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Technological Evolution and Tourist Decision-making: A Perspective Article

Abstract

Purpose – This paper seeks to demonstrate the importance of technological advancements in shaping tourist decision-making. It reviews relevant theories and underlines the need for new theoretical frameworks that would illustrate the role of cognitive technologies, i.e. artificial intelligence (AI) applications, in tourist decision-making.

Design/Methodology/Approach – A critical analysis and synthesis of interdisciplinary literature was undertaken, aiming to discuss the theoretical frameworks and approaches utilized and to offer a future perspective based on major technological advances.

Findings – The technological advancements play a structural role in tourist decision-making processes, with digital technologies and cyber-physical systems becoming extensions of a tourist's self.

Implications – The study offers the basis for a new theoretical framework in the area of tourism decision-making, considering the future of cyber-physical-human systems.

Originality value – This study exemplifies the main elements of tourism decision-making theory and describes the need for a paradigm shift as new forms of AI will complement human intelligence.

Keywords: Decision-making; Cognitive technologies; Intelligence augmentation; Cyber-Physical-Human systems; Theoretical framework; Tourism industry

1. Introduction

Past research has shown that technological advancements in information technology have changed the ways tourists plan and execute their vacation/travel plans (Buhalis, 2003; Pantano et al., 2017). Various socio-cultural shifts are induced by the interaction of tourists with various digital applications and intelligent systems (Gretzel, 2011, Fan, Buhalis, Lin, 2019).

The role of social media platforms, mobile applications, recommender systems and artificial autonomous intelligent agents in mediating travel decisions has been well documented (Gretzel et al. 2006; Buhalis and Sinarta, 2019). The existing theoretical frameworks have been developed by studying pre-Millennials and not the more recent types of techno-human tourists (Sigala, 2018). Increasingly consumption patterns are heavily affected by digital technologies usage (Monaco, 2018). The distinct roles humans and artificial agents play in shaping the tourism decision-making process have not been studied jointly (Law et al., 2014); as theories take either a socio-psychological approach or have a purely data science focus. The sole exception to this is the *new general model of tourism decision making* (NGMTDM) (McCabe et al., 2016) which still neglects the symbiotic relationship of tourists and AI applications.

This study seeks to demonstrate the importance of technological advancements in shaping tourist decision-making, providing a future perspective. It paves the way for an advanced framework of decision-making in light of tourists' wide access to the collective intelligence of digital tourism ecosystems (Buhalis, Harwood, Bogicevic, Viglia, Beldona, Hofacker, 2019; Boes et al., 2016), and the upcoming human – AI coalescence (Kapur, 2018).

2. Past perspective 75 years of developments 1946-2020

Many technological advancements have been achieved during the last decades. However, the applications that have recently been introduced, e.g. virtual reality/augmented reality applications (e.g. avatars), location-based digital services (LBS), and autonomous devices/agents (virtual assistants, robots, drones), seem to be the ones disrupting and transforming the tourism industry (Buhalis et al., 2019). Models that have prevailed in tourist choice literature have resulted from consumer research models. They were developed before 2000s, when most digital technologies did not exist or were at experimental stages (Hawking, 2016). The main theories employed in tourism research are the expected utility theory, the theory of planned behavior and the choice-set approach (Smallman and Moore, 2010), largely based on rationality and largely neglecting the key influence of technological disruptions (Buhalis et al., 2019).

McCabe et al. (2016) proposed a dual-system model (analytic/rational and emotional/intuitive ones) taking consideration of the complex digital information environments tourists are faced with. Yet, the dualistic premises of NGMTDM do not respond to the real-time dynamic engagement of human intelligence (Buhalis and Sinarta, 2019), especially when the latter coalesces with advanced forms of AI (e.g. recommender systems and bots) to optimize decision-making (Davis and Lewis, 2003; Thill and Lowe, 2012).

