



ORIGINAL ARTICLE

ICT and tourism impacts in islands

Giovanni Ruggieri and Patrizia Calò

Observatory on Tourism for Islands Economy (OTIE), Palermo (Italy)

E-mail addresses: ruggieri@otie.org and research@otie.org

Abstract – New technologies can represent, for some aspects, both a problem and a precious resource. As we concerns, in tourism sector, ICT can help in managing and promoting destinations in a better way than in the past, especially in those cases where problems linked with the management of tourist flows and the need to manage a sustainable development exists.

Monitoring tourism impact at the destination is a fundamental issue in order to respect the right pressure and to avoid negative effects in the destination and with the residents. There are several devices available and useful for different needs, therefore almost each kind of monitoring and analysis can be supported by the right tools. This knowledge should encourage local responsible to implement regular and meticulous surveys and analysis to manage the impact of tourism pressure and to respect the optimal carrying capacity of the site.

Keywords – destination, tourism impact, development, information and communication technology, ICT

Received: July 31, 2018 Accepted: August 19, 2018

Introduction

Local development is always more often dependent from tourism sector, especially in fragile contexts such as islands. These territories, in fact, represent a special cluster such as an independent state from the membership countries. Particularly, insular economies are almost totally based on tourism and connected activities. Because of this, they are the best cases to be analysed in order to highlight positive and negative aspects of economic development based on tourism sector.

Tourism can bring development and growth but also negative effects on the local environment and residents. So, it needs to consider a sustainable development approach based on quantitative and qualitative indicators and a wide awareness about the need to preserve and then valorise local resources. It needs to use new tools in order to reach the optimal development without threatening the sustainability of the destination, containing the negative effects of tourist flows and then the local carrying capacity. In this sense new technologies represent a relevant tool both in the phase of analysis and as a method to reach the goal. New technologies have radically changed the way to share information, to speak, to work, to travel and, in general, to live. They can

represent, for some aspects, both a problem and a precious resource. As we concerns, in tourism sector, information and communication technology (ICT) can help in managing and promoting destinations in a better way than in the past, especially in those cases where problems linked with the management of tourist flows and the need to manage a sustainable development exists.

Monitoring tourism impact at the destination is a fundamental issue in order to respect the right pressure and to avoid negative effects. ICT can be employed, for example, to drive tourists towards alternative paths, promoting other sites, as well as to monitor the number of tourists visiting or walking through a specific site at the destination, reducing for example the lack of data deriving from the administrative nature of traditional surveys.

There are several devices available and useful for different needs, thus almost each kind of monitoring and analysis can be supported by the right tools. This knowledge should encourage local responsible to implement regular and meticulous surveys and analysis to manage the impact of tourism pressure and to respect the optimal carrying capacity of the site.

The paper will present the island contexts and their peculiarity in respect of the mainland, as well as some of the existing technologies and methods to monitor and to evaluate the impact of tourism at the destination, showing how ICT tool can support an efficient and effective management. The aim is, indeed, to keep the attention towards the available methods and tools and encourage the use of technologies in promoting the preservation of the site, through the evidences obtained in the existing literature. Particularly, the attention will be on the use of ICT tools in contexts characterized by high levels of tourism pressure and relevant problems in terms of sustainability. The need to reduce the impacts of tourist flows in the destination is linked with the preservation of local heritage, either material or immaterial, and the promotion of a real exchange between residents and tourists, based on a respective approach oriented to the relationality and the valorisation of the local identity (Vázquez & Ruggieri, 2011).

Literature and background

Island contexts

Tourism has become essential for local economy, especially in islands, characterized by little other economic activity. The obstacles to economic growth in these contexts can be summarized under four categories (Briguglio, 1995; Hampton & Christensen, 2007; Scheyvens & Momsen, 2008):

- small size,
- insularity / remoteness,
- environmental vulnerability, and
- socio-economic factors.

