

out of passiveness but rather out of activeness. This statement underlines the argument of Zátori (2013), who sates that tourists prefer participating actively rather than just falling in the state of a passive consumer. Stepping away from the optimal experience, O'Dell (2005) inter alia points out that experiences are highly individual, subjective and intangible. McIntosh and Siggs (2005, cited in Zátori, 2013) further state experiences to be exclusive, guided and accompanied by emotions, and to have a great personal worth. Holbrook and Hirschman (1982, cited in Neuhofer et al., 2012, & Neuhofer et al., 2014) argue that an experience has an extremely emotional meaning that evokes from consuming certain products and services.

However, the offering of solely functional products and services to tourists is not enough anymore. Tourists desire and demand experiences, wherefore offers increasingly have to come along with experiences (Pine, & Gilmore, 1999; Schwartz, 1990; cited in Walls, et al., 2011). As tourist experience is regarded as a vague and miscellaneous phenomenon (Uriely, 2005, cited in Zátori, 2013; also see Quinlan-Cutler, & Carmichael, 2010) by several writers, and the denotation of it being related with various clarifications from social, environmental and activity constituents of the total experience (Tussyadiah, & Fesenmaier, 2009), there is no unified definition for the term tourist experience existing. According to Quan and Wang (2004, cited in Zátori, 2013, p. 33), the overall tourist experience is made up of the complementing "peak" (e.g. art, culture, heritage) and "supporting" (accommodation, transportation, shopping, etc.) experiences that must be viewed in its entity. Maslow (1964, cited in Walls et al., 2011) defines "peak" experiences as the state where individuals pass the line of their perceived ordinary reality and step over into their perceived ultimate reality. This sensation is fleeting in its duration and accompanied by positive effects.

Due to the vast quantity of definitions existing on tourist experience, and for underlying the purpose of this thesis, this paper combines the definitions of Neuhofer, Buhalis and Ladkin (2012), who incorporated some definitions on this subject from different writers:

> *"The tourist experience arises through the active participation in interaction with and consumption of the tangible (physical and objective) and intangible (immaterial and subjective) characteristics of a tourism destination."*

It further can be described as a "*result of meaningful encounters*" that occur when tourists meet the inimitable attributes of a destination (Tussyadiah, 2014, p. 1) or a "*moment of value creation"* that ensures from the meeting of production and consumption (Andersson, 2007; Neuhofer et al., 2012). In that, the engagement of the tourist in the experience, that is emotional, physical, intellectual, and spiritual in nature (Mossberg, 2007, cited in Neuhofer et al., 2012; Pine, & Gilmore, 1999, cited in Quinlan-Cutler, & Carmichael, 2010), is substantial enough to be anchored in long-term memory (Larsen, 2007, cited in Neuhofer et al., 2012; also see Gram, 2005, cited in Quinlan-Cutler et al., 2010).

In this regard, it can be said, that the value of destinations to tourists is more and more determined by experiences (Zátori, 2013). Hence, creating and offering experiences through the supply of products and services that are unique and memorable to tourists can help destinations and their DMMOs to differentiate themselves from their competitors and, therefore, gain a substantial competitive advantage (Pine, & Gilmore, 1999; King, 2002; Williams, 2002; cited in Zátori, 2013; Walls et al., 2011). In this respect, the ultimate goal for DMMOs is to increase the loyalty and satisfaction of tourists.

Elements of the tourist experience

For achieving the goal of increasing tourists' satisfaction, DMMOs have to understand and take into account the elements that constitute the tourist experience. According to Quinlan-Cutler and Carmichael (2010) these elements can be categorized under the "influential realm" and the "personal realm" (pp. 9-11).

The **influential realm** consists of elements that can impact an experience outside an individual. These elements or influences can be divided into three categories: 1) Physical aspects, 2) Social aspects, and 3) Products and Services (Quinlan-Cutler et al., 2010, p. 9, 10). *Physical aspects* refer to the physical settings and environment, spatial, geographical, and place-based attributes within a destination, that enable activities and foster interaction in a social context. *Social aspects* comprise interactions and relationships with friends, family, other tourists, hosts, personnel, etc., and have the power to influence all elements of the total tourist experience. *Products and services* encompass, for instance, the quality of service, activities

offered and tourist products. All three factors have a striking impact on the experience, due to the constantly mediating aspect, on the evaluation of the experience, as well as on the tourists' behaviour and level of satisfaction (Quinlan-Cutler et al., 2010).

The remaining elements are included in the ***personal realm***, that incorporates those elements existing within an individual itself, that are (Quinlan-Cutler et al., 2010): *1) Motivation and Expectation* (p. 11), 2) Satisfaction and Dissatisfaction (p. 13), *3) Knowledge* (p. 16), *4) Memory* (p. 16), *5) Perception* (p. 19), *6) Emotion* (p. 19), and *7) Self-identity* (p. 20).

Motivation and Expectation: Motivation impacts the choices tourists' make and what kind of experiences they seek. It can either arise from within an individual, having, for instance, the urge to break out from everyday life, the "push factors", or from motivational factor outside, the so called "pull factors", that are introduced from a destination itself, through offerings, images, but also benefits that appeal to and inspire the individuals push factors (Quinlan-Cutler et al., 2010). Expectations are formed through personal beliefs, expected features, and predictions about future happenings (Larsen, 2007, cited in Quinlan-Cutler et al., 2010). The level of satisfaction or dissatisfaction of tourists', as well as the evaluation of an experience is closely connected to tourists' expectations prior to and of the upcoming experience. The state of satisfaction arises when previously held expectations of a certain experience are meet or even exceeded. The contrary, dissatisfaction occurs if expectations are not fulfilled (Quinlan-Cutler et al., 2010).

Satisfaction and Dissatisfaction: As most of the elements, satisfaction is a complex concept that is widely discussed. However, satisfaction is argued not to be the ultimate goal of tourists' when travelling, but more of an attitude that is held prior to an experience (Pearce, 2005, cited in (Quinlan-Cutler et al., 2010). Some authors argue that satisfaction and dissatisfaction are more than the conformance or non-conformance of experience and expectation. According to Arnould and Price (1993, cited in Quinlan-Cutler et al., 2010, p. 14) it is created through a personal evaluation of an experience, mirroring emotions, relationships and self-identity. Ryan (2002b, cited in Quinlan-Cutler et al., 2010) stated, that dissatisfaction, arising from unsatisfactory events, can have the ability to transform into satisfaction, if these

experiences are converted into stories where the tourist manages to resolve complications.

Knowledge: Knowledge, arising from education and learning, can be described as the intellectual or cognitive part of a tourist experience. However, there is little research about if tourists' are actively searching for learning and skill development in experiences engaged, if these aspects are subliminally brought with an experience, or if it is a conjunction of both (Quinlan-Cutler et al., 2010).

Memory: Memory is regarded as an outcome of tourist experiences, that establishes a connection between a tourist event and the result of emotions and perceptions of a such (Oh, Fiore, & Jeoung, 2007, cited in Quinlan-Cutler et al., 2010). Experiences undergo constant progress and evolvement through the narration of memories, allowing the interpretation of an experience to be altered (Selstad, 2007, cited in Quinlan-Cutler et al., 2010).

Perception: Perception is a mental (Larsen, 2007, cited in Quinlan-Cutler et al., 2010)) process of distributing significance to certain items, surroundings or experiences. It is is argued to be a strong determining factor of tourist satisfaction (Ryan, 2003, cited in Quinlan-Cutler et al., 2010), that is influenced by an individual's motivations, emotions, values, opinions and worldviews (Quinlan-Cutler et al., 2010, p. 19).

Emotion: Tourism is supplying a broad range of emotions (Noy, 2007, cited in Quinlan-Cutler et al., 2010), that are the result of tourist events (Oh et al., 2007 cited in Quinlan-Cutler et al., 2010). Emotions have the ability to impact the connection between places and people (White, 2005, cited in Quinlan-Cutler et al., 2010), as well as the perception and memory of experiences (Chang, 2008; Trauer, & Ryan, 2005, cited in Quinlan-Cutler et al., 2010).

Self-identity: Travelling is seen as a temporary experience that has the ability to affect tourists' self-identity, through shaping their perception and understanding of self (Desforges, 2000; Palmer, 2005; Selstad, 2007; Vogt, 1976, White, & White, 2004, cited in Quinlan-Cutler et al., 2010).

For reflecting the above and to summarize this section, it can be said, that DMMOs have to increasingly shed light on the importance of the elements a tourist experience consists of for being able to achieve tourist satisfaction, as well as for recognizing the tourists' need and desire to become an integrated part of experiences. Moreover, it is important to note, that the motivation to visit a destination is highly dependent on the emotions a destination promises to deliver with their experiences offered (Zátori, 2013). The next section will explain how DMOs can use technology to enhance the on-site experience.

2.2.2 Technology enhanced on-site experience

As discussed before, tourism industry is revolutionized by the integration of technology, which changed the creation and consumption of tourism products and services (Stamboulis, & Skayannis, 2003, cited in Neuhofer et al., 2014), as well as the travel behavior (Gretzel, Fesenmaier, & O'Leary, 2006; Werthner, & Klein, 1999; Xiang, Wang, O'Leary, & Fesenmaier, 2015, cited in Lamsfus et al., 2014; Neuhofer et al., 2014). As a result, technology can even act as the center of an experience (McCarthy, & Wright, 2004, cited in Neuhofer et al., 2014). Thereby, ICT are argued to be one of the main facilitators of experiences, in either enhancing, supporting or even transforming the experiences (Tussyadiah, 2014; Binkhorst, & Den Dekker, 2009, cited in Neuhofer et al., 2014). ICT involves multiple media (Gretzel, & Jamal, 2009, cited in Neuhofer et al., 2014), covering the total array of electronic tools (Buhalis, 2003, cited in Neuhofer et al., 2014), that have the ability to enhance the tourist experience in various ways, such as the *Internet*, *Web 2.0*, encompassing *social networking platforms/social media channels*, *blogs* or *microblogs*, *videos*, *wikis*, *chatrooms*, *podcasts*, *images*, *mobile/smartphones*, *applications (apps)*, *augmented and virtual reality*, *digital cameras*, *virtual (tourist/travel) communities or Second Life*.

Neuhofer et al. (2014) state, that the provision of technology within the creation of experiences leads to increased interactivity, personalization, as well as to a higher level of social engagement. Thereby, as pointed out before, technology can either take on a complementary role, or illustrate the fundamental part of the experience. The extent to which tourists choose to engage with the complementary technological offers within an experience is at their choice, be it in form of active

involvement, the use of social media pre, during or post travel, or the use of mobile applications and the obtaining of personalized information within a destination (Neuhofer et al., 2014, p. 344). The physical experience is argued to increase in its richness the more tourists' engage with technologies provided by tourism destinations (Neuhofer et al., 2014).

To better illustrate this argument, the level of engagement increase of tourists' along with the increase in the different levels of technology in experiences is depicted in Figure 1 (adopted from Neuhofer et al., 2014, p. 348), entitling the "consumer" as "tourist" and "company" as "destination". The *experience hierarchy* (Figure 1) consists of four all-embracing technological-experience levels.
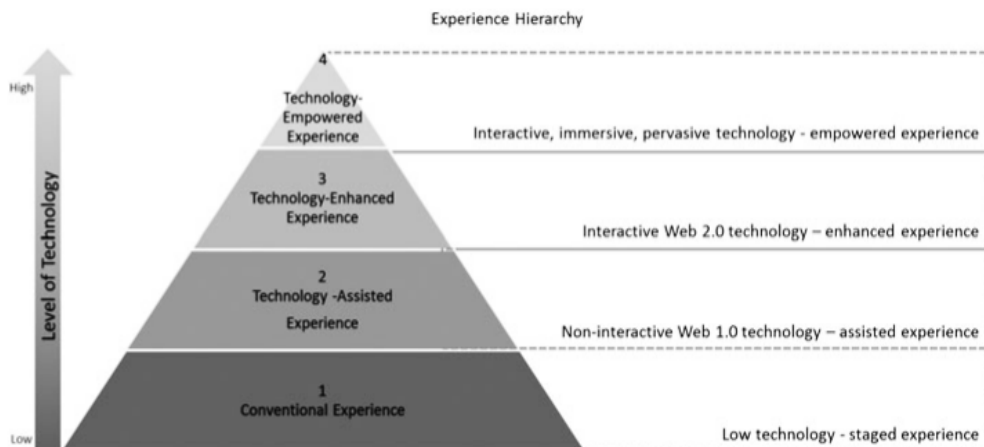
Figure 1. Experience hierarchy (adopted from Neuhofer, Buhalis, & Ladkin, 2014, p. 348)

The basis is formed by the *conventional experience*, that is characterized by a non- or rarely-existent level of technological integration in the experience, low tourist involvement in the experience creation process, only occurring at the consumption, due to unilateral supply of experiences by the destination. The next level builds the *technology-assisted experience*, where technology takes on a facilitating role of experiences in assisting tourists through Web 1.0 technologies (e.g. non-interactive websites, distribution and reservation systems) (Buhalis, & Jun, 2011, cited in Neuhofer et al., 2014), allowing for no interaction and rare involvement in the creation of experiences. Thirdly, the level of *technology-enhanced experience* provides tourists with Web 2.0 technologies (e.g. social media), taking on a supplementary role, that are fostering the active participation of tourists in creating experiences, enabling interactions between tourists and other tourists, as well as

with DMMOs and other organizations within destinations. The last level of the experience hierarchy constitutes the *technology-empowered experience*, where technology is ubiquitous throughout every travel stage (e.g. points of contact within the physical destination or the online environment with service providers), and required for the happening of experiences. This due to the fact, that technologies either empower, or are the core of an experience on this level.

ICT is accompanying tourists through its various tools on from the pre-travel-stage, over the during-travel-stage, until and throughout the post-travel-stage. This in assisting tourists with the search of information, making comparisons and decisions, planning the travel, communicating, retrieving information and sharing of experiences. However, it is interesting to see how all these activities are also increasingly undertaken on-site while on-the-go (Neuhofer, 2014). As this thesis is aiming to explore what technological trends the city of Vienna is offering to tourists for enhancing their experience within the destination, the focus for the subsequent topics will be shed on the technological tools applied by tourists and employed by tourism organizations on-site for enhancing experiences.

