

THE DYNAMIC ROLE OF AUGMENTED REALITY IN TOURISM

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The use of mobile phones has undoubtedly paved the way for the utilization of technological intermediation in the tourism sector. This article presents a study of the proposed relationship that can occur between augmented reality (AR) as a technological tool and mobile phones which can in turn increase the touristic attraction. To achieve the aims of the study, qualitative interviews with consumers and producers who are interested in AR applications were done. Snowball sampling was used to collect responses. The results have shown that the use of AR leads to an augmented construction of an actual reality that is multidimensional and is composed of the owner, site, and touristic agency. Consequently, technological tools take on a secondary role since it becomes integrated in the

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production and consumption process, and becomes an integral part of numerous experiences, procedures, competition processes and touristic product consumption. Furthermore, the integration of modern technology in the touristic experience will undoubtedly enhance that experience and makes it more enjoyable in addition to improving expertise and skills in the touristic operation and attraction process.

Keywords: *Augmented reality, Tourism experience, Marketing, Technology mediation, Perception.*

INRODUCTION

Tourism is facing a growing need for incorporating modern technologies in its industry. (AR) is but one example as an application that provides the world with additional information. This is achieved by overlaying visual, auditory, or even haptic materials on physical objects (Azuma, 1997; Feiner, 1997; Barfield & Caudell, 2001), where the ultimate goal of AR is to support user interaction with the world around them (Starner, 1997; Barfield & Caudell, 2001; Starner, 2015).

AR is defined by Oxford dictionary as “a technology that superimposes a computer-generated image on a user's view of the real world”, thus providing a composite view coupled with the massive influx of tourists to destinations and point -of -interests (POIs) all over the world. As the ease of marketing and presentation became necessary, the development of personal technologies was inevitable such as small, easy to carry, and relatively inexpensive computing devices designed to serve the unique informational needs of their users (Weiss, et al., 2001), such as smartphones, tablet computers, and smart wearable devices.

The co-dependent relationship between tourism and technology requires the necessary adjustments to integrate the new devices into the everyday routine of tourism productions as indicated by previous researchers (ComScore, 2011; Oulasvirta, et al., 2012; Nielsen, 2014)

who continued to explore their perception and impact on the real-world industry. In tourism industry, AR may produce three-dimensional models (1-Direct encounter: tourist – destination, 2-Contemporary mediation: tourist-tour guide- destination, 3-Technological mediation: tourist-technology-destination). These dimensional models explain the roles of Internet Computer Technologies (ICTs) in tourism industry and the real time interactively between producer-consumer with a very low cost (Yovcheva, et al., 2011; Leue, et al., 2014; Han, et al., 2014; Yovcheva, et al., 2015; Leue, et al., 2015). Several researchers indicated significant importance of the roles of ICTs in daily experiences and the spillover effects of these technology mediated experiences on travel and tourism industry worldwide (Wang, et al., 2014).

Despite the debate over the use of AR in tourism marketing and promotion, such a technology may bridge the gap between what is real and what is expected. In other words, AR brings the end users closer to the social life of destinations and mitigates the unexpected. Furthermore, it enhances the tourists new perception, cognition processes, and contributes in the decision making process (Yovcheva, et al., 2011; Kounavis, et al., 2012; Yovcheva, et al., 2015).

Accordingly, a positive sense of the space might have been created and worked as a motivation to a real visit. Besides, the perception of users and stakeholders will have been weighted against a successful tourism experience (Smith & Schoene, 2012). For these reasons, this study elaborates on the use of AR in tourism and introduces qualitatively the opinion of users and how their perception may impact the decision of using such a technology. In addition, the tourism producers, once adopt the AR technology may reduce the expenses and promote the least known destinations to a wider group of customers (Nurminen, et al., 2014). Recent studies aim at improving the technological design for existing users to attain the acceptance of using AR applications, measuring the satisfaction of

the user and his perceptive experience of the expected benefit of those applications (Olsson & Salo, 2011).

The use of smart phones and hand-held devices is considered as affordable and simple (Miller, 2012). This study focuses on studying a downloadable smart phone application supported by App Store program and Android and is called LAYAR. This application is the most popular and widely used program on mobile phones (Rice, et al., 2009), since this program can display and highlight to the user many possibilities and preferences to test how mobile applications can be used for example in navigation (Lee, et al., 2012) and also clarifies several key points that have been set and selected by the tourism product (Nelson & Chapman, 2015). Furthermore, the LAYAR program enables the use of downloaded images using the Geographical Positioning System (GPS) using the built-in camera of the mobile device, a compass, and an accelerometer (Jang, et al., 2005).

