Implementing Augmented Reality to Increase Tourist Attraction Sustainability

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Abstract
Tourism is in need of new technologies, such as Augmented Reality (AR) to provide enhanced tourist experiences; hence, much research focuses upon this potential. At the same time, sustainability is considered among the most important topics within the tourism domain and the use of information technologies for tourism sustainability has emerged as a research area within the last six years (Ali & Frew, 2010). However, currently few studies explore the use of AR technology in improving and increasing tourism sustainability. Sustainability plays a particularly important role for cultural heritage tourism attractions, which are dependent on their natural environment, cultural and social traditions (Barthel-Bouchier, 2012; Prentice, 1993). One example of such an attraction is Geevor Tin Mine Museum, a UNESCO world heritage site located in Cornwall. Therefore, the present study aims to use the case of Geevor Tin Mine Museum to identify a number of ways AR implementation could positively contribute to increased attraction sustainability.

Keywords: augmented reality, sustainability, tourist attractions, cultural heritage

Introduction and Literature Review

It is necessary for tourism organisations to adopt new technologies to remain competitive and attractive (Han, Jung, & Gibson, 2014). AR has emerged as a popular tool to enhance the tourist experience (Hume & Mills, 2011), because of its ability to overlay information, (Leue, Jung, & tom Dieck, 2015), improving users perception and interaction with the real world (Di Serio, Ibanez, & Kloos, 2013; Roesner, Kohno, & Molnar, 2014), and enhance the educational and entertainment experience (Wu, Lee, Chang, & Liang, 2013). These characteristics, coupled with the practical ability of AR to allow tourists with limited knowledge of an area to naturally and realistically experience their surroundings, has propelled AR to become a widely accepted and valuable tool for tourism (Chung, Han, & Joun, 2015; Martínez-Graña, Goy, & Cimarra, 2013). Hence, a number of AR applications in tourism have begun to be developed to create 'info-cultural-tainment' experiences (Palumbo, Dominci, & Basile, 2013) and facilitate the tailoring of information to users preferences and knowledge levels (Kounavis, Kasimati, & Zamani, 2012). The potential and benefits of AR are widely explored; however, few studies attempt to appreciate the use of AR as a means to improve sustainability. Using technologies as tools to increase sustainability in tourism is much overlooked, despite the fact ICTs are a critical element in the modern tourism industry (Ali & Frew, 2014). The majority of tourism sustainability studies focus upon the use of technologies in consumer and demand dimensions, technological innovations and industry functions (Buhalis & Law, 2008). Therefore, this study aims to identify how AR implementation can increase sustainability, to help improve the longevity and self-sufficiency of tourist attractions.

Methods

UNESCO recognised Geevor Tin Mine Museum, Cornwall is used as a case study. Performing stakeholder analysis of Geevor identified key influential stakeholders involved in the attraction. As a result 46 semi-structured interviews were held with, 9 internal stakeholders, 30 visitors, 2 tertiary groups, 1 local business and 4 local authorities. The interviews were conducted from April 2015 to March 2016 and lasted between 20 to 52 minutes. Results were analysed using content analysis to permit the identification, comparison and organisation of data.

Findings

Respondents identified authenticity as an integral strength of the visitor experience provided at Geevor. Yet, a challenge was recognised in retaining the first-hand knowledge and experiences delivered by mine guides once they have retired and also providing the same experience to visitors exploring without a guide. AR was agreed as a solution to sustain the value and authenticity. It was believed developing a Geevor AR guide using audio and video recordings of guides would ensure their personal and first-hand knowledge was not lost, and the same level of visitor experience was maintained.

Respondents suggested implementing an AR guide would provide interpretation for the informal visitor. In peak times, there are not enough staff positioned across site to offer interpretation, yet there is limited funding to train additional staff. Thus AR facilitates an sustainable alternative, providing the same level of knowledge, while alleviating pressure on staff and helping keep within budget. Further to this, using AR as a method to deliver information and interpretation, such as 'virtual signage' was acknowledged for its benefit of minimising damage and harm to the protected environment. This is considered one of the key advantages of AR for destination and attraction sustainability.

The introduction of AR in itself was considered a tool to improve sustainability, by broadening the visitor appeal, increasing and enticing interest and demonstrating site advancement. All these factors respondents suggested would ensure the longevity of the attraction, since engaging in younger audiences is vital because they are the visitors of the future. Additionally, attracting more visitors means generating more revenues through increased ticket sales.

