CHAPTER 16

The Making of Data-Driven Sustainable Smart City Communities in Holiday Destinations

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Introduction

Sustainable development is a term that emerged from the Brundtland Commission's report of 'Our Commons Future' in 1987 (Saarinen, 2006). The concept of sustainable development entails a responsible practice of resource consumption by current generations so that future ones are not deprived of the same resources for their basic survival (WCED, 1987; Saarinen, 2006). The argument in favour of advocating sustainable development got further impetus in institutional terms in the 'Earth Summit' in 1992 held in Rio de Janeiro, Brazil since the Rio Conference

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B. George, J. Paul (eds.), *Digital Transformation in Business and Society*, https://doi.org/10.1007/978-3-030-08277-2_16

in 1992 on account of the observation of manifold negative ecological and social impacts caused by decades of industrialization (Hanharan, 2010; Saarinen, 2006).

The perspectives of sustainability in tourism emanated from the Agenda 21, an action plan on sustainable development that emerged from the discourses of the Rio Conference. Sustainable development issues have become crucial in current tourism discourses (Roberts & Tribe, 2008)—given the negative impacts of tourism operations in terms of social, political, economic and environmental aspects. According to United Nations World Tourism Organization (UNWTO) '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' (UNWTO, 2004).

Since the last three decades, several initiatives primarily by non-profit organizations as well as academic, governmental and inter-governmental organizations have pursued sustainability, both in practice and dialogue through regional, inter-regional and global projects, grassroots-based activism as well as workshops and conventions. In addition, private sector/industry initiatives towards sustainability have also been evident in spite of the conflicting interests emanating from a dominant neo-liberal economic environment that has shaped the industry perspectives in tourism. However, climate change issues and inequality in tourism destinations have been ever increasing despite various pursuits of sustainable development by different sectors in the tourism industry. Hence, the quest for sustainability in tourism is far from over due to the increasing environmental and social challenges faced globally.

Technological developments and innovations have brought us to a new phase in our modern society. Cutting edge technologies in digital, environmental and transportation domains have paved the way towards a new epoch of industrialization that provides accessibility, communication and socialization to the masses via affordable means. Developments in more efficient, faster and safe mass public transit systems, as well as developments in green energy that have made it relatively more affordable and cost-effective to a much larger section of consumers and businesses, have brought sustainability and technology closer and compatible with each other than ever before. Clean energy and cleaner modes of transportation driven by new innovative technologies and coupled with smart digital technologies have brought new opportunities to the process of transformation towards a sustainable future. Clean energy, cleaner modes of trans-

portation systems as well as smart digital systems have fostered the development of sustainable urban tourism by virtue of hospitality outlets and urban attractions increasingly adopting green energy technologies—clean modes of transportation providing affordable, environmentally clean and efficient mobility services to tourists and digital technologies (powered by widely available Wi-Fi services) enabling communication and availability of information critical for destination knowledge and travel decision-making. Public/state funded technological projects around the world are leading the way for more innovations in cleaner automobiles and cleaner energy production—ARPA-E in the United States and Germany's KfW, a state investment bank have funded a number of clean technology initiatives with relation to energy efficient and renewable projects in the recent past (Tate, 2017). Tesla, a leading producer of electric cars in the United States has been funded by the US Department of Energy for producing electric automobiles with cutting edge technology. Returns from green technology investments initiated both by state and the private sector has resulted in creation of wealth for the public providing more coherence and impetus to the role of technology in fostering sustainable development (Harris, 2017).

The bond between sustainability and technology will mostly be necessitated by the imperative needs in cities and urban areas of the world. Growing complexities in ever expanding cities of the world resulting from the demands for quality of life, environmental protection and competitiveness will drive the need for sustainable development powered by clean energy technology, soft mobility technology and more intelligent digital technologies (Siemens AG, 2013). Moreover, cities and other urban areas around the world, which currently produce approximately 70% of the greenhouse gas emissions, will increasingly become the epicentres of high volumes of consumption leading them to be major contributors to climate change (Siemens AG, 2013). Hence, the demand for innovative technologies that can facilitate sustainable and inclusive urban growth will necessitate effective solutions and strategies that can ensure resilient and environmentally compatible ways of urbanization of our cities in the future.

One of the prime areas of economic activity and consumption in cities around the world is tourism. Cities and urban areas vibrant with arts, culture, music, architecture and design and heritage along with centres generating robust volumes of business and commercial activity have attracted all kinds of visitors. Moreover, ease in mobility and communication due to rapid digitalization and internet connectivity via Wi-Fi as well as expansion

of different modes accessible and efficient public transportation networks have made tourism in urban areas grow manifold. Urban tourism as referred to by UNWTO (2012) is 'trips taken by travelers to cities or places of high population density'. Cities which are administrative capitals of nations are gateways to many destinations and the first point of reference for tourists in acquiring an impression of the nation as a destination. This makes large number of tourists travel to and via cities and hence crucial for destination management organizations to manage cities as destinations in a way that they can facilitate quality experiences and enhance satisfaction of such large mass of tourists.

