Liu Liu
Capital University of Economics and Business

Yunpeng Li
Capital University of Economics and Business

Huiying Zhang
University of Nevada, Las Vegas

Esencan Terzibasoglu
World Tourism Cities Federation

Government's Perception of Constructing Smart Tourism Cities

The development of technology has triggered innovations in the tourism industry as well as the construction process of smart cities. The adoption of smart tourism products within cities has enhanced tourist's travelling experience while encouraged tourism businesses. Due to the significant role of publishing policies and strategies, the local government's participation in the smart tourism city construction is essential. However, the existing guidelines for constructing smart cities has not stressed the smart tourism products, nor did they emphasis the function of local government. This paper fills this research gap and proposes an evaluation matrix that assesses four aspects, namely data research, sustainable development, smart tourism tools and innovative business models. A questionnaire reflecting the evaluation matrix was answered by 37 global cities that have successful experience constructing smart tourism cities. Their positive feedback validates the evaluation matrix and proves it to be an effective guideline for local governments. The research findings enrich the smart tourism city construction literature.

Key words: smart tourism cities, evaluation matrix, government's perspective

Liu Liu
School of Business Administration
Capital University of Economics and Business
No. 121, Fengtai District, Beijing, China, 100070
Email: liuliu@cueb.edu.cn

Yunpeng Li
School of Business Administration
Capital University of Economics and Business
No. 121, Fengtai District, Beijing, China, 100070
Email: liyunpeng@cueb.edu.cn

Huiying Zhang
University of Nevada, Las Vegas
4505 S. Maryland Pkwy. Las Vegas, NV 89154
Email: sophie.zhanghy@qq.com

Esencan Terzibasoglu
World Tourism Cities Federation

6th Floor, No. 3 Dongbinhe Road, Deshengmen, Xicheng District, Beijing, China, 100120
Email: eterzibasoglu@gmail.com

Liu liu is an assistant professor in School of Business Administration, Capital University of Economics and Business. Her research focuses on e-commerce and gaming behaviour.

Yunpeng li is a professor in School of Business Administration, Capital University of Economics and Business. His research focuses on ecommerce, technology application, big data in the context of tourism and smart tourism

Huiying Zhang is a Ph.D student in University of Nevada, Las Vegas. Her research focuses on smart tourism city and big data in tourism.

Esencan Terzibasoglu is a consultant to the secretary general of World Tourism Cities Federation. Her research focuses on destination marketing and city governance.

Introduction

Technology has been widely applied in tourism and driven innovations of tourism products (Hjalager, 2010). Particularly within the tourism industry, the development of smart products and smart places have caused a paradigm shift (Buhalis, 2015). Having adopted smart products and services, smart cities have been constructed globally to improve travel experiences (Wang et al., 2013; Buhalis and Amaranggana, 2014; Gretzel et al., 2015), promote local businesses (Caragliu et al., 2011; Buhalis and Amaranggana, 2014) as well as integrate all members of society (Cohen, 2014; Malek and Costa, 2015). As an essential contributor to the construction of smart cities, local government acts to launch tourism policies and strategies which incorporate smart technologies (Nam and Pardo, 2011; Cocchia, 2014; Meijer and Bolivar, 2015). Although there are some guidelines for smart city construction (Zhang et al., 2018 and Wang et al., 2016), they tend to focus on one certain aspect and ignore the whole picture from the government's perspective. Particularly, there has not been any study about constructing smart tourism facilities in cities. In order to guide the government actions, this research introduces an evaluation matrix for smart tourism city construction. The evaluation matrix covers areas of data research, sustainable development, smart tourism tools and innovative business models. 37 global cities are surveyed using this evaluation matrix and the results validates the evaluation matrix proposed.