Small size often implies limited natural resources, high propensity to import goods and services, limited possibilities for import substitutions and a lot of what is consumed by tourists cannot be produced locally in neither sufficient quality nor quantity (Sharpley & Ussi, 2012). Small size also means small market for domestic products and hence dependency on export markets, difficult for domestic industries to take advantage of economies of scale, high transportation costs and high levels of openness to international trade. The barriers to economic growth, especially in the case of small islands developing states (that is, SIDS), include a heavy dependency on foreign aid, cooperation and preferential trade agreements. Tourism development for these contexts is a valid chance for independent economic growth and increasing standards of living, so representing opportunity. It is an opportunity, for example, for the local population, to gain much income and employment or to improve basic infrastructure such as roads, airports and utilities that the local population can use.

Tourism impacts

The impacts, both positive and negative, of tourism on islands can have a more pronounced effect than those ones recorded in the mainland (Croes, 2006 and 2011). The magnitude of the economic benefits will also depend

on the degree of good governance in the destination. In this context, the need to pay particular attention to the carrying capacity, the community involvement, the dynamic political environment and the special interest activities emerges (Lim & Cooper, 2009). We consider both the small islands developing states (SIDS) and the small island tourism economies (SITE) that are economies heavily dependent on tourism as measured by indicators such as aggregate tourism spending or average daily tourist density, and exhibit more favourable characteristics on a range of economic, social and demographic indicators. For these ones, this depends on three reasons: the geographic proximity to major global markets; early post-war development of international tourism; a longer and more intense period of colonization that led to the early establishment of basic infrastructure and market institutions (Parry & McElroy, 2009). Particularly in these contexts, tourism and agriculture have had special relationship, with benefits for the local economies (Mitchell & Ashley, 2010; Torres, 2003).

Tourism for local development

Many small island economies rely heavily on international tourism for their economic growth. Schubert, Brida, and Risso (2011) study the relationship between the tourism demand growth and the economic one. They find that an increase of tourism demand leads to an increase in economic growth, a confirmation of the tourism led growth hypothesis (Durbarray, 2002). Moreover, Seetanah (2011) finds a two way relationship between tourism growth and economic growth. Another peculiarity concerns the focus of islands efforts on sustainable tourism because of their natural environments and lack of built tourism attractions, like theme parks and museums. Also, there is normally a cultural allure to the islands that motivates visitors to choose those destinations. One of the issues associated with natural tourism sites is that tourists expect a more personal experience in a natural setting with minimal development. However, they need to focus their product development efforts in areas that are consistent with their strengths, as well as the economic policies of the government. Additionally, it is important to manage the negative social and environmental impacts of tourism and in this sense there has been a good deal of research in the area of sustainable island development (Craigwell & Maurin, 2007; Griffith, 2002; Chen, 2006; Sharpley, 2003). In fact, the expansion of tourism from a luxury destination to a mass-appeal destination with many companies benefiting, including hotels, taxis and local food producers, if it is not well managed, could lead also to negative effects and impacts on people and environment. All of the same products available to tourists are made available to the locals, resulting in a favourable environment for tourism expansion and a high percentage of repeat visitors. Initially, other countries do not take advantage of the favourable international environment for tourism expansion. Over time, most of the countries improve once they realized the importance of tourism to the economy.