This chapter discusses the magnitude of technology being strongly implanted in the process of sustainable development of cities as manifested through urban tourism—one of the main pillars of urban economy. The chapter identifies four critical dimensions of sustainability in urban tourism—urban ecotourism, food tourism, urban culturescapes and smart transportation. Correspondingly, critical dimensions of technology in urban tourism—social media and user-generated content, gamification, M-learning (mobile-based learning), green energy technologies and green/soft mobility, are also discussed comprehensively. The chapter then discourses the integration between technology and sustainability in urban tourism contexts based on existing cases and models around the world.

Dimensions of Sustainability in Urban Tourism

Culture, nature and communities in urban areas have been instrumental in shaping the tourism landscape of cities around the world. City-based parks, gardens and waterbodies as well as museums, arts galleries, performing arts, avant-garde arts and countercultural communities have attracted large number of culturally inclined independent travellers. On the rise are emerging forms of urban travel activities like food tourism combined with walking tourism that involves trips to areas of cities noted for local food—wet markets, restaurants, confectionaries and all other forms of eateries and food outlets. Also associated with such tours are the communities engaged with food tourism businesses, their enterprises, the aesthetic aspects of their culinary offerings, their skills as well as the socio-cultural environment they create and belong to as a whole. Another aspect that culture-oriented city walking tours involve are visitations to prime natural and cultural attractions of urban areas harnessing mass transit public transport systems. All these elements reflect socio-cultural inclusivity,

environmental compatibility and offer deeply engaging lived as well as socializing experiences to tourists. Such increasingly popular forms of urban tourism have been receiving adequate patronage from tourists and destination planners in the recent times as the modern tourism discourses progressively reflect the virtues and the essentiality of sustainability.

Urban Ecotourism

Towns and cities have large tracts of nature either in the form of national parks, sanctuaries, wildlife reserves and other organic forms or in modified or artificially created forms. Urban centres around the world are increasingly trying to harness the value of such nature tracts in providing sustainable living to both its residents and visitors. Urban tourism now significantly involves travel to nature-based areas in and around cities especially to such natural areas, which are of high significance in terms of flora or fauna or both. Such trips help both residents and visitors understand the value of nature as well as enable them to have a sustainable approach to experience cities. Such a phenomenon can be referred to as 'urban ecotourism'. Though the term 'urban ecotourism' was first coined in 1996, the phenomenon has been in practice since long. Planeta.com, an award-winning website on ecotourism, in a conference in 2004, described it as 'simply nature travel and conservation in a city environment' (Kastelein, 2004). The definition laid down by the Toronto Green Tourism Association (2006) was 'travel and exploration in and around a city that provides visitors and residents with a greater appreciation of the cities' natural resources and cultural resources'.

Cities like New York, Toronto, Singapore, Hong Kong and Kuala Lumpur have attracted local and international visitors towards both natural and modified nature-based attractions. Nature-based attractions in these cities offer opportunities for various leisure and adventure activities like bird-watching, nature-viewing, photography, caving, hiking and rock-climbing. Such opportunities have made nature-based attractions in these cities an integral part of their urban tourism offerings to all kinds of visitors. One of the prime features of urban nature-based attractions in most cases is that they are often well-connected by mass transit public transportation systems due to their location within or on the periphery of cities and major towns. Hence, travel to urban nature-based attractions or urban ecotourism contributes towards sustainable development as it creates opportunities for alternative recreational activities as against the traditional

highly consumptive urban tourism activities. Urban ecotourism apart from primarily focusing on travel to nature-based areas in urban areas also involves trips to cultural sites like museums, art galleries, handicraft streets, wet markets and food streets. This provides the social and anthropological element to the urban ecotourism phenomenon making it inclusive and environmentally inclined at the same time. Urban ecotourism offers the opportunity to all sections of the society to be educated on the value of ecology to human societies as nature-based attractions offers easy access by the virtue of being located within or close to cities and by being well-connected efficient and affordable mass transit transport systems.

Food Tourism

Food tourism is the phenomenon of travelling and experiencing other cultures through food (Herrera, Herranz, & Arilla, 2012). Food tourism is also sometimes referred to as culinary tourism or gastronomique tourism. Food tourism entails a sense of place in geography (or the link between land and people). Travel for the purpose of experiencing exquisite culinary offerings of a destination has become one of the main motivators of travellers in terms of their travel behaviour and activities at a destination (Herrera et al., 2012; OECD, 2012). Such culinary experiences are offered in an array of settings—the most exciting and engaging ones being local street food at popular street food enclaves of towns and cities, wet markets or night markets as well as local/traditional food outlets which by virtue of their unique offerings (taste, aroma and aesthetic style of presentation) for a considerable period of time have become transformed into a heritage due to the sustained popularity that they have enjoyed (Gillan, 2014; Nualkhair, 2015). Experiencing food related events like food festivals or experiencing hands-on cooking (participating in cooking classes) as well as food tasting and/or experiencing the attributes of specialist food production are also some of unique experiences that urban destinations offer to foodie travellers (Peltier, 2015).