Literature Review

The construction of smart cities

Smart cities adopt modern technological solutions to facilitate sustainable economic growth and enhance a high quality of life (Caragliu et al., 2011). Through intensive information sharing and value co-creation, smart cities deliver and manage intelligent touristic products and services (Gretzel et al., 2015). Government's participation is an

essential part in the construction of smart cities through managing natural, social and human resources (Caragliu et al., 2011). By connecting government with private businesses, tourism organizations are interconnected to provide tourists with customized and real-time products, while enabling the collection of data which are further used for strategy optimization and operational management (Wang et al., 2013; Gretzel et al., 2015). In terms of the construction model of smart cities, Giffinger et al. (2007) firstly proposed six essential characteristics, namely Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, and Smart Living. There are various smart cities constructed following different methods addressing the cities' policies, funding, objectives and scopes (Amitrano et al., 2014). Additional evaluation criteria have been proposed for smart destination websites (Zhang et al., 2018) and tourist preferences of smart tourism attractions (Wang at al., 2016). Most of the prior research on smart cities emphasize the impact brought by business-led tourism products and services which enhance the tourist experience (Wang et al., 2013; Buhalis and Amaranggana, 2014; Gretzel et al., 2015). The role of the local government has not been thoroughly studied. More specifically, the function of government when it comes to constructing a smart city for tourism.

Composing an evaluation matrix

To overcome the problems faced by the current evaluation matrixes, the research proposes a more comprehensive evaluation matrix that takes four aspects into consideration: data research, sustainable development, smart tourism tools and innovative business models. This evaluation matrix integrates all the domains of technology intervention in the tourism sector, which contributes to sustainable economic growth and better life quality (Anthopoulos and Tougountzoglou, 2012). The data research assesses the level of government's involvement in establishing tourism intelligence systems. The decisions made by the local

government are critical because they guide the implementation process of smart facilities (Previtali and Bof, 2009). Because of the novel insights regarding tourists' behavior brought by data streams (Kitchin, 2013), the types of data collected and used are also assessed to study of the impact brought by big data and open data separately.

Sustainable development is an essential part in city management, and smart tourism initiative contributes by providing technological solutions (Bifulco et al., 2016). The evaluation matrix measures all its critical elements including biodiversity (Tanguay et al., 2010), waste, freshwater, renewable energy (Dameri, 2013, p. 2549), ecofriendly transportation (Bulu, 2014), accessibility (Albino et al., 2015, p. 11) and digital monitoring (Meijer and Rodríguez-Bolívar, 2015). Although smart cities focus on the adoption of technology (Harrison et al., 2010), being able to use technology does not make a city smart already (Cohen, 2012; Townsend, 2013). Only when associated with human, organization and social structure, technology will performance its functions (Geels, 2002, p.1257). In the smart tourism tools section, this evaluation matrix considers the performance of various technological tools including Internet connectivity in tourism facilities, WIFI connectivity in tourism facilities and public spaces separately, mobile platforms (Bulu, 2014), technology tools, crowd management and technology embedded environment (Schilling and Logan, 2008). As a significant element to improve competitiveness (Porter, 1998), innovation has been proven to be vital for the competitiveness of smart cities (Hielkema and Hongisto, 2013). Innovation is not only a critical input but also an outcome of smart cities (Boes et al., 2016). In the last part of the evaluation matrix proposed, the innovative business models section evaluates public digital platforms and commercial platforms for tourism, aiming to discover new types of tourism products and services run by both public and private sectors.

Methodology

To testify the validity of this evaluation matrix, five tourism experts were interviewed. The experts include one university professor who specializes in tourism management and four experts from tourism organizations. The evaluation matrix was amended according to their feedback. To further prove the effectiveness of this evaluation matrix, a questionnaire was generated with contents reflecting the matrix. The questionnaire contains 22 questions, both quantitative and qualitative. Quantitative questions adopt a five-point Likert scale to access a certain domain of smart tourism construction. The respondents indicated their city's performance in the corresponding question by selecting a scale from 1 (almost undeveloped) to 5 (well developed). The qualitative questions aim to collect more detailed opinion for each smart tourism construction aspect. 37 cities' government tourism department officer answered the questionnaire, There are 22 European cities, 5 Asian cities, 6 American cities, 3 African cities and 1 city from Oceania. All 37 cities have good level of smart tourism facilities and many of them have been awarded with smart tourism certificates and rewards, making the questionnaire responses trustworthy. The names of cities are kept anonymous in this paper. The questionnaire responses have been tested for their validity in terms of the completion rate and the answer quality. All responses passed the test.

