Virtual reality and mixed reality for second chance tourism

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ABSTRACT

The deterioration of attractions, landmarks, artefacts and destinations is a critical issue facing tourism across the world. The closure of tourism sites and attractions is increasingly more common due to the difficulty and expense of managing preservation with onsite tourism engagement. However, the closure or destruction of tourism sites presents challenges for tourism development. The inability to foster meaningful visitor engagement at sites has implications for the local communities. This paper aims to explore the efficacy of creating tourism experiences in destinations and sites that have succumbed to over-tourism, resultant deterioration and even, destruction. To achieve this objective, the paper introduces the concept of second chance tourism and the role of innovative preservation methods such as virtual and mixed reality. Based on the proposed framework, the collation of data will provide indications on site preservation and impact mitigation via a second chance to reduce pressure on inherently fragile destinations.

1. Introduction

The deterioration of natural attractions, landmarks, infrastructure, artefacts and environments is a major issue facing tourism destinations across the world. The deterioration is a result of a range of human and natural forces, including tourist activity, weather events, and inadequate policy, planning and management, political unrest, among others (Bauer, 2015; De'ath, Fabricius, Sweatman, & Puotinen, 2012). Although tourist visitation is not the only source of deterioration at destinations, Frey and Steiner (2011) argue that tourism, particularly over-tourism, is a significant contributor and ceasing visitation through techniques such as demarketing is often a key strategy to prevent further decline.

The considerable, long-term cultural, heritage, social, environmental and economic implications that can result from the destruction of tourism sites are well-established (Comer, 2012; Murzyn-Kupisz, 2012). These implications may be heightened for regions dependent on tourism, as the destruction may reduce short and long-term visitation, adversely affecting local economies (Bonet, 2013). Academic research aimed at addressing the issue of destination destruction continues to evolve, offering a multitude of approaches to manage the different impacts, causes and outcomes. The aim of this paper, is not to provide an additional approach to destination preservation, rather explore avenues that create new tourism opportunities for destinations and sites that have/are experiencing various forms of deterioration, particularly as a result of over-tourism. A contribution of this paper is the introduction of the concept of second chance tourism. Subsequently, this paper details the potential role of innovative preservation methods, such as virtual and mixed reality, for providing a high-level visitor experience and supporting tourism redirection to facilitate destination/site regeneration. The new tourism opportunities can also be applied respond to the current travel behaviour restrictions stemming from COVID-19, offering an alternative method of tourism consumption.

2. Preservation approaches for destinations

The preservation of natural and man-made sites, artefacts, attractions and destinations has received increased attention in the last decade (Moyle et al., 2018). Increased research foci have been driven by greater emphasis on sustainability which has become deeply embedded within current tourism practices (Hall, Gossling & Scott, 2015; Mowforth & Munt, 2015). Traditionally, preservation has focused on restoration, which often leads to adaptive approaches to prevent further impact (Nasser, 2003). However, within the tourism industry there has been a

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notable shift in the type of tourism approaches offered at destinations as a means of preservation. For example, there has been an increase in ecotourism ventures which aim to reduce tourism impacts and environmental degradation (Buckley, 2012; Cobbinah, 2015).

Concomitantly, to redress this issue, various forms of tourism have emerged. Such as 'last chance tourism', 'doom tourism', and 'extinction tourism' (Leahy, 2008). Last chance tourism (LCT) refers to the intention of visiting landscapes and destinations that are disappearing or vanishing, resulting from human or natural destruction, prior to their demise (Lemelin, Dawson, Stewart, Maher, & Lueck, 2010). Alaska, Greenland, the Great Barrier Reef, the Maldives and others are fast becoming bucket-list LCT destinations due to rapid transformation of the natural environment such as melting glaciers, bleaching corals or disappearing landscapes (Eijgelaar, Thaper, & Peeters, 2010). LCT is often considered a marketing strategy for destinations (Lemelin et al., 2010) encouraging tourists to *visit before it all disappears*. While scholars cloak increased visitation on promoting environmental awareness and engaging tourists to be conservation ambassadors, others criticise LCT for initiating an increase in visitor numbers, leading to over-tourism - exacerbating the destinations demise (Dawson et al., 2011; Lemelin et al., 2010). Despite this, tourism 'opportunities' appear to be a common theme underpinning the research, drawing attention to other issues such as climate change, encouraging sustainable practices and as a strategy to raise money and awareness for conservation efforts (Lemelin, Dawson & Stewart, 2012; Lemelin et al., 2010).

