

The Quantified Traveller: Implications for Designing Tourism Systems

Yeongbae Choe^a, and
Daniel R. Fesenmaier^a

^aNational Laboratory for Tourism & eCommerce
Eric Friedheim Tourism Institute
University of Florida, USA
ychoe@ufl.edu; drfez@ufl.edu

Abstract

The purpose of this study is to develop a foundation for understanding the practical applications of wearable devices and the emerging technologies for the tourism industry. While mobile technologies have had a huge impact on the tourism experience by providing relevant information upon request, it is posited in this research that the technologies related to the quantified-self (e.g., wearable devices connected to the internet) substantially enhance the potential for changing how we travel. That is, this emerging technology is becoming perfectly matched with the needs of context-relevant information and therefore offers even greater potential to create and shape tourism experiences. As such, the information collected through this technology enables tourism marketers to understand not only each individual traveller, but also the collective market in much greater detail, and consequently enables them to design much more compelling and efficient tourism services.

Keywords: Wearable device, quantified self, Mobility, SMART tourism

1 Introduction

The continuing evolution of information and communication technology (ICT) has hugely transformed travel. In particular, smartphones and associated apps have expanded the scope of the tourism experience by enabling travellers to contact and share their experiences with family and friends in different places whenever and wherever they want (e.g., Wang, Park, & Fesenmaier, 2012). Further, wearable devices (e.g., google glass, Apple watch, etc.) have attracted significant attention owing to their advantages of portability and potential usability in the tourism industry (Tussyadiah, 2013). Indeed, recent studies suggest that these technologies enable the tourism industry to move toward a so-called data-driven 'sensor society' wherein an individual leaves a huge data footprint during the course of their life (e.g., Andrejevic & Burdon, 2014). However, it is easy to imagine how to 'repurpose' this information such that it can be used to provide detailed information about the traveller including health status, potential considerations for maintaining a diet, possible changes in plans or quality of sleep, emotional status and the need to communicate with friends and relatives, etc. With this background, the primary purpose of this study is to propose a framework with which to identify the potential of these technologies for developing and managing a range of applications which can be used by the tourism industry.

2 The Quantified-Self and Wearable Technologies

The quantified-self movement is an emerging trend identified by a wide range of

technological devices used for self-tracking, life-logging, personal analytics, and personal informatics. The concept of the quantified-self is based upon a new phenomenon wherein people voluntarily monitor their lives to better understand themselves (Lupton, 2014). Indeed, the notion of self-monitoring (and tracking) has long roots that can be traced back to the 1970s (Kopp, 1988). Since then, the concept of self-monitoring has proven effective in changing people's attitude and behaviours, which is the goal of an embodied function in the sensing technologies (Choe, Lee, Lee, Pratt, & Kientz, 2014). The motivation behind this movement is to gain self-knowledge by tracking one's life to 'optimize' behaviour through the process of quantification (Choe et al., 2014). Having these motivations, quantified-self participants have identified several benefits to this process including acquiring data about their lives, challenging themselves, and eventually receiving feedback from the comparisons between their life and goals.

Importantly, the development of wearable devices (e.g., wrist, smart watch) along with cheaper sensors and cloud computing have completely changed the way people track their daily life by lessening the effort and the level of consciousness (Swan, 2013). The quantified-self have been applied to a number of the different domains (e.g., health, fitness, sport) and ultimately generates several different types of information about our lives. Many 'smart' products and devices now have capabilities to capture everything surrounded to us (e.g., activities, bodies) in real-time unobtrusively and interact with each other to understand the current circumstance (Lupton, 2014). For example, the driving habits and drowsiness are monitored so as to alert drivers to be safe.

Although the concept of the quantified-self emphasises the individual, this concept is easily extended well beyond the scope of individuals and used by a group of people together (Swan, 2013). That is, people often share data about their lives (e.g., the level of happiness, walking distance) with others with the purpose of collective knowledge development, benchmarking performance and participating in social communities. Thus, it is possible that other entities such as actors, agencies, and organizations beyond the personal and privatized scope are able to access the information via such communities and/or cloud services and in turn, provide feedback (e.g., a solution, a discount coupon, etc.) in real time (Lupton, 2014). With these advantages, tourism industry can repurpose these data to create 'value' (often commercial).