Tourism is often the principal source of employment and foreign exchange earnings for island states, and the dominant economic sector. The economic effects of tourism development can be evaluated in different ways if you don't consider the other dimensions involved, such as the social and environmental ones. According Sharpley (2003), promoting mass tourism has proven to be an effective vehicle of development while promoting sustainable or 'quality' tourism might not be as effective as the mass marketing approach. Kokkranikal et al. (2003) addressed the issue of the added importance of sustainability-oriented tourism development for islands, given the fact that they face geographic, environmental, structural, and political limitations. This approach proved effective in minimizing the negative impacts of tourism. Ghina (2003) explored the status of sustainable development in small island developing states, highlighting that they face challenges such as ecological fragility and economic vulnerability. But according the authors the main challenge was environmental vulnerability – e.g., climate change which will threaten the sustainability of the economy (e.g., tourism). Belle and Bramwell (2005) examined the importance of policies addressing climate change impacts and how policy makers and tourism managers disagreed. Tourism managers didn't view policy interventions as favourable as the government policy makers, even though both felt it was very likely to be damage to the coast and the ecosystems. Moreover, some researchers have proposed new methods for managing island destinations. Sahli and Nowak (2007) proposed a trade theoretic approach for modelling the role of inbound tourism on overall economic development. There are negative economic impacts from tourism, in addition to the well documented negative social and environmental impacts.

Tourism and technologies

The use of technology in tourism is not new. The tourism industry has been influenced by increased applications, growth and widespread use of ICT and it continues to heavily influence the changes within tourism (Buhalis and Law 2008). The literature concerning the application of ICT to specifically support the management of sustainable tourism is not very rich. Melville (2010), Dao et al. (2011), and Bajracharya et al. (2013) have commented that a research gap exists which focuses on the role of technology for developing businesses capabilities for sustainability. Watson et al. (2010) further argues that studying on providing a greater understanding of how technology can help to support sustainability concerns to scholars, while Henry (2012) noted that, "it would seem foolhardy not to understand the ICT implications in these regard". Destinations are not only a widely accepted organising unit in tourism and the attracting power for tourists; they are the central point for all the stakeholders in the tourism industry (Ko 2005; Bornhorst et al. 2010).

In the literature, one area that has not been thoroughly investigated is the possibility of using ICT to mitigate the negative impacts of tourism and highlighting its positive consequences. For destinations, it serves as a mechanism for new distribution channels and increases communication and interaction with and between stakeholders (Gratzer et al. 2002; Buhalis and O'Connor, 2006).

Shafie et al. (2013) presented a conceptual approach in understanding how ICT can be used in sustainable urban tourism through specific indicators development. Using the ski resort Åre in Sweden as a case study, Fuchs et al. (2013) presented a knowledge-based destination management information system, which can aid in sustainable destination development. Chiabail et al. (2013) focused on facilitating stakeholder participation for sustainable cultural tourism development through the design of a Website, which used tools such as blogs and forums concentrated on how ICT can be used for sustainable tourism. Ali and Frew (2013) have presented an overview on the field of ICT sustainable tourism by conceptualizing it from a destination, consumer and business perspective and derived a collection of ICT-based tools for sustainable tourism development.

The importance of technology is marked by now, since technology and innovation are considered the main forces for ensuring sustainability (Scheel 2011). Hjalager (2010) reinforced this when she identified ICT as an important catalyst for tourism innovation whilst Racherla, Hu and Huyn (2008) argued that destinations have not embraced the power of ICT to connect with innovation for tourism planning and development. Since this, new roles in Destination Management Organizations (DMO) will be defined. The innovations not only exist in a physical state, but also are habits and customs and provide some type of framework within which people can interact.

Tourism management and ICT

The tourism system will have to be managed by an institution that is located beyond the scope of individual businesses and organizations, but able to understand local needs and potentialities. The use of ICT for sustainable tourism helps innovation by fostering better partnerships with stakeholders and engaging in dialogue with the community. ICT can be an innovative and practical approach for destination managers in their efforts to further support sustainable tourism. Then, one of the fundamental issues for the tourism sector development will be adopting a sustainable strategies and policies for the future. To understand the effective direction, the definition of sustainable tourism is needed. The official definition of sustainability as regards tourism sector has been provided by WTO in 2005: "Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability". In order to reach this goal, the analysis of the actual scenario

at the destination has to be defined through a set of tools to evaluate the impact of tourism. In this sense, over the years, many indexes have been elaborated to evaluate the impact of tourism in a destination, such as carrying capacity, social responsibility and integration between tourists and local people. Particularly, carrying capacity has been considered the most relevant indicator. According the WTO, the carrying capacity of a tourist destination may be defined as "the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and social environment".

