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From digitization to the age of acceleration: On information technology and tourism

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ABSTRACT

This essay presents an overview of the research development over the last twenty years on information technology and tourism. It argues that knowledge created in the last two decades can be characterized as consisting of two distinct eras, i.e., Digitization (1997–2006) and Age of Acceleration (2007–2016), which reflected the general understanding of how technology has transformed our society and economy. Knowledge development within each of these eras is examined in terms of the technological conditions, dominant paradigms, main research questions, and influential discipline and research approaches. Particularly, it recognizes the shift of our view of information technology in tourism research from a primarily a marketing-driven tool to a knowledge creation tool due to new technological conditions such as the smartphone, drone, wearables, new connectivity and big data. Finally, this essay discusses possible future research problems and challenges our existing views of the relationship between information technology and tourism.

1. Introduction

Information technology continues to move our society. While many commentators have characterized the transformative power of technology in various ways, perhaps few has done more eloquently than Nicholas Negroponte and Thomas Friedman. In his book *Being Digital*, Negroponte (1995) made a compelling argument about the fundamental differences between atoms, which make up tangible stuff, and bits, which constitute digital information. With this, he offered a visionary insight on what being digital means for our future at the dawn of the Internet. Approximately two decades later, with a book titled *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Acceleration*, Friedman (2016) presented his view on how we should understand the 21st century. He argued that there were three largest forces, i.e., technology, the market, and Mother Nature, all accelerating at once, creating transformative impact on many important facets of our society. He noted year 2007 was a major turning point in that the release of the iPhone, together with advances in hardware, software, storage, sensors, and networking, created a new reality. These ideas reflect the broad impact of information technology, as well as speed of change, at the global, societal level.

The importance of technology as a strategic tool to tourism has been long recognized (Poon, 1993). With the emergence of the Internet as a commercial tool, Pauline Sheldon (1997) published her pioneer book *Tourism Information Technology*, wherein she emphasized tourism as an "information intensive" industry and illustrated various IT applications in a number of sectors related to tourism. This book, along with Werthner and Klein's (1999) *Information Technology and Tourism: A Challenging Relationship* published shortly afterwards, represented the new thinking about the nature of change brought about by IT in general and the Internet in particular, and offered fresh conceptual frameworks to understand structural change. Since then, there has been substantial development of research on IT and tourism spanning over roughly twenty years.

Reflecting upon the past two decades, it is obvious that we cannot separate our understanding of the relationship between IT and tourism from the global, societal view of technology. Borrowing the ideas from Negroponte and Friedman, we can view knowledge development on IT and tourism as consisting of two distinct eras: the first decade can be characterized as "digitization" (1997–2006) and the second represents the "age of acceleration" (2007–2016). While there was continuity in IT development and diffusion of technological innovations, these two eras had their unique technological conditions, research problems, dominant paradigms and research approaches. Importantly, our view of technology in relation to tourism management seems to have shifted through these years. Therefore, looking back at IT and tourism as a field of study could be a useful exercise to highlight our knowledge development and, hopefully, to help us identify clues for future inquiries.

2. Digitization (1997–2006)

This era was known for the development and maturity of the

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Internet as a commercial tool. During this era, technical terms such as the World Wide Web, LAN, Netscape Navigator, IE, Web page, email, desktop, laptop, mobile phone and eCommerce became household names. This era can be characterized as digitization because much of online information, especially in the early days, could be considered the digital version of its existing offline content. The business domain on the Internet went through the early development and then the burst of the eCommerce bubble followed by a period of reflection and recovery. At the individual level, adoption and use of the Internet was a huge transition from the conventional media to the hypertext-based media, resulting in cognitive dissonance and behavioral challenges. Although tools such as search engines were becoming increasingly important, the dominant mode of interaction with the Internet was reflected in metaphors such as “surfing the Web” and “navigation”, which implied that how we looked for and processed information on the Internet was fundamentally different from the past (e.g., reading a book or watching TV).

As such, the primary research problem can be seen as the representation of tourism on the Internet. On the one hand, we celebrated and marveled at this new form of interactive media, which seemed to have unlimited capacity to store, display and connect information in a variety of modes, 24/7, and on a global scale. On the other hand, we struggled and strived at finding sensible approaches to bridging the tourism supply, whose product is intangible, heterogeneous and experiential, with travelers and tourists alike. This very nature of the tourism experience, when facing the new digital media, required fresh conceptual and technical tools to articulate and tackle the problem. Unsurprisingly, one of the dominant paradigms adopted by tourism scholars and marketers was the notion of the experience economy (Pine & Gilmore, 1999), which suggests that technology could play an indispensable role in the creation, staging and communication of meaningful experiences. Another important paradigm was the “long tail” (Anderson, 2006), which argues that technology has changed the way we view the impact of digitization on value creation. It suggests that businesses should not only pay attention to products that are popular but also those that tend to be ignored by our conventional wisdom. Our key literature on IT and tourism was inspired by these general ideas about value creation in the era of digitization. For example, the notion of tourism as experience provided the conceptual foundation for building new logic and new language into tourism information systems (e.g., Gretzel & Fesenmaier, 2002). Web design features and strategies to incorporate multimedia contents, personal stories, and virtual communities, which presumably are essential in communicating experiential aspects of the product, were extensively examined.