2.1 Context-Aware Information and Smart Tourism

Smart Tourism often refers to the convergence of information technologies, business ecosystem, and tourism experiences (e.g., Gretzel, Sigala, Xiang, & Koo, 2015). Importantly, Gretzel et al (2015) emphasizes that the core technology of smart tourism are sensors and mobile devices which enable destinations to create the pervasive technological environment in order that marketers can anticipate travellers' needs in real time, enhance one's experiences, and enable to share/reinforce one's tourism experiences. Thus, tourism destinations and companies need to utilize the personalization, context-awareness, and real-time monitoring system, whereby the key components are the information collections, ubiquitous connectedness, and real-time synchronization (e.g., Neuhofer, Buhalis, & Ladkin, 2015). Further, the basic

nature of the tourism industry closely connects to the concept of tourist mobility, which is the movement of travellers from the origin to the destination as well as from the places to places within the destination (Yoo, Tussyadiah, Fesenmaier, Saari, & Tjøstheim, 2008). This characteristic implies that travellers face a number of different decision contexts (e.g., situations and surrounded environments) which might cause changes in travellers' decision-making and behaviour while on-the-go (Lamsfus, Wang, Alzua-Sorzabal, & Xiang, 2014); for example, the stage of travel, composition of travel party, physical fatigue, emotional state, etc. might influence on travellers' behaviours in a manner that people negotiate their pre-defined trip planes with internal and external contextual information. Importantly, changes in context and subsequent behaviours can further transform the way travellers interact within and/or experience the destination (e.g., Kim & Fesenmaier, 2014). Thus from the destination marketers' perspective, understanding context and mobility empowers marketers with the ability to alter (and manipulate) travellers' behaviours at the destination by informing them of relevant information in real time (Lamsfus et al., 2014; Stienmetz & Fesenmaier, 2015).

3 A Conceptual Framework

Based upon the literature, this study provides a foundation for assessing the potential use of the concept of quantified-self movement (and wearable devices) by integrating individual travellers' behaviours and stored sensor data at their ordinary life into the recommendations for their behaviours at the moment of travelling. The fundamental aspect of the proposed framework is the use of personal historical data generated at the ordinary life and the connection of that information to the touristic experience (Wang, Xiang, & Fesenmaier, 2014). Technologies (e.g., sensors, internet-of-things, wearable devices, and so on) have an important but implicit role in facilitating the interaction between travellers, the environment, and technologies. Indeed, technologies have been considered as an effective instrument to create, support, and reinforce tourism experiences by providing information, broadening the choice of travellers' behaviours, and enabling travellers to share their experiences with their family and friends even at the destination (Tussyadiah & Fesenmaier, 2009; Wang et al., 2012). Among them, information searching and retrieving behaviours are the most vital functions that impact travellers' behaviours and experiences (Gretzel, 2010; Wang et al., 2012). Importantly, the use of technologies (e.g., mobile, wearable devices) affords travellers the ability to create and/or manage their own tourism experiences by not just passively receiving the information from the destination and tourism marketers, but by actively and dynamically engaging in activities within the destination (Zach & Gretzel, 2012).

The foundations of the quantified traveller discussed above can be organized so as to provide a framework within which to consider a wide range of applications and their affordances for contributing to, or enhancing, the touristic experience. As shown in Fig. 1, the various affordances of the emerging systems can be organized on two axes where they support the **individual vs. place** and where the various measures are monitored on a **daily basis** or are only **trip-related**. For example, the nature of data collected for health occurs on a daily basis and on a personal level; this contrasts to hotel or event reservations which are related to places and are trip specific.

Further, Fig. 1 illustrates (using the connected lines) that some of the many of the aspects of daily life such as dining preferences, communication with family and friends, etc. can easily extend into the travel experience using emerging mobile technologies. Many other connections (and related affordances) can be mapped using this framework; the following identifies some possible applications in tourism.

