Personal Technology and Tourism Experiences*

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Abstract

Personal technologies have become an integral part of and caused dramatic impacts on human experiences. As people increasingly use personal devices to plan, organize, and reflect on a trip, the roles of personal technologies in travel and tourism become more and more prominent. These roles are typically associated with enablement (i.e., making certain experiences possible) and facilitation (i.e., assistive technology to enhance experiences), which often result in transformation of the various aspects of travel experiences. Recent development indicates that personal technologies evolve from being portable to wearable, implying the potential changes in the ways users interact with technology and, consequently, the ways they use it during traveling. This article addresses the potential implications of the development in personal technology, including wearables, on the transformation of travelers' behavior and overall travel patterns.
Keywords: Personal Technology, Mobile, Wearable, Travel

1. Personal Technologies

The modern life is characterized with the widespread use of information and communication technologies (ICTs), where people increasingly live with and rely on electronic devices to search, record, and distribute information. Importantly, personal technology now pervades our lives and become the primary means by which people interact with each other. In a broader context, the term personal technology is used to explain electronic devices that are relatively small and easy to carry (i.e., portable machines), which typically refers to ubiquitous, pervasive, and mobile computing. Personal technology can also refer to approaches to computing that demonstrate how advanced technologies can be personalized to meet the unique informational needs of their users (e.g., Weiss, Whiteley, Treviranus, & Fels, 2001), allowing for electronic devices to serve for an individual's personal (e.g., educational, social, entertainment, and emotional) use. For example, the term personal computer (PC) was introduced to describe a general-purpose computer (also called a microcomputer) that is intended to be operated by an end-user (i.e., single-person use) without an intervening computer operator. Today, personal technology has moved beyond PC and is generally associated with "consumer tech," referring to smart mobile devices that are designed (i.e., in terms of their size, capabilities, and price) for general and/or specialized personal use (e.g., smartphones, tablets, e-readers, etc.).

To illustrate the pervasive nature of personal technology, Nielsen (2014a) reported that smartphones are adopted at a phenomenal pace, with 71% overall penetration rate in the US in 2014. Indeed, PC has been dethroned by smartphones as

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primary computing devices since people are increasingly performing digital tasks from reading news articles to editing a spreadsheet using smartphone apps (Mossberg, 2014). Smart mobile devices are characterized with constant connectivity (i.e., ubiquitous access to information and social connections; always on and always accessible) supported by intelligent systems and robust, rapid networks. These provide smartphone users with world's information and entertainment at their disposal and "on demand", enabling the performance of many aspects of life anytime anywhere. Consequently, the use of smartphones causes changes in the ways in which people socialize, do tasks, find, gather and share information, have fun, and manage their lives (Oulasvirta, Rattenbury, Ma, & Raita, 2012; Nielsen, 2014b). Many have demonstrated the impacts of smartphones on their users (e.g., Darrell, 2014; Derks et al., 2014), which include such aspects as consumer behavior (e.g., mobile banking, mobile payment systems), social interaction (e.g., relationships with circles of friends and families, online social networking), and general work-life balance (i.e., less separation of work and personal life), as well as the society in general (e.g., Laird, 2012; Penn, 2015; Sarwar & Somro, 2013), which include impacts on business (e.g., increase in productivity), education (e.g., distraction in the classrooms, bullying and hazing in schools), and health (e.g., access to healthcare facilities, ease of health monitoring), among others.