Apart from the hedonic and consumptive aspects associated with the experiences of food tourism, the communal and cultural elements that are strongly embedded in it often construct the basis of such experiences (Peltier, 2017). A critical aspect associated with these communal and cultural elements is sustainability. Food tours are often characterized by walking tours for short durations of 4–5 hours as well as harnessing the services of mass transit public transportation systems. The use of such soft modes

of mobility enable food tours to deeply involve the communal element as it provides a social interface between foodie travellers and the communities engaged with food tourism businesses, the small scale nature of the enterprises they run as well as the aesthetic aspects of their culinary offerings along with their culinary skills (Gillan, 2014; Nualkhair, 2015). This social interface constructs a socio-cultural environment that immerses the visitors and their gazes with deeper social meanings of their experiences of local culinary cultures. Hence, the utilization of soft mobility and the socially immersive experience reflect the sustainable nature of the communal and cultural elements of food tourism.

Urban Culturescapes

Cultural activities ranging from visitations to art galleries and museums depicting different aspects of aesthetic and social scenes of modern society as well as radical/avant-garde and contemporary forms of arts and events mainly advocated by the urban youth shape the culturescapes of our cities (Merrick, 2011; Buffenstein, 2016). Urban areas around the world encompass both mainstream and alternative forms of visual and performing arts along with edifices of heritage like museums and monuments that attract a large number of travellers to urban areas.

Cities like Berlin, London and New York have attracted culturally inclined travellers to art galleries and art collectives that focus both on popular and 'avant-garde' forms of aesthetic expressions. Attractions like the Museum island in Berlin which consist of museums and galleries as well as alternative art centres like Kreuzberg, Friedrichshan and Prenzauler Berg attract all kinds of politically and art-inclined visitors. Many of such culture streets represent underground and alternative urban youth cultural expressions in the form of street musicians and street art collectives. Cultural centres like these in many instances have been the backdrop of radical urban socio-political movements that gave rise to countercultural thoughts challenging traditional Capitalist consumption models and advocating collective action and Do-It-Yourself ethos. Such actions and ethos have become underlying principles of many urban sustainable projects. Urban cultural centres like these often undergo continuous evolution and in the process have attracted a wide array of visitors—art-inclined people and artists themselves, youth belonging to avant-garde movements as well as with visitors based on socio-political factors like immigrants and anarchists. Urban culturescapes that involve such vibrant youth cultural vibes

offer visitors the experience and learning on ecological and social dimensions of urban sustainability through different artistic expressions and other culturally expressive activities.

As in the case of urban ecotourism and food tourism, visitations to urban landscapes also involve the harnessing of the urban mass transit public transport system that connect major centres of cultural sites with various important mass transit hubs.

Soft Mobility

Soft mobility refers to low emission transportation systems that provide mobility in urban spaces to the masses. Such low emission transportation systems operate in a variety of modes like inter-modal, waterborne, rail, public/collective transport and non-motorized individual mobility (Rocca, 2009). Soft mobility should involve—the consideration of the urban destination geographical features, legal and planning structures anticipated ecological, social and financial impacts of development as well as the needs and wants of the residents of the urban destination (Kramer, 2009; Transdanube, 2014).

Cycling/biking in urban streets has become a popular phenomenon around the world. Tourists and residents alike commute considerable distances in their daily schedules in cities with the help of cycling/biking. Several urban destinations have become bike-friendly cities encouraging visitors to utilize cycling paths as a way to reduce congestion and automobile-based pollution. Cheap and affordable mass transit systems like subway trains, monorails, trams and electric buses have provided easy accessibility to different cultural, nature-based and gastronomique streets to all types of visitors (Rocca, 2009). Therefore, one of the emphasizing factors emerging from soft mobility is to convert more tourist movement into sustainable modes of transport which can also be referred to as modal shift (Gebhardt et al., 2016). An inter-modal chain model of mobility for tourists involving the combination of waterborne, rail and public/collective transport as well as walking and cycling ensures a sustainable consumption from tourism movement within an urban destination (Gebhardt et al., 2016).

The rise of collective transport or transport options that have emerged under the sharing economy has also reduced the rate of consumption and offered a more convenient, reliable and safe mobility options for tourists in cities and towns. Sharing economy in transport refers to carpooling

services where car journeys are shared by more than one person. Several carpooling initiatives like Lyft, MyCotra and Uber have become commercially successful and are contributing towards less congestion and reducing individuals' travel costs.

