



## Progress in Smart Tourism 2010-2017: A Systematic Literature Review

Pam Lee<sup>a</sup>, Florian J. Zach<sup>b</sup>, and Namho Chung<sup>c,\*</sup>

<sup>a</sup>College of Hotel & Tourism Management, Kyung Hee University, Seoul, Republic of Korea

<sup>b</sup>Howard Feiertag Department of Hospitality and Tourism Management, Pamplin College of Business, Virginia Tech, Blacksburg, VA, USA

<sup>c</sup>Smart Tourism Education Platform, Kyung Hee University, Seoul, Republic of Korea

### Abstract

Smart tourism technologies are becoming ever more pervasive and an increasing number of destinations and hospitality establishments are investing in smart tourism initiatives. However, while governments and businesses around the world are aggressively pushing the smart tourism agenda forward, smart tourism research initiatives are still in their infancy and seem to not fully cover the whole spectrum of smart tourism-related issues and questions. This paper conducts a systematic review of existing smart tourism literature to determine the status quo of smart tourism research and to identify research gaps. Considering the steep growth of smart tourism initiatives starting at the beginning of this decade, this paper reviews publications on smart tourism over the last 8 years. All publications for which the keyword “smart tourism” appears in the title, keywords or abstract were included in the sample.

### Keywords

smart tourism; systematic literature review; semantic network analysis; smart tourism city; destination competitiveness

### 1. Introduction

The term “smart” has become an increasingly popular term to illustrate technological, economic and social developments fueled by technologies that enhance decision making (Gretzel, Werthner, Koo, & Lamsfus, 2015). Technology has had impacts on society as a whole. It made cities more effective, economies easier to grow, and travel more convenient. For example, with IoT sensors, it is possible to monitor environmental problems and we are able to make science and evidence-based decisions. The proliferation of smartphones enables people to communicate, access, and share information, and indulge location-based services anytime and anywhere (Sultan, Rohm, & Gao, 2009).

In the context of tourism, smart technologies are altering business processes and consumer experiences, which are generating new tourism business models. On the consumer side, smart tourism provides travelers the opportunity to explore, understand, and indulge in onsite-specific experiences based upon a variety of contextual factors. It helps with making decisions regarding consumption of activities, travelers’ behavioral experiences, and interconnectedness via social networks (Gretzel, Sigala, Xiang, & Koo, 2015). On the business side, smart tourism facilitates new approaches of managing inbound and outbound tourist flows, interactive tourist services (online and offline), new advertising via online reviews and startup ventures.

As smart tourism technologies are becoming ever more pervasive and an increasing number of destinations and hospitality establishments are investing in smart tourism initiatives, the social concerns on resident friendly tourism elevated the inevitable role of smart tourism. Those popular tourism cities are now facing tourism growth that challenges existing carrying capacity and residents’ routine-life-disturbance.

With smart tourism infrastructure, those governments can take a novel approach: using online live streams of notices regarding peak visiting times, providing mobile guides (Lee, Hunter, & Chung, 2020). The role of smart tourism and cities is even more significantly complemented. A smart (tourism) city has to leverage its physical and Information and Communication Technology (ICT) & data infrastructure to deliver more efficient and more effective services for citizens, to monitor and optimize existing infrastructure, and to maximize collaboration within and between the private and public sectors (Marsal-Llacuna, Colomer-Llinàs, & Meléndez-Frigola, 2015). Designing and delivering such features based on ICT is also essential to deliver smart tourism. However, while “smart” technologies are popping up everywhere and smart tourism has become one of the most favorable subjects in the tourism discipline, smart tourism research initiatives are still in their infancy distributed across several tourism research streams from information technology to sustainability. Thus, a systematic literature review allows us not only to take stock of existing smart tourism research, but also to identify opportunities for future smart tourism research.