Findings

Having analyzed the responses from the 37 participant cities, the evaluation matrix proposed received positive feedback and was well recognized throughout all the cities. The result reveals that the evaluation matrix is useful and applicable when it comes to guiding local government to construct smart tourism cities.

Questionnaire responses from the 37 global cities

More than half of the participated cities (24 cities) have established institutes for a tourism intelligence system. Some city governments organize these institutes by establishing specific departments in charge of statistics, tourism industry, smart city construction, IT, etc. Other cities use multiple sources to collect tourism data such as city website, social network, Economics Ministry, tourism attractions data, tourist surveys, etc. participants have reported that the data has been successfully used for tourism strategic planning, traffic management, event management, security, attraction revenue evaluation, tourists analysis and customization, flight and hotel reservation management, crowd management, etc. In terms of the market intelligence tools used by cities, 19 cities have used big data and 20 cities used open data. The big data used were collected by local government of traffic, parks, hotels, hospitals and attractions. The open data include online reviews, mobile providers, surveys and market trends. There are 8 cities who mentioned other market intelligence tools including monthly tourism development reports and individual market research projects.
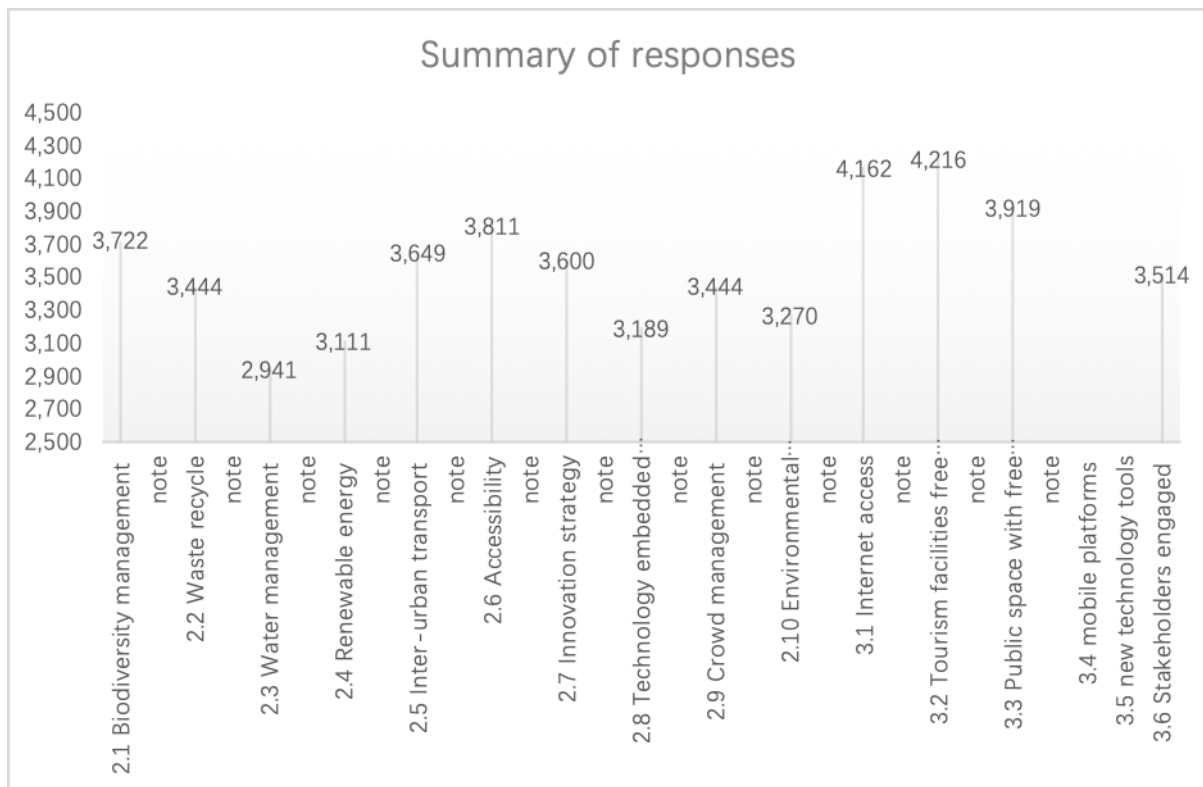