After communicating with many users of the program (LAYAR) two groups of users were found: the first group that wants to register specialized data on topics related to the touristic journey which will enable the tourists to re-live the touristic experience even after going back to their native country. The second group that wanted to use the (LAYAR) program to create a comprehensive and well-informed and historical vision of the visited touristic site. When analyzing those results for the tourism activities, the importance of this study emerged, which will focus on gaining knowledge of strategies and advanced technologies that are necessary to fully understand the ability of these modern and advanced technological applications to reproduce and revive touristic sites.

The tourism sector around the world has suffered greatly in the past 5 years due to political conflicts, economic difficulties and inflation. Tourism producers use costly tools to attract tourists and promote touristic destinations in addition to poor and ineffective utilization of modern advertisement tools to improve the current decline in tourism sector income (Maaiah, 2014). Consequently, the

current research, discusses the various aspects of AR as a tool within the reach of all users (producers and consumers), and therefore might help in promoting an attractive touristic image and show the stability and security that ensures internal and external tourists safety and well-being.

THEORETICAL BACKGROUND

Technological Mediation In Tourism Experience

The intertwined relationship between space and place in tourist destinations is exemplified by Harrison and Dourish (1996) as being a tourist opportunity and a tourist place respectively. The space of a tourist site can be described as a 3D representation of the touristic place or the place in which we live or visit for a specific amount of time. Location based-services (LBS) are services typically designed to serve their users, such as navigation, planning, and provide information about the location (Schiller & Voisard, 2004). The only practical application of LBS program is to help people explore and identify their surrounding environment. Furthermore, LBS is providing augmented walking experiences for tourists (Gleue & Dahne, 2001; Fritz, et al., 2005; Han, et al., 2014; Chung, et al., 2015; Tom & Jung, 2015).

Community members use physical tools to navigate across the surrounding environment (space), whether those tools were tourist site guide tools (Spring, 2006) field maps (Vertesi, 2008) or spatial evidence of tangible heritage (Persky, 2011). But with the availability of modern technology, which allows affordable and constant connection with great computing capabilities while on the move (Tussyadiah, 2017), there has been symmetrical and competitive techniques to offer multiple and advanced services in all fields, especially in the field of tourism. This is done to both present the touristic place or to present the surroundings and its advantages and properties without even the need for the interference of service providers (Ebert, et al., 2009). The study of these modern technological tools such as smart watches and smart glasses (Rauschnabel, et al., 2015; Tom & Jung, 2015) can clearly reveal how

tourists can visit local and international tourist sites, interact with the local cultures, and navigate through history without even leaving their place of residence (Urry, 1995; Knudsen & Waade, 2010; Towner, 2011).

Augmented reality techniques enable the users to enjoy tourist sites and services through realizing spatial reality before users on a real temporal scale and incorporated content of the offered services (Ershow, et al., 2011). Computing devices will increasingly subsume to the personal space of their users, allowing them to help more intelligently, consistently, and continuously. Therefore, the availability of an AR technology on portable devices at an affordable price, as they are embedded in the experiences and actions of their users (Tussadiah, 2014) was made possible through internet services which allowed tourists to truly live touristic experiences (Dourish, 2006). Furthermore, understanding the potential of this technology encourages tourism producers to expand their offers and use versatile and modern marketing tools effectively (Thrift & French, 2002; De Souza & Silva, 2006; Sheller & Urry, 2006; Aurigi & De Cindio, 2008).

The use of smart glasses in facilitating tourism experiences in AR, have become viable due to the full support of several technological means (Tom, et al., 2016). The use of wearable technological devices and its implications on touristic experiences was extensively discussed in literature and mass media (Prabu, 2012; Dickey, 2013; Tussadiah, 2014). In addition, the deployment and enrichment of these programs with relevant tourism information are simplified and technologically affordable with regards to visual information, interaction, spatial and temporal reality, expertise, and tourist services (Maaiah, 2014). For example, indoor touristic experiences enhanced with AR are developed in museums, art galleries, and indoor theme parks by overlaying exhibits with additional information through touch-screen displays, smartphones, and/or wearable devices (Wojciechowski, et al., 2004; Damala, et al., 2007; Jung, et al., 2015; Leue, et al., 2015; Tom & Jung, 2015).