#### 1.1 Smart Tourism

Smart tourism is defined as tourism supported by integrated efforts at a destination to collect and aggregate data from physical infrastructure, social connections, governments, businesses and other organizations and humans and to transform this data with advanced analytical tools into meaningful experiences and business value-propositions with a clear focus on efficiency, sustainability, and experience enrichment (Gretzel et al., 2015). Advanced technologies have been playing an important role in the hospitality and tourism

\*Corresponding author:

Namho Chung, Smart Tourism Education Platform, Kyung Hee University, Seoul, Republic of Korea

E-mail address: [nhchung@khu.ac.kr](mailto:nhchung@khu.ac.kr)

Received 13 January 2021; Received in revised form 5 March 2021; Accepted 23 March 2021

industry and are a critical driver of smart tourism. The Internet has transformed the travel business as it delivered transparency to compare prices and convenience to book a complete journey from within the comfort of your home. This created eTourism as a new paradigm of the travel industry. The emergence of smartphones not only moved the advantages of the Internet into the palm of a traveler, but also enabled more personalized and location-based recommendations (Tussyadiah & Zach, 2012) and on-demand services such as ride-hailing apps. This development and upcoming technologies such as artificial intelligence, machine learning, and robotics have challenged tourism businesses to adapt and simultaneously created business opportunities, such as short-term rentals, paperless boarding passes and keyless hotel room entry. Smart tourism thus is characterized as a holistic approach that provides touristic products and services enabled by ICT devices and new ways of processing methods.

ICT has a double reinforcing effect: first, the use of websites, apps and other electronic services enables the collection and analysis of user data and traditionally “dumb” objects can now generate data when enhanced with sensors. This allows for a more accurate and holistic knowledge of a destination which can be leveraged to provide new or more efficient services. Second, many electronic services allow users to share their travel ideas and experiences and it allows businesses to promote their products and services created using aforementioned data to more people than was possible before ICT became a household product. Thus, while tourism organizations previously could not easily learn from the personal narratives, comments, and critiques from potential and past consumers, it is today possible to assess texts and photos and to combine such data with destination specific data such as traffic patterns, or crowding of spaces to direct consumers towards personally desirable places within the destination.

## 2. Methodology

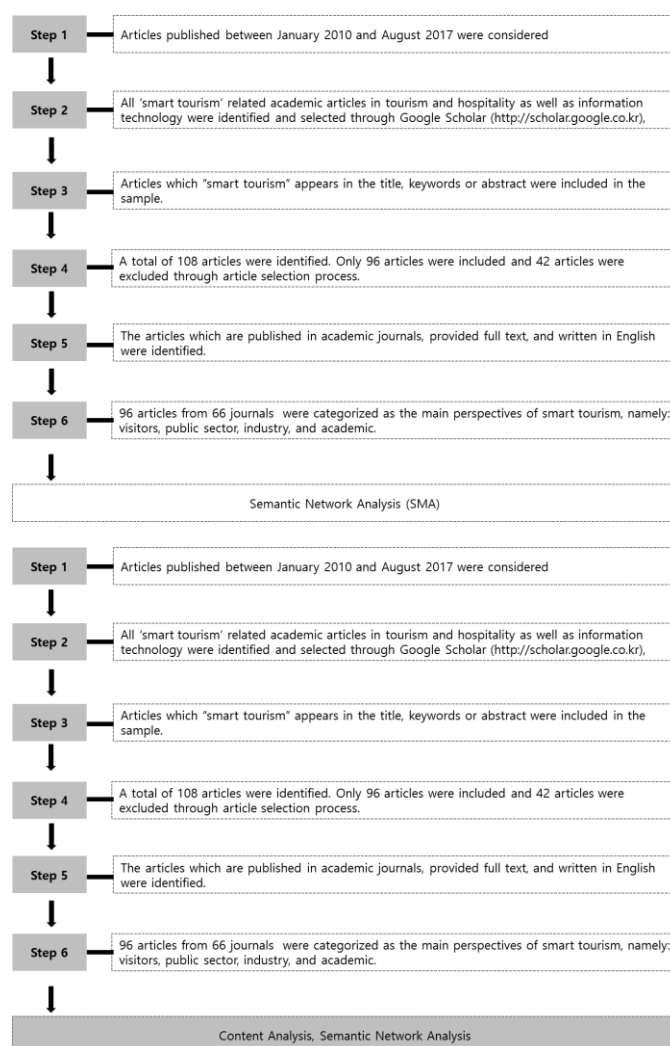
Considering the increased interest in smart tourism initiatives since the beginning of this decade, this review includes academic publications on smart tourism published between 1 January 2010 to 31 August 2017. We reviewed the literature to enhance methodological transparency and rigor regarding the research, decision, and judgment calls throughout the process of conceptualizing and designing the study. For a comprehensive and systematic review we followed the six steps proposed by Aguinis, Ramani, and Alabduljader (2018) to identify articles:

