Augmented Reality (AR) in Urban Heritage Tourism

Timothy Jung and Dai-In Han

Department of Food and Tourism Management
Manchester Metropolitan University, United Kingdom
{t.jung, d.han}@mmu.ac.uk

Abstract

New technology has been seen as a way for many businesses in the tourism industry to stay competitive and enhance their marketing campaign in various ways. AR has evolved as the buzzword of modern information technology and is gaining increasing attention in the media as well as through a variety of use cases. This trend is highly fostered across mobile applications as well as the hype of wearable computing triggered by Google's Glass project to be launched in 2014. However, although research on AR has been conducted in various fields including the Urban Tourism industry, the majority of studies focus on technical aspects of AR, while others are tailored to specific applications. Therefore, this paper aims to examine the current implementation of AR in the Urban Tourism context and identifies areas of research and development that is required to guide the early stages of AR implementation in a purposeful way to enhance the tourist experience. The paper provides an overview of AR and examines the impacts AR has made on the economy. Hence, AR applications in Urban Tourism are identified and benefits of AR are discussed.

Keywords: Augmented Reality; AR applications; benefits; urban tourism.

1 Introduction

Today's tourism industry faces many challenges including the marketing and competitiveness of destinations. Holloway (2002) argues that for many countries tourism boosts economic growth, increasing the living standard by providing job opportunities and attracting investments in the region. Thus, it is crucial to investigate the opportunities that tourism can provide for urban as well as rural areas. Both areas cannot be neglected when it comes to heritage tourism, however, this paper will focus on the context of urban tourism, as the development and impact on urban and rural heritage should be examined separately. One of the ways for destinations to obtain competitive advantage is the investment and implementation of new technology. While Kalawsky et al. (2000) have suggested mobile virtual experiences in the tourism industry to enhance the tourist experience, AR has evolved as the buzzword of modern technology increasing with the development of wearable computing such as the Google Glass project to be launched in 2014 (Wrenn, 2012). However, although the implementation of AR particularly through the mobile media has been attempted for tourism purposes (Fritz et al., 2005), research in the field of employing AR for the enhancement of Urban Heritage Tourism is still limited (Liarokapis et al., 2006). This study aims to provide a concept of how AR can be implemented in Urban Heritage Tourism as well as its direction and development in the future. The paper provides an overview of AR and examines the impacts AR has made on the economy. Hence, AR applications in Urban Tourism are identified and benefits of AR are discussed.

2 Writing Style

2.1 Augmented Reality (AR)

Although many definitions of AR exist, most of them are tailored to specific use-cases, while all of them agree that AR refers to any enhancement of the real environment by computer-generated content. Up to this point, computerized content is fostered by graphical overlay. However, the supplementation of other senses is being explored (King, 2009). Nonetheless, AR is still seen to be in its infant stage and is being further developed and explored in its capabilities, leading to a continual modification to define AR (Olsson et al., 2012). Due to its nature of mixed reality, AR has proven significant support and potential in many industries, which have been mostly of industrial nature up to this point (Reinhart and Patron, 2003; King, 2009). Thus, academics and industry practitioners have seen the potential of AR in industries such as tourism that lives from the exploitation of its immediate surrounding (Olsson et al., 2011). Current AR implementations in the public sphere are focused on mobile applications running on smartphone devices since 2007 and have incorporated the use of GPS navigation for localisation and provision of more information on specific points of interest (Yovcheva et al., 2012). Other early indications of AR include image recognition as trigger, which have spread awareness through the use of QR-Codes, which has started as a gimmick but have proven to be capable for more purposeful use and companies such as Layar and HP's Aurasma that introduced the first AR implementations for interactive overlay (Kan et al., 2009). While hardware limitations have slowed down the development of AR for public use, developers are continuously working on and improving hardware issues, such as battery life as well as image tracking and stability (Gazzard, 2011). Nevertheless, AR is argued to have a high potential for the tourism industry due to the ability of enhancing the immediate surrounding (Fritz et al., 2005).