The latest development in personal technology is the introduction of wearable computing devices, the next generation of portable machines. Today, the array of wearable computers ranges from wristbands and smart watches that intelligently monitor users' fitness (e.g., heart rate, blood pressure), activities (e.g., movement, sleep) and communication, to smart eyewear that run apps (e.g., Google Glass), to wearable fashion technology making use of wearable sensors and smart textiles (e.g., performance enhancing footwear). As they are worn on the body (i.e., head-mounted, on the wrist, etc.), wearable computing devices are subsumed into the personal space of the users and, at the same time, controlled by the users. These devices also provide both operational and interactional constancy, making it possible for the users to obtain real-time feedback on their experiences and dramatically improve their performance. Consequently, they have tremendous potentials in shaping user behavior on a moment-to-moment basis (e.g., through regular prompts), motivating habit forming positive behavior for healthy lifestyle, smart consumption, etc. (Patel, Asch, & Volpp, 2015). Therefore, wearable computers promise to let technology impact users on a more personal, intimate level. According to Ledger and McCaffrey (2014), wearable devices are achieving mass market penetration in the US with one in 10 Americans 18 years and older owns an activity tracker. Statista (2015) shows that the market for wearables was US$5 billion in 2014 and is expected to rise to US$12 billion by 2018. These demonstrate the potentials of wearable computing devices to start dominating the landscape of personal technology in the near future.

The development in personal technology has a remarkable impact on travel and, consequently, studies on the impacts of personal technology on tourism experiences have emerged. In general, the literature on travel and tourism associate the roles of ICT with facilitation and enhancement of tourism experiences (Neuhofer, Buhalis & Ladkin, 2012; Tussyadiah & Fesenmaier, 2009; Wang, Park & Fesenmaier, 2012). Smartphones support travelers with convenience in travel planning and enhancement in the overall tourism experience by providing access to information and interpretation, direction and

navigation, social networks, and entertainment (Wang, Park, & Fesenmaier, 2012; Wang, Xiang, & Fesenmaier, 2014a; 2014b). Smart mobile devices allow tourists to stay connected, well-informed and fully equipped for travel-related performances such as information search, navigation, social networking, and travel reporting (Tussyadiah, 2014a). Most recently, Tussyadiah (2014a) propose that almost hands-free wearable devices such as Google Glass are expected to enable these processes to be even more immediate, less cumbersome (e.g., allowing people to look ahead instead of down on a mobile phone screen), and rather surreptitious. Additionally, using the context of use of wearable videos for travel, Dinhopl and Gretzel (2015) demonstrate that hands-free videography impacts the structure of tourism experience. Furthermore, many have speculated how wearable computing devices will revolutionize tourists' behavior and the tourism industries (Dickey, 2013; Prabu, 2012), specifically in the areas of guiding with augmented reality and information overlay, travel reporting with first-person view (FPV), and instant navigation. The recent introduction of Apple Watch also encourages expectation for a new level of convenience in travel experiences, from getting direction and unlocking your hotel room to e-hailing your Uber car (Clampet, 2015).

2. The Smart Travelers

The pervasive use of personal technology for travel is directly impacting travelers' performance (i.e., in terms of effectiveness and efficiency of task completion) and overall tourism experiences. Thanks to the operational and interactional constancy as well as a higher extent of sensitivity (i.e., always aware) and intelligence, travelers are able to receive constant feedback on their experiences and continuously improve their performance. Therefore, it can be suggested that travelers equipped with smart personal technology can become smarter in various aspects of travel, because of the facilitation in various travel-related decision making and performances. Indeed, research shows that travelers use smartphones for various travel-related experiences including such activities as navigation and information search, itinerary management/facilitation, sharing and communication, as well as entertainment (Modschein, 2011; Tussyadiah, Fesenmaier, & Yoo, 2008; Verkasalo et al., 2010; Wang, Xiang, & Fesenmaier, 2014a; 2014b). Wang, Xiang and Fesenmaier (2014b) summarize these use types into two broad categories: en-route planning and en-route sharing. Importantly, with these categories, they emphasize the shift in travelers' behavior as they rely more and more on technology where activities typically associated with pre-trip and post-trip experience are enacted on-site (Tussyadiah and Wang, 2014). For example, with the help of context-aware applications, travelers are able to screen and evaluate alternatives and make informed decisions on-site (Tussyadiah, 2012; Tussyadiah & Zach, 2012). They are also able to post immediate reflection on trip experiences to gauge real-time feedback from social networks (Wang, Xiang and Fesenmaier, 2014b)). In summary, as technology takes the burden of carrying out actions to assist travelers (e.g., sensing the environment, monitoring user actions and providing feedback, etc.), travelers are becoming more well informed and "literate" in various aspects of tourism destinations. It is worth noting that a recent research on the roles of intelligent agents among tourists, Tussyadiah and Wang (2014) found the paradox resulting from the use of smartphones for on-site experiences. That is, the use of intelligent agents may result in amplification of certain aspects of travel (e.g., better, more relevant information for cognitive experiences), but reduction in opportunities to learn from making mistakes or exercising own trial and error decisions.