- *Step 1, Goal and scope of review:* The goal of this study is to determine the current status of smart tourism research to identify research patterns and suggest recommendations for future research. As ICT is a key component of smart tourism, only recent publications were considered as older publications might not capture the technical capabilities of today's technologies.
- *Step 2, Journal selection procedure:* Smart tourism related academic articles from the tourism and hospitality journals as well as the information technology field were identified and selected through Google Scholar (<http://scholar.google.co.kr>) as it represents one of the most comprehensive repositories of research works. Google Scholar is an openly accessible web search engine with one of the most comprehensive repositories of research works across a multitude of publishing formats and disciplines.
- *Step 3, Calibrate source selection process:* Articles that included the keyword “smart tourism” in either the title, keywords or abstract were selected for review. Coders independently reviewed the articles to include or exclude them for further analysis. The decision to include an article in the analysis was based on mutual agreement among the coders regarding the publications' association with and relevance to smart tourism.

- *Step 4, Selection sources:* A total of 108 articles from academic journals, books and conferences were found using the keyword search in Google Scholar. Publications for which full text was not available through numerous database searches and work not written in English was excluded. This resulted in 96 articles for future analysis.

- *Step 5, Calibrate content extraction process:* In this step the coders read all papers to assess if they contribute to smart tourism research. Furthermore, the coders categorized the articles to identify research streams within smart tourism research. The coders discussed the articles to ensure intercoder agreement.

- *Step 6, Extract relevant content:* The coders reviewed the identified 96 articles and confirmed for further analysis. As main smart tourism research themes the coders identified: visitors, public sector, industry, and academic.



**Fig. 1.** Process for Identifying Journals, Articles, and Content

Content analysis was applied to the final set of 66 articles. This is a widely used qualitative research technique to assess textual data and is suitable for the analysis of multifaceted and delicate phenomena (Elo & Kyngäs, 2008). It is therefore an appropriate technique for this study. Content analysis can be applied in an inductive or deductive way. An inductive approach is employed when there is lack of prior knowledge on the research subject, whereas a deductive approach is employed when the analysis is based on previous knowledge (Elo & Kyngäs, 2008) and test a previous study to compare categories at different time periods. Thus, a deductive approach was employed in this study as we aim to analyze and describe the phenomenon of the existing body of research on smart tourism.

As described above in Step 6, the articles were assigned into four categories (visitors, public sectors, industries and academic). To ensure validity and reliability of these categories the coders classified the articles according to subject of study and in case of multifaceted articles assigned such articles to more than one category.

Finally, a Semantic Network Analysis (SMA) was conducted for further explanation of smart tourism research issues over time. SMA is described as an automated network analysis that yields quantitative measurements to discover qualitative aspects of a semantic (Wassermann & Faust, 1994; Newman, Barabasi, & Watts, 2006). A network structure involves edges, paths, nodes and hubs: edges (weight) represent collocation, semantic relation, meaning; paths (length) represents that set of connected semantic relations; nodes (degree,  $d(v)$ ) represent that complexity of a semantic concept on word, hubs (centrality measures, filtering,  $d(v) \geq n$ ) represent that global importance of a node relative to the network; clusters (clustering coefficient; filtering,  $d(v) \leq n$ ) represent that strongly connected components encoding specific semantic topics or complex concepts (Drieger, 2013).

Validity is testing if instruments are accurately measuring what it is supposed to whereas reliability is a measure of the stability or consistency of test scores and the ability for a test or research findings to be repeatable. In favor of the reliability and validity, the respective researchers reviewed all 96 articles included as the sample and classified them according to subject of each study. In case of an article being multifaceted it was assigned to more than one category. The assigned categories were cross-checked by the other coders to minimize the coder's personal bias during the classification process the respective assignment results.

After all these steps, this paper consists of classification of articles based on each subject and following by principal and key findings.