Figure 2, a "framework of technology enhanced tourism experience" (adopted from Neuhofer et al., 2014, p. 343), is, inter alia, graphically demonstrating how experiences on-site are enhanced by the integration of ICT, functioning as a catalyst to foster the experience co-creation between the company and the consumer with the outcome of a *technology-enhanced on-site tourism experience*.

Research is suggesting that tourists' satisfaction is increased through ICT offering access and availability to services (Law, Leung, & Buhalis, 2009, cited in Neuhofer et al., 2014), and enabling to retrieve information and share experiences constantly at every place (Rahman, & Alia, 2016; Wang, Park, & Fesenmaier, 2012; Neuhofer et al., 2013; also see Neuhofer, 2014), leading to improved flexibility of tourists (Lamsfus et al., 2014).

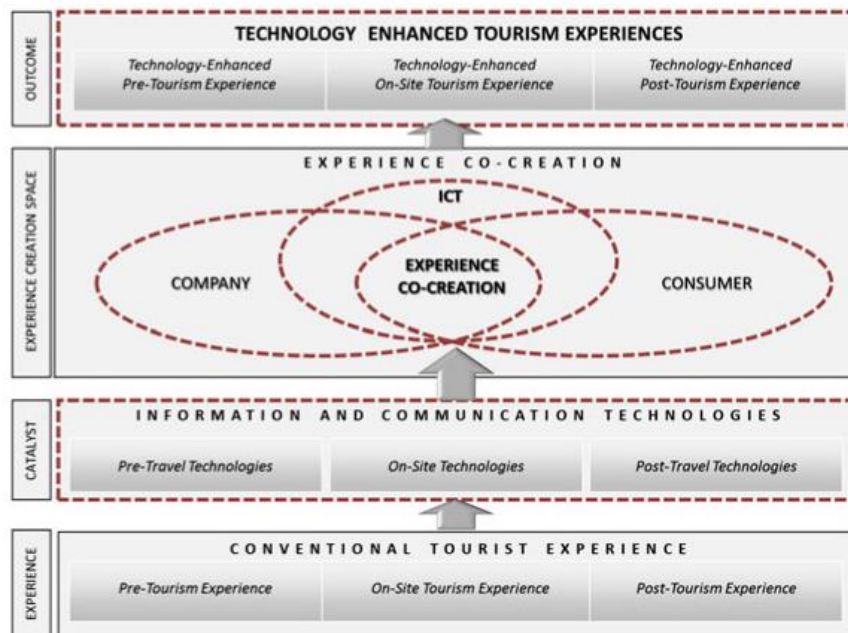**Figure 2.** Framework technology-enhanced tourism experiences (adopted from Neuhofer, Buhalis, & Ladkin, 2014, p. 343)

Thereby mobile technologies (Beer, Fuchs Höpken, Rasinger, & Werthner, 2007; Grün, Pröll, Retschitzegger, & Schwinger 2008, cited in Neuhofer, 2014), gamification (Xu, Weber, & Buhalis, 2014, cited in Neuhofer, 2014), and augmented and virtual reality apps (Linaza, Marimon, Carrasco, Alvarez, Montesa, Aguilar, & Diez, 2012; Yovcheva, Buhalis, & Gatzidis, 2013, cited in Neuhofer, 2014) are increasingly contributing to the enhancement of the experience of place within a destination (Tussyadiah, & Zach, 2011, cited in Neuhofer, 2014).

The following subsections will introduce and briefly discuss these ICT tools, how they affect tourist experience and satisfaction, as well as some benefits of the integration of these tools for DMMOs and tourists.

2.2.2.1 Mobile Technology & Smartphones

The evolvement of mobile phones into smartphones, that are now "fully functional computers" (Wang et al., 2014), has stimulated a complete alternation of how tourists experience travel (Neuhofer et al., 2013). Greztel and Jamal (2009, cited in Wang et al., 2014, p. 12) argue that the use and integration of mobile technologies within the context of travel potentially will serve as catalyst for bringing up a "new generation of modern tourists", entitled as the "creative tourist class". Indeed,

mobile technologies have fostered a shift in tourist behavior from "sit and search" to "roam and receive" (Pihlström, 2008, cited in Neuhofer et al., 2013), with the effect of tourists being increasingly flexible while on the move and activities being changed easily (Kramer, Modsching, Hagen, & Gretzel, 2007, cited in Wang et al., 2012). Smartphones, in combination with their various apps, are capable of assisting tourists in several ways on-the-go within a destination (Wang et al., 2012). These mobile technologies support tourists with "functional purposes", such as functioning as a destination guide, generating and exploring new opportunities for experience creation, planning, making reservations, and meeting their current needs (Dickinson, Ghali, Cherrett, Speed, Davies, & Norgate, 2014, cited in Tan, 2017), as well as with their desire to retrieve information and communicate with others while on the move (Jansson, 2007, cited in Wang, et al., 2014; Wang et al., 2012).

In addition to supporting the basic actions mentioned above, the use of smartphones also enables "micro moments" during travelling, such as detecting restaurants, looking up waiting times of public transport, but also "seeing places as they once were" (p. 372). These "micro moments" can be facilitated through location-based services that provide immediate access to information, images, videos, online recommendation platforms, etc. with relevance to the tourists' instantaneous position (Green, 2002, cited in Neuhofer et al., 2013). Neuhofer et al. (2013) and Tan (2017) further stated, that the tourists' on-site experience is no longer restricted by the physical boundaries of a destination and the engagement no longer stuck to the current physical environment of tourists, through the enabled connection to and interaction with the virtual environment. Searching for information on-site is affecting the view of tourists on a destination (Wang et al., 2014), as the connection of tourists to virtual channels are adding a "virtual layer" to their physically undertaken activities within a destination (Neuhofer et al., 2013, p. 44). For DMMOs, this illustrates the possibility to enhance the physical on-site experience by recognizing tourists' immediate wants through co-creating and providing information instantaneously and at the right place, tailored to the tourists' needs, as well as by using the virtual space for gathering user-related information and, in turn, use the generated data for improving the physical tourist experience (Neuhofer et al., 2013; also see Lamsfus et al., 2014).

Moreover, DMMOs can benefit from tourist-generated media, such as photos, videos, blogs and written statements of tourists' experiences that are shared on social media platforms, as it can function as an efficient and effective marketing tool (Mariani et al., 2016). This due to the passionate attitude of travellers towards sharing their experiences with others, facilitated by the constant connectivity to social media via smartphones (Neuhofer et al., 2013; Tussyadiah et al., 2009). The sharing of, for example, videos by tourists or organizations, as Tussyadiah and Fesenmaier (2009) stated, is mediating the tourist experience trough letting others virtually immerse in an experience, giving them mental enjoyment by allowing the access to other places and inspiring daydreaming. However, negative experiences shared by tourists in different forms with the virtual world also have the ability to damage a DMMOs reputation, wherefore effective management of social media is required (Mariani et al., 2016).

Nevertheless, trough DMMOs providing information to tourists on their websites by applying various multimedia features supports tourists on-the-go and, hence, is adding value to their experience within a destination (Tussyadiah et al., 2009). Even though the use of smartphones while touring through a destination, is argued by some to let tourists fall in the state of "absent presence" (Misra, Cheng, Genevie, & Yuan, 2014, cited in Tan, 2017, p. 615), negatively impacting encounters in the physical place, distancing individuals from travel companions even with physical proximity (Germann Molz, 2012, cited in Tan, 2017), and possibly raising the desire to disconnect (Dickinson, Hibbert, & Filimonau, 2016), it is also stated by many researches to have a positive effect on tourist satisfaction and on the overall enhancement of experiences (Neuhofer et al., 2014; Neuhofer et al., 2014; Tussyadiah, 2013), through enabling constant and immediate access to and retrieval of current and personalized information, empowering to co-create experiences (Neuhofer et al., 2013; Neuhofer et al., 2014), and fulfilling the need to share, connect, communicate and interact with the virtual environment.

2.2.2.2 Gamification

Gamification, also referred to as "game based learning", "pervasive games" (Bogost, 2007; Kapp, 2012, cited in Xu, Buhalis, & Weber, 2017), and "serious games" (Xu et al., 2017) or "alternative reality games" (McGonigal, 2011, cited in Xu et al., 2017), is

an approach that is still in its developmental phase, wherefore no unified definition is existing to date.

However, it can be described as the application of "lessons from the gaming domain to change behaviours in the non-gaming situations" (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015, p. 412), "game design principles in non-gaming contexts" (ibid., p. 411), or "game mechanisms outside its original domain" (Deterding, Dixon, Khaled, & Nacke, 2011, cited in Xu et al., 2017, p. 244). The World Travel Market (2011, cited in Xu et al., 2017, & Egger et al., 2015) predicts in their Global Trend Report, that gamification is becoming a widespread trend within the tourism industry in the near future. Due to a broad span of applications and supporting tools (Xu et al., 2017), technology provides a constructive environment to apply gamification (Burke, 2014, cited in Bulencea, & Egger, 2015). This possess a noteworthy potential for tourism organizations (Xu et al., 2017), such as the gathering of information about tourists, the identification of their interests, processes of thought and interests (Xu, Tian, Buhalis, Weber, & Zhang, 2015, cited in Xu et al., 2017), the controlling (Robson et al., 2015), altering (Robson et al., 2015) and influencing of their behaviour and behavioural patterns, and the engaging of tourists in the co-creation of experiences (Xu et al., 2015, cited in Xu et al., 2017).

With the application of gamification, it is aimed to boost enjoyment, entertainment, motivation, and engagement within a non-gaming context (Seaburn, & Fels, 2015, cited in Bulencea et al., 2015; Robson et al., 2015; Xu et al., 2017), and to encourage loyalty and brand awareness (Robson et al., 2015; Xu et al., 2017). Gamification is focusing on motivating tourists to undertake activities (Deterding, Dixon, Khaled, & Nacke, 2011, cited in Xu et al., 2017), transforming the behaviour of its "players", fostering the engagement with their physical environment and other players to achieve evocative interactions (Xu et al., 2017). Thereby gamification affects tourists from a social and emotional perspective, as well as through creating experiences that are highly immersive (Xu, 2011, cited in ibid). Deterding, Dixon, Khaled, and Nacke (2011, p. 10, cited in Xu et al., 2017, p. 245) stated that "gamification involves applying elements of gamefulness, gameful interaction, and gameful design with a specific intention in mind". Xu et al. (2017) and Bulencea et al., (2015) highlighted examples of how to integrate gamification into the destination experience. For

instance, designing gamified tour guides (Bulencea et al., 2015), creating "treasure hunts" (Xu et al., 2017) or "scavenger hunts" (Bulencea et al., 2015) that support tourists in discovering several places and, in addition, gather points (through the gamified app) and pictures, as well as memories and experiences (Xu et al., 2017). Robson et al. (2015) suggest, that a properly featured gamification experience should consist of a combination of intensifications, being extrinsic (physical rewards, i.e. money) and intrinsic rewards (non-physical rewards, i.e. fun), and elicit satisfying outcomes for players. However, McGonigal (2011a, cited in Bulencea et al., 2015) argues that the individual feelings – such as satisfaction, social connection, and pride –, as well as the intrinsic needs – being competence, autonomy and relatedness – (Bulencea et al., 2015) alone, possess the power to completely replace extrinsic rewards (McGonigal, 2011a, cited in ibid.).

2.2.2.3   Virtual & Augmented Reality

The integration and use of virtual- and augmented reality is becoming increasingly popular for tourism purposes. For reasons of tourism being an industry that is highly dependent on exploiting a tourists' instantaneous surrounding (Olsson, & Väänänen-Vainio-Mattila, 2011, cited in Jung, & Han, 2014), augmented reality possesses great potential to enhance a such (Fritz, Susperregui, & Linaza, 2005, cited in ibid.). Augmented Reality (AR) can be described as a visualization technique (Kounavis, Kasimati, & Zamani, 2012) which enhances and transforms the actual environment (Jung et al., 2014), as well as the users' perception of the real world (Osterlund, & Lawrence, 2012, cited in Kounavis et al., 2012) through projecting computer generated content on top of it (Burdea, & Coiffet, 2003, Vince, 2004, cited in Guttentag, 2010). Thereby, computer generated content refers to multimedia tools, like videos, images, texts, graphical illustrations, GPS data, etc. The application of AR is enabled and facilitated through the use of smartphones, wearable computing devices, such as the *Google Glass* (Tussyadiah, 2014; Wrenn, 2012, cited in Jung et al., 2014), and other computing devices that feature a camera (Kounavis et al., 2012).

Virtual Reality (VR), in contrast, offers the possibility of full immersion into a realistically represented, artificial, computer generated, virtual environment, stimulating the users' senses (e.g. seeing, hearing, touching). Thereby users' possess

the ability to navigate themselves through this environment in real time, giving them the opportunity to decide themselves what to explore when. In some cases, the virtual environment also allows for interaction with different objects in it, meaning selecting and moving them around (Guttentag, 2010; Virtual Reality, n.d.; Slater, & Usoh, 1993, cited in Tussyadiah, Wang, & Jia, 2017).

Although there exists great dispersion among some researchers concerning the degree of relatedness of AR and VR – *"AR is not VR in its strictest sense"* (Burdea, & Coiffet, 2003, p. 1, cited in Guttentag, 2010, p. 638; Guttentag, 2010), *"AR is a type of VR system"* (Vince, 2004, cited in ibid.), *"AR and VR are related and it is quite valid to consider the two concepts together"* (Milgram, Takemura, Utsumi, & Kishino, 1994, p. 283, cited in ibid.) – this thesis accepts the viewpoint of Milgram et al. (1994, cited in Guttentag, 2010), being AR and VR are related concepts.