2.2 Impacts of Augmented Reality

Even though AR has become a buzzword of modern technology, it is surprising how little AR has been used so far to generate revenue (News 3.0, 2013). AR shows high potential in many areas and is regarded to create significant economic as well as non-economic benefits for businesses and stakeholders in various industry sectors. While AR is still seen by many businesses as gimmick and used for promotional purposes only, Semico forecasts the revenues generated from AR technology to exceed USD 600 billion by 2016 (Business Wire, 2013). It is believed that AR will not only serve to grab peoples' attention, but as mainstream technological tool that will alter the way people interact with technology and content (Business Wire, 2013). Furthermore, it has been found in the Semico research that over 864 million cellphones will be AR enabled by 2014 (Breeze, 2012) and 100 million vehicles include AR functions in the equipment (Mind Commerce, 2013). Ahonen (2012) predicted users to adopt AR naturally with the increasing market penetration of smartphones and expects AR users to exceed 1 billion by 2020. As AR penetration is mainly spread in the public through mobile applications, the trend is expected to continue and result in 2.6 billion AR app downloads by 2017 according to Juniper Research (2012). Even today, developers spend significant parts of their budgets into AR technology. Ingram (2013) argues that about USD 670 million is currently spent on the development and research into AR

and is expected to increase to USD 2.5 billion within the next five years. Investments into AR are increasing in many industry sectors as more people see the potential that this technology has to offer through the combination with a cloud based database that is able to grant access to information immediately and anywhere in the world. However, while AR has mainly been used for promotional activities to enhance brand image and social capital, businesses that have implemented AR are now seeking to further develop the technology to encourage customers to a purchase decision seeking economic benefits (News 3.0).

2.3 AR applications in Urban Heritage Tourism

Tourism destinations require constant investment into new technologies, following the current trend of mobile use, in order to stay competitive in the global market, as Fritz et al. (2005) point out the difficulty of many tourist attractions facing the lack of funding to maintain the site. Olsson and Väänänen-Vainio-Mattila (2011) argue that AR devices have the potential of replacing the common tourist guide and become the next generation personalized guide as personal service is gaining popularity across the service sector. Current tourism AR applications have focused on pinpointing the tourist's location and providing background information on POIs in the area (Höllerer and Feiner, 2004). However, due to GPS limitations in the mobile device, such applications still need improvement and increased efficiency to be fully functional and be able to support the tourist. Furthermore, attempts have been made to enhance the holiday experience through AR gaming, such as TimeWarp (Herbst et al., 2008) as well as the reconstruction of heritage sites, such as monuments and public spaces through a 'time travel' effect (Fritz et al., 2005). Heritage sites are considered one of the key sectors of tourism in the urban context. Urban heritage has started to develop due to many influences, one being the global economic impact on many destinations around the world (Chang et al., 1996). Urban heritage destinations, such as Dublin and Venice are considered to be attractions in their nature where impacts on the destination reflect the conflict between tourism and socio economic issues compared to other destinations that live due to built in tourist attractions. The number of tourists in such urban destinations is steadily increasing, affecting the tourist experience as well as the living space of its residents (Nasser, 2003). One of the concerns in urban tourism deals with the issue of space and the limitation of posting signs or other types of information boards that potentially affect existing urban heritage sites (Rkhter, 2004). Thus, virtual space has been suggested as an alternative area to portrait and store information relevant for tourism purposes (Kalay et al., 2007). The proper use of AR for heritage as well as urban tourism still requires investigation to enhance the tourist experience (Fritz et al., 2005). This study aims to provide a concept for the development and implementation of AR in the Urban Tourism context. Current implementations of AR in tourism still lack the effective engagement of the tourist in order to enhance the tourist experience. However, if implemented properly and purposefully, AR shows a high potential of becoming a mainstream technological tool in the tourism industry in the future due to its indoor and outdoor capabilities (Fritz et al., 2005).

2.4 Benefits of Augmented Reality

The benefits that AR comprises are widespread and does not only affect the business sector, but increasingly the end-user. With the increasing use of the Internet for tourism purposes, the tourism product has become more transparent empowering the tourist to get in contact with the destination prior to the actual trip. However, a common dilemma with industries, such as tourism that are based on intangible experiences, the possibility to interact with the destination has been limited. Through the introduction of mobile AR applications, tourists are able to interact with a tourism product prior to the trip as well as on site (Lu and Smith, 2008). Current AR implementations in tourism facilitate the tourists to pinpoint their location and provide information on the immediate surrounding based on sources from the world-wide-web (Höllerer and Feiner, 2004). Other applications of AR have been tested in museums to serve as virtual tourist guide to enhance the way tourists see, experience and interact with the exhibitions and enable the tourist to interpret art pieces in various ways (Damala et al., 2007). AR has been praised for its potential to facilitate particularly for educational purposes due to its nature of providing a dynamic experience and hands on interaction (Horn, 2006). Especially for tourist attractions that are linked to a heritage or religious site, regulations for maintaining the site often restrict the use of information boards and signs, which can alter or affect the heritage site negatively. Therefore, AR has been seen as potential method to provide information depth to tourists without affecting the environment by utilizing the virtual space. Through mobile applications, such as 'Paris, Then and Now' tourists are able to travel back in time and experience Paris 100 years ago in 2000 different locations (Hutchings, 2013). Such entertainment purposes are increasingly popular in the tourism industry, which can be seen in the amount that is being developed towards AR gaming (Herbst et al., 2008). As services are shifting towards personalized and targeted content, AR is increasingly gaining more interest among end-users, as well as businesses (Lee et al., 2008). Pushing more use-cases, it has already made an impact in the way people go shopping. Businesses, such as TryLive allows the user to try on virtual glasses and test the look online through a website without having to physically be there (Total Immersion, 2013). AR will provide social benefits and alter habits of how people used to shop and experience customer service. While information can be tailored to specific needs and preferences, the invasion of privacy and access of personal data will remain to be a challenge to overcome (Hyman, 2013). Another issue will be the amount of virtual spam and unauthorised advertising that AR allows for open source networks (Zacharias, 2010). However, as more people are exposed to AR and make use the technology, the experience and benefits are expected to surmount such issues.