Once the starting framework has been pictured, an efficient and effective strategy to contain the negative impact has to be selected and implemented. In both phases preliminary analysis and management of the tourist flows, new technologies play a relevant role since their accuracy and widespread over the world.

Existing technologies and methods

The available tools to collect data about tourists' movements and behaviour at the destination are mainly based on GPS, WiFi or video technologies. They consist in counting people at the access points of the destination, such as harbours or airports for insular contexts, as well as at the entrance of specific sites at the destination, such as city centres, archaeological sites, natural or theme parks and so on. The devices could be positioned also in specific sites to evaluate the level of crowd and support decisions. But the available tools and the support they can provide are increasing.

A destination is defined as the physical space / geographical area, which contains tourism products and services to be consumed by the tourists as part of the experience and which is managed by an organization, such as a DMO, that is the organization responsible for the management of tourism at the destination level. To support the destination management, the available ICT tools for sustainable tourism are:

- Destination management system (DMS)
- Intelligent transport system (ITS)
- Environment management information system (EMIS)
- Location based services (LBS)
- Global positioning system (GPS)
- Geographical information system (GIS).

DMS is identified by destination managers within DMO as the most important tool for supporting efforts in sustainable tourism development. It is used for information management, marketing (Horan and Frew 2007), exchange amongst stakeholders, resource management, distribution, tourist education and satisfaction and sustainable consumption.

ITS is an important ICT tool used for tourist satisfaction by providing real time information and traffic management (Diagle and Zimmerman, 2004), leading to

savings in energy, to identify the safest and quickest route, assist in navigation and generally enhance the enjoyment of the destination.

EMIS is used for resource and information management (El-Gayar and Fritz, 2006), which could lead to cost savings. Labour cost is reduced since manual processes can be automated through the use of the EMIS. Destination managers are then more aware of the impacts of tourism at the destination and can therefore take the necessary remedial or mitigating action. This information helps to monitor and measure the environmental quality of the destination to identify areas for zoning, for instance, areas of tranquility or areas with people on bikes.

LBS are very promising for managing sustainable tourism, with a wide variety of uses, including the provision of information to the tourists for visiting geographic locations in real time (Berger et al. 2003; Liburd 2005). It aids in the management of the destination's resources since they can market and inform the tourists about which sites and attractions to visit, educate them on travelling to sensitive areas, how they can maintain the destination's environment and appropriate behaviour at the destination. This information can help tourists make sustainable choices about which products to consume during the stay (Liburd 2005).

GPS is identified for both tracking and analysis of tourist movements (Shoval and Isaacson 2006) and location identification for tourists. A destination manager can use this information to develop tourism plans for spreading tourists at different sites and attractions at the destination. This ensures that environmental impacts are better managed in a particular area through 'load balancing'.

Another ICT-based tool/application was GIS, used for mapping and profiling tourists at the destination (Lau and McKercher 2007). Using this information, destination managers can monitor the destination and use it to assist with visitor management techniques. GIS also assists a DMO in transport planning and routes identification (Lew and McKercher 2005). This provides both the tourists and the locals with the safest and quickest routes at the destination. Economic benefits can also be realised from the co-ordination and management of information. GIS can also being used for data integration and mapping so as to provide DMOs with a clearer picture of conditions at the destination for better decision-making.

Other ICT tools

Further technologies are strongly related with the need to preserve local heritage and resources, such as Community Informatics (CI), used for community engagement, heritage preservation, interpretation and community cohesion (Gretzel et al. 2009), and truly engages with the socio-cultural aspect of sustainable tourism. It can connect the community by allowing them greater involvement in decisions relating to tourism development

and planning at the destination. This is important since if the locals feel integrated in the tourism process then they will have greater buy-in (Cole, 2006).