The availability of these ICT tools have increased the tangibility and transparency of tourism products, in terms of enabling tourists to connect and interact with a respective destination before the actual commencement of the trip (Jung et al., 2014). On-site, mobile AR implementations and applications foster interaction with the immediate surrounding, facilitated through the provision of location-based information (via GPS navigation) on, for instance, particular points of interest (POIs), retrieved from various Internet sources (Lu, & Smith, 2008, Höllerer, & Feiner, 2004, Yovcheva, Buhalis, & Gatzidis, 2012, cited in Jung et al., 2014). Thus, the transferred information is highly individualized and catered to a tourist's specific and immediate needs (Kounavis et al., 2012). As mobile AR applications and devices have the trait of being portable, they can be deployed as highly personalized tourist guides (Olsson, & Väänänen-Vainio-Mattila, 2011, cited in Jung et al., 2014; Kounavis et al., 2012). The are several benefits for tourists arising out of the utilization of such a service including, for instance, the delivery of and access to tailored information on demand, minimization of irrelevant information and an excess of information, and the improvement of knowledge concerning various offers, attractions and POIs within a destination (Fritz, Susperregui, & Linaza, 2005, cited in Kounavis et al., 2012; Kounavis et al., 2012). Moreover, the integration of AR into the tourist experience illustrates a noteworthy entertainment factor for tourists', positively influencing and increasing the educational effect at the same time (ibid.; Horn, 2006, cited in Jung et

al., 2014). A possible facilitator of combining entertainment and education at the same time in a stimulating and engaging way, constitutes AR gaming, which can be implemented, for instance, in form of a time travel effect (Herbst, Braun, McCall, & Broll, 2008, Fritz, Susperregui, & Linaza, 2005, cited in Jung et al., 2014). Through the use of wearable computing devices, like the previously mentioned *Google Glass*, the AR experience is expected to become increasingly instantaneous and subtle, as well as less obstructive, due to the nearly hands-free usage possibility (Tussyadiah, 2014).

Positive effects on entertaining and educating tourists are also attributed to VR, for instance, when implemented in theme parks, museums, or at cultural heritage sites (Guttentag, 2010). For reasons of VR being enormously immersive in nature, it is argued to have the potential of acting as a substitute for tourism products, for instance, substituting a real trip (Cheong, 2995, cited in Tussyadiah et al., 2017). This due to its ability to provide users or, in this case, tourists with an authentic replication of the environment it represents (Slater, & Usoh, 1993, cited in Tussyadiah et al., 2017). However, the application of VR systems in tourism should not be regarded as a substitute for tourism products, such as the actual visitation, but more like an opportunity to allow tourists to gain realistic and authentic impressions and expectations of a destination (Guttentag, 2010). Therefore, VR is also considered as an effective marketing tool (Huang, Backman, Backman, & Chang, 2016, Williams, & Hobson, 1995, Williams, 2006 cited in Tussyadiah et al., 2017; Guttentag, 2010), as it possesses the possibility for DMMOs to present their tourism destination in a highly persuasive way to a much broader audience, through offering potential visitors a perception of physically being in the presented environment, or a "try before you buy" experience (Slater, & Usoh, 1993, Steurer, 1992, cited in Tussiadiah et al., 2017; Tussiadiah et al., 2017, p. 2).

Also AR possesses great potential for marketing purposes, as it intensifies the value perceived and fosters customer engagement with a brand or a destination (Sung, & Cho, 2012, cited in Jung et al., 2014). AR is also seen as a powerful tool for creating highly memorable experiences. It creates the possibility for tourists to individualize and tailor their visitation to their personal desires, needs and expectations (Sparacino, 2002, cited in Kounavis et al., 2012). This happens through allowing them to discover a destination in a highly interactive and dynamic way by overlaying their

reality with multimedia data. Even though it is argued, that the simulated VR environment hinders tourists to develop a real connection with their immediate surroundings, in contrast to AR (Kounavis et al., 2012), it is, nevertheless, a new and exciting way of enhancing the sensation of embodiment (Wirth, et al., 2007, cited in Tussyadiah et al., 2017).

After explaining and discussing the most important theories and concepts in the framework of technology development and the tourist experiences, the next chapter will introduce the method and cities to analyse the technological trends applied to enhance visitors' experiences.

3   Case Study: Vienna

3.1   General Information

Vienna is the capital city of Austria, with a current population of about 1.8 million (4,260 people/km²). With about 415km², it is the smallest of Austria's nine provinces, that is subdivided into 23 districts. Vienna is known as one of the safest cities on the globe with a very well-developed infrastructure (VTB,2009).

More than half of Vienna's total area account for green spaces, which makes it to the city with the highest proportion of a such in whole Europe. There are several woods, recreation areas, gardens and about 850 parks, whereof 280 are imperial. Moreover, it is the only city in whole Europe that holds a national park, the Donau-Auen. Vienna also possesses a great amount of water spaces, including 4 rivers, 29 wetlands, 29 wood streams, and 40 lakes and ponds. Also the second largest river of Europe, the Danube, is flowing directly through Vienna. Each day, 400,000m³ of spring water are supplied to the city via two mountain spring pipelines from four mountain areas of the Austrian provinces Styria and Lower Austria. It takes about 36 hours till the water reaches Vienna and can be enjoyed from the tap (VTB, 2009).

The Vienna International Airport is located in the east of Vienna in Schwechat (Lower Austria), approximately 16km away from the city. From the Airport, the city center can be reached quickly through public transport: City Airport Train (CAT) to Wien-Mitte in 16 minutes, Railjet to Wien Meidling in 26 minutes, Express train S7 to Wien

Floridsdorf in 37 minutes, Bus connections of the Vienna Airport Line to Wien Westbahnhof in 45 minutes, to Wien Donauzentrum in 42 minutes, and to Wien Schwedenplatz in 22 minutes. Vienna has four train stations: Wien Meidling, Wien Westbahnhof, Wien-Mitte, and the main station Wien Hauptbahnhof, where all of the Austrian Federal Railways' (ÖBB) long-distance trains are stopping. The public transport network of Vienna has a total of 1,150km and consists of five subway lines, 29 tram lines and 127 bus lines, that are operated by the Vienna Transport Authority (Wiener Linien) nearly 20 hours a day (VTB, 2009).

The architecture of Viennese buildings ranges from Gothic and Baroque, over Art Nouveau to Modern Art (VTB, 2009). In 1996, the Palace and Gardens of Schönbrunn was affiliated into the list of cultural heritage of UNESCO, followed by the historic center of Vienna in 2001 (Austrian Commission for UNESCO, 2014). Since 2013, Vienna holds an additional emblem. The DC-Tower is the highest building of Austria, with 60 floors and a total height of 250 meters, providing location to offices, lofts, public spaces, and a hotel (DC Towers, 2010). Vienna is globally known for its coffeehouse culture, which is also part of the intangible cultural heritage of UNESCO since the year 2011. Furthermore, Vienna is also known for its wines, that grow on a total of 700 hectares of vineyards. The Wiener Gemischter Satz is Vienna's white wine specialty, that goes well along with Vienna's most famous main dish, the Viennese Escalope (VTB, 2009).

In 2017, Vienna was awarded as the "World's Most Liveable City" for the eight year successive by the international consultants Mercer, resulting from their conducted "Quality of Living Survey". Thereby, a quality of life survey is conducted each year in 231 cities, assessing the destinations on the basis of various factors, such as the social, economic and political environment, education, infrastructure, leisure facilities and environmental attributes (VTB, 2009). In the same year, Vienna was ranked first among 87 cities on the international "Smart City Strategy Index" presented by the consulting company Roland Berger, followed by Chicago and Singapore (Smart City Wien, 2017).

3.2 Tourism in Vienna

In 2016, Vienna achieved 6.9 million arrivals (+ 4.5 %), 15 million bednights (+ 4.4 %) (MA 23 – Dezernat Statistik Wien, 2017), and gained a total of € 738.5 million in room revenues (+ 0.2 %) (MA 6, & MA 23 – Dezernat Statistik Wien, 2017).

Vienna provides its inhabitants and tourist history and culture and modern spirit at the same time. There are more than 100 museums, such as the Roman Museum at the Hoher Markt, the Natural History Museum and the opposite Art History Museum, as well as numerous different exhibitions. The most popular emblem of Vienna is the St. Stephan's Cathedral, followed by the Giant Ferries Wheel, the Danube Tower and the Palace Schönbrunn. Along the Vienna Ringstrasse, many more well-known sights can be found, inter alia, the Imperial Palace, the Parliament, and the Vienna State Opera. In addition, Vienna offers several shopping streets and malls, like the Kärntner Strasse, the Mariahilfer Strasse and the Danube Center, as well as a broad variety of culinary highlights (VTB, 2009).

Vienna is a successful destination in the meeting, congress, and events industry. Each year, Vienna hosts festivals, such as the Vienna Danube Island Festival, and big events like the Vienna Life Ball that attracts people from all over the world. From 2005 to 2012, it was ranked the first place on the list of precedence of the International Congress and Convention Association (ICCA) (VTB, 2009). In 2015, Vienna achieved 3,600 congresses and corporate events, accounting for 12% of the total volume with about 1.7 million overnight stays. In this year, it was awarded the fourth place in the International Congress and Convention Association (ICCA) ranking, behind Berlin, Paris and Barcelona, due to the number of meetings held in the city, totaling 178 (VTB, 2015; ICCA, 2015).

For its "open strategy" approach, concerning the Vienna Tourism Strategy 2020, the Vienna Tourist Board attained the first place of the "Innovative Destination Award", awarded by the International Federation for IT and Travel & Tourism (IFITT) in 2015. Moreover, in 2015, the destination of Vienna received the first place of the "Most Admired Knowledge City Award", presented by the World Capital Institute, and was ranked third on the "Innovation Cities Index" by the 2thinknow Innovation Cities among 500 cities on a global scale (VTB, 2015; 2thinknow, 2015).

4   Methodology

In order to answer the former proposed research questions, a benchmarking analysis is conducted. This method is perceived to be the most appropriate to use for this purpose, as it allows to assess the performance of Vienna regarding the offered technological trends compared to three other popular tourist destinations. Moreover, the findings of the benchmarking analysis will depict how Vienna is currently implementing technological trends for enhancing the tourist experience on-site. The information used for the benchmarking analysis is retrieved solely from secondary data sources, mainly from relevant material published on the Internet, such as the DMMO websites.

4.1   Benchmarking Analysis

A benchmarking analysis is a popular performance and quality assessment tool within the tourism industry, as it allows to assess the own performance compared to other organizations operating in the same field – that are mostly direct competitors –, through the use of certain indicators, and subsequently to take on the right actions for enduring improvement (Fong, Cheng, & Ho, 1995, Ferisak, 1998, Woher, 2002, cited in Zlatković, 2016; Benchmarking, n.d.; Meares, Owen, & Murray, 2012). It is an ongoing process of learning and gaining information, in order to achieve the highest quality possible. A benchmarking analysis can be internal or external and is classifiable into the following categories: internal, functional, generic, and competitive (Zlatković, 2016). As this thesis is, inter alia, aimed to explore how Vienna is performing compared to three other destinations regarding their technological trends in tourist experience design, a competitive (external) benchmarking analysis is employed. With regards to the subject matter and the interest of this paper, a competitive benchmarking analysis is concerned with the comparison of certain activities of one organization or destination to those of its direct competitors (Zlatković, 2016). The goal is the obtaining of essential information on the current state of operations of the destinations to be benchmarked in the respective field. This for the purpose of assessing the momentary performance of Vienna and providing recommendations for improvement.

4.1.1 Sample

The sample pool for the conduction of the benchmarking analysis consists of four European destinations: Amsterdam, Barcelona, Berlin, and Vienna. The later has been presented already, as it is the focus of the entire thesis. Before briefly introducing the three remaining cities, a table (Table 2) is presented, for better visualizing how the four cities have performed in different studies from 2015 to 2017 compared to one another.

Title of Study & Provider	Total No. of Cities	AMSTERDAM Ranks			BARCELONA Ranks			BERLIN Ranks			VIENNA Ranks		
		2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
European Cities of the Future fDi Intelligence	Top 25	9	7		7	-		8	20		12	-	
European Digital City Index European Digital Forum	60	n.ac.	3	n.pb	n.ac.	9	n.pb.	n.ac.	6	n.pb.	n.ac.	10	n.pb.
Global Power City Index MMF (1)	Top 10	9	8	n.pb.	-	-	n.pb.	8	9	n.pb.	10	10	n.pb.
Worldwide ICCA City Rankings ICCA (2)	385	12	n.pb.	n.pb.	3	n.pb.	n.pb.	1	n.pb.	n.pb.	4	n.pb.	n.pb.
Innovation Cities Index 2thinknow (WW)	500	7	12		27	13		14	17		3	10	
Quality of Living Survey Mercer (WW)	231	n.ac.	n.ac.	11	n.ac.	n.ac.	n.ac.	n.ac.	n.ac.	n.ac.	1	1	1
Smart City Strategy Index Roland Berger (WW)	87	n.pf.	n.pf.	n.av.	n.pf.	n.pf.	n.av.	n.pf.	n.pf.	n.av.	n.pf.	n.pf.	1
Sustainable Cities Index ARCADIS (WW)	50 (2015) 100 (2016)	4	11	n.pb.	n.i.	24	n.pb.	6	17	n.pb.	n.i.	4	n.pb.

(1) Institute for Urban Strategies of the Mori Memorial Foundation *n.ac. - not accessible *n.pf. - not performed
(2) International Congress and Convention Association *n.av. - not available *n.pb. - not published
*n.i. - not included *(WW) - Worldwide

Note: Please find detailed information on the sources in the bibliography.

Table 2. Rankings of selected studies of the sample cities from 2015 to 2017

4.1.1.1 Amsterdam

Amsterdam is the capital city of the Netherlands and at the same time the largest city of the country. The city of Amsterdam has a population of about 814 thousand that are living on approximately 220km² (4,908 people/km²) (I amsterdam, 2017; World Population Review, 2017). In the year 2015, Amsterdam scored around10 million international overnight stays (I amsterdam, 2017).

4.1.1.2 Barcelona

Unlike all other cities included in this paper's benchmarking analysis, Barcelona is not a capital city, in this case of Spain, but the capital of the region of Catalonia. The city of Barcelona has 102km², providing home to about 1.7 million people. With approximately 16,000 people/km², Barcelona has one of the highest population densities of whole Europe. In 2015, Barcelona achieved almost 9 million arrivals and about 19.6 million overnight stays (Barcelona City Council, Barcelona Regional Council, & Consortium Turisme de Barcelona, 2015; World Population Review, 2017).

