# Sheffield Hallam University

# Technology for Sustainable Tourism

ALI, Alisha <http://orcid.org/0000-0002-7667-4293>

**Citation:**

**Copyright and re-use policy**

Ali, A., 2022, Technology for Sustainable Tourism, in Buhalis, D., (ed), Encyclopedia of Tourism Management and Marketing Edward Elgar Publishing, Cheltenham.
_____

**Technology for Sustainable Tourism**
Alisha Ali
Alisha.Ali@shu.ac.uk

Striking a balance between viable economic growth and maintaining harmony with the natural and socio-cultural environment is still at the core of the discussion in academic and industry circles. Tourism's future is critically dependent on its sustainable development and pragmatic remedies are needed. The use of technology as a workable approach to support sustainable tourism development is growing as a body of research (Ali & Frew,2013; Benckendorff, Xiang, & Sheldon, 2019). Such a fusion is vital for a healthy tourism industry (Ali & Frew, 2013).  Technology for sustainable tourism refers to the usage of the breadth of innovative technologies which encompasses an integrated system of software and networked equipment utilising databases, communication devices and the internet for information flow, sharing and processing of information relevant to supporting sustainable tourism development.

Ali & Frew (2013) offered a broad collection of technology for sustainable tourism. They argued that these technologies can be a pragmatic tool used by destination managers. Benckendorff, Xiang and Sheldon (2019) developed this work further by using the twelve aims of sustainable tourism established by UNEP and WTO (2005) to understand the relationship between technology and sustainable tourism. These authors concluded that technology could enable the democratisation of information for more effective decisions related to a destination's sustainability. Successful engagement with technology for sustainable tourism needs to be considered in accordance with the Sustainable Development Goals (SDGs) and tourism primary stakeholders who are tourism planners, tourists and host communities. Table 1 provides an overview of the range of tools which can be used to support sustainable tourism.

Tourism organisations can engage with technology, so they are at the forefront managing their economic, natural, and socio-cultural environments. Experiencing the natural environment is a primary motivator for travel and the future of tourism is dependent on the preservation and maintenance of this environment. Technology can be used here to support those critical decisions needed to ensure continued respect for the environment.  Engaging with technology for sustainable tourism can improve how information is managed and provided by monitoring the economic impacts on the visitor economy. It can support in overseeing and controlling development in fragile areas by supplying relevant and updated information to key decision makers. Many of the challenges of tourism development such as poverty alleviation and raising the capabilities and standard of living of local communities can be addressed through technology (Gouvea, Kapelianis, & Kassicieh 2018) as it offers real prospects for significant changes (Negrusa et al. 2015).

Ali, A., 2022, Technology for Sustainable Tourism, in Buhalis, D., (ed), Encyclopedia of Tourism Management and Marketing Edward Elgar Publishing, Cheltenham.

_____

Table 1:  Range of Technologies for Sustainable Tourism Development

| Area of use | Tourism Planning | Tourist Education | Local communities |
|---|---|---|---|
| **Types of Technologies** | Computer simulation<br>Destination management systems<br>Economic impact analysis software<br>Environment management information systems<br>Geographical information system<br>Global positioning system<br>Intelligent transport systems<br>Location based services<br>Unmanned aerial vehicles | Gamification<br>Social Media<br>Virtual reality/virtual tourism<br>Augmented reality<br>Mobile technologies<br>Intelligent transport systems<br>Carbon calculators | Community informatics<br>Computer simulation<br>Geographical Information System<br>Sharing economy<br>Social media<br>Virtual reality/virtual tourism |

Some of the technologies tourism planners and decision makers can engage with are geographical information systems (GIS) and computer simulation. A GIS collects, stores retrieves, maps, manipulates, analyses, integrates and displays vast amounts of spatial and non-spatial geographical data (Chancellor & Cole, 2008).  A GIS can serve as a decision support system for tourism planners because the combination of spatial information with data on the local infrastructure and conditions provides a resource inventory and identifies the suitable types of development. This highlights the areas which need protection, determining capacities, suitable indicators of sustainable tourism for monitoring and establishing boundaries with the communities (Ali & Frew, 2013). Computer simulation enables a tourism planner to model complex planning processes to determine the impacts of development over time. Issues such as visitor usage patterns and capacity issues can be modelled to enable a tourism planner to understand the related risks and prospects. In addition to the above-mentioned, new technologies such as mobiles are continuously being innovated which will support destinations in collecting, processing and analysing data for real-time, informed sustainable decision making.

Planning will be useless if tourists do not play their part in sustainable tourism development. Tourism planners have a responsibility to educate tourist on their behaviours and their potential impacts when visiting a destination. There are several emerging technologies which can be used to help to educate the tourists. These are gamification, virtual reality, augmented reality, mobile technologies, and social media.