Figure 1. Summary of the questionnaire responses

Looking at the quantitative questionnaire responses as a whole (Figure 1), the smart tourism facilities with the highest scores are tourism facilities with free WIFI connections, internet access and public space with free WIFI connections. The areas which are relatively undeveloped at the moment are water management, renewable energy and technology embedment environment. When evaluating the sustainable development performance within smart tourism cities, this research proposes 8 criteria, namely biodiversity, waste, water, renewable energy, eco-friendly transportation, accessibility and digital monitoring. The questionnaire responses show that the participant cities have stressed accessibility, biodiversity and eco-friendly transportation. To increase the accessibility within the city, many respondents have reported that they have introduced accessible transportations and acoustic crossing aids. To ensure the biodiversity, participant cities have launched policies to protect species, monitor climate changes and preserve reserves. The ecofriendly transportation is achieved through encouraging the usage of bikes, e-bikes, car free days and zones. Water management is one area that many cities have not emphasized, more actions could be taken including recycling and installing water saving devices. The smart tourism tools evaluate the performance of multiple technology solutions. Questionnaire feedback has revealed that Internet and WIFI is well spread in both tourism facilities (e.g. attractions, hotels, tourist information centers) and public spaces (e.g. restaurants, shops, transport terminals, hospitals). Many cities offer free public WIFI which comes with complementary information on cultural events, transit, subway and buses. Crowd management has been improved due to the data collected from mobile phones, street cameras and real-time visitor arrivals statistics. Based on the data acquired, big data analytics are processed to manage and predict crowd flows. The technology embedded environment is achieved through sensors in parking lots, smart pedestrian traffic lights, intelligent traffic system, machine learning and

advanced GIS. The two additional evaluation criteria in this section are mobile platforms and technology tools which are accessed in the questionnaire through open ended questions. Participant cities have reported launching mobile apps for tourism information including maps, personal itinerary, ticket purchasing, public transportation, tourism sales incentive, film destinations, cashless payment, audio guidance, visitor attractions, local amenities, intelligent events calendars and bike sharing. Technology tools adopted include Virtual Reality devices, 360-degree panorama online, NFC technology, Augmented Reality applications, QR Codes, Bluetooth and interactive maps. Smart tourism city construction calls for innovative business models in both public and private sectors. This part is accessed in the questionnaire through open-ended questions. Participant cities have reported successful public business models including official tourism websites, social media and mobile apps, open database for tourism provided by government and consulting firms, transportation information platforms, climate management platforms, etc. Commercial business models proposed by the cities include trip planning, shared economy, events and festivals, accommodation, food industry, ticketing, nightlife and cashless payment.