In the Asian context, major cities like Singapore, Hong Kong, Seoul and Tokyo offer a combination of transport options ranging from subways or referred to as MTR and MRT (in Hong Kong and Singapore respectively) supported by extensive citywide bus networks along with options for biking-cycling at different parts wherever possible.

The Case of Hong Kong as a Soft Mobility Destination

In Hong Kong, the MTR (Mass Transit Railway), a combination of heavy rail, light rail and feeder bus service, is one of most extensive and profitable mass transit systems in the world and offers itself as a successful model for many other mass transit systems coming up around in the world and particularly within Asia. In addition, Hong Kong offers the option of using tram services in certain parts of the highly congested Hong Kong Island as well as extensive cycling opportunities in the new territories. Besides, waterways—a traditional mode of transport that have existed in Hong Kong since long still operates significantly offering services from Hong Kong Island (Central) and Kowloon ferry terminals to different parts of Kowloon, Hong Kong Island, New Territories and several outlying islands. The tram and ferry services are also a major part of the tourist experiences of Hong Kong. Tourist—centric transport like the furnicular rail or the Peak tram which covers a distance of 1.4 kilometres approx. starting from downtown Hong Kong Island to the Victoria Peak, a point of commercial and tourist importance at the higher elevations of Hong Kong Island enables both tourists and local residents a convenient commuting option. Another tourist-centric transport is the Ngong Ping cable car which starts from the Tung Chung MTR station to the tourist attractions in the higher elevations of Lantau island (Lantau peak) covering a distance of 5.7 kilometres and providing breathtaking views of the Hong Kong International Airport, the dense flora and topography of Ngong Ping plateau as well as the urban areas around. The Hong Kong International Airport and the

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Hong Kong Disneyland are connected with the main commercial and residential areas of Hong Kong by means of MTR's special services—the Airport Express and the Disneyland Resort Line respectively. The urban bus network operated by different companies as well as the Green Liquified Petroleum Gas (LPG) light buses (minibuses) offers a comprehensive and highly well-connected system of road transportation to residents and tourists alike. Road transport in Hong Kong is also featured by three kinds of LPG run taxicabs—the red, green and blue taxicabs. The red taxicabs operate in the downtown areas of Hong Kong Island and Kowloon, the green taxicabs operate in the New Territories of Hong Kong and the blue taxi cabs operating only in the Lantau Island.

This comprehensive mass public transport system of Hong Kong offers a perfect example of an inter-modal model of soft mobility in an urban tourism destination. Firstly, the MTR services, the ferry services and bus network (especially the green LPG minibus services) as well as the extensive cycling-biking options which are highly interconnected enable tourists to commute to different famous and offbeat folk cultural, local culinary and heritage attractions of Hong Kong. Secondly, the 'Peak Tram' and the Ngong Ping Cable car offer exciting and safe tourist-specific experiential commuting to a large of urban tourists and resident visitors. Thirdly, the engaging experiences tourists obtain while availing ferry services and the tram services to commute around Hong Kong transform such transport services into tourist attractions. The extensive MTR network, cycling-biking options as well as the extensively operating LPG run cabs and minibuses along with tourist-centric transport options of the 'Peak Tram' and the Ngong Ping Cable car aptly manifest an eco-friendly and inclusive mass-oriented soft urban mobility system. Due to this dynamic nature of the urban inter-modal in the city, Hong Kong has been ranked first in terms of having the most sustainable transport as per the 2017 Sustainable Cities Mobility Index by Arcadis (Arcadis, 2017).

Dimensions of Technology and Their Integration with Dimensions of Sustainability in Urban Tourism

Cities and urban regions around the world are the most technologically vibrant in terms of use and applications. Urban infrastructure provides the basis and urban consumption patterns necessitate the presence and use of technology at considerable levels. Cities are connected with Wi-Fi technologies and its commercial activities are highly dependent on the use of innovative tech applications for various interconnected systems to work efficiently. Urban regions around the world are generally equipped with technological connectivity in terms of Wi-Fi availability, internet zones and social media sharing that benefits visitors and tourists to derive satisfaction and intention to re-visit urban attractions.

Social Media and User-Generated Content

Social media founded on the technological applications of user-generated content (Web 2.0) plays a major role in communication and socialization among tourists (Buhalis & Law, 2008; Kaplan & Haenlein, 2010). Urban destinations facilitated by easy availability of Wi-Fi services drive online activity of tourists who prefer to be connected while they are in the process of consumption of urban leisure-based experiential products (Bock, 2015). Facebook, which enjoys the highest number of users in the world, followed by Twitter and travel-oriented platforms like Trip Advisor—have been the widely used social media platforms by tourists for online social interactions, sharing of vital travel information influencing travel decision-making by tourists (Santos, 2011). Online social exchanges and sharing of information by tourists in online platforms have led to co-creation of collective knowledge (Seraj & Ayesugul, 2012).