Thus, a new theoretical approach is needed for tourism decision-making that would incorporate various decision-making agents, in the form of either autonomous devices or extensions to human beings, to render the behaviors of digital savvy generations as influenced by revolutionary technological developments (Sigala, 2018).

3. Future perspective 75 years 2020-2095

It is challenging to forecast the growth of technological advancements in the next several decades (Davenport & Harris, 2017). The combination of innovations occurring in different technological fields, e.g. that of digital technology with cognitive science (Pantano et al., 2018) provide credible alternatives regarding the type of data sources, data mining techniques and relevant behavioral analyses. It causes a partial shift of the locus of decision-making from individual tourists' decision-making to collective ones, via expert systems in smart digital systems (Baggio, 2017). Various forms of AI, e.g. the Internet of Everything (IoE), machine-to-machine communications (Zhang et al., 2012), will formulate cyber-physical ecosystems (CPES) (Neidhardt and Werthner, 2018; Smirnov et al., 2017). This trend will most probably maintain and increase its momentum for the rest of the 21st century.

Web 4.0, as the basis for the next step in technological evolution, transforms the human-machine relation, by improving their real-time integration and creating a new cyber-physical environment (Kurgun et al., 2018). There are fundamental differences between the past Web era, with machines contributing in various stages of decision-making. As a result, the position of humans in this new cyber, physical and social environment drastically changes.

The crucial question is about *decision-makers' hypostasis in the cyber-physical ecosystem in the future*. This would greatly influence the outline of the frameworks and models of decision-making.

Decision-makers' very nature would take various forms, employing either AI or/and intelligence augmentation (IA), depending on the objectives, conditions and relevant contexts (Makridakis, 2018). With regard to tourists, two options seem to be gaining momentum: a) *Non-embodied agents*: human avatars, as software programs or collaborative robots (cobots) in the form of personalized autonomous artificial agents (Yu and Ngan, 2019) will assist or act independently and proactively utilizing their enhanced cognitive intelligence skills to understand and utilize Big Data (Stylos and Zwiegelaar, 2019; Wilson and Daugherty, 2018). b) *Embodied agents*: cybernetically augmented humans equipped with compact implanted devices in the human body and exoskeletons, providing cognitive, emotional and sensory augmentation abilities (Schirner et al., 2013). These are two complementary options which are expected to facilitate decision-making in a unified, parallel and mutually inclusive manner (Smirnov et al., 2017; Jarrahi, 2018). Huge implications of both need to be discovered.

4. Conclusions

Future tourists will be quite different from present-day ones, as they gradually become even more individualistic, more time-driven and more demanding of technology (Akehurst, 2009). One scenario is that tourists would delegate several planning tasks to their personal avatars, thus saving time to focus on other tasks, e.g. enjoying their holiday experience (Buhalis et al., 2019). For example, in some instances personal avatars would potentially take certain proactive steps in the decision process of tourism destinations visitation, accommodation and leisure activities, based on the digital behaviors (e.g. expressed emotions, facial expressions, previous preferences, online recommendations) of human avatars combined with those of tourists themselves (Kurgun et al., 2018). The second scenario is that cybernetically-augmented tourists would directly engage with some real-time decision-making, such as updating plans and focusing on creative activities while being on vacation. These scenarios are not mutually exclusive, as tourists would activate one or/and another depending on the occasion and the needs of their extended self (Belk, 2016).

Figure 1 demonstrates the complementarity between tourists and various artificial intelligence agents in shaping the cyber-augmented human system. In the wider cyber-physical ecosystem context, the flows of data (i.e. Big Data) link the different forms of decision-makers with the tourism ecosystem stakeholders via a range of enabling technologies (including various AI systems). This may serve as the basis for building a new advanced framework that would offer a more accurate conceptualization of tourist decision-making processes.