4.1.1.3 Berlin

With its 892km², Berlin is the biggest city of Germany and also its capital. The city of Berlin has approximately 3.6 million inhabitants. Among all four destinations presented here, Berlin has the lowest population density with 3,809 people/km². When compared to all cities of the European Union, Berlin ranks second concerning its population and fifth regarding its surface (Berlin Tourismus & Kongress GmbH, n.d.; World Population Review, 2017). In 2015, Berlin recorded about 12.4 million arrivals (+ 4.2%) and 30.3 million bed nights (+5.4%) (Amt für Statistik Berlin-Brandenburg, n.d.).

After the basic profiling of the three studies and case study used in the thesis, the next chapter (results) will demonstrate the benchmarking analysis based on the technological trends integrated by the cities.

5 Results

5.1 Benchmarking Analysis concerning the technologically enhanced tourist experience

5.1.1 DMMO Website Performance

In today's time, a strong online presence and performance is of an utmost importance for tourism destinations worldwide. In order to stay competitive and market destinations effectively, the proper and efficient utilization of multiple ICT is inevitable. Therefore, the first benchmark used to compare the four destinations concerning their technological trends in tourists experience design is their DMMO website performance. First, the DMMOs are identified and introduced briefly. Afterwards, their websites are assessed in objective way according to the following main criteria: information and system quality, design, navigation, multimedia tools, and additional features. Due to the importance of social media for tourism purposes, it is also aimed to investigate the presence of the respective DMMOs on social media platforms. For a visual impression and imaginary illustration of the examined DMMO websites, please see Appendix 1 for supportive screenshots of the respective websites.

5.1.1.1 Amsterdam

I amsterdam is the official DMO (in this case, referring to Destination Marketing Organization) of Amsterdam that was launched in 2013. The name is simultaneously also their slogan. The homepage of their website *iamsterdam.com* gives users the option to first choose between the main websites: *I am visiting*, *I am local*, and *I am business*. In addition, three other websites are featured that are directly accessible from the main websites and presented in a corporate design: *Expatcenter* – for assistance with official matters –, *Travel Trade* – database for information, news and promotional material, and *Press* – press portal (I amsterdam, 2017). In this section, the *I am visiting* website will be examined.

The content of the website can be retrieved in six languages and is accessible with all electronic devices. The information provided is very useful, clearly presented to

visitors and easy to understand. The website as a good system quality, referring to the reliability and its short response time, although there are a few Google ads displayed. The design relies heavily on images, that are presented in a very good quality and are always related to the respective content. Also very few videos are provided on their website. The chosen colors for background and text are mirroring the flag of Amsterdam (red, white and black). Even though the font is consistent, the size is rather small. It is easy to navigate the website and the structure is very user-friendly. All in all, the design with its imaginative pictures is simple and eye-catching but not distracting. In addition, the website features a blog, where stories of the life in Amsterdam are shared by locals. I amsterdam is visible on Facebook, Twitter, Instagram, LinkedIn and Pintrest, where, inter alia, pictures from visitors are shared (I amsterdam, 2017).

5.1.1.2 Barcelona

The *Consortium of Turisme de Barcelona*, short *Barcelona Turisme*, was created in 1993 and is the official Organization of Tourist Promotion of Barcelona. Their official website *barcelonaturisme.com* for visitors, called *Visit Barcelona*, features three other websites: *Tickets* – Turisme de Barcelona's online shop –, *Professionals* – intended for business related subjects –, and the *Barcelona Convention Bureau* (Barcelona Turisme, n.d.). Even if it makes the impression, that Barcelona Turisme has tried to present their four websites in a corporate design, they have not managed it well. Moreover, all websites open up in a different tab. However, it is just intended to scrutinize the main website in this section.

The website is available in four languages and compatible with all electronic devices. There is no information overload but the information provided is of relevance for tourists and presented in a well-arranged manner. However, when it comes to the system quality, some inconsistencies can be detected. The response time of some of the pictures is moderate, meaning they are not opening immediately. Moreover, when clicking on certain information buttons, the content is opened in a separate tab. Nevertheless, the website is perceived as user-friendly. The moderate response time of pictures could possibly lead to short distraction. However, the overall design is held simple and clear. The website is mainly colored in white, with some red and grey elements, and provides the user with wherefore the eye-catching effect is

moderate. The font is consistent, but sometimes the size is too small. The website is well structured and easy to navigate. The quality of the pictures presented varies between high and moderate. Moreover, it is not possible to "interrupt" photo slide shows to, pause, go back or forward. Besides pictures, also some videos are offered on the starting page. When clicking on a specific button, users are enabled to share certain pre-arranged information on Facebook, Twitter, Pintrest and Google+. Besides the just mentioned, Visit Barcelona also operates an Instagram account and a YouTube channel.

5.1.1.3 Berlin

visitBerlin is the official brandname of the *Berlin Tourismus & Kongress GmbH*, the official DMO (Destination Marketing Organization) of Berlin, that was formed in 1993. Even if not really visible, it sues its brand with the slogan *We know Berlin*. Their official website *visitberlin.de* for "Tourism" is featuring three additional websites that are all intended for business purposes: *Partner*, *Convention*, and *Traveltrade* (Berlin Tourismus & Kongress GmbH, n.d.). A corporate design of the four websites is not missing entirely, however it is rather an attempt than a success. Nevertheless, it is just aimed to assess the Berlin Tourismus & Kongress GmbH's main website.

The website is available in 14 languages and accessible from all different electronic devices. Due to the vast quantity of information provided on several touristic subjects, visitors can find, or more appropriately, search for everything they need. Thereby it is referred to the information overload existing on the website and the very unclear presentation of it. This also strongly impacts the structure in a negative way, making the whole website rather un-user-friendly. However, it is easy to navigate the website. The response time varies from fast to medium and there are a lot of advertisements displayed. This heavily affects the design, as it the website looks more like an entire advertisement than like an official website. The space left for design appears massively confusing and distracting, even though the colors are held in white, light grey, red and blue. It is also given the option change the contrast of the entire website, turning white and light grey to black, and blue into yellow. Moreover, users are enabled to adapt the font size, however just to smaller sizes. The biggest font available is the one proposed by visitBerlin, which is sometimes

causing text overlaps. Even though the font is consistent, too many formatting styles are used (italic, bold, normal). The images presented are rather small, vary from moderate to low quality, and appear obsolete. There are no additional features offered that could be detected. visitBerlin is active of Facebook, Instagram, Twitter and Google+ and also operates a YouTube channel.

5.1.1.4 Vienna

The *Vienna Tourist Board* (VTB) is the authorized Destination Marketing Agency of the city of Vienna, existing since 1955. It sues with the slogan *Vienna – Now. Forever*. Their official website *wien.info* for visitors, features four additional databases and websites, obviously developed and intended for different purposes and different customer segments: *Vienna's B2B service for the tourism industry* – for business and related purposes –, the *Vienna Experts Club* – an initiative of the VTB, intended for all tourism contributors, that requires registration –, the *Vienna Convention Bureau*, and *Vienna Pictures* – photo database for PR purposes. All websites are directly accessible from the main website and presented in a well-structured corporate design (VTB, 2009).

The main website, that is intended for visitors, is available in 13 languages, whose content can be retrieved from all electronic devices without difficulty. Moreover, certain content is made accessible for people with hearing impairments, through the provision of videos. The sign language videos are available in German (Austrian and German sign language videos), English (American and British sign language videos), and French. On the VTB's website, tourists are enabled to gather all kind of relevant information necessary for their trip in a clearly represented, and well understandable manner. The system quality is reliable, the response time of the website is short, and there is no kind of advertisement displayed. The design is simple and eye-catching but not distracting, referring to the website's colors that are held in white and red, which reflects the Austrian flag. The font is consistent and legible. In addition, the website is well structured, user-friendly and easy to navigate. The website relies heavily on pictures that are meaningful, meaning they are related to the content and the message the VTB wants to transmit to their users, and are presented in an excellent quality. Moreover, the website features, a weather notification, an interactive city map and a webcam, that broadcasts up-to-date

panorama views of certain POIs and also gives the option to review past panorama views, onwards from December 2015. Furthermore, the possibility to create a personal travel plan, called *myVienna*, is given to tourists directly on the website. Thereby users can create their individual must-see list by assembling tips, events and POIs, through clicking on a certain button. In addition, users are given the possibility to share their travel plan on Facebook and Google+.

The VTB operates various social media channels, such as four Facebook pages, accounts on Instagram, Twitter, Flickr, and Google+, a YouTube channel, but also target market specific social media platforms, like *Weibo* for Chinese tourists – the biggest Chinese micro-blogging service. Via these social media channels, the VTB makes great effort to integrate and engage their fans and followers through various competitions (VTB, 2009).

5.1.2 Apps

On-site, the employment of apps via smartphones for various purposes is becoming increasingly popular among tourists. Therefore, the second benchmark is concerned with the provision of apps the DMMOs of the respective destinations are offering and/or recommending to their visitors directly on their website, that has been previously examined in the DMMO website performance. For each city, it is aimed to identify the number of apps provided and recommended by their DMMO, their name, to which category they can be assigned to, as well as in which way they should benefit and assist tourists on their trip. If procurable on the DMMOs websites, it is also intended to indicate their compatibility with different devices, as well as the prices of the apps. This information is illustrated in form of a table, carried out for each destination, which can be found in Appendix 2. The main findings of each city will be briefly addressed below. It is not intended to assess the apps in any form.

5.1.2.1 Amsterdam

On the official website of I amsterdam, a total of 13 apps are recommended to visitors in a clearly represented manner. These can be categorized into four categories: *Air Transportation (2), Practical Information (1), Public Transportation (4), and Tour Guide and Travel Tips (6)*. Even though the number of apps

recommended can be considered as rather small, the selected apps cover all the necessary things important to know for visitors and that are relevant for their stay. However, the description of the promoted *I amsterdam City Guide* app is missing. Moreover, no apps with multimedia features are presented. Except for *Q! Amsterdam* and *Spotted by Locals*, all listed apps are free of charge. Only the *weCity Guide* app is solely compatible with Apple devices, but all others can be downloaded with both, Apple and Android devices.

5.1.2.2   Barcelona

Barcelona Tursime promotes twelve apps on their website that can be divided in the following categories: *Art (2), Audio Tour Guides (4), Gastronomy (1), Public Transport (1), Tour Guides (3), and for People with Special Needs (1)*. Half of the apps have a strong emphasis on art and architecture. However, all apps can be considered as relevant for visitors and offer all information necessary for a trip. Moreover, Barcelona Tursime recommends an app for people with special needs. All apps itemized are downloadable for free and, except for the *Barcelona Metro Walks* app, compatible with Apple and Android devices.

5.1.2.3   Berlin

The Berlin Tourismus & Kongress GmbH presents a total of 50 apps on their website in a rather confusing way. This great amount of apps can be divided in eight categories: *Games (2), Gastronomy (2), Multimedia and Audio Tour Guides (17), Practical Information (7), Tour Guides and Trip Planning (13), Social (2), Transport (7), and for People with Special Needs (2)*. Although the necessity and relevance of these apps for visitors cannot be contested, the presentation on the website, as well as the description of the apps is considered not user-friendly and not well-structured. However, visitBerlin, the official brandname of the Berlin Tourismus & Kongress GmbH, offers an own correspondent app. Moreover, two apps for people with special needs are itemized. For more than half of the listed apps, the price is not mentioned. The compatibility with devices varies, but half of the apps can be downloaded with Apple and Android devices.

5.1.2.4 Vienna

The VTB promotes a total of 35 apps on their website, which are presented in a very clear manner. They can be categorized in nine categories: *Attractions and Culture (5), Car Transport (2), Gastronomy (3), Multimedia and Audio Tour Guides (5), Parking (2), Practical Information (12), Public Transport (2), Social (1), and Tour Guides and Trip Planning (6)*. All apps can be considered as well selected, and relevant for visitors and their stay. The majority of apps is free of charge and compatible with Apple and Android.

5.1.3 Wi-Fi Hotspots

In recent years, the availability and provision of free Internet access in public spaces is getting increasingly demanded by tourists, as they like to stay socially connected wherever they are. For this reason, the third benchmark is concerned with the number of free Wi-Fi Hotspots provided in public spaces by each destination, as well as how these can be found online.

5.1.3.1 Amsterdam

There is no information provided on the website of I amsterdam concerning public Wi-Fi Hotspots, nor on the exact number. However, the website *wifi-amsterdam.nl* (n.d.) itemizes free public Wi-Fi Hotspots, totalling 91, and gives location-based information on them. Furthermore, a map is featured on this website. In addition, it is mentioned there, that at some of the Hotspots power plugs are available, but it is not evident at which exact locations. On the website of *TestInternetSpeed.org* (2016) it is stated, that the Swedish Tech-Startup *Instabridge* is currently working on the launch of a network that is aimed to install more than 300 Wi-Fi Hotspots in the city of Amsterdam, as well as in its surrounding areas. Nevertheless, it is still unclear when this project will be launched. Amsterdam's Airport Schiphol is providing free Wi-Fi for four hours without interruption (Schiphol Amsterdam Airport, 2017).

5.1.3.2 Barcelona

Barcelona offers its residents and tourists the largest number of free public Wi-Fi Hotspots in entire Spain and one of the most wide-ranging public network with free access in whole Europe. A total of 703 Wi-Fi Hotspots are spread all around

Barcelona, whereof some are marked with a blue "W sign" (Barcelona Turisme, n.d.). There is no information available on the exact location of the Hotspots, nor a map. However, it is assumed that the missing of this information does not illustrate an obstacle to find a connection, due to the massive amount of Wi-Fi Hotspots provided. Barcelona's Airport El Prat offers free access to the Internet. However, there is no information provided on the availability of power outlets for charging electronic devices. On a blog post on *kayak.co.uk* it is denoted, that there are around 1,000 power plugs available (Kayak, 2015).