Increasing awareness through CI can support the host community in gaining a better appreciation of their neighbours, their community and their environment. According to Chiabai (2013) encouraging stakeholders' participation is a key element in terms of social sustainability. This ICT-tool improves awareness among the host community about sustainability in an online environment. It can also allow the community to play an important role in what messages to communicate to the tourists. Another example is the Carbon Calculators that is more of an awareness-raising tool, which allows tourists to monitor their CO₂ emissions. It is a marketing and promotion tool for destinations wanting to advertise that they are "green" and environment friendly. A bit different is the Virtual Tourism (VT), which contributes to reducing degradation at sites/attractions by reducing tourist numbers. Through information distribution tourists can also be educated about the destination. A number of destinations are already using rich media on their websites to seek to reduce the intangibility aspect of the tourism product. Finally, Computer Simulation (CS) is used for predicting trends by simulating scenarios (Lawson 2006) such as climate change and illustrating changes to the environment from tourist usage. This provides the destination manager with realistic images of what proposed tourism developments would look like under varying conditions. This information can be used to make decisions, which have a more favourable long-term impact on the environment and therefore contribute to the destination sustainable development.

Conclusions

The sustained tourism growth rate makes it highly attractive as a means of economic development (Mihalic et al. 2012) but like most commercial activities, tourism has produced both beneficial and detrimental environmental and socio-cultural impacts, some of which may be irreversible. Balancing economic growth with protection of the environment is a challenge, which today faces most tourism professionals and the tourism industry is focusing on sustainable tourism development as a mechanism to try to achieve the goals of economic development whilst protecting, preserving and enhancing the environment and the local culture. Destinations are the sites where the tourism impacts occur (Wall and Mathieson 2006) and there has been a general and growing concern on how destinations can develop in a sustainable manner (Dodds 2012). Some examples of these approaches include indicators, monitoring, eco-labelling, codes of conduct and alternative forms of tourism. However, many of these approaches have been documented as having a "lack of quality, technical content, reliability, maturity, equity and effectiveness" (Van Der Duim and Van Marwijk 2006). ICT can help to

reach this goal with the different tools available and the high degree of precision in collecting data.

Without any form of control, in case of very popular sites, the risk is to receive so many visitors that they are perceived as invaders rather than guests by the residents. This doesn't help the creation of a good exchange between residents and tourists as well as the valorisation of the local culture. In general, the whole local heritage is threatened by this massive flow. Moreover, also the arising attention towards a more relational tourism and the awareness for the need to protect and valorise local features, should be considered as a stimulus to reach new tools to monitor and manage tourism impacts, as encouraged by this paper. The tools briefly introduced in this paper can help to understand the variety of existing opportunities in order to collect the needed data, to deeply analyse them and to implement the designed solutions.

References

- Ali, A. & Frew, A. J. (2013) Information and communication technologies for sustainable tourism. Routledge, London
<https://www.taylorfrancis.com/books/9781135100261>
- Ali, A., & Frew, A. J. (2014) Technology innovation and applications in sustainable destination development. *Information Technology & Tourism*, 14(4), 265-290.
<https://doi.org/10.1007/s40558-014-0015-7>
- Bajracharya, B., Cattell, D., McPhee, D., Too, L., & Khanjanasthiti, I. (2013) Sense in the city: Making the Gold Coast an intelligent and sustainable city.
[Google Scholar](#)
- Belle, N. & Bramwell, B. (2005) Climate change and small island tourism: policy maker and industry perspectives in Barbados. *Journal of Travel Research*, 44 (1), 32-41.
<https://doi.org/10.1177%2F0047287505276589>
- Berger, S., Lehman, H., & Lehner, F. (2002) Location-based services in the tourist industry. *Journal of Information Technology & Tourism* 5: 243-256.
<https://doi.org/10.3727/109830503108751171>
- Bojanic, D. C., Warnick, R., & Musante, M. (2016) An Evaluation of the Relative Importance of Tourism for Islands.
[ScholarWorks](#)
- Bornhorst, T., Ritchie, J. R., & Sheehan, L. (2010) Determinants for DMO & destination success: an empirical examination. *Tourism Management* 31:572-589.
<http://dx.doi.org/10.1016/j.tourman.2009.06.008>