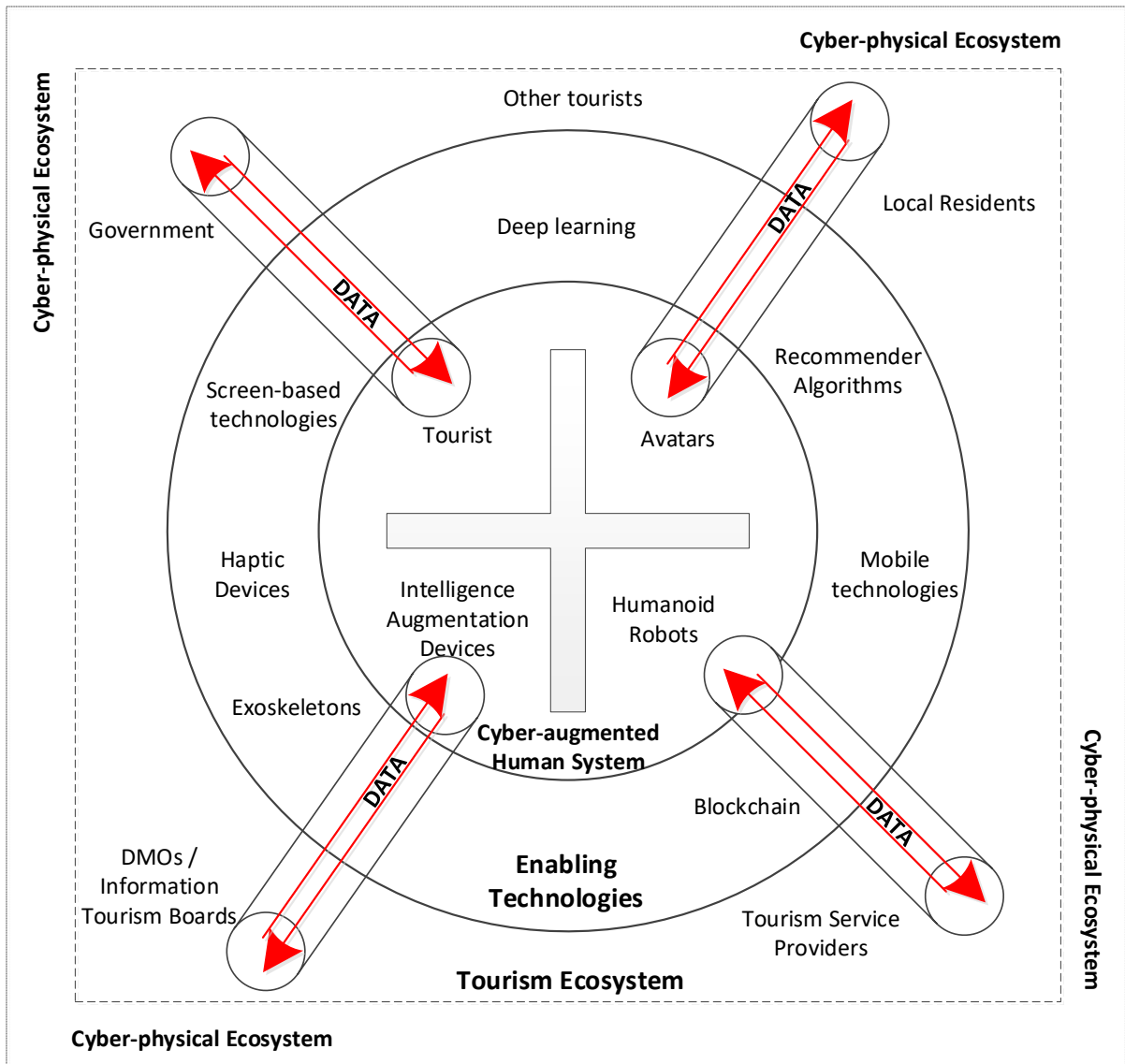


Figure 1. The Cyber-augmented Human System (CHS) framework.

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