There are many studies that focused on the commercial potential, modern design patterns, and the adoption of a tour guide through mobile phones (Junglas & Watson, 2008). With regard to smart phone AR applications, they create an advanced technological impact through linking and analyzing the available information. It has

a remarkable ability to create a relationship between the surroundings, navigation and efficient marketing of a touristic product (Sutko, et al., 2011). It makes the augmented content of a touristic product an integral part of the touristic site itself. It also allows tourists to see this catalog content in multiple manners and at the same time allows them to save such content or marketing offers (Kitchin & Dodge, 2011). Furthermore, AR applications through smart phones can be of great effectiveness in the areas such as browsing, navigation and identification of the experience of others, if it is applied in urban places more than other less civilized places (Fehlings, et al., 2013).

The use of software applications of mobile phones is only a reflection of how individuals consume the surrounding space, but the creation of AR has the chance to re-produce the space, which can be represented by a symbol (Nelson & Chapman, 2015). Since spaces or augmented spaces are an integral part of people's everyday lives and represented by a specific code, they can be re-organized and re-arranged (Kitchin & Dodge, 2011). Consequently, a code or a symbol can reproduce the meaning of a site's reality, it also explores the social and spatial realities (Smith & Schoene, 2012). According to Penn (2015) the relationship between the icon and the place is a constituent relationship through inference that the roads and sites and cities may disappear in the event of failure of the program to work perfectly (for example: airports, which rely mainly on software and geo-localization techniques that show us on the screen a AR of a true reality, if that software failed or broke down, all actions and operation dependent upon the software will cease to function leading to chaos)

Among the previously mentioned potential applications of AR on modern technological devices, the LAYAR program, a firmly established AR application, allows its user to establish his content (Nelson & Chapman, 2015). This use is identical to the geographical site localization (Mobile geotagging), which is simply a technology used to connect information available on the internet, or digital content with the actual touristic location (Fehlings, et al., 2013). Given how a geographical site is located, this may generate a new set of practices. The LAYAR program marketing tools allow the touristic producer to spread an augmented content, enhanced with compound visual techniques of a tourist site using 2D and 3D technologies,

which becomes visible only when tourists reach the touristic site and use the technology (Miller, 2012). Augmented reality programmers connect the tourist sites database with 3D models (Liao, 2012) and create algorithms that can represent the true reality by a non-matching AR (Graham, 2012). Many possibilities have emerged in relation to smart phones AR applications, which showed the dynamic force that lies behind these applications (Sheller, 2006; Graham, 2012).

The multi-modular relationship between media and marketing, the symbol and touristic surrounding was researched extensively. Tom Dieck and Jung (2015) see that the augmented surrounding works by eliminating any ambiguity between the physical and augmented surroundings, while the study of Farman (2012) went a step further by including the embodiment of media using mobile phones and the social production of the surrounding. He shows that the ways and methods that use mobile phones are implemented into the daily lives of individuals. Accordingly, they become sensory-inscribed to reflect the complementarities between the media and marketing, surrounding and marketing bodies to represent a certain tourist reality (Graham, 2012).

Undoubtedly, differences exist between individuals in using and dealing with AR and in realizing the uses and benefits of such programs and therefore use them to achieve their goals and needs. According to De Certeau (1984), there are two types of augmented spatial patterns: strategic or tactical, which characterizes the modern civilized reality. The strategic pattern tries to distinguish its own places and is usually practiced by certain authorities, such as governments and armed forces and cities, those who have the power to build, design and create databases, motion control, and the formation of regulatory technological software programming and possess their own AR pathways. On the other hand, the tactical pattern is used by the weaker part of society that depends on specific sectors, some activities, and some producers to formulate, in one way or another, specific pathways to the individual users. Here, if people tried to resist attempts to make their surroundings transparent or electronic, those attempts are considered spatial and tactical.

The AR technology works to represent the touristic destination and its surrounding using a symbol that can be accessed and identified using mobile phones and computers, which gives strategy makers the power to implement their ideas (Kitchin & Dodge, 2011). On the

other hand, those who oppose these modern technologies can use AR techniques via mobile phones to distribute and advertise several activities using direct communication (Graham, 2012).