- Briguglio, L. (1995) Small island developing states and their economic vulnerabilities. *World Development*, 23(9), 1615–1632
[https://doi.org/10.1016/0305-750X\(95\)00065-K](https://doi.org/10.1016/0305-750X(95)00065-K)
- 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: 609-623.
<http://dx.doi.org/10.1016/j.tourman.2008.01.005>
- Buhalis, D. & O'Connor, P. (2006) Information communication technology-revolutionizing tourism. In: Buhalis, D, Costa C (eds) *Tourism management dynamics: trends, management, tools*. Elsevier, Oxford, pp. 196-209
<https://core.ac.uk/download/pdf/101700.pdf>
- Chen, R. (2006). Islands in Europe: Development of an Island Tourism Multi-Dimensional Model (ITMDM). *Sustainable Development*, 14, 104-114.
<https://doi.org/10.1002/sd.302>
- Chiabai, A., Paskaleva, K., & Lombardi, P. (2013) e-Participation model for sustainable cultural tourism management: a bottom-up approach. *Int. J. Tourism Res.* 15:35–51.
<https://doi.org/10.1002/jtr.871>
- Cole, S. (2006) Information and empowerment: the keys to achieving sustainable tourism. *Journal of Sustainable Tourism* 14: 629-644.
<https://doi.org/10.2167/jost607.0>
- Craigwell, R. & Maurin, A. (2007) A Sectoral analysis of Barbados' GDP business cycle. *Journal of Eastern Caribbean Studies*, 32 (1), 21-52.
<https://mpra.ub.uni-muenchen.de/33428/>
- Croes, R. (2006) A paradigm shift to a new strategy for small island economies: Embracing demand side economics for value enhancement and long term economic stability. *Tourism Management*, 27(3), 453–465.
<http://dx.doi.org/10.1016/j.tourman.2004.12.003>
- Croes, R. (2011) Measuring and explaining competitiveness in the context of small island destinations. *Journal of Travel Research*, 50(4), 431–442.
<https://doi.org/10.1177%2F0047287510368139>
- Dao, V., Langella, I., & Carbo J (2011) From green to sustainability: information technology and an integrated sustainability framework. *Journal of Strategic Information Systems*, 20:63-79.
<https://doi.org/10.1016/j.jsis.2011.01.002>
- Diagle, J. J. & Zimmerman, A. C. (2004) The convergence of transportation, information technology and visitor experience at Acadia National Park. *Journal of Travel Research* 43: 151-160.
<https://doi.org/10.1177%2F0047287504268239>
- Dodds, R. (2012) Sustainable tourism: a hope or a necessity? The case of Tofino, British Columbia, Canada. *Journal of Sustainable Development*, 5:54-64.
<https://doi.org/10.5539/jsd.v5n5p54>
- Durbarray, R. (2002) The economic contribution of tourism in Mauritius. *Annals of Tourism Research*, 29(3), 862–865.
[http://dx.doi.org/10.1016/S0160-7383\(02\)00008-7](http://dx.doi.org/10.1016/S0160-7383(02)00008-7)
- El-Gayar, O. F. & Fritz, D. B. (2006) Environmental management information systems (EMIS) for sustainable development: a conceptual overview. *Communications of the Association for Information Systems* 17: 756-784.
<https://aisel.aisnet.org/cais/vol17/iss1/34>
- Fuchs M, Abadzhiev A, Svensson B et al (2013) A knowledge destination framework for tourism sustainability: A business intelligence application from Sweden. *Tourism: An International Interdisciplinary Journal* 61:121-148
<https://hrcak.srce.hr/106864>
- Ghina, F. (2003) Sustainable development in small island developing states. *Environment, Development and Sustainability*, 5 (1/2), 139-165.
<https://link.springer.com/article/10.1023/A:1025300804112>
- Gratzer, M., Winiwarter, W., & Werthner, H. (2002) State of the art in eTourism. 3rd South Eastern European Conference on e-Commerce 2002.
<https://eprints.cs.univie.ac.at/1147/>
- Gretzel, U., Go, H., Lee, K. et al (2009) Role of community informatics in heritage tourism development. In: Hopken, W., Gretel, U., & Law, R, (eds.) *Information and communication technologies in tourism 2009*. Springer, New York, pp. 1-12.
https://doi.org/10.1007/978-3-211-93971-0_1
- Griffith, W. (2002) A tale of four CARICOM countries. *Journal of Economic Issues*, 36 (1), 79-106.
<https://doi.org/10.1080/00213624.2002.11506444>
- Hampton, M. P., & Christensen, J. (2007) Competing industries in islands: A new tourism approach. *Annals of Tourism Research*, 34(4), 998–1020
<https://doi.org/10.1016/j.annals.2007.05.011>
- Henry, B. C. (2012) ICT for sustainable development. *Science and Technology* 2:142-145.
<http://article.sapub.org/10.5923.j.scit.20120205.06.html>
- Hjalager, A. (2010) A review of innovation research in tourism. *Tourism Management* 31:1-12.
<http://dx.doi.org/10.1016/j.tourman.2009.08.012>