5.1.3.3 Berlin

About 100 public Wi-Fi Hotspots are provided by the city of Berlin free of charge (Berlin Tourismus & Kongress GmbH, n.d.). Besides a listing of free Wi-Fi Hotspots of eight POIs and cafés, the website of visitBerlin provides also a link to an external website, called *hotspot-locations.de*, where 45 free Wi-Fi Hotspots can be found. Moreover, when clicking on the button "Wi-Fi for all", a map, operated by *publicwifi.de*, is opened, where all the Hotspots are mapped. However, this website is only available in German and does not allow much navigation. In addition, the information on the Hotspots is limited to the rough location of them. The link provided to the external website *digitale-chancen.de*, should give information on the location of Internetcafés in Berlin. Even if the option is given to access the website in an English version, it is not working. On visitBerlin's website, the App "Hotspotfinder" is mentioned, which is intended for enabling users to find currently available Hotspots and can be downloaded for free from the AppStore and the Google Play Store (Berlin Tourismus & Kongress GmbH, n.d.). On Berlin's two airports, Berlin Schönefeld and Berlin Tegel, free access to the Internet is offered for one hour (FBB, 2015). The availability of power plugs for charging electronic devices are not mentioned on any of the official websites. However, from reviews on the Berlin travel forum on *TripAdvisor.com* it can be drawn, that they are rather a scarcity and located at random places (TripAdvisor, 2013).

5.1.3.4 Vienna

Vienna offers its inhabitants and tourists more than 400 public Wi-Fi Hotspots, on several POIs, in hotels, cafés and bars, as well as in train and some subway stations.

40 of them can be found in the first district alone. In addition, free Wi-Fi is also provided throughout the Vienna International Airport in Schwechat (Lower Austria), where also USB plug-ins and power sockets are offered in lounges and the waiting areas at the gates (VTB, 2009; Vienna International Airport, 2017). Detailed information on seven free Wi-Fi Hotspots is provided directly on the website of the VTB. The location of all Wi-Fi Hotspots can be found on the interactive city map of *wien.gv.at*, as well as on *freewave.at*, where all Hotspots are clearly represented per district and detailed information is given on each of them. Direct links to these two external websites are provided on the website of the VTB (VTB, 2009).

5.1.4 Activities

The last benchmark is introduced for exploring the state of technological integration into experiences. For matters of objectivity and fairness, the activities selected for this purpose were retrieved from TripAdvisor.com (TripAdvisor, 2017). If not indicated differently, the listed activities for each destination illustrate the five most popular activities rated by TripAdvisor users. All kinds of tours are excluded in this study, for reasons of having little or no potential of being technologically improvable. In addition, all activities that illustrate not a single activity but involve an accumulation thereof – for instance, whole districts or others having a too broad scope –, are exempted as well. In this section it is aimed to discover if and what forms of technological offers the respective activities are possessing, as well as how they are rated by TripAdvisor users. For better illustrating the findings, tables are provided for each city in Appendix 3. The technological offers listed are recorded solely from TripAdvisor or the official website of the respective activity. However, the main findings are summarized below.

5.1.4.1 Amsterdam

According to TripAdvisor.com (TripAdvisor, 2017), Amsterdam offers a total of 501 top activities. Three activities are excluded (City Tours – ranked 5th, Private Tours – ranked 7th, and The Jordaan – ranked 6th), wherefore the top eight activities are shown in the table but only five are addressed. Except for the Vondelpark (ranked 4th), all activities possess technological offers, being multimedia tours (Rijksmuseum – ranked 1st), an interactive multimedia guide (Van Gogh Museum – ranked 3rd) and

an audio guide (Museum Ons'Lieve Heer Op Solder – ranked 8th). The Anne Frank House (ranked 2nd) offers an interactive 3D tour with audio material, accessible on the official website. As this technological feature is not offered directly at the physical location of this activity, it is not rated by TripAdvisor users. The remaining activities are predominantly ranked positive.

5.1.4.2 Barcelona

Drawn from TripAdvisor.com (TripAdvisor, 2017), Barcelona's top activities are totaling 697. In the table, the top eight activities are illustrated, as three exemptions have been made (Gothic Quarter – ranked 3rd, City Tours – ranked 5th, and Sightseeing Tours – ranked 6th). However, just two of the activities integrate technology in the experience. The Basilica Sagrada Familia (ranked 1st) is offering its visitors an audio guide, as well as a VR visit of six different locations, that is available on the official website. The Casa Battlo (ranked 2nd) provides visitors with a free audio guide, as well as with a free VR and AR guide. The majority of ratings concerning these two activities are positive. The remaining activities have not implemented any technological offers (Palau de la Musica Orfeo Catala – ranked 4th, Camp Nou – ranked 7th, St. Joseph La Boqueria – ranked 8th).

5.1.4.3 Berlin

TripAdvisor users have ranked a total of 806 top activities that can be undertaken in Berlin (TripAdvisor, 2017). Thereof, the table lists the top seven, for reasons of two activities have been excluded (City Tours – ranked 1st, and Private Tours – ranked 5th). The Reichstag Building (ranked 2nd) integrates technology in form of a free audio guide, but also offers free audio guides for children and people with special needs. The first mentioned audio guide is rated very positively by TripAdvisor users. The Memorial of the Berlin Wall (ranked 4th) provides users with a free app and the Holocaust Memorial's underground museum offers its visitors an audio guide, as well as a free video and audio guide for people with special needs. However, these technological offers of those two activities are not rated on TripAdvisor. The Brandenburger Tor (ranked 3rd) and the Berlin Philharmonics (ranked 6th) possess no technological enhancements.

5.1.4.4 Vienna

For Vienna, the TripAdvisor community ranked a total of 561 top activities. The table includes the top six activities, as the first rank, the Historic Center of Vienna, has been excluded. The Schönbrunn Palace (ranked 2nd) and the Imperial Palace (ranked 5th) are providing its visitors with free audio guides and tour descriptions. The later can also be downloaded from the respective websites. The Kunsthistorisches Museum is offering an audio guide, as well as a audio guide for children, and a KHM stories app. TripAdvisor users have rated the technological offers of these activities mainly positive. Schönbrunn Gardens (ranked 4th) is not offering any technological enhancements, except for a common plan and a running map, downloadable from the official website. The Tiergarten Schönbrunn (ranked 6th) solely provides its visitors with interactive info boards and displays within the zoo. Both activities are not rated by TripAdvisor users.

6 Conclusion

6.1 Answers to Research Questions and Recommendations

The central aim of this thesis was to uncover how Vienna is currently implementing technological trends for enhancing the tourists experience on-site. For this purpose, a benchmarking analysis was employed, whereby the technological offers of three other popular European tourism destinations were examined as well. This examination enabled to gain knowledge about how Vienna is competing with other European tourism destinations with regards to technological trends in tourists experience design, which illustrates the second research question of this dissertation. Both research aims are closely connected. More precisely, the findings of the second research constitute the basis for responding to the first and central research question. For this reason, it is perceived to be necessary to first present the findings corresponding to the second research aim and, subsequently, to address the resulting findings of the central aim in line with possible recommendations for further improvement.

First, the parameters for inspecting and comparing the four destinations were established, which are: the performance of the DMMO website, the apps

recommended by the respective DMMOs on the conforming websites, the number of free Wi-Fi hotspots provided, and the technological implementations within the top activities ranked by TripAdvisor users.

Except for some minor points of criticism – a too small font size (I amsterdam and Barcelona Turisme), not being able to interrupt image slide shows, a moderate quality of some of the presented images, and some inconsistencies concerning the system quality (Barcelona Turisme) – the DMMO website performance of I amsterdam, Barcelona Turisme, and the VTB is perceived to be fairly equal. Even though all three websites differ in terms of their appearance and their offered features – I amsterdam: blogs from locals; Barcelona Turisme: sharing of pre-arranged information on social media channels, VTB: creation of a personal travel plan –, they all are user-friendly and provide a good quality of information and structure. However, when it comes to the offered language options, the VTB is outperforming I amsterdam and Barcelona Turisme, as the VTB provides its content not only in 13 languages, but also offers videos in sign language. Although the Berlin Tourismus & Kongress GmbH has made the information available in 14 languages, the website exhibits several striking failures. Consequently, it is not assessed as user-friendly and adjudged to have the worst web presence of the four DMMOs.

In addition, the apps recommended and presented by the Berlin Tourismus & Kongress GmbH on their website represent a very unstructured information overload. Even though the number of apps recommended, totaling 50, is exceeding the number of apps listed by the other DMMOs, the relevance is questioned, as it makes the impression that the apps are not thoughtfully selected. The number of apps recommended by the VTB is just minimally smaller (38 apps). However, in contrast to the apps of the Berlin Tourismus & Kongress GmbH, they seem very well selected and are presented in a very good structure. Barcelona Tursime with twelve apps, and Amsterdam with 13 apps, are presenting the smallest number of apps to potential visitors. However, they cover all important information areas that are relevant to tourists and their trip. Nevertheless, the VTB is considered to offer a higher diversity of recommended apps, that is, in addition, presented in a very clear structure on the website.

On the official website of I amsterdam, no information on free public Wi-Fi Hotspots is indicated. On the website *wifi-amsterdam.nl* (n.d.), a total of 91 is designated, which illustrates the smallest number of free public Wi-Fi Hotspots of all sample cities. However, on *TestInternetSpeed.org* (2016) it is announced, that the Swedish Tech-Startup *Instabridge* is working on the launch of a network, including the instalment of more than 300 Wi-Fi Hotspots in the city of Amsterdam and its surrounding areas. Barcelona Turisme (n.d.) and the VTB (2009) are both adverting to the free public Wi-Fi Hotspots available in the city on their DMMO website, and also provide the highest number thereof – Barcelona Turisme 703, and the VTB more than 400. On the website of the Berlin Tourismus & Kongress GmbH (n.d.) it is denoted that there are about 100 free public Wi-Fi Hotspots located in Berlin. Moreover, on their website it is referred to other external websites and one app that should assist visitors in finding those Hotspots, however in a not well developed quality. Taking into account the size of the total area of Berlin, as well as the size of and the number of free public Wi-Fi Hotspots provided by the other three cities, the total of 100 Hotspots provided in Berlin is considered rather small and therefore insufficient.

Concerning the implementation of technology within the top five activities of each city, Amsterdam and Vienna are outperforming Barcelona and Berlin, as four out of five of the activity providers have employed technological features into the experience. Berlin's activity providers have incorporated technology in three, and Barcelona's in just two out of the five examined activities. However, when it comes to the diversity of technological implementations, Amsterdam is the clear leader. This due to the fact, that the other activities are mainly offering audio guides, whereas Amsterdam's activities are designing the tourist experience more with the provision of interactive multimedia guides. Even though Barcelona has currently implemented technology in just two of their five top activities, both possess VR and/or AR elements.

Second, when analysing the overall performance of Vienna its technological trends for enhancing the tourist experiences, various conclusions and recommendations can be made. As Jung and Han (2014) suggested, implementing and investing in innovative technologies is one of the strategies for obtaining a competitive

advantage. With their DMMO website, the VTB is performing great in comparison to its three competitors. No other DMMO of the sample cities provides, for instance, a webcam that broadcasts up-to-date panorama views of certain POIs, which could enhance the engagement of potential visitors with Vienna and, subsequently, persuade them to become actual visitors. Also in terms of the recommended apps by the VTB, Vienna is considered to possess an advantage over its sample competitors. This due to the great variety and visualization of those.

However, in consideration of the size of the different destinations, Barcelona, the smallest sample city with 102km², is outperforming Vienna in terms of the amount of free public Wi-Fi Hotspots provided, with a total of 703. In addition, the launch of the network by *Instabridge* in Amsterdam, including 300 Wi-Fi Hotspots, is in progress. Due to this fact, Amsterdam could possibly outperform Vienna in the near future concerning this aspect. Nevertheless, the amount of free public Wi-Fi hotspots currently provided in Vienna can be considered as very high. Moreover this lower amount is not perceived to affect the attractiveness of Vienna as a demanded tourism destination in any form.

Thus, when it comes to the technological implementations within activities, the VTB could encourage more of its stakeholders to implement technology within the tourist experience design, as well as to offer more and a greater variety of multimedia tools and features. This is perceived to be of an utmost importance, as the integration of technology within experiences, as well as the need to constantly experience something new, is getting increasingly demanded by tourists.

6.2   Future Research and Limitations

Future research should address the need to differentiate between or to better define the terms destination marketing organization and destination management organization, for preventing or completely eliminating confusion.

Concerning the results of this thesis, there are some limitations that are considered necessary to investigate here. The first limitation refers to the sample size of the benchmarking analysis, that solely consists of three other European cities, whose employed technological offers were opposed to the ones of Vienna. Moreover, the

geographical location of all of the selected sample cities is concentrated in Europe. In addition, the sample cities, the number of samples, as well as the variables, on the basis of which the cities were compared to each another, and the number of variables were selected randomly. Moreover, it is important to note, that the activities examined solely represent the five best ranked activities by TripAdvisor users. For these reasons, the results should not be generalized. Nevertheless, this study is giving some valuable and interesting insights on the current state of the technological progress and implementations in four popular, European tourism destinations.