While LCT has led to increased preservation efforts and improved conditions for some destinations experiencing stress, there is limited ability or scholarly attention focused on the relative efficacy of immersive technology for generating emotive tourism experiences which can alleviate pressure on destinations experiencing over-tourism. In addition, technology can preserve destinations in virtual reality in the event the location succumbs to external pressure. Second chance tourism to culturally significant, iconic, and heritage sites that have been destroyed or forced to close to the public due to excessive deterioration, can be achieved through proactive or reactive techniques. Sites such as the Moago Caves in China, the Chacaltaya Glacier in Bolivia, sections of Machu Picchu in Peru, limit or prohibit visitation to avoid further deterioration (Demas, Agnew & Fan, 2015; Ignacio, 2017). In 2018, temporary closure of the famous Maya Bay to tourists (part of the Hat Noppharat Thara-Mu Ko Phi Phi National Park, Thailand) was initiated as part of a four-month rejuvenation program and coastal and marine environment quality evaluation (Cripps, 2018). However, for some sites, particularly those threatened by overtourism and climate change, it may be too late. The Buddhas of Bamiyan in Afghanistan, the ancient city of Palmyra in Syria (Bauer, 2015), Venice in Italy or the Great Barrier Reef in Australia are examples of tourist sites degraded by human and/or natural forces. The closure of tourism sites and attractions is a last resort for many destinations, however, is increasingly a necessity due to the difficulty of managing the inherent challenges and costs.

There is growing concern that irreplaceable cultural heritage will continue to be lost (Bauer, 2015; Toubekis et al., 2009). Given the economic and socio-cultural significance of these unique places, the exploration of tourism opportunities that permit economic development, and reflect social and cultural need, is an imperative (Park, 2010). While last chance denotes no further opportunity (when it's gone, it's gone), the concept of *second chance tourism* offers a framework to redirect visitors to enhance, or replace, existing offerings.

3. Second chance tourism

Second chance tourism (SCT) is an approach that gives a second 'life' to destinations, attractions, sites or artefacts that have been destroyed or severely deteriorated. SCT allows visitors to experience these using different mediums or formats, to be experienced in-situ (on-site) or ex-situ (off-site). SCT involves the development of supplementary products, which focus on stimulating engagement through emotive recreated digital experiences. Supplementary products can be physical structures, replications or reconstructions of the original tourism attraction, or partial displays in conjunction with redevelopments such as museums, information centres, or monuments.

Rapidly evolving technological developments have resulted in innovative digital mediums and methods for giving new life to tourism-based products within destinations. Consequently, mixed reality applications rapidly expanding, particularly in the context of cultural tourism (Han, Weber, Bastiaansen, Mitas, & Lub, 2019; Yung, Khoo-Lattimore, 2019). Digital technologies such as laser scanning (Guttentag, 2010; Little, Patterson, Moyle, & Bec, 2018) create and recreate environments or objects in two and three-dimensional formats to offer digital and physical experiences. Laser scanning is a suitable technique for replicating sites still in existence. To recreate sites no longer available in a physical form, photogrammetry and computer modelling are used. In addition to the potential development of a recreated 'destination', tourists and local people can engage by sharing personal and historical photos. For example, Project Mosul is using tourist photographs and video, and archival documents and images, to recreate lost artefacts (Vincent, 2017).

Digital replications can be presented in interactive digital environments for public and visitor consumption. Most notably, sites and artefacts are being presented in augmented and virtual reality experiences. Virtual reality (VR) is a computer-generated simulation of an environment, whilst mixed reality (MR) presents the co-existence of the real and virtual worlds. Augmented reality (AR) is a type of mixed reality where the real environment is overlaid in a digital context. For more information about the different levels of immersion from digital technologies and their application in tourism, refer to the study by Bec et al. (2019). While traditionally being used for marketing purposes, digital experiences, such as AR and VR, are progressively being adopted in other areas of the tourism sector for enhancing the tourism experience (Beck, Rainoldi, & Egger, 2019; Guttentag, 2010; Wei, 2019). In particular, governments and other stakeholders have implemented digital experiences for heritage preservation and tourism experience (Bec et al., 2019). For instance, Toubekis et al. (2009) used laser scan documentation to reconstruct destroyed Buddha figures in Afghanistan. The computer-generated simulation was then developed into a VR tourism experience to allow visitors to engage with the destroyed Buddha figures and other no longer existing aspects of the local site (Toubekis et al., 2009). The ArkaeVision project also examined cultural heritage experiences that had been enhanced through the creation of technological infrastructure using virtual (AR and VR) representations. The study found the digital experiences to contribute to the permanent enhancement of cultural resources and innovatively communicate the associated stories (Bozzelli et al., 2019). Additionally, Arvia'juaq National Historic Site in Nunavut, Canada developed an interactive virtual tour to connect people to sites that are otherwise inaccessible and simultaneously increase awareness of cultural heritage to visitors. Although both AR and VR are progressively becoming more common in tourism experiences, Moro, Rita, Ramos, and Esmerado (2019) found that VR is commonly designed as the basis of an experience, whist AR was used to supplement an existing experience.