### 3. Findings and Discussions

As a field of academic inquiry, smart tourism research emerged only recently with our sample containing no published articles until 2012 and most published articles between 2015 and 2017 whereby 42 articles were published in 2017. This demonstrates that smart tourism is an emerging research area that has been gaining traction only recently (see Figure 2).

Interestingly, articles from 2015 to 2016 underscored the importance of smart tourism in the context of "tourist" "experience" "destination" whereas articles from 2010 to 2014 focused on "IT" "service." In 2017 most articles were published and new topics such as "application" "sustainable" "urban" emerged. This indicates that much attention from the academia has been paid to industry 4.0: the fourth industrial revolution and sustainable tourism.

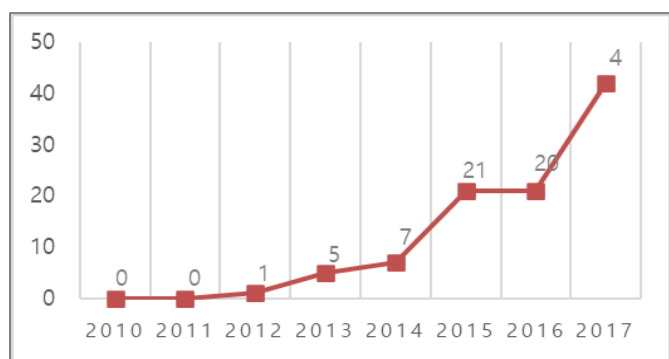


Fig. 2. The number of articles on Smart tourism from 2010 to 2017

In this research, we identified a total of 96 journal articles for discussion. As Figure 2. indicates it is appropriate to split the

data into three research periods given the number of studies produced over time: an Early Period (2010-2014, N=13); a Formative Period (2015-2016, N=41); and a Progressive Period (2017, N=42). Each of the three periods was examined using Semantic Network Analysis based on key words which extracted from each research titles. KrKwic program was used to identify co-relations among words (Park & Leydesdorff, 2004) and used Ucinet and Netdraw to visualize the word-networks (Borgatti, Everett, & Freeman, 2002).

#### 3.1 The Early Period (2010-2014)

The Early Period presents smart tourism research as novel. There were many IT related words while "smart" and "tourism" were the most frequent keywords. In total 34 words were extracted with the minimum of frequency of 1: innovation, information, context, concept, system, super-map, stakeholder, sharing, platform, netnography, mechanism, localization, internet, initiative, convergence etc., Table 1. shows salient keywords that were used at least three times and shows their share among all keywords; see Table 1.

**Table 1.** Frequency and share of total of keywords used at least three times in titles of smart tourism research during the early period (2010-2014)

Rank	Keyword	Frequency	Share of Total (%)
1	Tourism	14	22.5
2	Smart	12	16.0
3	Service	4	5.3
4	China	3	4.0
5	Innovation	3	4.0
6	System	3	4.0

Table 2 illustrates the degree and closeness centrality of the extracted keywords from research titles during the early period. "Smart" and "tourism" have the highest degree and closeness centrality. This demonstrates the significant role of service, system, and innovation in the smart tourism research in early stage. This early period appears to be a primarily descriptive stage and the scholars mainly focus on its definition, framework, application, development, and its relation with tourism informationization.

**Table 2.** Degree centrality and closeness centrality of keywords used at least three times during the early period (2010-2014)

Keyword	Degree Centrality	Closeness Centrality
Tourism	0.188	0.86
Smart	0.248	0.76
Service	0.079	0.58
China	0.085	0.61
Innovation	0.042	0.55
System	0.042	0.55

As nodes represent words, the amount of neighboring nodes also gives insights on the diversity of a word's acceptance referring to the position. The words smart and tourism were identified as hubs which are significant nodes in a network and usually are equal to highly connected nodes. Thus, the nodes' centrality measures can be explained to characterize a node in a network (Wassermann & Faust, 1994; Brandes & Erlebach, 2005).

Figure 2 visualizes the semantic network between all 34 keywords. The nodes and dotted circle lines in pink highlight that the research was focused to a large extend on information technology. Indeed, Xu, Li, Qian, and Liu (2013) emphasized that technological innovation was not the center of smart tourism and smart tourism's nature should be defined clearly on their research.