The evaluation matrix for smart tourism city

Combining both literature and questionnaire feedback, an evaluation matrix for smart tourism city construction is abstracted. This evaluation matrix is an improvement from the current smart city construction guidelines (e.g. Giffinger et al., 2007; Amitrano et al., 2014), focusing on instructing government's actions when building smart cities for tourism specifically. The evaluation matrix includes four aspects: data research, sustainable development, smart tourism tools and innovative business models. The data research sector emphasizes the government's role in collecting and applying data in the tourism industry. Government-led tourism intelligence systems should be built in the forms of statistic, IT or

smart city departments, allowing big data in associate with tourist behavior to be collected. Other than this, multiple sources should be used to collect open data, including city website, social network, Economics Ministry, tourism attractions data and tourist surveys.

Sustainable tourism is constructed from the areas including biodiversity, waste, water, renewable energy, eco-friendly transportation, accessibility, and digital monitoring. Although many cities have established relevant policies, more actions could be taken for water management. The smart tourism tools emphasize Internet and WIFI in tourism facilities and public spaces, as well as other innovative technology tools including Virtual Reality devices, NFC technology, Augmented Reality applications and Bluetooth. Technology such as sensors, intelligent traffic system and machine learning GIS have been applied to enhance tourism management and crowd management. Various mobile platforms should be built for tourist information, transportations and cashless payment. Smart tourism city construction encourages innovative business models. Public business models include tourism information platforms, open database and climate management tools. Commercial business models include various mobile apps for tourist information, cashless payment and shared economy.

Conclusion

Technology has driven innovations of tourism products and made substantial contribution to the construction of smart cities. To fill the research gap of constructing smart tourism facilities within cities, this research proposes an evaluation matrix that assess four aspects, namely data research, sustainable development, smart tourism tools and innovative business models. This evaluation matrix is an improvement from the current smart city guidelines which tend to focus on one certain aspect, proposing a matrix that guide the government's actions in multiple areas. The evaluation matrix is summarized from literature and experts' opinions. It is further validated by a questionnaire which surveyed 37 global

cities that have successfully practiced smart tourism. All evaluation criteria in the matrix received positive feedback, proving the evaluation matrix to be effective. The findings of this research enrich the smart tourism city construction literature and the evaluation matrix proposed acts as a useful guideline for local government.

Acknowledgement

References

Albino, V., Berardi, U. and Dangelico, R.M., 2015, "Smart cities: definitions, dimensions, performance, and initiatives", *Journal of Urban Technology*, 22 (1):3-21.

Amitrano, C.C., Alfano, A. and Bifulco, F., 2014, "Smart cities at the forefront: the development of greenfield cities", *Journal of Economy, Business and Financing,* 2 (2):58-66.

Anthopoulos, L. and Tougountzoglou, T., 2012, "A viability model for digital cities: economic and acceptability factors", in Reddick, C.G. and Aikins, S.K. (Eds), Web 2.0 Technologies and Democratic Governance, 1, *Springer*, New York, NY:79-96.

Bifulco, F. et al., 2016. ICT and sustainability in smart cities management. *International Journal of Public Sector Management,* 29(2):132–147.

Boes, Kim, et al., 2016 "Smart Tourism Destinations: Ecosystems for Tourism Destination Competitiveness." *International Journal of Tourism Cities*, 2, (2):108–124., doi:10.1108/ijtc-12-2015-0032.

Buhalis, D. and Amaranggana, A., 2014, "Smart tourism destinations", in Xiang, Z. and Tussyadiah, L. (Eds), Information and Communication Technologies in Tourism 2014, *Springer*, Dublin:553-64.

Buhalis, D., 2015, "Working definitions of smartness and smart tourism destination", available at: http:// buhalis.blogspot.co.uk/2014/12/working-definitions-ofsmartness-and.html (accessed 2 March 2019).

Bulu, M., 2014, "Upgrading a city via technology", *Technological Forecasting and Social Change*, 89, November:63-67.

Caragliu, A., Del Bo, C. and Nijkamp, P., 2011, "Smart cities in Europe", Journal of Urban Technology, 18 (2:65-82. Cocchia, A., 2014, "Smart and digital city: a systematic literature review", in Dameri, R.P. and Rosenthal-Sabroux, C. (Eds), Smart City: How to Create Public and Economic Value with High Technology in Urban Space, *Springer International Publishing*, Heidelberg:13-43.