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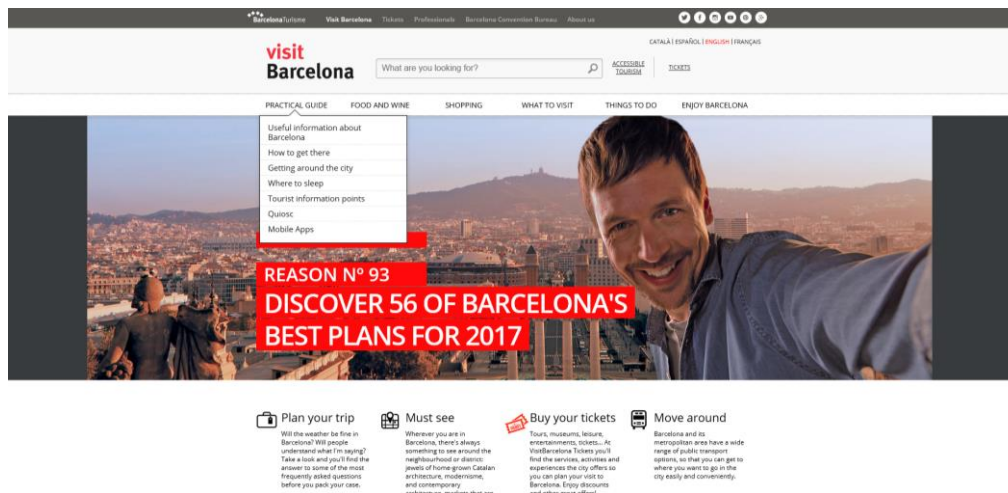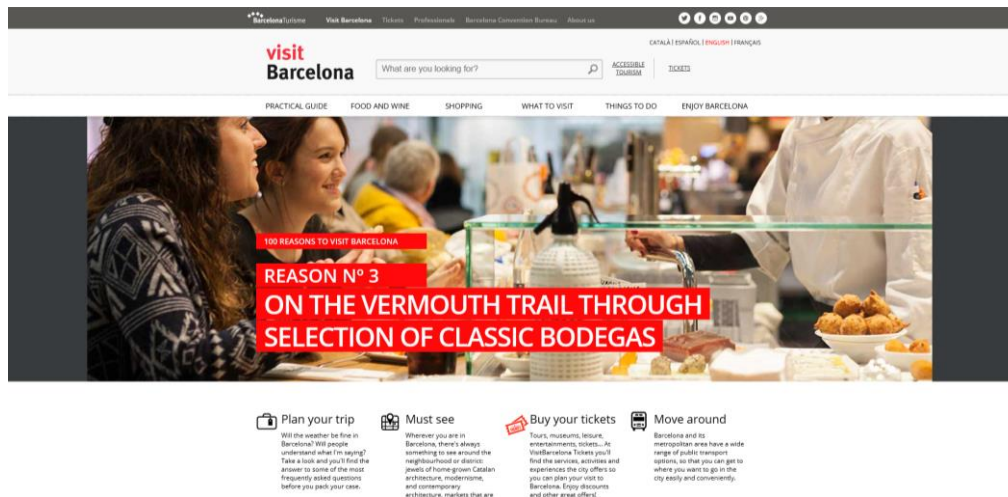
Appendices

Appendix 1: Snapshots of the DMMO Websites
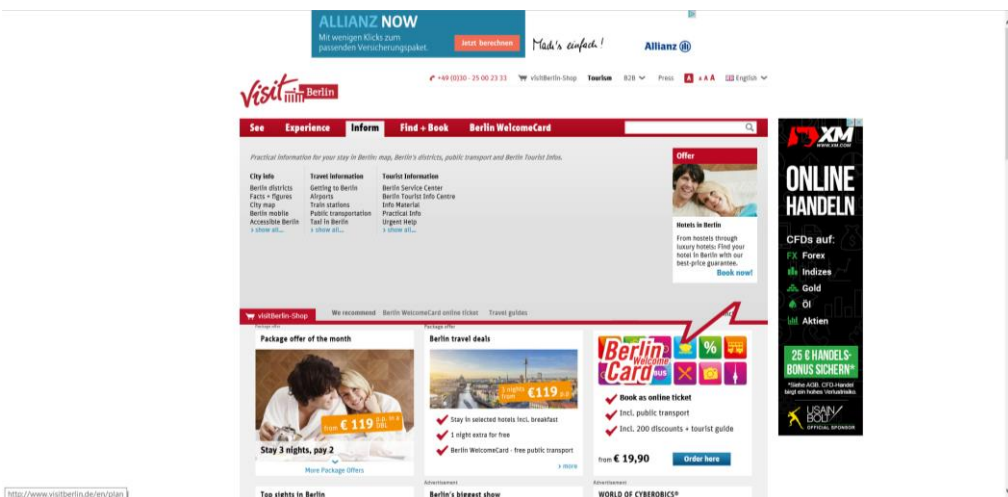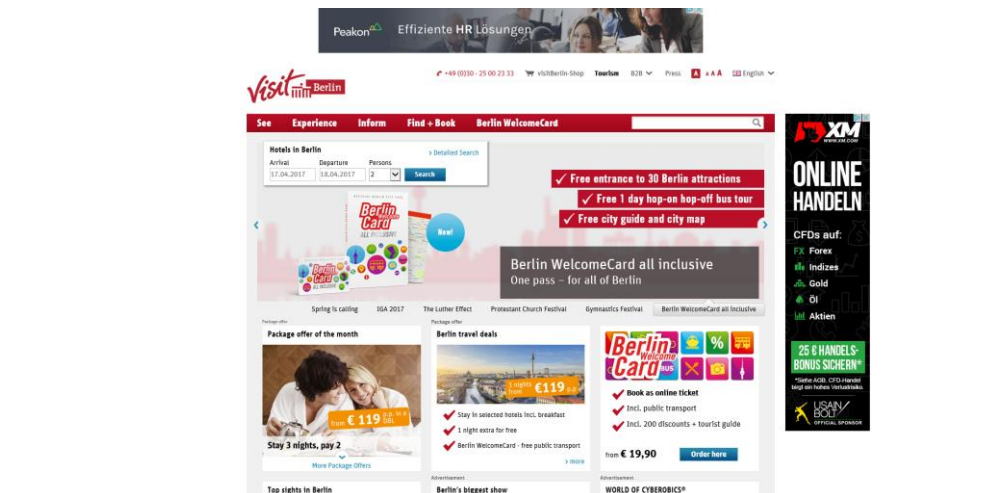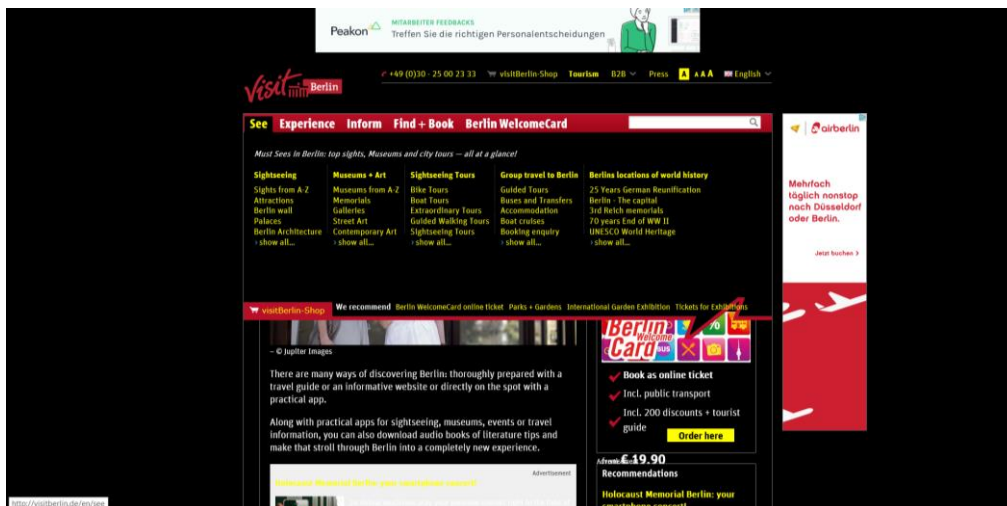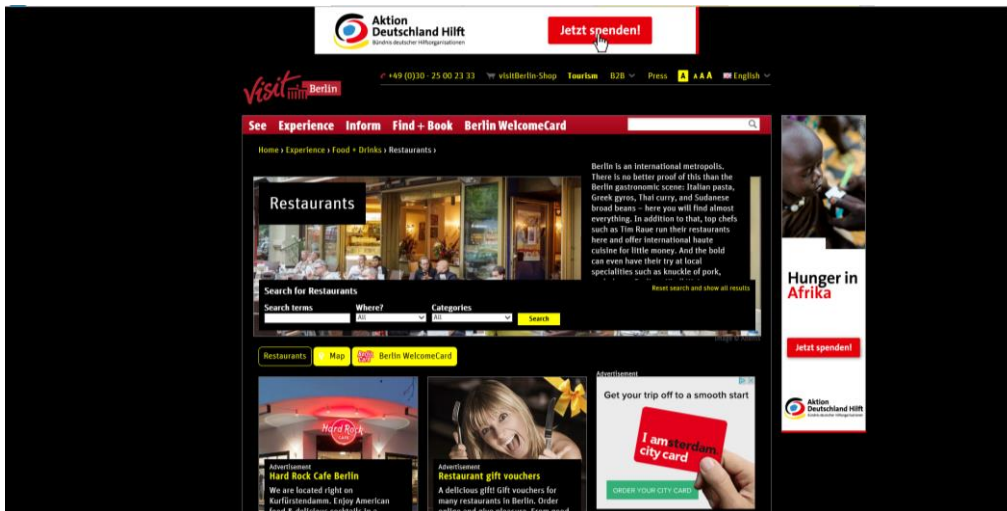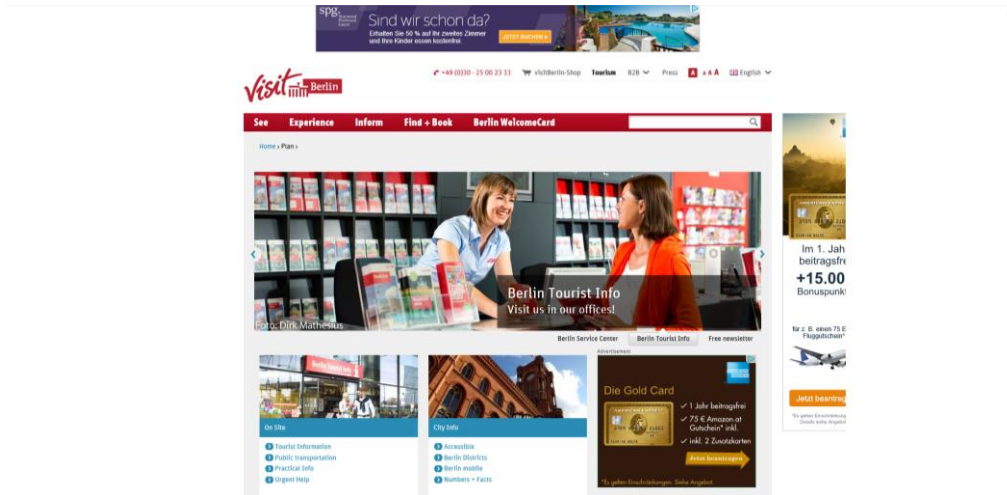
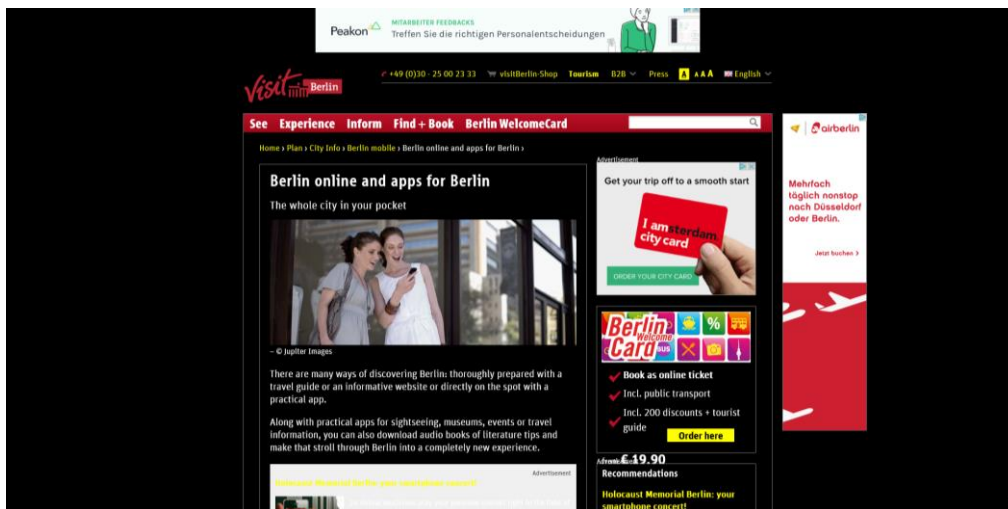### Appendix 1.1: Amsterdam – I amsterdam Website
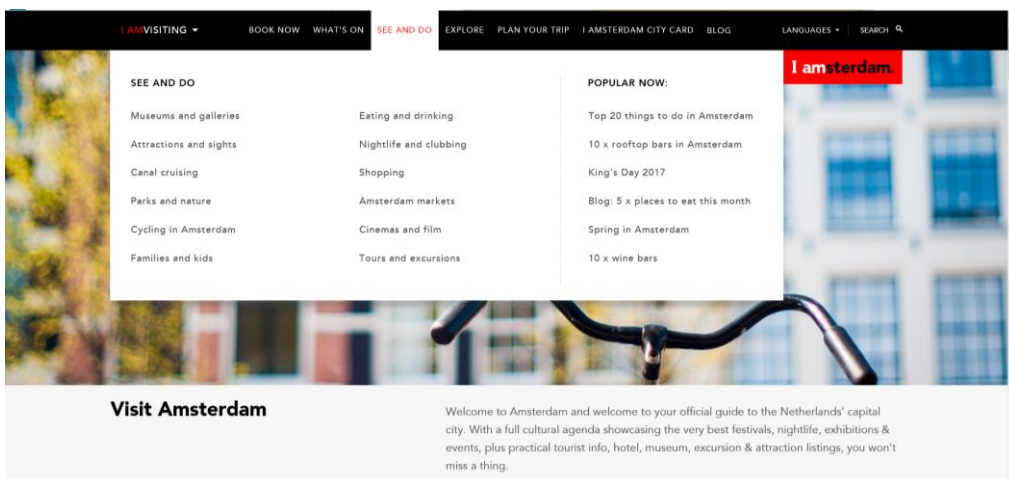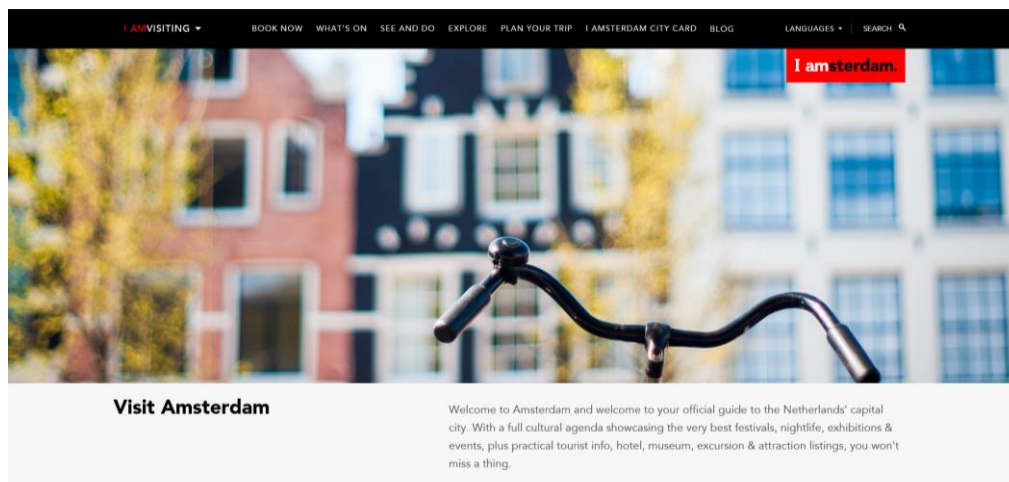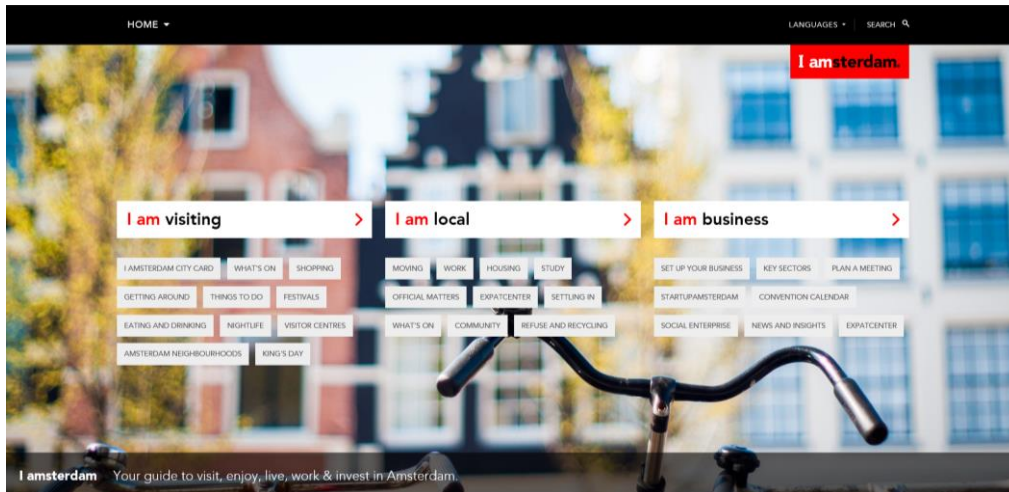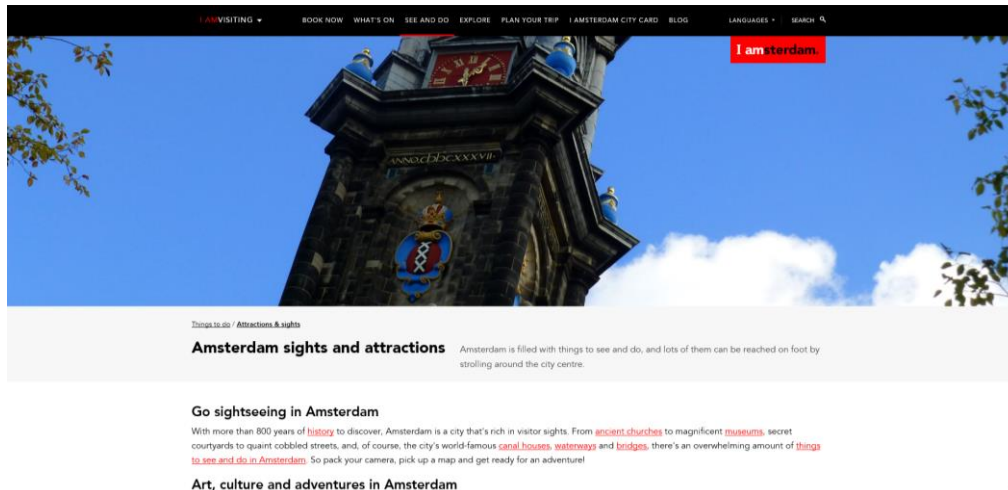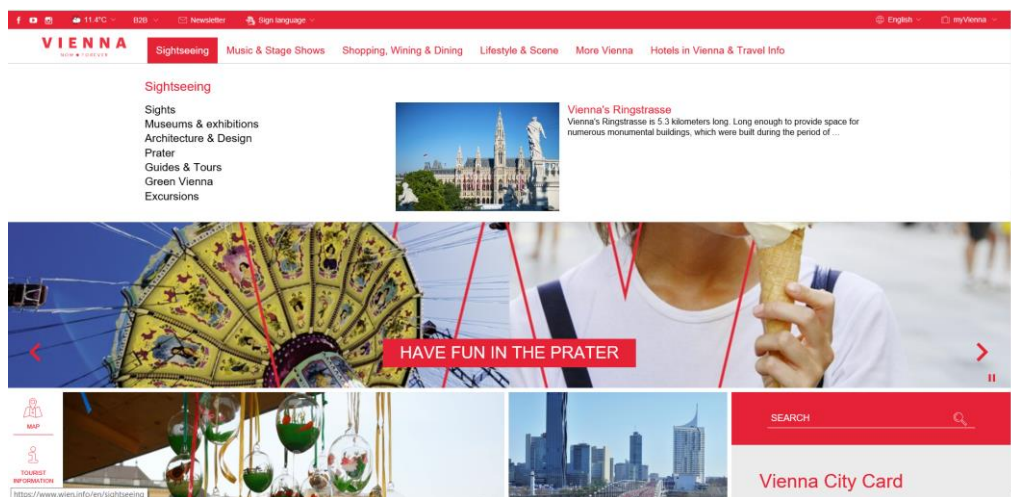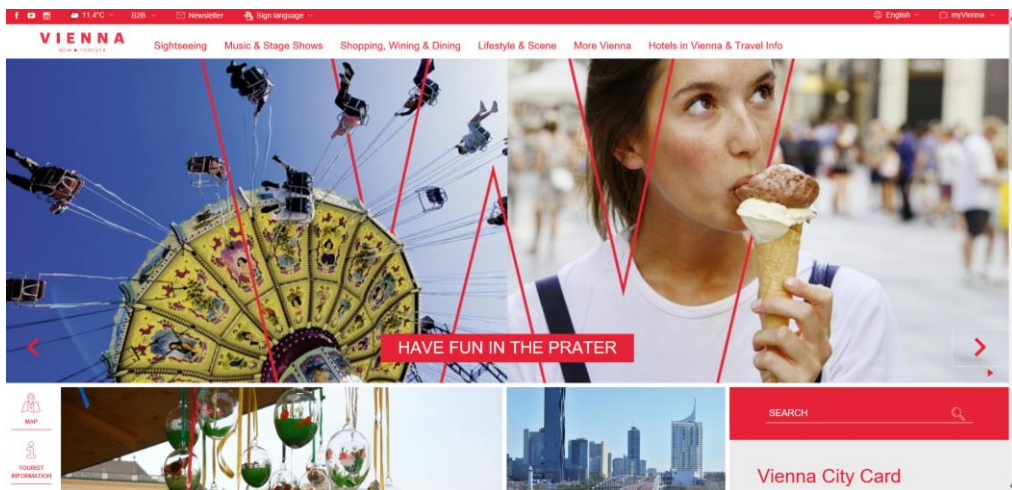
Appendix 1.2: Barcelona – Barcelona Turisme Website