As such, literature on travelers' information search behavior such as needs, sources, structures and processes served as a conceptual basis for studying many problems resulting from online representation of tourism. Seeing travel and tourism as a domain of applications, research was also informed by several disciplines including notably communications, human-computer interaction (HCI), and management information systems (MIS). A clear lineage of literature was the applications of the Technology Acceptance Model (TAM) (Davis, 1989) and its derivatives to examine travelers' adoption and acceptance of tourism websites or other decision-making tools. The HCI approach served as the basis for understanding behavioral patterns when travelers interact with the Internet and tourism websites for important tasks such as information search and trip planning (e.g., Pan & Fesenmaier, 2006). There was also the design and development or engineering perspective represented by many of the papers presented at the ENTER eToursim conferences (celebrating its 25th anniversary in early 2018), whose goal was primarily to provide technical solutions for travel decision making.

During this era, technology was largely seen as a medium, a tool and an object. The main purpose of research was then to understand and improve its utilities for consumer communication and engagement and, thus, it was driven by the needs of tourism marketing and business opportunities. The research vocabulary was adapted from several disciplines outside tourism. Like in the general consumer behavior literature, many of the published studies concerned with users' attitude towards adoption and intention to use a specific technology in a context-free setting. The role of technology evolved from the focus on functionality and usability in the early days, to a means for online communication and persuasion, and finally to an intelligent entity that presumably understands travelers' personal needs, wants and desires. Importantly, we saw the development of knowledge from the applications of single theoretical or methodological approach to the culmination of a multidisciplinary approach, which included CS, HCI, MIS and marketing, to frame our core research problems in online tourism marketing (Fesenmaier, Wöber, & Werthner, 2006). IT and tourism aka “eTourism” as a field of study was manifest in the growing number of publications in leading tourism journals as well as the development of specialized outlets such as the *Journal of Information Technology & Tourism* dedicated to the development and theoretical understanding of information technology primarily in consumer settings.

3. Age of acceleration (2007–2016)

This era was marked by technologies such as Wi-Fi, search engines, Web 2.0, tablet, the smartphone, wearable computers, sensors, Internet of Things, crowdsourcing, open source, drones, and the emergence of machine learning and artificial intelligence, etc. This era can be characterized as the age of acceleration largely due to the tremendous growth of user-generated contents on the Internet, as well as the widespread diffusion of technologies and devices not only in our homes and offices but also in many other physical environments. This led to the accumulation of data and information at an exponential rate. While digital divides existed in many ways, the adoption of the Internet in advanced economies had reached saturation across different demographics. In contrast to the previous era, users' access to information on the Internet had transitioned from navigation to searching and subscription-based modes. Social media such as Facebook, Twitter, and Instagram and many other collaborative tools helped redefine the role of the Internet from a publishing platform to a platform for participation and social networking. By creating novel ways to connect supply with demand, new business innovations such as the sharing economy emerged to disrupt many industries. Information technology, material or immaterial, seemed to have been built into every fabric of our socio-economic life including travel and tourism.

While there might not be a dominant paradigm, research on IT and tourism appeared to echo with a number of ideas developed elsewhere. For example, the notion of “life on the screen” by Sherry Turkle (2011) captured how our identities and communications could have been redefined by technology. There were several ideas contributing to the burgeoning paradigm of the so-called “big data” approach. For example, “life in the network”, as suggested by Lazer et al. (2009), signified the growing importance of data and computational methods to process, analyze and interpret data generated in various social science fields in large quantities. Someone like Chris Anderson even went as far as to say “theory is dead” to suggest that it is data that will help define research problems and give us new scientific insights. Notions such as “people as sensors” (Laituri & Kodrich, 2008) and the “quantified self” (Swan, 2013) reflected how technology has been woven into our everyday life, rendering social beings into data generating devices.