MATERIALS AND METHODS

Firstly, this study reviews previous literature on practices of mobile geotagging and content creation by using LAYAR app, that enhance our understanding of current touristic practices related to production and consumption. Then attention is turned towards the relationship between code and space. Finally, since the focus of the current study is on people's touristic practice in and through space, De Certeau (1984) theoretical and analytical framework was applied to understand mobile AR uses as tactical spatial practices.

In the current study the interpretivist framework was applied; this frame work allows researchers to interpret multidimensional elements. The above-mentioned frame work, allows the examination of users' practices, experiences, interactions, and perceptions of a social daily practice as a mobile AR in their touristic usage.

DATA COLLECTION

60 LAYAR users were interviewed in-depth, all of them were recruited via snowball sampling. Interviews were all conducted over whatsapp, Facebook and Skype. Of the 60 participants, 28 men and 32 women were interviewed, ranging in age from early-20s to mid-50s. The interviewed individuals were either recent users of LAYAR (6 weeks) or started using the service shortly after it launched. Of the 60 participants, 39 participants used the open Application Programming Interface (API) to create new layers. Additionally, the snowball sampling revealed a group of artists who founded a group called Manifest.AR. This newly founded group is described as an international collective working with growing forms of AR as interventionist public art.

The conducted Interviews were audio recorded and transcribed to ensure accuracy of recorded information. Names of informants are pseudonyms unless interviewees explicitly waived confidentiality. Many questions were presented to the participants who used LAYAR

including: how participants used LAYAR, how using LAYAR influences their experiences and decisions regarding touristic destinations, and how LAYAR changed their relationship with the spaces around these destinations. Follow-up questions mainly focused on more specific uses of LAYAR, depending on whether they were viewing content or creating content layers, or both. Creators of content were asked about their motivations for creating layers, their views on the relationship between their layers and the physical space, and how creating layers affected their perceptions of touristic space. The duration of the Interviews ranged from 20 to 40 minutes, with an average of 35 minutes.

DATA ANALYSIS

The study uses a snowball sampling method (exponential non-discriminative: the first subject recruited to the sample group provides multiple referrals and then each new referral is explored until primary data from sufficient number of samples are collected) to collect data about experiences, practices, interactions, and perceptions of AR users in the tourism industry and managers in the AR industry (Fig. 1). The sampled subjects were asked about AR program, their impact on the decision to visit a tourist site, and their impact on the relationship of those individuals at destinations. The feedback application forms were filled by subjects who were subscribers to the social media ‘LinkedIn’ among which are executive managers and workers in the field of AR and users of AR for tourism purposes.

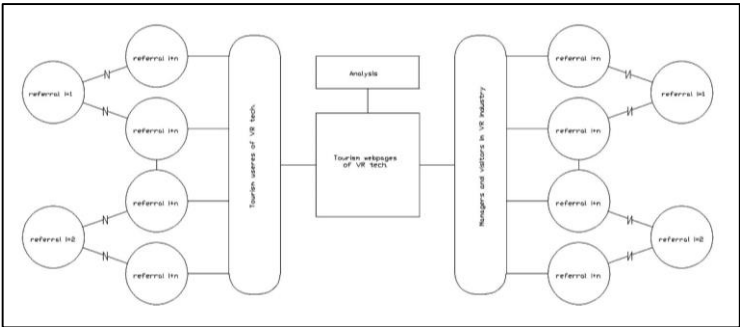


Figure 1: Snowball sampling methods.

The study adopts the principle of De Certeau (1984) by considering what lies behind the users acts due to its important and meaningful value, rather than recording the abstract behaviors and acts as they are. What concerns us is the benefit that can be attained from using a program and the reason for using it rather than the common methods of using it since this is the main focus of the current research, which aims to explore the processes by which the user interacts with the emerging technology. This study prioritizes the following: the details of the touristic journey, and description of different roles carried out by people in the tourist sites (Crang & Graham, 2007). Data analysis in the current study was achieved by creating a matrix and comparing the responses with several similar questions in order to form a comprehensive description and thorough understanding for those who provided information. The uses of the AR programs by the subjects were classified according to tourist places that were uploaded to the program, the time frame of the program use, how and why they uploaded this particular tourist site, and what they intended to know from such a use. Analysis of the similarities and differences through a matrix of information allows us to identify regularities, consensus and idiosyncrasies in the data.