Eco-conscious tourists in urban settings have the ability of setting ecological citizenship through continuous co-creation of knowledge that is collectively generated through their online social interactions and sharing of information on ecological and social elements they experience in nature-areas in urban settings (Rokka & Moisander, 2009; Sarkar, Au, & Law, 2013). The advent of Flickr, a photo-sharing social networking site and recently, Instagram—a photo-sharing social networking app has initiated online co-production of destination knowledge through pictures and photographs. This has enabled tourists create aesthetically credible pictorial connotations of destinations that have deeper influences on fellow-tourists.

Urban tourism destination-based authorities and promotional bodies have harnessed the co-creative and collective knowledge building potential of social media platforms like Facebook and Instagram (Sarkar et al., 2013). Promotional efforts on social media platforms and initiating co-creative practices among consumers have become a key innovative marketing strategy that transforms consumers into pro-sumers. Co-created content by tourists on social media can become invaluable marketing content for destination management organizations (Özdemir & Çelebi, 2015).

The advent of smartphones in the last 5–7 years have enhanced the role of social media use among urban tourists. With the increasing availability of Wi-Fi facilities and high-speed internet connectivity in public places, cultural sites as well as natural sites, smartphones have accelerated the volume of online activity of tourists. Smartphones have drastically reduced the time between tourists experiencing an attraction and their sharing of pictorial, audio-visual as well as textual information in various social media platforms based on such experiences. Tourists can very quickly engage in co-creative practices on social media platforms in the context of urban destinations due to the widespread availability of Wi-Fi and increasing use of smartphones and smartphone-based apps. Tourist-generated (and co-created) content in social media platforms primarily via smartphones have become more reliable and easily available than supplier-generated content resulting in effective travel decision-making and collective knowledge building by existing and prospective tourists.

In the context of urban tourism, both tour operators and tourists make use of social media platforms like Facebook and Instagram to co-create experiences and products of nature, culture and gastronomical tourism. Moreover, blogs maintained by tourists on urban nature, food and cultural attractions play a major role in initiating collective knowledge building through sharing and exchange of key information. Such collective knowledge or tourist/consumer generated knowledge become more intense and reliable than supplier-generated knowledge as it involves a dialectic process of critical and comprehensive introspection of content. Moreover, through such dialectical process of collective knowledge building, tourists establish and advocate ecological and cultural citizenship online.

Gamification in Tourism

Gamification in tourism is ‘the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals’ (Burke, 2014). Gamification can be a great method to digitally engage

visitors with a use of their smartphones, tablets or other digital devices (Sever, Sever, & Kuhzady, 2015).

Gamified tourism experiences often involve challenges in the form of quizzes, puzzles, making and submitting photos according to a task. Scores based on these challenges determine how well the participant has accomplished the challenge (Kazakova, 2015). To monitor the participants there are leaderboards who keeps them updated how they are progressing in the game in terms of the rounds of challenges to be completed and the scores scored. Those completing all stages of the game successfully with high scores are rewarded in both virtual and real (tangible) forms (Kazakova, 2015).

Gamified tourism experiences are offered in different forms especially in the urban context. Some of the prominent forms are location-based augmented reality games, gamified tours specific to urban environments, augmented experiences of theme parks and transmedia storytelling, gamified immersive experiences in cultural and natural heritage and virtual cultural heritage experience, gamified restaurant and hotel experiences.

As mentioned earlier, one of the main aims to offer gamified experiences to tourists is to immerse them in a situation that is highly subjective and enduring in nature and therefore can provide high levels of satisfaction to them. Gamified experiences have the potential to bring loyalty among tourists for the destination and enable repeat visits. Gamified experiences are an attempt to add value to the generic trip experience of tourists while they are visiting an urban destination (Sever et al., 2015).

Applying gamified experiences in the area of sustainable tourism can facilitate social interactions, cultural understanding, inculcate sustainable consumption habits and bring about an enhanced quality of experience (Negruşa, Toader, Sofică, Tutunea, & Rus, 2015). Gamification in sustainable tourism is aimed at engaging as well as encouraging tourists to advocate and internalize new sustainable habits, sustainable consumption or even engage in new sustainable activities and visit new destinations that are sustainable. Gamified experience in the context of sustainable tourism has the potential to provide intrinsic incentives to tourists while they are engaging in activities that enable them to derive self-esteem and social recognition (Negruşa et al., 2015). The merits of applying gamification in sustainable tourism involve usher engagement before during and after any nature-based experience as well as marketing and promotional benefits. Gamification by means of improving the experience offers an opportunity to attract new visitors and new markets.

M-Learning or Mobile Learning

M-learning or mobile-based learning is a process of learning and education through the means of movable electronic computing devices like smartphones and tablets. The use of M-learning in the hospitality industry has been evident in the recent times in areas of hospitality workers' training and education. Hospitality chains like the Marriot and Hilton are applying M-learning applications for recruitment of new workforce in their respective hospitality properties.