Further, the use of personal technology is also associated with enhancement in travel experiences due to the augmentation in travelers' cognitive abilities. For example, facilitated by augmented reality and information layering, travelers can learn more about tourism attractions. Recent studies on wearable augmented reality applications (Leue, Han, & Jung, 2014; Leue, Jung, & Dieck, 2015) found that visitors who received augmented information in an art gallery indicated that they had an enhanced learning experience. They further argue that in addition to providing additional information, enjoyment and flow (i.e., via interactivity, vividness, etc.) also contributed to the enhancement of travelers' cognitive experiences. In terms of social connections, with smartphones or wearable devices, everyone in the travelers' social networks is only a swipe (or touch) away. Tussyadiah (2014a) points out that the use of Google Glass allows travelers to maintain real-time connectivity with family and friends (e.g., by using Google+ Hangout app simultaneously while experiencing tourism destinations), which can be helpful to provide necessary social support for travelers on the move (Kim & Tussyadiah, 2013). Additionally, the use of Google Translate app assists travelers in eliminating language barriers between them and local residents real-time, which can be conducive in facilitating social interactions. Moreover, personal technology is increasingly designed with anthropomorphism in mind (Guthrie, 1993; Marakas, Johnson, & Palmer, 2000), enabling technology to serve its users as social actors in addition to its roles as tools and media. Fogg (2003) calls these roles the "functional triad" of technology. As a result, travelers regard the social role of smartphones as travel buddies or companions (Tussyadiah, 2014b; Tussyadiah & Wang, 2014).

In summary, the use of personal technology eases decision making and provides travelers with necessary support, resulting in an increase in travelers' confidence while experiencing tourism destinations. As a consequence, Tussyadiah (2014a) suggests that the use of wearable technology encourages the transformation from "tourists" to "explorers" (i.e., or simply from "travelers" to "smart travelers"), where well-informed travelers (with extended cognitive abilities) are able to roam around the destinations independently, enjoy en-route experiences, and explore unfamiliar places with a higher degree of confidence. This transformation in travel behavior will surely impact not only the management of tourism destinations and the design approach to create personalized tourism experiences, but also the strategic use of data (i.e., digital traces left by travelers) to better capture relevant tourism market and shape traveler behavior.

3. The Smart Destinations

Tourism destinations realizing the potentials of ICT in enhancing their offerings and attracting a wider market often invest in developing specialized devices to assist travelers, such as hand-held audio guides or destination-specific recommender systems. With tremendous computing power and greater personalization capability (and the abundance of apps), travelers now use their own devices for various travel-related activities (from booking to navigation to mobile payment) and to experience different destinations. Moreover, as technology enters the personal (and intimate) space of its users (worn as part of human bodies), it gives users a greater control over what, where, when, and to what extent certain functions should be performed. This leads to the prevalence of silent travelers, those who turn to their own devices first to search for information and make decisions instead of contacting tourism offices. Therefore, the pervasive use of personal technologies present strategic challenges for tourism destinations in terms of

communicating with and tapping into consumer technologies for various marketing and management decisions.

The concept of "smart destination" is suggested as an umbrella term describing tourism destinations where technology infrastructures are embedded within them allowing the synergy among various entities (i.e., stakeholders) for better coordination and management of visitor experiences as well as improvement of residents' quality of life (Buhalis & Amaranggana, 2014; 2015). Drawing from a smart tourism destination project in China, Wang, Li and Li (2013) describe smart destinations as platforms where information on tourist behavior, tourism consumption, and resources are integrated and then fed back to the various stakeholders (i.e., tourists, enterprises, tourism organizations, government) through a variety of end-user devices. They further suggest that the components of technology infrastructure necessary to create such smart platforms include cloud services, the internet-of-things, and end-user internet service systems, highlighting the importance of machine-to-machine interactions to synergize the inter-connected processes involving the different components of tourism destinations. At the core of this technology infrastructure, the internet-of-things (i.e., a system that allows a variety of things or objects to interact and cooperate with each other to reach common goals [Atzori, Iera & Morabito, 2010]) plays a prominent role in the ways destination can communicate with travelers' personal technology.