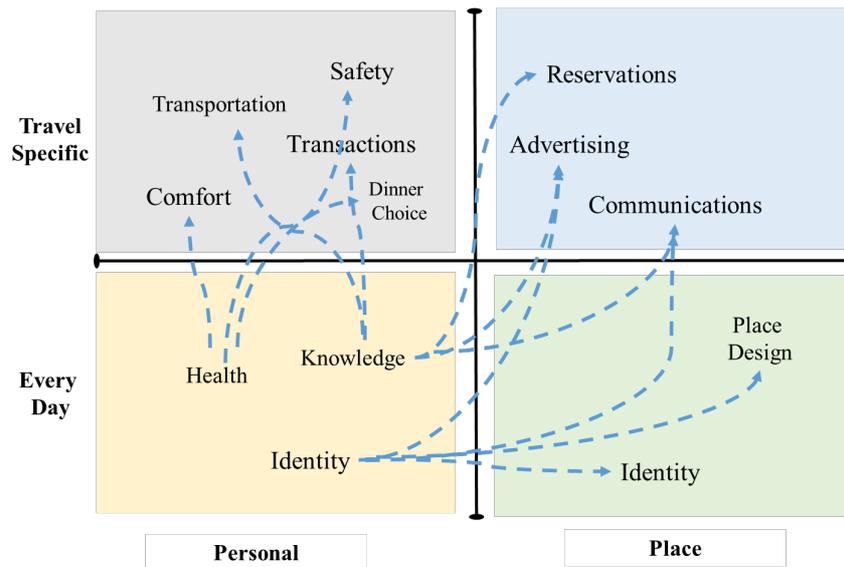


Fig 1. A Framework for the Quantified Traveller

4 Conclusions

The way we travel to a destination and the experiences we have at the destination have been constantly evolving because of technology. Now, the advent of the systems supporting the quantified traveller (and all the related systems including wearable devices, big data and artificial intelligence) serves as a new generation of tools revolutionizing how people travel. In this new world of the quantified traveller, wearable devices will be used to capture the entire journey (i.e., behavioural outcomes, the bodily state) wherein all aspects of the trip will become seamless and unobtrusive and ‘matched’ perfectly to the individual traveller. Further, these new technologies will induce changes in the value creation process wherein travellers become more creative in designing their trip in a way that closely fits their distinctive travel needs, values, preferences, and so on. All these new devices and new ‘informational ecosystems’ threaten traditional information channels that simply provide basic destination related information and/or recommendations. As such, the emergence of the quantified traveller requires destination to develop more dynamic strategies so as to empower each visitor to choose his/her own unique “activated path” depending on his/her needs. To do so, destination marketers need to understand better their own products and services within the context of how to interact with travellers within the destination (Stienmetz & Fesenmaier, 2013, 2015). Several considerations

should be emphasized in order for destination and tourism marketers to respond to these new innovations. Importantly, gamification, ambient notification, and a narrative storytelling should be used to inspire people to adapt those technologies for their own purpose. Further, privacy concerns is a very important issue that should be addressed (e.g., Andrejevic & Burdon, 2014) . With this said, it is argued that the tourism industry is on the verge of a new revolution which will change not only the tools used to plan travel and the way we create travel experiences, but the nature of the tourism industry itself.

References

- Andrejevic, M., & Burdon, M. (2014). Defining the sensor society. *Television & New Media*. doi:10.1177/1527476414541552
- Choe, E. K., Lee, N. B., Lee, B., Pratt, W., & Kientz, J. A. (2014). Understanding quantified-selfers' practices in collecting and exploring personal data. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems - CHI '14* (pp. 1143–1152). New York, USA: ACM Press.
- Gretzel, U. (2010). Travel in the network. In M. Levina & G. Kien (Eds.), *Post-global network and everyday life* (pp. 41–58). New York, NY: Peter Lang.
- Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: foundations and developments. *Electronic Markets*. doi:10.1007/s12525-015-0196-8
- Kim, J. J., & Fesenmaier, D. R. (2014). Measuring Emotions in Real Time: Implications for Tourism Design. *Journal of Travel Research*. doi:10.1177/0047287514550100
- Kopp, J. (1988). Self-monitoring: A literature review of research and practice. *Social Work Research and Abstracts*, 24(4), 8–20.
- Lamsfus, C., Wang, D., Alzua-Sorzabal, A., & Xiang, Z. (2014). Going mobile: Defining context for on-the-go travelers. *Journal of Travel Research*. doi:10.1177/0047287514538839
- Lupton, D. (2014). Self-tracking Modes: Reflexive Self-Monitoring and Data Practices. In the *"Imminent Citizenships: Personhood and Identity Politics in the Informatic Age" workshop*. Canberra, AU, AU. Retrieved from <http://ssrn.com/abstract=2483549>
- Neuhofner, B., Buhalis, D., & Ladkin, A. (2015). Smart technologies for personalized experiences: a case study in the hospitality domain. *Electronic Markets*, 25(3), 243–254.
- Stienmetz, J. L., & Fesenmaier, D. R. (2013). Traveling the network: A proposal for destination performance metrics. *International Journal of Tourism Sciences*, 13(2), 57–75.
- Stienmetz, J. L., & Fesenmaier, D. R. (2015). Estimating value in Baltimore , Maryland : An attractions network analysis. *Tourism Management*, 50, 238–252.
- Swan, M. (2013). The Quantified Self: Fundamental Disruption in Big Data Science and Biological Discovery. *Big Data*, 1(2), 85–99.
- Tussyadiah, I. P. (2013). Expectation of Travel Experiences with Wearable Computing Devices. In Z. Xiang & I. P. Tussyadiah (Eds.), *Information and Communication Technologies in Tourism 2014* (pp. 539–552). Cham: Springer International Publishing.
- Tussyadiah, I. P., & Fesenmaier, D. R. (2009). Mediating tourist experiences. *Annals of Tourism Research*, 36(1), 24–40.
- Wang, D., Park, S., & Fesenmaier, D. R. (2012). The role of smartphones in mediating the touristic experience. *Journal of Travel Research*, 51(4), 371–387.
- Wang, D., Xiang, Z., & Fesenmaier, D. R. (2014). Smartphone use in everyday life and travel. *Journal of Travel Research*. doi:10.1177/0047287514535847
- Yoo, Y., Tussyadiah, I. P., Fesenmaier, D. R., Saari, T., & Tjøstheim, I. (2008). Emergent distributed narratives in spatiotemporal mobility: An exploratory study on mobile 2.0 services. In *Proceedings of the Annual Hawaii International Conference on System Sciences* (pp. 85–95).

Zach, F., & Gretzel, U. (2012). Tourist-Activated Networks: Implications for Dynamic Bundling and EN Route Recommendations. *Information Technology & Tourism, 13*(3), 239–257.