Digital experiences are also becoming increasingly implemented as communication and education strategies, whereby important information is presented in immersive and/or interactive formats, such as AR, VR or 3D simulations (Nayyar, Mahapatra, Le, & Suseendran, 2018). The tourism sector can explore the use of digital technologies and experience for this purpose as a means to communicate local culture heritage or educate visitors on heritage preservation. Such approaches are already being implemented in museums as a comprehensive and interactive learning experience (Kang & Yang, 2020).

Furthermore, this form of SCT offers opportunities which extend beyond the physical destination. For example, the VR experience of the Buddha figures is not limited to tourism consumption at the destination. The VR experience is also available for purchase online, generating
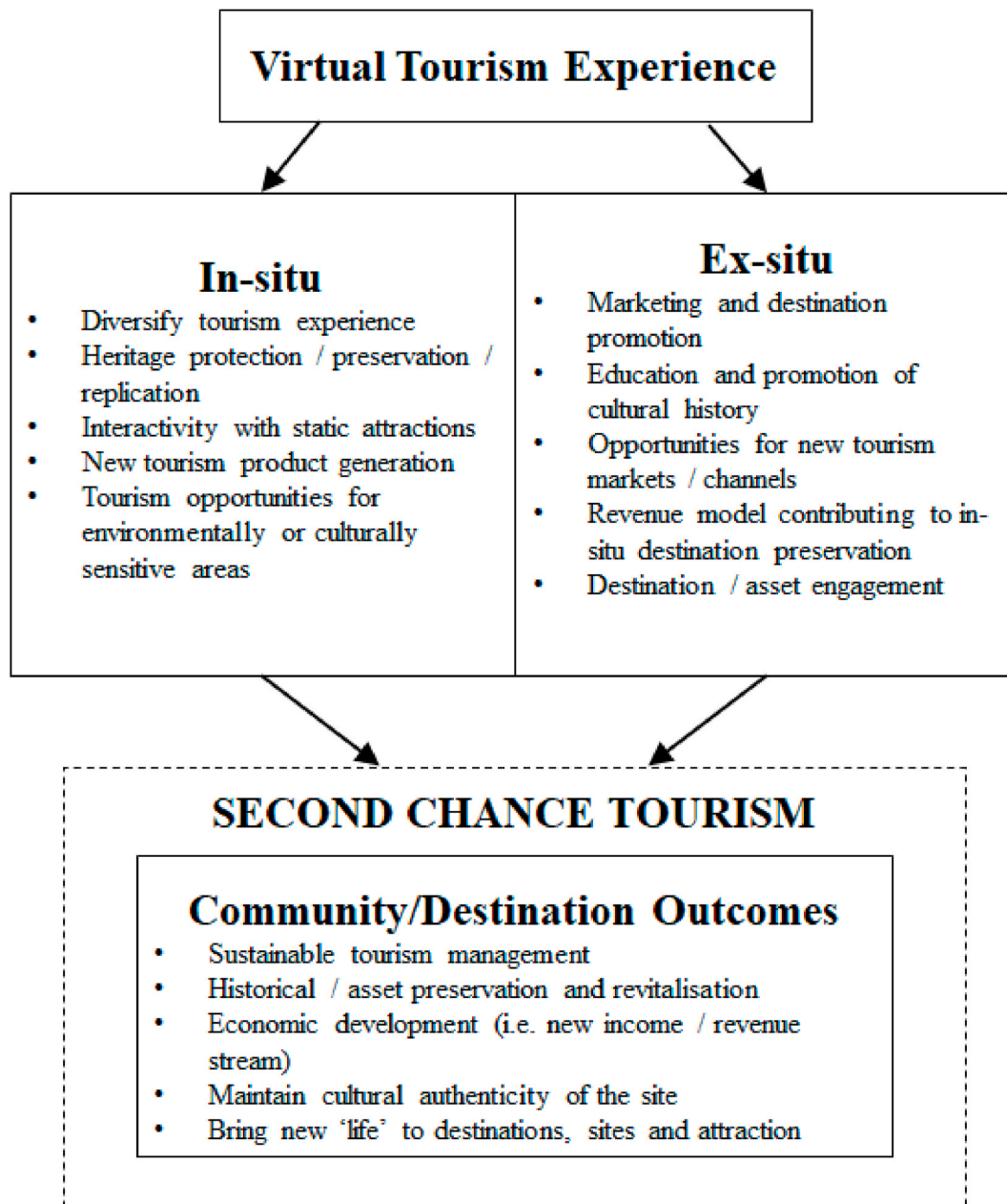
Fig. 1. Virtual technology for second chance tourism model.

revenue for the destination, without visitation. The online experience also acts to stimulate interest in the actual site, though keeps numbers to a sustainable level, especially during peak periods. A study by Huang, Backman, Backman, and Chang (2016) found that ex-situ experiences can act as a marketing tool for the destination and increased the desire for tourists to visit the destination.