As travelers use their personal technologies to interact with their surroundings (e.g., making reservation, retrieving recommendations, searching for information, taking pictures), they leave traces of digital information related to the users, such as preferences, relative positions, activities, etc. Therefore, smart destination platform is also characterized with the capability of technological infrastructure to capture and process large scale data (i.e., big data), often in real-time, and to recognize, extract, and analyze patterns in order to generate feedback and suggest relevant recommendations for travelers as well as other entities. While a solid infrastructure facilitating communication and dissemination of information is a backbone of smart destinations, data management is an important process that fuels the dynamics of smart destinations. In practice, wearable computers provide tremendous opportunities for tourism destinations in management and marketing. For example, embedding sensors and objects that ping travelers' wearable devices (Investopedia, n.d.) can assist tourism destinations in determining areas visited by travelers in a point in time as well as travelers' flow based on changes in their positions. Tourism enterprises can leverage consumer technologies by targeting the users based on their preference, physical and emotional states (e.g., location, fitness) as well as activities performed before to push relevant recommendations and notifications. Finally, the development in cloud services should be able to capture, store and process information specific to individual users that can be useful for market targeting.

4. Implications for Travel and Tourism Research

The development in personal technology and the transformation it causes on user behavior as well as management practices call for tourism research that not only explains the phenomenon and prescribe future states, but also shed a new light in understanding the phenomenon from various theoretical lenses. For example, Tussyadiah (2014a) suggests a second look into the concept of mediation, which is prevalently used to explain the roles of technology in tourism experience. She exercises the concept of embodiment to explain user experiences with wearable computing, describing its use on

the contexts of travelers' interaction with physical objects and near surroundings. According to Ihde (1990), technology-mediated experiences are non-neutral. That is, technologies appear in between humans and the world (i.e., mediation) and change human experiences (i.e., transformation), enhancing some aspects while reducing others. He further explains that embodiment of technology results in a symbiosis of technology and user within human actions. In an example of seeing experience that is mediated by optical technologies, he suggests that user is experiencing "seeing through glasses" experience, which, in itself, is a transformed experience. Similarly, seeing a painting with augmented information through Google Glass in an art gallery (as in the study of Leue, Han, and Jung, 2014) can be interpreted as a transformed experience, where technology is embodied and becomes inseparable from the action of seeing a painting.

To explain embodied interactions, it is important to think of the integration of technological capacity into human actions and its role in extending the perceptual bodily (as well as cognitive) sense of its users (Ihde, 1990). That is, technology plays an important role in the performance of human actions relative to their contexts and near environments. In other words, the use of personal technology means enriching user skills with the technological capabilities. Previous studies confirmed that travelers expected the use of Google Glass to extend their perceptual sense (the body and the mind), such as in the example of "seeing through Glass eyes" for hypothetical travels (Tussyadiah, 2014a) as well as actual visitor experiences in an art gallery (Leue, Han & Jung, 2014). From the viewpoint of Human-Computer Interaction (HCI), the use of wearable personal technology stimulates a phenomenon called "a technology withdraw", where technology "disappears" (or perceived to be) as they become an integral part of the users' actions. Indeed, it is suggested that the biggest challenge for wearable technology to penetrate a wider market is for it to disappear, to be naturally embedded with the wearer, and not to attract too much attention (Porges, 2015) that might disrupt users' daily activities and social interactions.