- Horan, P. & Frew, A. J. (2007) Destination eMetrics. In: Frew, JA (ed) Proceedings of the Travel Distribution Summit, Europe Research Conference 2007. Axon Imprint, London, pp. 25-44.
[Google books](#)
- Ko, T. G. (2005) Development of a tourism sustainability assessment procedure: a conceptual approach. *Tourism Management* 26: 431-445.
<http://dx.doi.org/10.1016/j.tourman.2003.12.003>
- Kokkranikal, J., McLellan, R., & Baum, T. (2003) Island tourism and sustainability: A case study of the Lakshadweep Islands. *Journal of Sustainable Tourism*, 11 (5), 426-447.
<https://doi.org/10.1080/09669580308667214>
- Lau, G. & McKercher, B. (2007) Understanding tourist movement patterns in a destination: A GIS approach. *Tourism and Hospitality Research* 7: 39-49.
<https://doi.org/10.1057%2Fpalgrave.thr.6050027>
- Lawson, S. (2006) Computer simulation as a tool for planning and management of visitor use in protected natural areas. *Journal of Sustainable Tourism* 14: 600-617.
<https://doi.org/10.2167/jost625.0>
- Lew, A. & McKercher, B. (2005) Modeling tourist movements: a local destination analysis. *Annals of Tourism Research* 33: 403-423.
<http://dx.doi.org/10.1016%2Fj.annals.2005.12.002>
- Liburd, L. J. (2005) Sustainable tourism and innovation on mobile tourism services. *Tourism Review International* 9:107-118.
<https://doi.org/10.3727/154427205774791771>
- Lim, C. C., & Cooper, C. (2009) Beyond sustainability: Optimising island tourism development. *International Journal of Tourism Research*, 11(1), 89-103.
<https://doi.org/10.1002/jtr.688>
- Melville, P N (2010) Information systems innovation for environmental sustainability. *MIS Quarterly*, 34: 1-22.
<https://misq.org/information-systems-innovation-for-environmental-sustainability.html>
- Mihalic T, Zabkar V, Cvelbar, K L (2012) A hotel sustainability business model: evidence from Slovenia. *Journal of Sustainable Tourism*; 20:701-719.
<https://doi.org/10.1080/09669582.2011.632092>
- Mitchell, J., & Ashley, C. (2010) *Tourism and poverty reduction: Pathways to prosperity*. London: Earthscan.
file:///C:/Users/Altri/Downloads/9781136544682_preview.pdf
- Shafiee, M. M., Shafiee, M. M., Shams, H., Yahai, M.R. & Golchin, H. (2013) 'ICT Capacities in Creating Sustainable Urban Tourism and its Effects on Resident Quality of Life', 7th International Conference on e-Commerce in Developing Countries with focus on e-Security.
<https://doi.org/10.1109/ECDC.2013.6556745>
- Parry, C. E., & McElroy, J. L. (2009) The supply determinants of small island tourism economies. *The ARA (Caribbean) Journal of Tourism Research*, 2(1), 13-22.
[Google books](#)
- Pratt, S. (2015) The economic impact of tourism in SIDS. *Annals of Tourism Research*, 52, 148-160.
<https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1016%2Fj.annals.2015.03.005>