Moreover, Williams and Hobson (1995) revealed that immersive touristic VR environments enriched with interactive possibilities had an impact on tourists' planning behaviour. This has been supported by more recent research that has found virtual reality experiences to increase the desire and likelihood to participate in an activity (Jeng, Pai, & Yeh, 2017; tom Dieck, Jung, & Michopoulou, 2019). The role of VR in interest generation can have benefits for other challenges facing the tourism sectors. In particular, the social and behavioural changes that have resulted from the COVID-19 global pandemic have had and will continue to have considerable implications on the tourism sector. Most notably, destinations will have to contend with considerably reduced

tourism visitation and the notion of undertourism. Virtual and mixed reality mediums can offer an alternative form of destination consumption to accommodate for the trends of social distancing and reduced movement that are likely to continue for the foreseeable future. Virtual tourism experiences also offer health and wellbeing benefits which have been found to assist individuals to cope with emotional and cognitive challenges, such as anxiety, that can be amplified during periods of isolation, loneliness, and uncertainty (Higuera-Trujillo, Llinares Millan, Montanana i Avino & Rojas, 2020; Tussyadiah, Wang, Jung, & tom Dieck, 2018). Further research needs to explore the implications that ex-situ tourism consumption has for a destination as well as for tourist motivations to visit the destination.

Preserving the physical site may result from SCT. However, the diversion of visitors to online or hardened sites such as museums and theatres may reduce or eliminate visitation to the original sites. Therefore, future research is required. The framework/concept proposed (refer to Fig. 1), has the potential to contribute to the digital

preservation of the site, as well as the associated socio-cultural heritage. The accuracy of representations further contributes to authenticity, as methods such as 3D scanning can recreate an artefact, site or attraction within 2 mm of accuracy (Demas et al., 2015; Guttentag, 2010). However, for digital experiences to be delivered and accurately represent cultural heritage sites, both in-situ and ex-situ applications need to consider the equipment and resources required, such as headsets, internet connectivity, and device compatibility (Cacho-Elizondo, Alvarez & Garcia, 2018).

4. Conclusion and future research

This paper introduced the concept of second chance tourism, which aims to give another life to destinations experiencing deterioration or at risk of future destruction. Research suggests people are loving some of our most unique destinations to death. Simultaneously, general aging, war and conflicts, climate change and environmental disasters take a toll on environmental and heritage sites. In 2014, UNESCO launched an emergency initiative to safeguard Syrian cultural heritage (UNESCO, 2017). Conservation, preservation and, more recently, restitution, are costly but critical endeavours. Tourism is an economic driver that could provide viable avenues to accomplish these aims. Technology has facilitated travel to virtually every corner of the planet (and beyond with space travel expected to commence by 2020). Emerging technologies such as drones, 3D printing, robotics and AR-based apps, are being employed to record and construct virtual experiences (Kidd, 2015). In-conjunction with tourism, these virtual destinations can evolve into attraction in of themselves.

This introduced concept of second chance tourism (SCT) and conceptual framework promotes best practice in digital preservation for destinations through embracing innovative technologies such as virtual and mixed reality. Future research into the economic, social and heritage outcomes of destination engagement with SCT is warranted. Exploring the many facets of SCT would open and advance dialogue into the ethical considerations of replicating significant cultural places and spaces; and the implications of using these for tourist consumption. Whilst the applications of virtual tourism are immense for addressing tourism issues and expanding the tourism experience, a limitation of this study is the specific focus on VR and AR technology specifically for heritage preservation to combat overtourism. There is a need for further research to expand scholarly discourse on the applications of virtual tourism. Furthermore, an evaluation of the tourist experience would inform and reveal, yet unknown, opportunities for creating meaningful and emotive activities designed to enhance, visitor satisfaction, engagement, sustainability and conservation. Lastly, research is needed to explore possible revenue models to generate funding from digital experiences. In particular, research needs to consider revenue models that ensure the financial contribution from digital experiences, especially those consumed ex-situ, are largely benefiting local heritage preservation and the local community.

Declarations of competing interest

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