Appendix 1.3: Berlin – Berlin Tourismus & Kongress GmbH Website

Appendix 1.4: Vienna – Vienna Tourist Board Website

Appendix 2: List of Apps recommended by the DMMOs

Appendix 2.1: Amsterdam – I amsterdam Apps

Categories & (No. of Apps)	App Name	Benefit	Price	Compatibility with devices
Air Transportation (2)	KLM	*Official app of KLM, providing information on flight related matters with check-in and booking option*	free	A, A
	Schiphol Airport	*Information on departure and arrival times, taxi reservation option and airport maps*	free	A, A
Practical Information (1)	Weer Online	*Weather information and forecasts*	free	A, A
Public Transport (4)	GVB	*Real-time information on timetables and disruptions of the GVB (Amsterdam's main public transport operator)*	free	A, A
	Citymapper	*Real-time journey planner for public transport, pedestrians, and cyclists*	free	A, A
	NS Reiseplanner	*Official app of the Dutch National Railway, offering real-time information on timetables, disruptions and prices*	free	A, A
	9292ov	*Information on public transport of the whole Netherlands*	free	A, A
Tour Guides & Travel Tips (6)	I amsterdam City Guide	*mentioned but not described or listed*		
	Q! Amsterdam	*Personalized and interactive tour guide trough leveraging open data, social networks and locals*	€ 0,99	A, A
	The Map	*Map with GPS function*	free	A, A
	VaarWater	*Navigation assistant for Amsterdam's canals, providing boating routes, and features like a speedbarometer, weather forecast, and a compass*	free	A, A
	weCity Guide	*Travel tips and recommendations about dinning, shopping, entertainment and culture from locals with a ticket booking and restaurant reservation option*	free	Apple
	Spotted by Locals	*Insider tips from locals*	€ 3,99	A, A
Total No. of Apps: 13				

*A, A - Apple & Android

Table A. Recommended apps by I amsterdam

Appendix 2.2: Barcelona – Barcelona Turisme Apps

Categories & (No. of Apps)	App Name	Benefit	Price	Compatibility with devices
Art (2)	**Galeries Art**	*Information on gallieries featured by the Association of Art Galleries of Catalonia (GGAC), including contact details, and inforamation on exhibitions and events*	free	A, A
	Joan Miro Official	*Information on catalan artists and their works, offered also as a city tour*	free	A, A
Audio Tour Guides (4)	**Barcelona Metro Walks**	*Guide to discover Barcelona's surroundings through a combination of metro, tram, bus and walking routes*	free	Android
	Gaudí's Barcelona	*Providing information on 11 sites*	free	A, A
	Medieval BCN	*Gives information on the medieval architecture*	free	A, A
	22@ Barcelona, the innovation district	*Offers information on Barcelona's lates urban planning project*	free	A, A
Gastronomy (1)	**Barcelona Restaurants**	*Restaurant guide featuring 170 restaurants*	free	A, A
Public Transport (1)	**TMB**	*Information on means of public transport, featuring timetables and routes*	free	A, A
Tour Guides (3)	**iBarcelona Lite Smartour**	*Information on cultural sites with georeferenced videos*	free	A, A
	Official Guide to Barcelona	*Interactive tour guide*	free	A, A
	Virtual Bus Turistíc	*AR guide for discovering nearby POIs*	free	A, A
For People with Special Needs (1)	**Mapp4all**	*Geo located information on the accessibility of buildings, restaurants, museums, etc.*	free	A, A
Total No. of Apps: 12				

*A, A - Apple & Android

Table B. Recommended apps by Barcelona Turisme

Appendix 2.3: Berlin – Berlin Tourismus & Kongress GmbH Apps

Categories & (No. of Apps)	App Name	Benefit	Price	Compatibility with devices
Games (2)	**Pocket Quiz Berlin**	*Edutainment quiz about attractions*	n.m.	Apple
	Mini metro	*Opportunity to create and operate a city subway map*	n.m.	A, A
Gastronomy (2)	**bitemojo**	*Offers self-guided food tours*	n.m.	A, A
	tip Speisekarte App	*Provides recommendations of gastronomy editors on restaurants, menu details, information on how to get there, and the option to reserve a table*	n.m.	Apple
Multimedia & Audio Tour Guides (17)	**me Berlin**	*AR tour of current exhibitions, including background information, visitor stories and videos*	free	A, A
	Berlin Wall	*Audio visual guide with more than 100 video documentations about the life during and after theBerlin Wall*	€ 2, 69	Apple
	BerlinWallArt: The Wall before the Fall	*Reconstruction of the Berlin Wall through images with GPS positionin, including four tours along the West side of the Berlin Wall*	n.m.	A, A
	GDR Dictatorship in Berlin	*Offers pictures, texts, and audio comments on 40 key places and stops of the various self-guided tours, informing about the history of the East Germany's communist regime*	n.m.	A, A
	Mauerschau	*Archive photo and and video material, eyewitness reports, as well as tours and stories about the Berlin Wall*	n.m.	Apple
	The Berlin Wall	*Interactive map with photos, videos and texts for discovering historical sports along the Berlin Wall, including different tours*	n.m.	Apple
	Artguide	*Artguide book with an audio guide, an interactive floor plan, a chronology and other features, offering differents artguides*	n.m.	A, A
	Historic Atlas of Berlin	*Virtual stroll through the past of Berlin, from the 15th to the 19th century, including six historic maps*	n.m.	Android
	South-West Berlin	*"Nobel Trail" tour through and around the south-west corners of Berlin, lasting 90 minutes, informing about the life of scientists including tex, images and audio material*	n.m.	Apple
	Virtual Concert in the Holocaust Memorial in Berlin	*Opportunity to experience the concert in memorial of the murdered jews of the Berlin Kammersymphonie performed in 2008 again, with the effect of changing sound depending on the user's location within the Holocaust Memorial*	n.m.	Apple
	WHATWASHERE_ Berlin	*Interactive city guide about historical facts and happenings, featuring video material*	n.m.	A, A