Up to this point, businesses have identified AR as a potential form of low cost marketing, which engages the customer with the brand for a rich user experience and increases perceived value (Sung and Cho, 2012). Through digital marketing campaigns, especially through the generation of AR games and interactive marketing, such as TryLive, companies have triggered a new trend to market to various segments of the market and engage the customer with the brand (Total Immersion, 2013). Potentially, AR has the ability to supplement the step of physically walking to the store to purchase a product by providing sufficient information and immediate purchase alternatives (Applefeld, 2013). However, the amount of businesses in

tourism that have shown impact of AR in revenue and sales is still limited and requires more exploration (Challinor, 2013).

2.5 The Human Factor in AR

Since AR is an interactive technology, it is inevitable to discuss the benefit and challenges of user adopting the technology. In order to implement AR in a meaningful way, it is critical that information is presented and handled by users to suit the need of each individual. Comerford and Johnson (2007) argue that AR technology, although providing standardized information and features, needs to be developed in a way that is adjustable to every user's preference. The same phenomenon was evident in investigating the use of AR technology for male and female users, which showed that men in general would perform more productively compared to women when completing a task using AR (Ahmad et al., 2005). It has been discussed that Augmented Reality has been implemented in various ways to enhance the user's environment and provide a way to directly interact with immediate information. However, Wang and Dunston (2004) argued that it is crucial to design information layers in a way that prevents information overload, resulting in poorer performance and distraction. Novel technology, such as AR is expected to make an impact on every day life of people in the future. However, the human factor and support should be the focus of continuous improvement of technology when designing and implementing AR.

3 Conclusion and Future Research

The aim of this research was to provide the current implementation of AR in the Urban Tourism context and identify areas of research and development that is required to guide the early stages of AR implementation in a purposeful way to enhance the tourist experience and benefit tourism business. The present study identified that AR is slowly moving from a hype and gimmick stage into an area of purposeful implementation in various sectors. As such, although AR in tourism is still considered a new concept, the employment of AR to enhance the tourist experience is rapidly gaining popularity (Fritz et al., 2005). Literature review suggests that AR through mobile applications has been seen to be adopted by tourists naturally, however, it was argued that current technological issues still need to be overcome in order to have a positive effect on the tourist experience (Olsson et al., 2012). Nonetheless, the impact of AR in tourism is significant and is expected to grow exponentially in the coming years through the development of hardware and software as well as with the coming trend of wearable computing triggered by computerised watches and Google's Glass project (Wrenn, 2012). The paper provides an overview of AR and examines the impacts AR has made on the economy. AR applications are wide ranged and many more exist within the tourism industry. Developers are continuously improving current technological standards and the potential of AR has not yet fully exploited. However, it is believed that AR will become a mainstream technology and should not be ignored by businesses in the tourism sector. For academia, this paper provides an overview of current AR practices in the tourism industry and areas of benefit as well as the identification of problems that need to be overcome. Many aspects of AR in tourism still require research to provide an indication of potential implementation as well as benefits. However, such applications

lack the active engagement of the tourist and interactive aspect that AR can provide to attract and motivate tourists to connect with the destination or tourist attraction. Thus, AR is an area that still requires investigation in the tourism sector to fully exploit the possibilities and benefits of this technology. AR research in the urban tourism context should therefore be directed in exploring the ways AR can be used to enhance the tourist experience. Such could be focused on tourist acceptance and ease of use to implement AR effectively as well as on the design and use of content through AR for purposeful employment.

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