As wearable technology penetrates deeper into users' personal space, the dynamics that explain man-machine interactions are increasingly complex. On one hand, personal technology is there to take tasks away from its users, it also impinges behavior back to its users, influencing and shaping their experiences. In their study on how tourists perceive proactive smartphones as intelligent agents, Tussyadiah and Wang (2014) refer to this issue as the inter-related processes of social and technological determinisms (Latour, 1988; 1993), demonstrating the complicated role of technology in the society. Therefore, researching the behavioral and experiential impacts of the use of personal technology requires different ways of gathering, processing, and analyzing information from travelers. Importantly, it requires different ways of asking questions to capture the richness of qualitative data to support conventional usability testing methods.

Additionally, the use of wearable technology allows users to leave a large amount of information that are not easily captured and interpreted in such ways that make them useful for the various entities in the tourism ecosystem. The availability of big data consisting of information atypical for conventional marketing and management research (e.g., fitness data, sentiments revealed in geotagged microblog posts, phone calls, reservation, etc.) requires travel and tourism researchers to apply alternative methodologies to "listen" to the data and extract unexpected patterns that can be useful to explain and predict trends. In other words, tourism researchers should equip themselves

with various tools and interdisciplinary approaches to make sense of big data and produce actionable insights for more impactful research.

5. The Pet Peeves, or Really Big Problems

One of the promises of personal technology is the ability to monitor, record, and share a large amount of information (often sensitive personal information) with minimal efforts. This creates a big challenge for users as they face a heightened sense of trade-off between personalization and privacy (and, to some extent, security). Indeed, the study conducted by Microsoft (Penn, 2015) revealed that internet users from around the globe think that personal technology is bad for privacy, with the majority indicating that they are not fully aware of what types of data are being collected and stored about them and who might have access to those data (i.e., third-party issues). Moreover, they perceive the lack of legal protection for users and insufficient regulation on who should be able to obtain user data and for which purposes. Porter (2014) also suggests that in the era of big data, personal data is routinely collected and traded and there are few effective controls over how they are used or secured. For example, heightened by the negative sentiments over government surveillance, the introduction of Google Glass (with the capacity to take images surreptitiously and, potentially, apply facial recognition features) was welcomed by fear of ubiquitous mass online surveillance (i.e., personal privacy in proximity). Furthermore, as many companies (including hotels) have experienced data breach problems (i.e., where third parties illegally obtained customer information), data security is an important issue facing travelers from the use of personal technology. Governments are realizing the privacy issues in the era of big data and starting to think strategically to solve these issues. For example, the President's Council of Advisors on Science and Technology (PCAST) in the US recognizes the importance of emphasizing regulation on the use of big data more than the collection and analysis (2014).

For travelers, having smart devices that are always on and always aware can negatively impact tourism from receiving constant notifications that might distract them from immersing themselves with the physical and social surroundings. As illustrated in Tussyadiah and Wang (2014), travelers are also concerned about the sense of control over their tourism experiences and over-dependency on technology when making decisions (i.e., they do not want their tourism experience and decisions to be dictated by the technology). That is, while personal technology can enhance their experience by helping solve their problems at the destination (e.g., navigation to avoid getting lost at the destination), some travelers think that facing and solving problems is an experience in itself that every traveler needs to go through.

Making sure that personal technology is monitoring users' states and behaviors accurately is another challenge (Patel, Asch, & Volpp, 2015). It is suggested that some wearables record and present data on physical activities, such as sleep patterns, based on 'guesstimation' instead of accurate measurements (Fowler & Stern, 2015), which can be an issue for both the users and service providers because it has a direct impact on the quality of feedback generated for users. Service providers also face several challenges from lack of consistency in the use of wearables (e.g., users might forget to recharge the battery, resulting in loss of data points). In order to be able to track patterns and insights from user data, it is necessary to have consumers consistently use their devices, providing a constant stream of information for service providers to get the 'full picture' of user performance. Therefore, making sure that personal technology is more user friendly and

does not require complex behavior to actively update the data is important. Finally, Patel, Asch and Volpp (2015) suggest that presenting information back to users in an easy to understand and motivating manner is another challenge for anyone attempting to influence behavior changes. For example, some providers may introduce social feedback (e.g., sharing data to social network) and social gaming (i.e., leaderboard) to encourage target behavior.

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