RESULTS:

The findings demonstrated that AR users became less aware of their surroundings compared with none AR users which can be attributed to the relatively deficient performance of AR applications on modern smart phones including chaotic and confusing presentation which leads to wasting the users' time to properly process and understand how the presented results can be utilized. Furthermore, the quality of the entire experience while using the AR applications (LAYAR) is further worsened by unanticipated result behavior which is due to numerous movement delays and unpredictable delay of the augmented objects. Finally, public use of AR applications was associated with unforeseen difficulties related to public acceptability

since using these apps involves physically interacting with the app by having to point the device and hold it in the direction information is sought after. However, several advantages were associated with using AR applications as opposed to other navigational applications as seen by the ability of AR apps to improve the users' understanding of destination related information such as proximity, directions and spatial relations.

CREATING THE TOURISTIC AUGMENTED CONTENT

Because many of the primary users were those who formed and created their own touristic reality, the results of this study focused on the purpose and how the creation of the augmented content came about, and how that number of touristic augmented realities can interact with hundreds of advertising methods and media and traditional tourism marketing. In Canada, for example, a user established his own company, and established several layers of AR for touristic destinations, one of which included a Metro station in his residential area (Quebec). Another user created an application running on filming a number of tourists who had their pictures displayed in a music festival for the purpose of tourism marketing. All users who have created their own touristic reality admitted that using AR programs have allowed them to change their relationship with the actual space reality that surrounds them.

The touristic producers acknowledged that seeing a touristic site in reality and then using AR program to visualizes what they would look like helped to motivate them to implement these changes to improve touristic sites. The ability to actually see the potential benefits of the suggested improvements without having to actually be burdened with their cost was one of the utmost advantage to the users.

When a Tour Operator in Canada was asked if his experience using the AR program has changed his perception of the reality itself he answered: Sure, now, wherever I go, and when I visit a touristic

site, whether it was formerly known as a tourist destination or not, I always start thinking about what this place would be using a special program of AR, and start to imagine many of the activities, services, enhancements, views but my perception goes beyond that to achieve greater impact. Similarly, another participant who is the manager of a theater in New York City, stated that AR programs helped her to form a comprehensive outlook of the theater she is in charge of. Furthermore, she found that she had more control over the theatrical environment and had better perception and awareness of the possibilities related to the theater in all of its aspects to a much greater degree which was not possible before using AR programs. She added that she always objects on all proposals submitted to improve the theater, but now she is more willing to accept these proposals and suggestions since she can actually view what they look like and how they will change the actual reality with no extra cost when using AR applications.

In the conducted interviews, it was clear that AR applications are able to play an important role in providing solutions to the basic services provided in the touristic field. This would surely have a major and positive impact on the tourism reality that suffers from many drawbacks, and which at the same time is working to provide and offer services for visitors to the tourist areas (by providing them with information they are unaware of regarding the tourist place) and to its inhabitants.

An AR programmer, in a tourist office, says that these modern technological applications enable us to travel to destinations that seems impossible to physically access due to security risks or difficulty in reaching them. Having said that, as users of AR applications, in these circumstances, users are free to create augmented perception of such inaccessible places that may exceed the limits and restrictions.

Another participant, who works in the field of tourism transportation in France, gave an idea related to what motivated her

to establish an augmented layer for serving public and private sectors, and to the residents and visitors of the region. She said that in France she uses a car sharing service (Car Share) such as Auto Car System. She added that the big challenge when using such a service, is locating a rental office that uses the same service in another city in France or the European Union. This service will not be possible without using this specialized LAYAR of the AR program.

Consequently, the producers of augmented layers had a unique purpose behind establishing them, which will benefit tourists who are seeking different services. In the following, a discussion will be conducted regarding what has been offered by producers concerning the archiving and preservation of certain touristic souvenirs. Researchers believe that AR applications may be one of the most important applications in the field of tourism in any destination. For instance, the city of Petra in addition to other Jordanian tourist sites need to be presented and marketed as a tourist destination through AR applications, which will open a way for the many museums, researchers, governmental and private sector authorities and workers in the Jordanian tourism sector to preserve and protect it. This will create a strong relationship between the used symbol in the application and the touristic site itself. Recently, in Iraq and Syria very large proportions of the heritage and cultural treasures and valuable monuments were destroyed. If AR applications were used, it would have ensured their existence and preservation.