	360°Berlin – Just Berlin	*Travel tips on restaurants and shops with virtual tours*	free	Apple
	Lenné	*Navigates users to parks and gardens designed by Peter Joseph Lenné and offers audio information, a gardeners quiz, historical footage and a glossary about landscape architecture and botany*	free	A, A
	VoiceMap	*Offers audio information and the possibility to create personal audio tours through a publishing tool*	n.m.	n.m.
	Wiidii	*Provides personal assistance and advice via voice control through combining human and artifcial intelligence, also featuring to-do lists, a reminder function and a reservation option*	n.m.	A, A
	Wikitude Veikkos Archive	*Historical atlas providing informationon the history of statues and monuments with the use of GPS and the user's camera function for displaying information and pictures*	n.m.	A, A
	Storytude Audio-Touren	*Offers various audio stories on different POIs, such as a detective thriller stor, but also gerneral sightseeing information*	free	A, A
Practical Information (7)	**Arrival Guide**	*Provides essential information on a destination, e.g. population, opening times and currency conversion*	free	Apple
	ParkTAG	*Information on availability of free parking lots in public car park*	free	Apple
	AroundMe	*Assisting with finding the nearest restaurant, cinema, cash dispenser, supermarket, etc. through a GPS function*	free	A, A
	bluespot City Info	*Provides information about various places, tours and events, as well as useful tips and additonal features, such as booking and rental options*	free	A, A
	KiezDaten	*General information about Berlin, e.g. about administration, population, and the social, political, economical and educational state*	free	Apple
	Yelp	*Provides comments and reviews of visitors on restaurants and stores*	free	A, A
	Vamos	*Informs about and displays upcoming events with the possibility to retrieve a list of the events the user's Facebook friends are attending*	n.m.	Apple

	Bike Citizens	*Real-time navigation for cyclists across bike paths and streets with the possibility to make up sightseeing tours*	n.m.	A, A
	Top10 Berlin - Location Guide	*Users can first choose sites, then get navigated to them and like and share them with friends*	free	A, A
	Potsdamer Platz	*Information about the Potsdamer Platz, as well as on restaurants, parking, rentals, etc.*	free	Apple
	Kamino Walking Tours	*Offers tours between 20 minutes and 2 hours*	free	Apple
	komoot Bike Berlin	*Navigates users from one POI to another, enabling them to choose the preferred floor covering*	free	A, A
	Neukölln - KiezExplorer	*Offers insider tips and information on the district Neuköln, as well as tours and information on upcoming events*	n.m.	Apple
Tour Guide & Trip Planning (13)	**Tripwolf**	*Information on travel related purposes with tips from other travellers, including the possibilitiy to share pictureswith other visitors*	free	A, A
	Spotted by Locals	*Insider tips from locals*	n.m.	A, A
	Twisper	*Provides recommendations and tips and the opportunity to compile and share an own travel guide*	n.m.	Apple
	Seasonal Cities	*Seasonal tips and guides, written by local travel journalists*	n.m.	Apple
	cityscouter.com	*Offers information on attractions, prices, opening times and review, as well as the possibility to mark sites you plan to visit or already have visited*	n.m.	Apple
	visitBerlin	*Offers 600 travel related tips*	free	A, A
	City Shopper Lite	*Offers shopping tours with various themes, freaturing, i.a., a filter and a budget function*	n.m.	Apple
Social (2)	**myLike**	*Discovering, saving, storing and sharing services and locations on social network platforms*	n.m.	A, A
	Storyo	*Sharing stories with additional features, including, i.a., photos and maps*	free	A, A, Fire OS

Transport (5)	**Station App**	*Informas about public transport routes, as well as about stops nearby restaurants, museums and others*	free	Apple
	Berlin/Brandenburg – iFahrinfo	*Offers schedules, a route planning feature and information on delays and service disruptions of*	n.m.	A, A
	Berlin travel info plus	*Provides travel information, a route planning and a mobile ticket purchasing option*	free	A, A
	BerlinMobil App	*Informs about the cheapest, fastes and most environmental friendly way through Berlin by car, public transport, or bike, through collecting real-time data of various providers*	free	A, A
	Taxi Berlin	*Determines user's location via GPS, informs about the costs of a taxi to a specific destination and automatically orders a taxi*	free	Apple
For People with Special Needs (2)	**Wheel map**	*Provides hints for safe travelling and information on accessibility, including maps with comments on public transport, restaurants, theaters and shopping centers*	n.m.	A, A
	Berlin travel guide in German sign language	*95 videos on popular POIs in German sign language and additional information on areas particular interest*	n.m.	Apple
Total No. of Apps: 50				

*A, A - Apple & Android

*n.m. - not mentioned

Table C. Recommended apps by the Berlin Tourismus & Kongress GmbH

Appendix 2.4: Vienna – Vienna Tourist Board Apps

Categories & (No. of Apps)	App Name	Benefit	Price	Compatibility with devices
Attractions & Culture (5)	Belvedere Museums	*Information on locations, exhibitions, architecture, pictures exhibited, general visitor information and ticket-purchase*	free	A, A
	Kunsthistorisches Museum Vienna	*Information on paintings and painters, opening times, admission prices, special exhibitions, accessibility for people with special needs*	free	A, A
	TeamUpClub	*Personalized scavenger hunts*	free	Apple
	The Vienna Project	*City map with information on 38 memory spaces concerning the victims of National Socialism and the history of each site*	free	A, A
	Ticket Gretchen	*Ticket-purchase for cultural offerings and corresponding information, wishlist, pre-sale alerts and waiting list function*	free	A, A
Car Transport (2)	MyTaxi	*Taxi ordering service with individualized options*	free	A, A, W
	Uber	*Driver ordering service with cash less payment*	free	A, A, W
Gastronomy (3)	Local Tips	*Location-based information on nearby dining options with contact details, pictures, and maps*	Android: free Apple: € 6,99	A, A
	Master Order	*Ordering assistant with translations, explanations and pictures of meals and drinks*	Full Version: € 1,99	A, A
	Wien isst	*Restaurant finder with reservation option*	free for 30 days, then: € 5,49	A, A
Multimedia & Audio Tour Guides (5)	beyondarts Art & Culture Guides	*Multimedia and interactive VR story teller on cultural sights*	free	A, A
	City Listening GPS Audio Guide	*Audio tour guide with GPS function and a scarvenger hunt*	free	A, A
	Hearonymus - your personal audio guide	*Audio tour guide with more than 180 tours*	free	A, A
	PocketGuide Vienna	*Audio guide with 10 themed routes*	free, Offline Version: € 5,49	A, A
	Wikitude	*Offers live cameras, interactive features and additional information for discovering the city, as well as the tool "myWorld" for creating an own AR world*	free	A, A
Parking (2)	ParkU	*Parking space finder for the inner city, event locations, and airports with a booking and purchase option*	free	A, A
	Kurzparkzonen	*Information on short-stay parking zones and location-based information on them*	free	Apple

Practical Information (12)	**Apotheken und Medikamente**	*Pharmacy finder with opening times*	free	A, A, W
	Bikar	*CityBike rental station finder*	free	A, A
	City Maps to 2Go	*Street map*	free	A, A
	film.at	*Cinema finder with information about the current program*	free	A, A
	Free WiFi Finder	*Offline Wi-Fi hotspot finder*	free	A, A
	Freewave WiFi Finder	*Offline Wi-Fi hotspot finder*	free	A, A
	HEROLD	*Telephone directory*	free	A, A
	Oanda	*Currency converter*	free	A, A, BB
	Shopikon	*Information on stores, route descriptions, pictures*	free	Apple
	Susi	*Information on things like restaurants, drugstores, shops, ATMs, etc.*	free	A, A
	Vienna - Memoricy	*Photo album creator*	free	A, A
	Wetter.at	*Weather information and forecasts*	free	A, A
Public Transport (2)	**moovel**	*Real-time data on timetables and disruptions of means of public transportation*	free	A, A
	qando	*Real-time information on timetables and disruptions of the Wiener Linien*	free	A, A
Social (1)	**journi**	*Travel diary*	free	A, A
Tour Guides & Trip Planning (6)	**GuidePal Vienna**	*Travel guide with location-based information and maps*	free	A, A
	Mtrip	*Personalized city guide*	€ 4,49	A, A
	Spotted by Locals	*Insider tips from locals*	€ 3,99	A, A
	TripAdvisor	*Trip planning assistant*	free	A, A, W, N
	Tripwolf	*Recommendations and information from travel community and travel journalists, maps with GPS function, AR viewer, assistance with trip planning*	free, Premium: € 4,49	A, A
	Vienna City Card	*Interactive tour guide providing information on attractions and general information*	free	A, A
Total No. of Apps: 38				

*A, A - Apple & Android   *N - Nokia

*BB - Blackberry   *W - Windows mobile

Table D. Recommended apps by the Vienna Tourist Board

Appendix 3: List of the Top Activities announced by TripAdvisor of each destination

Appendix 3.1: Amsterdam – Top Activities

Rank*	Activity	Category	Technological Offer	Ratings* of Technological Offer
1	Rijksmuseum	Art Museum	Multimedia tours available with the free Rijksmuseum app (compatible with Apple & Android) or at the entrance (€ 5) *https://www.rijksmuseum.nl/*	Excellent: 617 Very Good: 185 Average: 37 Poor: 5 Terrible: 2 Total: 846
2	Anne Frank House	History Museum	Interactive 3D tour with audio material through the Secret Annex of Anne Frank available on the official website *http://www.annefrank.org/en/Subsites/Home/*	/
3	Van Gogh Museum	Art Museum	Interactive multimedia guide available in 11 languages at the entrance (€ 5 for adults, € 3 for 13-17 year-olds, free for 6-12 year-olds) *https://www.vangoghmuseum.nl/*	Excellent: 737 Very Good: 215 Average: 34 Poor: 10 Terrible: 4 Total: 1.000
4	Vondelpark	Park	None	/
5	City Tours (101)	Excluded for reasons of tours being hardly technologically improvable		
6	The Jordaan (Neighbourhood)	Excluded due to too broad scope		
7	Private Tours (90)	Excluded for reasons of tours being hardly technologically improvable		
8	Museum Ons'Lieve Heer Op Solder	Speciality Museum	Free audio guide available in 7 languages at the entrance	Excellent: 220 Very Good: 89 Average: 3 Poor: 2 Terrible: 1 Total: 315
Total: 501				

*by Tripadvisor users

Table E. Top Activities of Amsterdam

Appendix 3.2: Barcelona – Top Activities

Rank*	Activity	Category	Technological Offer	Ratings* of Technological Offer
1	Basilica Sagrada Familia	**Historic Cathedral**	Audio guide available in 10 languages at the entrance; VR visit of 6 different locations available on the official website (not rated) *http://www.sagradafamilia.org/*	Excellent: 840 Very Good: 129 Average: 22 Poor: 4 Terrible: 5 Total: 1.000
2	Casa Batllo	**Architecture**	Free audio guide (a) available in 11 languages at the entrance; Free VR and AR guide (b) available in 10 languages *https://www.casabatllo.es/*	Excellent: a) 743 b) 191 Very Good: a) 194 b) 68 Average: a) 42 b) 15 Poor: a) 14 b) 6 Terrible: a) 7 b) 2 Total: a) 1.000 b) 282
3	Gothic Quarter (Barri Gotic)		Excluded due to too broad scope	
4	Palau de la Musica Orfeo Catala	**Architectural Bulding, Theater, & Concert Hall**	None	/
5	City Tours (123)		Excluded for reasons of tours being hardly technologically improvable	
6	Sightseeing Tours (141)		Excluded for reasons of tours being hardly technologically improvable	
7	Camp Nou	**Stadium**	None	/
8	St. Josep La Boqueria	**Street Food Market**	None	/
Total: 697				

*by Tripadvisor users

Table F. Top Activities of Barcelona

Appendix 3.3: Berlin – Top Activities

Rank*	Activity	Category	Technological Offer	Ratings* of Technological Offer
1	City Tours (113)	Excluded for reasons of tours being hardly technologically improvable		
2	Reichstag Building	Architecture	Free audio guide, also for children and people with special needs available in 11 languages at the entrance *https://www.bundestag.de/*	Excellent: 783 Very Good: 192 Average: 22 Poor: 3 Terrible: 0 Total: 1.000
3	Brandenburger Tor	Historic Site	None	/
4	Memorial of the Berlin Wall	Historic Site & Memorial	Free "Die Berliner Mauer" App with multimedia features and GPS function (compatible with Apple & Android) *http://www.chronik-der-mauer.de/*	/
5	Private Tours (107)	Excluded for reasons of tours being hardly technologically improvable		
6	Berlin Philharmonics	Architecture & Music Hall	None	/
7	The Holocaust Memorial - Memorial to the Murdered Jews of Europe	Educational Memorial Site & Museum	Audio guide available in 3 languages and audio translations available in 7 languages for the museum at the entrance (€ 4); Free video and audio guide for people with special needs available in German at the entrance of the museum *https://www.stiftung-denkmal.de/*	/
Total: 806				

*by Tripadvisor users

Table G. Top Activities of Berlin

Appendix 3.4: Vienna – Top Activities

Rank*	Activity	Category	Technological Offer	Ratings* of Technological Offer
1	Historic Center	Excluded due to too broad scope		
2	Schönbrunn Palace	Historical Building	Free audio guides available in 16 languages (also available as free download from iTunes and yasssu) & tour descriptions available in 21 languages at the entrance *https://www.schoenbrunn.at/*	Excellent: 602 Very Good: 315 Average: 62 Poor: 17 Terrible: 4 Total: 1.000
3	Kunsthistorisches Museum	Art History Museum	Audio guide for adults in 4-8 languages (€ 4 for one, € 7 for two persons) & audio guide for children available at the entrance; free KHM Stories app (compatible with Apple & Android) *https://www.khm.at/*	Excellent: 201 Very Good: 45 Average: 10 Poor: 2 Terrible: 0 Total: 258
4	Schönbrunn Gardens	Historic Parks & Gardens	None; download of a a common plan and a running map, including distances in metres, of Schönnbrunn Gardens available on the official website *https://www.schoenbrunn.at/*	/
5	Imperial Palace (Hofburg)	Speciality Museum	Free audio guides (also available as free download from iTunes and yasssu) & tour descriptions available in 12 languages at the entrance *http://www.hofburg-wien.at/*	Excellent: 256 Very Good: 132 Average: 31 Poor: 3 Terrible: 1 Total: 423
6	Tiergarten Schönbrunn	Zoo	Interactive infoboards and displays within the zoo *https://www.zoovienna.at/*	/
Total: 561				

*by Tripadvisor users

Table H. Top Activities of Vienna