The potential application of mobile learning in the context of the touristic use can be realized in the form of environmental interpretation and visitor education within the context of urban natural settings like botanical gardens, city parks, urban groves and other similar places. Utilizing the current developments and innovations in mobile broadband networks, smartphone technology and mobile software applications, the M-learning process can provide engaging interpretive programmes involving free-choice learning and mindful visitor experiences to tourists in urban natural settings.

Soft Mobility and Green Energy Technologies in Urban Tourism

As discussed earlier, soft mobility involves a set of different forms of low emission transport in urban destinations—an inter-model mode of transport. Soft mobility forms have facilitated accessibility to the masses and brought about social transformations and quality of life in many parts of the world. Inter-modal soft mobility has provided inclusivity and an egalitarian mode of transport in which lower income urban communities have found easy and convenient access to different parts of urban areas where they have to commute for earning a means of livelihood and education. Efficient and affordable inter-modal soft mobility available for local residents from all sections of the society also provide accessibility and connectivity to tourists and visitors in urban destinations. Such inter-modal soft mobility forms are driven by technologies that provide access to difficult terrains and dense settlements evident in urban destinations. Transport technologies like cable car and low emission automobiles using new forms of renewable fuel as well as electricity have provided greater social sustainability. These are the emerging smart mobility technologies that have enabled visitors from all economic sections or urban societies to affordably have access to attractions of ecological and socio-cultural interest.

The Case of Gondolas or Cable Cars in Latin American Cities and Hong Kong

Gondolas or cable cars are considered as a cheap option which requires lesser investment for infrastructure and lesser need of displacement of people and communities compared to other mass transit forms like subways or rail tracks. Gondolas may not have the ability alone to transport a large number of people from one to another but support significantly other forms of mass transit system by playing a major role in inter-modal connectivity (Barber, 2017). Gondolas on one hand can facilitate tourist movement within and to attractions in urban destinations and on the other hand also enable to move local residents from their neighbourhoods to major centres of cities at an affordable cost especially where the urban geographical landscape is characterized by challenging topographies. In particular, gondolas have been able to provide a faster, time-saving and affordable mode of transport to urban residents living in the poorer parts of cities and linking them with commercially important parts where there are opportunities for earning a livelihood. Latin American cities like La Paz (Bolivia), Medellin and Cali (Columbia) and Caracas (Venezuela) are major examples of such socially inclusive and effective gondola systems in commuting terms for the masses (Barber, 2017).

The Metrocable in Medellin city, Columbia is regarded as the world's first integrated multi-line gondola system. The Metrocable connects with major business and commercial centres of Medellin city with many outlying and less wealthy areas of the city in upper elevations of hillsides. The Metrocable was opened in 2004 and since then has been credited on one hand, in reducing commuting times, providing cheap and efficient connectivity to many low income residents of outlying areas and on the other hand, has been significantly instrumental in reducing crime rates and urban poverty levels in the city(Barber, 2017).

Mi Teleférico, the gondola system in La Paz, Bolivia is considered as one of the most developed and longest in the world. The Mi Teleférico was opened in 2014 and since then has enabled 50 million people to commute from poorer parts of the city to the upscale business and commercial areas. It has been reported to have saved 652 million minutes for all commuters it has served since 2014. The Mi Teleférico has been claimed to be a very effective project and the city authorities are considering to expand it to seven more lines which are expected to be covering a distance of 20 kilometres.

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The Caracas Metrocable in Caracas, Venezuela operates with the similar philosophy of providing connectivity for the city's poorer parts with the affluent parts. It was built to avoid displacing people and providing poorer parts of Caracas like the San Agustin a safe and efficient mode of transport to commute especially within such areas. The Caracas Metrocable primarily connects with other major forms of public transport systems of Caracas and provides transportation within the San Agustin area of Caracas.

All the above examples manifest an environmentally significant and socially inclusive efficient form of urban soft mobility driven by the Cable car or gondola technology. Such a gondola system has proven to have provided safe and crime free transportation which becomes an important factor in tourist's use of such soft mobility systems.

The Ngong Ping 360 cable car in Hong Kong and the Singapore Gondola are on the other hand, urban projects that have been purpose-built for tourist mobility. These cable car projects have been able to divert tourist movement away from the vehicular traffic-prone areas of the city. Moreover, these projects have reduced the dependence of road transportation that involves automobiles run by fossil fuels especially in the case of Lantau Island, Hong Kong.

The Case of Electric Automobiles and Bio-Fuel-Driven Urban Buses

Another variety of smart mobility technologies are electric/hybrid vehicles exemplified in the form of electric cars and bio-fuel driven vehicles. These vehicles run on fuel from renewable sources like bio-fuels and electricity.