Cohen, B, 2012, "6 key components for smart cities", available at: www.ubmfuturecities.com/author.asp? section_id1∕4219&doc_id1∕4524053 (accessed 14 November 2019).

Cohen, B., 2014, "Leading smart cities promote 5P collaboration", available at: www.ubmfuturecities.com/ author.asp.doc_id1∕4526721 (accessed 28 September 2019).

Dameri, R.P., 2013, "Searching for smart city definition: a comprehensive proposal", *International Journal of Computers & Technology*, 11 (5):254451.

Geels, F.W., 2002, "Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study", *Research Policy,* 31 Nos 8-9:1257-74.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N. and Meijers, E., 2007, "Smart cities ranking of European medium-sized cities", available at: www.smart-cities.eu/ download/smart_cities_final_report.pdf (accessed 25 June 2019).

Gretzel, U., Werthner, H., Koo, C. and Lamsfus, C., 2015, "Conceptual foundations for understanding smart tourism ecosystems", Computers in Human Behavior, 50 (C):558-63.

Harrison, C., Eckman, B., Hamilton, R., Hartswick, P., Kalagnanam, J., Paraszczak, J. and Williams, P., 2010, "Foundations for smarter cities", *IBM Journal of Research and Development*, 54 (4):1-16.

Hielkema, H. and Hongisto, P., 2013, "No developing the helsinki smart city: the role of competitions for open lynndata applications", *Journal of Knowledge Economy*, 4 (2):190-204.

Hjalager, A.-M., 2010, "Progress in tourism management: a review of innovation research in tourism", *Tourism Management*, 31 (1):1-12.

Kitchin, R., 2013, "The real-time city? Big data and smart urbanism", *GeoJournal*, 79 (1):1-14.

Malek, A. and Costa, C., 2015, "Integrating communities into tourism planning through social innovation", *Tourism Planning & Development*, 12 (3):281-99.

Meijer, A. and Rodríguez-Bolívar, M.P., 2015, "Governing the smart city: a review of the literature on smart urban governance", *International Review of Administrative Sciences*, April:1-17.

Nam, T. and Pardo, T., 2011, "Conceptualizing smart city with dimensions of technology, people, and institutions", in Bertot, J. and Nahon, K. (Eds), Proceedings of the 12th Annual International Digital Government Research Conference on Digital Government Innovation in Challenging Times - dg.o '11, *ACM Press*, New York, NY:282-91.

Porter, M.E., 1998, The Competitive Advantage of Nations, Macmillan Business, Basingstoke. Previtali, P. and Bof, F., 2009, "E-government adoption in small Italian municipalities", *International Journal of Public Sector Management*, 22 (4):338348.

Schilling, J. and Logan, J., 2008, "Greening the rust belt: a green infrastructure model for right sizing America's shrinking cities", *Journal of the American Planning Association*, 74 (4):451-466.

Tanguay, G.A., Rajaonson, J., Lefebvre, J.F. and Lanoie, P., 2010, "Measuring the sustainability of cities: an analysis of the use of local indicators", *Ecological Indicators*, 10 (2):407-418.

Townsend, A.M., 2013, Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia, W. W. *Norton & Company*, New York, NY.

Wang, D., Li, X. and Li, Y., 2013, "China's 'smart tourism destination' initiative: a taste of the service-dominant logic", *Journal of Destination Marketing & Management,* 2 (2):59-61.

Wang et al., 2016. How smart is your tourist attraction: Measuring tourist preferences of smart tourism attractions via a FCEM-AHP and IPA approach. *Tourism Management*, 54:309–320.

Zhang, T., Cheung, C. & Law, R., 2018. Functionality Evaluation for Destination Marketing Websites in Smart Tourism Cities. *Journal of China Tourism Research*, 14(3):263–278.