Lastly, some respondents identified that implementing AR would encourage visitors to spend longer on site, increasing their likelihood to visit, and spend in the site café and shop. An option to link the AR experience to the site facilities and entice customers was recommended as a method to increase revenues and therefore self-sufficiency and sustainability.

Discussion and Conclusion

Geevor stakeholders identify and recognise numerous ways in which AR could help contribute to, and increase the sustainability of the attraction whilst also providing an enhanced visitor experience. Introducing technical innovations to increase sustainability of tourism attractions or developments is an under researched field. Often sustainability considers the impact of tourism activities on the environmental, social and economic elements; however, it rarely considers the positive impact technical innovations can introduce to increase sustainability. Technical innovation is argued as paramount to the future success of tourism. Therefore,

understanding the use of innovations to improve sustainability and sustainable tourism development is equally as essential and bridge a gap missing from current research.

There are a number of limitations in this study, for example due to its exploratory nature; a case study approach was adopted. However, such an approach does not readily support the generalisation of results and extension to other attractions. Although, findings can be used to aid and help managerial and theoretical understanding of the use of technologies to enhance sustainability in tourism at other similar attractions. This study identifies factors relating to sustainability introduced by AR for the consideration of managers, practitioners and stakeholders at Geevor, and by extension other cultural heritage attractions. Nonetheless, it is recommended further research to be extended to include other attractions, allowing the comparison of findings and increasing generalisation.

References

Ali, A., & Frew, A. J. (2010). ICT and its role in sustainable tourism development. In U. Gretzel, R. Law., & M. Fuchs (Eds.), *Information and Communication Technologies in Tourism* 2010 (pp. 479-491), Springer, Heidelberg.

Ali, A., & J. Frew, A. (2014). ICT and sustainable tourism development: an innovative perspective. *Journal of Hospitality and Tourism Technology, 5*(1), 2-16.

Barthel-Bouchier, D. (2012). *Cultural heritage and the challenge of sustainability*: Walnut Creek, CA: Left Coast Press.

Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the Internet ; the state of eTourism research. *Tourism management, 29*(4), 609-623. doi:10.1016/j.tourman.2008.01.005

Chung, N., Han, H., & Joun, Y. (2015). Tourists' intention to visit destination: Role of augmented reality applications for heritage site. *Computers in Human Behavior, 50*(2015), pp. 588-599. doi:http://dx.doi.org/10.1016/j.chb.2015.02.068

Di Serio, A., Ibanez, M., & Kloos, C. (2013). Impact of an augmented reality system on students' motivation for a visual art course. *Computers & Education, 68*(2013), 586-596.

Han, D., Jung, T., & Gibson, A. (2014). Dublin AR: Implementing augmented reality in tourism. In Z. Xiang & I. Tussyadiah (Eds.), *Information and Communication Technologies in Tourism* (pp. 511-523). Wien, New York: Springer Computer Science.

Hume, M., & Mills, M. (2011). Building the sustainable iMuseum: is the virtual museum leaving our museums virtually empty? *International journal of nonprofit & voluntary sector marketing, 16*(3), 275-289. doi:10.1002/nvsm.425

Kounavis, C., Kasimati, A., & Zamani, E. (2012). Enhancing the tourist expeirnce through mobil augmented reality: challenges and prospects. *International Journal of Engineering Business Management, 4*(10), pp. 1-6.

Leue, M., Jung, T., & tom Dieck, D. (2015). Google Glass Augmented Reality: Generic Learning Outcomes for Art Galleries *Information and Communication Technologies in Tourism 2015* (pp. 463-476): Springer.

Martínez-Graña, A., Goy, J., & Cimarra, C. (2013). A virtual tour of geological heritage: Valourising geodiversity using Google Earth and QR code. *Computers & Geosciences, 61*(0), 83-93. doi:http://dx.doi.org/10.1016/j.cageo.2013.07.020

Palumbo, F., Dominci, G., & Basile, G. (2013). *Designing a mobile app for museums according to the drivers of visitor satisfaction*. Retrieved from http://www.wseas.us/e-library/conferences/2013/Dubrovnik/MATREFC/MATREFC-24.pdf

Prentice, R. (1993). Tourism and heritage attractions.

Roesner, F., Kohno, T., & Molnar, D. (2014). Security and privacy for augmented reality systems (Vol. 57, pp. 88-96). New York: ACM.
Wu, H.-K., Lee, S. W.-Y., Chang, H.-Y., & Liang, J.-C. (2013). Current status, opportunities and challenges of augmented reality in education. *Computers & Education, 62*, 41-49. doi:10.1016/j.compedu.2012.10.024