- Racherla P., Hu, C., & Hyun Y. M. (2008) Exploring the role of innovative technologies in building knowledge based destination. *Current Issues in Tourism* 11: 40-427.
<https://doi.org/10.1080/13683500802316022>
- Sahli, M. & Nowak, J. (2007) Does inbound tourism benefit developing countries? A trade theoretic approach. *Journal of Travel Research*, 45 (4), 426-434.
<http://dx.doi.org/10.1177/0047287506295948>
- Scheel, C., & Vazquez, M. (2011) The role of innovation and technology in industrial ecology systems for the sustainable development of emerging regions. *Journal of Sustainable Development* 4: 197-210
<https://doi.org/10.5539/jsd.v4n6p197>
- Scheyvens, R., & Momsen, J. (2008) Tourism and poverty reduction: Issues for small island states. *Tourism Geographies*, 10(1), 22-41
<https://doi.org/10.1080/14616680701825115>
- Schubert, S. F., Brida, J. G., & Risso, W. A. (2011) The impacts of international tourism demand on economic growth of small economies dependent on tourism. *Tourism Management*, 32(2), 377-385.
<http://dx.doi.org/10.1016/j.tourman.2010.03.007>
- Seetanah, B. (2011) Assessing the dynamic economic impact of tourism for island economies. *Annals of Tourism Research*, 38(1), 291-308
<https://doi.org/10.1016/j.annals.2010.08.009>
- Sharpley, R. (2003) Tourism, Modernization and Development on the Island of Cyprus: Challenges and Policy Responses, *Journal of Sustainable Tourism*, 11 (2/3), 246-265.
<https://doi.org/10.1080/09669580308667205>
- Shoval N, Isaacson M (2006) Tracking tourists in the digital age. *Annals of Tourism Research* 34: 141-159.
<https://doi.org/10.1016/j.annals.2006.07.007>

Torres, R. (2003) Linkages between tourism and agriculture in Mexico. *Annals of Tourism Research*, 30(3), 546–566.

[https://doi.org/10.1016/S0160-7383\(02\)00103-2](https://doi.org/10.1016/S0160-7383(02)00103-2)

Van der Duim R. & van Marwijk, R. (2006) The implementation of an environmental management system for Dutch tour operators: an actor-network perspective. *Journal of Sustainable Tourism* 14: 449-472.

<https://doi.org/10.2167/jost559.0>

Vázquez, F. J. C. & Ruggieri, G. (2011) Relational tourism: challenges and potentials. *Turismo y Desarrollo: Revista de Investigación en Turisme y Desarrollo Local*, 4(9) 1-14.

<http://www.eumed.net/rev/turydes/09/cvr.pdf>

Wall, G. & Mathieson, A. (2006) *Tourism: change, impacts and opportunities*. Pearson Education Limited, Essex, 412 pp.

https://doi.org/10.1111/j.1541-0064.2007.00194_3.x

Watson, T. R., Boudreau, M., & Chen J. A. (2010) Information systems and environmentally sustainable development: energy informatics and new directions for the IS community. *MIS Quarterly* 34:23-38.

<https://www.jstor.org/stable/20721413>