Ali, A., 2022, Technology for Sustainable Tourism, in Buhalis, D., (ed), Encyclopedia of Tourism Management and Marketing Edward Elgar Publishing, Cheltenham.

_____

Gamification focuses on motivating the user with rewards (extrinsic and intrinsic) and emotions (Robson et al., 2015). Through the creations of gamified experiences by destination planners, tourists can learn about sustainability and their actions and be encouraged to change their behaviour (Negrusa et al., 2015). Using a computer-generated 3D environment, virtual reality enables real-time simulation of our senses with the user being completely immersed in the virtual world (Guttentag, 2010). Virtual reality provides opportunities for tourists to visit sites which they can longer experience in person, educate tourist pre-trip and in-trip on making environmentally responsible choices. Augmented reality, on the other hand, overlays the real-world environment with computer generated information (Guttentag 2010). The value of augmented reality lies in its ability to support cultural and heritage sites through visitor education and interpretation on their sustainable actions.

Tourists are increasingly engaged with their mobile phones pre-, in- and post-trip. Each mobile phone number is a unique identifier. Using mobile location information, tourists can be pushed messages related to local activities such as food, drink, attractions, and activities to enable them to make more sustainable consumption choices. Social media is undoubtedly a powerful communication tool, and this can also be used as a mechanism to share sustainable tourism messages with tourist. Social media content is important influencer of tourist's decision making and the right green messages online can endorse and encourage responsible travel and sustainable behaviours (Gössling, 2019).

Communities are at the heart of tourism development their participation is key to enacting the bring forth the principles of sustainable development. These local communities should be given a say in their tourism development activities in their areas so they can reap the rewards and strengthen their opportunities for a better quality of life. Technology can play a transformative role in local community development by giving them a voice and leading to more democratic participation and representation especially groups which are marginalised and have protected identities. It presents the opportunity for greater achievement of equity to achieve sustainable livelihoods by allowing them to organise their resources and create new knowledge because they now have wider access to information. Technology if used effectively enables tourism organisation to make more effective decisions and facilitate stronger engagement with stakeholders. Technology can used to create market opportunities for communities. This leads to long term improvements in livelihoods such as job security, work opportunities supporting the economic arm of sustainable tourism.

There are several challenges in implementing technology for sustainable tourism. These are the cost, the users, stakeholders' knowledge of sustainable tourism, technology suppliers and partnerships, the stage of destination development, reliable and accurate data and government support. Despite these challenges, the current pandemic has highlighted the importance of technology in shaping tourism's sustainable future especially the achievement of the UN SDGs. The value of technology for sustainable tourism will be realised by their fitness for purpose and how they are engaged with by stakeholders.

Ali, A., 2022, Technology for Sustainable Tourism, in Buhalis, D., (ed), Encyclopedia of Tourism Management and Marketing Edward Elgar Publishing, Cheltenham.

_____

Future directions should focus on synchronising the interconnectivity and interoperability of these technologies to enable smart tourism destinations allowing for a comprehensive approach to the management of tourism resources (Buhalis, 2019). Social networking sites have become powerful in influencing consumer behaviour. These sites offer real possibilities of making lasting changes in sustainable tourism development through connecting and influencing communities, tourists, destinations planners and decision makers. Emerging technologies such as the Internet of Things, haptics, biometrics and the rapid development of the technology environment through mobile phones, superfast broadband and 5G connectivity provides opportunities for tourism planners to be innovative in the sustainable tourism development of their destination.

References

Ali A, Frew JA (2013) Information and communication technologies for sustainable tourism. Routledge, London

Beck J, Rainoldi M, Egger R (2019) Virtual reality in tourism: a state-of-the-art review. Tour Rev 74: 586-612

Benckendorff PJ, Xiang Z, Sheldon PJ (2019) Tourism information technology. CABI, London

Buhalis, D. (2019). Technology in tourism – from information communication technologies to eTourism and smart tourism towards ambient intelligence tourism: A perspective article. Tourism Review, 75, 267-272.

Chancellor C, Cole S (2008) Using geographic information system to visualize travel patterns and market research data. J Travel Tour Mark 25:341-354

Gössling S, Hall CM (2019) Sharing versus collaborative economy: how to align ICT developments and the SDGs in tourism? J Sustain Tour 27:74-96.

Gouvea R, Kapeliani D, Kassicieh S (2018) Assessing the nexus of sustainability and information & communications technology. Technol Forecast Soc Change 130: 39–44

Guttentag DA (2010) Virtual reality: applications and implications for tourism. Tour Manage 31:637-651

Negrusa LA, Toader V, Sofica A, Tutunea FM, Rus VR (2015) Exploring gamification techniques and applications for sustainable tourism. Sustainability 7:11160-11189. doi:10.3390/su70811160

Robson K, Plangger K, Kietzmann JH, McCarthy I, Pitt L (2015) Is it all a game? Understanding the principles of gamification. Bus. Horiz. 58: 411–420