One of the recent and best examples of bio-fuel driven is the Bio-bus experimentations in the UK. Bio-bean, a London-based enterprise, has taken the initiative to run a project of Bio-buses driven by the bio-fuel made out by combining oil extracted from old coffee grounds and diesel (Hirtenstein, 2017). Utilizing old coffee grounds from major coffee shops across the UK, it is claimed that 6000 litres (1583 gallons) of bio-fuel or B20 bio-fuel can be produced to run a sizable fleet of buses for public transport in London city (Hirtenstein, 2017). Though bio-fuel is already used to run 9500 buses, the 'coffee-powered' bio-bus is an innovative soft mobility technology to be used for the first time in the city (BBC, 2017).

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Another bio-fuel-driven bus project also from the UK is the Bio-Bus project also known as GENeco Bio-Bus. The Bio-Bus is a project powered by bio-fuel in the form of gas formed out of human wastes of food, sewage and commercial liquid wastes (Geneco, 2016). Though two Bio-Buses were operating in 2015, the Office for Low Emission Vehicles turned down the bid for funding and operating this project in 2016 (BBC, 2017). However, officials at GENeco—the enterprise which ran this project—believe the concept that emerged from this project can inspire other similar projects that can become successful since bio-methane gas powered buses have been found to reduce significant amount of air pollution in urban areas around the world (BBC, 2017).

Electric cars are now becoming popular in many countries around the world and in the United States, sales of electric cars rose to 37% in 2016 compared to the previous years and a 70% year-to-year increase in monthly sales (Rapier, 2017). This has made Hotel chains like the Marriot, Starwood and the Hilton to open Electric Vehicle (EV) charging stations in collaboration with Tesla (the largest electric automobile maker) and GE in many of their properties. This move by hotels to welcome electricity powered low emission vehicles also serves their strategic purpose of alluring high-end guests (Hanley, 2015). Such high-end guests who can afford the most expensive services offered by hotels also happen to have the ability to afford electric cars. Apart from hotels, car rental services are starting to offer electric car rentals in some parts of the world. The case of Enterprise Rent-A-Car electric car rental services in Orlando city exemplifies the use of electric cars in the travel industry. The electric car rental service named as Drive Electric Orlando (DEO) programme started in 2013 as a result of collaboration between Enterprise and Electrification Coalition and has grown considerably through the strength of tie-ups with hotels, theme parks and tourism promotional organizations like Visit Orlando (Padilla, 2017). The DEO programme offers opportunities to tourists for test drives of the latest versions of the electric car model—Chevy Volt, a hybrid electric car brand of Chevrolet (Hanley, 2015). Through such an opportunity, tourists are in turn provided the experience of new low emission vehicle technologies through car rental services and motivated to be owners of electric powered low emission vehicles in the near future (Padilla, 2017). The DEO programme is facilitated by 300 EV charging stations in different tourist centres of Orlando city and 40 partner hotels that provide free parking and valet services to the tourists who are clients of the program.

Green Energy Technologies

Green energy technologies are exemplified by the existence of energy conservation and cost-saving technologies primarily in the context of urban hotels. The casino destination of Las Vegas has demonstrated how major casino and convention facilities can be majorly dependent on renewable energy sources instead of conventional energy sources.

The hotel industry has also improvised its process of energy saving by installing digitally powered rooms and energy management systems that control and minimize energy consumption in guest rooms. Though this technology is not specific to urban hotels, its applicability has been possible more in such hotels. However, one of the best developments of green energy technology in the context of urban tourism has been in the case of Gardens by the Bay in Singapore.

Gardens by the Bay, Singapore

Gardens by the Bay opened in 2012 demonstrates a model of an iconic green urban attraction that involves the harnessing of a range of different renewable energy technologies like solar energy, biomass technologies and technologies providing the basis of sustainable design (Rowell, 2017). The most striking technological element of this attraction is the manmade supertrees. These supertrees ranging between 25–50 metres in height are built with a combination of green technology features—solar energy harvesting photovoltaic cells on the canopies as well as water harvesting inbuilt tanks that enable cooling of domes in the attraction containing 90,000 plants (Rowell, 2017). The supertrees themselves support 160,000 plants and the energy produced by the photovoltaic cells on their canopies are used for spectacular light, colour and sound displays from the attraction during nighttime (Rowell, 2017). The two domes or glass biomes in the attraction—the Flower dome and the Cloud Forest—are equipped also with sustainable features like green designing which allow sunlight to provide nourishment to the plants inside as well as rainwater capturing features that allow irrigation of the different flora species that they contain. The Gardens by the Bay attracts 25 million tourists every year from all over the world since it was opened in 2012 (Algie, 2014).

Gaming and entertainment companies in Las Vegas have moved away from conventional-energy-producing agencies like NV Energy. MGM Resorts International, one of the largest gaming and entertainment companies in Las Vegas exited from NV Energy paying an exit fee of $87 million (Hernandez, 2016). It is now considering a full-fledged transformation into a renewable energy agency in terms of fulfilling its energy needs by harnessing its phenomenal rooftop solar project as well as tie-ups with energy companies investing in solar energy as well as with solar photovoltaic developers and solar plants projects outside its premises (Hernandez, 2016). MGM developed rooftop solar projects in one of its principal Las Vegas projects—Mandalay Bay—which now has 26,000 solar panels spread across 28 acres and producing over 14 megawatts of energy. Other Las Vegas resorts like the Wynn Resorts and Las Vegas Sands are planning to buy more solar energy from the open market produced in surplus volumes in the solar farms in nearby places as well as produce renewable energy particularly solar energy themselves.