These practices mentioned above, highlight a complementary and fundamental relationship between an AR symbol and an actual real place. As time passes, those symbols become an integrated wholesome entity, in that the touristic site will have a different meaning without it. Furthermore, it becomes the only way to acquire information related to the touristic site and also preserves it and improves or modernizes it as time passes. Often, as youngsters, we passed in different places and public squares, and remember that there may be a statue or monument.

However, as time passes, a number of these monuments and statues that represent a certain value were removed. Remembering details that were part of a place that previously had been known is somewhat hard unlike getting accustomed to more modern buildings and institutions which are not difficult to be familiarized with over time. But with AR applications it will be much easier to preserve information and details for many generations to come. This may represent a new tourism product in any visited city, which encourages travelling and visiting, and acquire a tremendous amount of information that may not exist in brochures. Furthermore, the tourist will be able to compare the information given to him with the touristic site that tells its story which enables the tourist to experience the actual spirit of the place in multiple time periods in history.

This research does not only show and explain the theoretical aspect of the study of AR, but it also shows how tourists are influenced by the touristic environment that surround the touristic site they are visiting, which was represented by the applications of AR. The results also show the influence AR applications have on the perception of users whether they were tourists or touristic producers of AR applications. It is only natural for tourists to be aware and receptive of the destination they are visiting and all of its surroundings, even without the use of modern technological tools, but still may have a different perception of the touristic site when using AR applications. Consequently, the authors believe that one of the most important contributions of the current research is to clearly draw the attention to the importance of tourists' understanding and perception of a destination.

This study implies that LAYAR app as AR application may present and market touristic destinations, but it still occupies a modest and disproportionate position in linking the relationship between AR and the actual one in the minds of tourists and touristic producers. In addition, AR applications using mobile phones open up new tactical horizons to re-create and re-interpret touristic sites from three

important aspects: first, the tourists have the ability to change and choose what they want to see (for example, examine the site from different angles and altitudes, add or remove what might hinder vision without having to move, add or remove some of the assets of the touristic site if the tourist does not wish to see it). Second, these augmented realities that were created become alive when a number of people watch them and experience them without affecting the capacity of the destination. This enables anyone to possess and enjoy whatever he desires at the site. Third, an individual will not be able to actually live the real experience without personally visiting the touristic site. These unique and distinctive components of AR applications for mobile phones allow users (individuals or companies) to create a public and private dialogue correspondence between each other. Many users can create a general content for the same touristic site, in an attempt to help the tourists, reach the desired destination or get access to specific information through AR applications. Others can create replicas or components with a link to the touristic place, which does not exist in reality in order to enable personal contact between each other. Both of these types of practices could be extended further by reviewing the literature to determine the geographical location of the touristic site. Individuals who want to personalize their experience and tell their own personal stories while visiting a touristic site will highlight their own experience of the touristic sites (Humphreys & Liao, 2011).

CONCLUSIONS

The study of tourism reality through modern technological applications, always pushes us to focus on the geographical location as a crucial factor to communicate with and be knowledgeable about the touristic site. It is plain to see for all of us that mobile phones play a role that can be described (Mobile mediating) in that it creates a link which is of paramount importance to acquire experiences, practices, and in the creation of significant links to enable users to get to know

the touristic sites. However, it can be noted that there are tactics and widespread strategies, whether among tourists or touristic producers to create physical spaces. We have seen many examples in the current study for individuals using AR applications using mobile phones in order to integrate their own methodologies, perception and ideas in the touristic site. But they did so using modern technological means to increase and deepen their perception of tourism reality surrounding them.

On the other hand, it is also possible for the responsible authorities to determine and limit individual's capabilities and access when using such applications in the future and these limitations may be imposed without hesitation. These limitations can be in the form of fees or certain boundaries for use of such applications if needed and may take place in the near future.

The positive perception among consumers and producers in AR applications in tourism industry boosts the decisions regarding a potential visit to a touristic destination and increase the level of confidence regarding their visiting plan. The producers can improve the services offered to potential tourists, improve marketing efforts, reach a greater number of potential customers, and exchange their experiences around the world easily. The number of consumers of AR may increase once proper and affordable applications are distributed.

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