These ideas were of high relevance to tourism research because today's consumers produce a variety of data in mobility and in their social networks via the use of technology. Within this context, the dominant research problem can be characterized as the search for new measurement in order to understand this fast-changing world due to technological innovations. We saw significant growth of research to exploit new data to understand problems in tourism management, old or new (Xiang, Schwartz, Gerdes, & Uysal, 2015). These data, such as search engine queries and rankings, user-generated contents (e.g.,

online product reviews, ratings, Twitter tweets and followings, Facebook postings and likes, and Instagram's geo-tagged photos), Web traffic data, and social networking data, afforded novel ways to construct new measures for travel behavior and to understand a range of research problems in the domains of market segmentation, customer relationship management, product design and strategic management. With digital footprints generated by travelers, voluntarily or involuntarily, there were possibilities to build conceptual frameworks such as the so-called “tourist activated networks” for understanding economic value of tourism behaviors. Importantly, analytical tools, particularly those based on natural language processing, network analysis and machine learning, enabled researchers to process and analyze qualitative, unstructured data in unprecedented large quantities. These tools had become indispensable for tourism researchers to understand the new representation of tourism in an increasingly complex, interdependent world.

During this era, understanding how travelers respond to new technologies such as search engines, Web 2.0, the smartphone, virtual reality and augmented reality continued to be of interest to tourism researchers. Research on travelers' use of these technologies allowed the development of insights into tools such as search engine marketing and social media marketing specifically for the tourism industry. There was considerable interest in examining how technology such as the smartphone influences travel information search and decision-making, which has theoretical implications for our understanding of the travel process. However, research focusing on IT adoption and acceptance represented by the applications of the TAM-based models was, understandably, on the wane. Perhaps more importantly, the growth of the data-driven approach in tourism research suggests that our focus had shifted: we used to see travel and tourism as a field to test ideas and theories originated in other disciplines. Now, technology had become a window to gain access to various aspects of travel behavior and the tourism experience. This was a sea change for tourism research in that technology now played a pivotal role in knowledge creation. That is, travel and tourism was no longer merely a field of IT applications or driven by tourism marketing; instead, technology had changed our view of what constitutes reality and enabled us to assign new meanings to tourism management (Fesenmaier & Xiang, 2016). However, due to the data-driven nature of this research, much of the existing literature was exploratory, opportunistic and ad hoc. A general framework was lacking to guide the data-driven approach to address the core problems in tourism management.

4. Where do we go from here?

Twenty years is very short in human history and even within the history of modern tourism. However, change caused by the recent development of information technology has been profound and far-reaching. Research on IT and tourism has reflected the general understanding of how technology changes our society and economy. Within this very short period, our view of information technology in its relation to tourism has shifted from a marketing-driven tool to a knowledge creation tool. Technologies come and go, and there will always be innovations and breakthroughs that defy our prediction. Nonetheless, what happened in the past two decades may be indicative of what will likely happen in tourism, at least in the not-so-distant future.

Imagine a world wherein driverless cars roam the streets and highways, and robots deliver services at our homes, offices, hotels, restaurants, and tourist attractions; a world wherein humans are connected, through a variety of wearable and even built-in devices, to the material and immaterial networks in a seamless, constant, and ubiquitous way; and, a world wherein there is no technical boundary between our everyday life and travel due to our capabilities to represent and simulate the tourism-like experience. These are plausible scenarios, and some of them are becoming parts of the reality as we speak. For example, much of the information on the Internet today is being generated by computer programs powered by artificial intelligence. With these scenarios on the horizon, there will be numerous new problems related to the interactions between human and data, networks and machine intelligence. There will be interests in understanding how technology assists and shapes travel information search and decision making in various settings (Werthner et al., 2015). There will be interests in developing smart systems that best serve travelers at tourist destinations. Besides these practical questions, technology will continue to help us interpret and perhaps redefine what it means to be a tourist (Tribe & Mkono, 2017). As such, information technology will remain an important and exciting topic in tourism research.

In the near future, research related to tourism management will likely be driven by the opportunities and challenges brought about by the unabated growth of data and information. Obviously, there will be concerns and issues related to the quality, trustworthiness and ethics of the applications of big data, social knowledge and machine intelligence. However, most importantly, information technology is connected to travel and tourism in so many ways that it will give us new room for imagination and new room to envision our future. Because of technology, there are now possibilities to access a variety of data, in massive quantities, in different formats, and potentially real time; and, because of technology, it is now possible for us to “connect the dots” in order to map the complex tourism system.

Perhaps, it is time for us to expand our consumerism-based research on IT and tourism in order to participate in larger conversations with renewed emphasis on how technology can be used to achieve quality of life, economic prosperity, social well-being and sustainability. Perhaps, it is also time for us to rethink and even challenge some of the long-held ideas about the relationship between IT and tourism. With ubiquitous computing and connectivity, today's technology is no longer simply an object or a tool for “eTourism”. It has blended into our everyday life and travel and, perhaps, has become “amorphous”. With open data and shared social knowledge serving as the foundations for the tourism experience and for new mechanisms of innovation, today's tourism is not only an information intensive field. It is fair to say that information constitutes the fabrics of tourism, and tourism management is inseparable from information technology.

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