Conclusion

As the drive towards the enhancement of sustainable and smarter urban tourism grows (UNWTO, 2017), the connection between technology and sustainability will get further strengthened. On one hand, as the world moves towards the era of Industry 4.0, (technologically) smarter cities will receive more impetus entailing the growth of smart tourism destinations—driven by digital technologies, widespread availability of internet technology and smarter digital devices. On the other hand, as the climate crisis becomes increasingly significant, cities will have a larger role to play in the deployment of green tech and clean energy which will, in turn, become embedded in the functioning of major urban industries like tourism. Moreover, smart mobility options are being increasingly adopted by global cities in the world which focuses on offering efficient mass transit systems and clean energy/low emission automobile and inter-modal transport options to both tourists and local residents (Arcadis, 2017).

A summary diagram highlighting the interlinkages discussed in this chapter is presented in Fig. 16.1.

The World Economic Forum (WEF) considers innovation in technology to be the key for growth in the times to come principally in the areas of digitalization, smart systems (encompassing intelligent systems in clean energy, soft mobility and man-machine interfaces), artificial

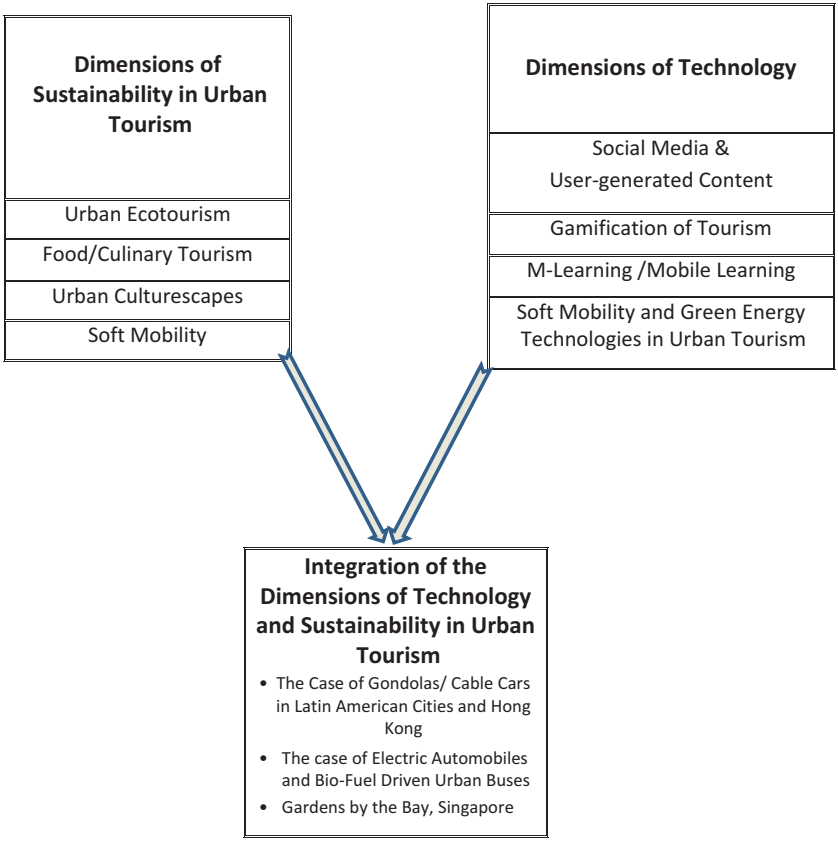

Fig. 16.1 Interlinkages between sustainability and technology in the urban tourism setting

intelligence and sustainable technologies (World Economic Forum, 2017). The UNWTO's call for a sustainable tourism for development in 2017 in the context encompasses social and economic inclusivity, cultural diversity, cultural mutualism and clean energy-driven environmental practice and (UNWTO, 2017). Therefore, the connection and integration of sustainability and technology in urban tourism contexts need to entail the social and cultural dimensions of both as their fundamental basis in addition to their environmental and innovational aspects.

The integration of sustainable forms of tourism and social and environmental dimensions of technology in urban contexts must yield benefits for all sections of visitors as well as all sections of the local resident population in urban destinations of the world.

One of the fundamental considerations for urban destination management organizations should be to put the sustainability-technology integration as the main underlying element in their destination marketing and branding process. Future studies focusing on the sustainability-technology integration may focus on the context of specific destinations—their scope in terms of sustainable forms of urban tourism attractions available as well as the available forms of digital and clean energy technology and their extent of use in such contexts.

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