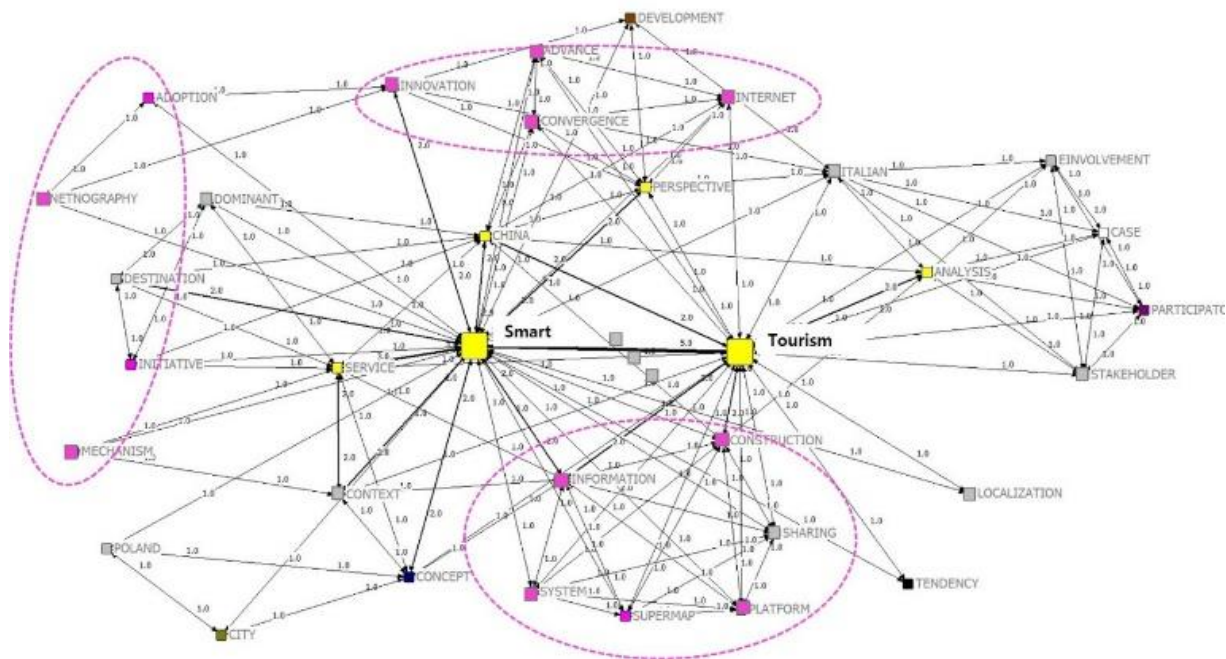


Fig. 3. Keywords of Semantic Networks during the early period (2010-2014)

### 3.2 The Formative Period (2015-2016)

Between 2015 to 2016, smart tourism research became an emergent domain given its rapid growth. Gretzel, Sigala, Xiang and Koo (2015) discussed the foundation and development of smart tourism and define the smart tourism concept and its components. Moreover Gretzel et al. (2015b) conceptualized the smart tourism ecosystem (STE) focused on a shared goal or purpose link between production and consumption of touristic value and meaningful experiences. Since governments and businesses are aggressively pushing smart tourism to gain competitiveness in the market, the defined STE has remarkable implications for scientific research to capture the phenomenon. Smart tourism research focusing on the destination made its debut that year (e.g., Boes, Buhalis, & Inversini, 2016; Buhalis & Amaranggana, 2015; Buoincontri & Micera, 2016; Cacho et al., 2016; Chung, Han, & Joun, 2015; Chung, Lee, Lee, & Koo, 2015; de Esteban Curiel, Jalón, Herráez, & Antonovica, 2017; Del Chiappa & Baggio, 2015; Hwang, Park, & Hunter, 2015; Koo, Joun, Han, & Chung, 2016; Koo, Shin, Gretzel, Hunter, & Chung, 2016; Marchiori & Cantoni, 2015) and “experiences” (e.g., Buoincontri, & Micera, 2016; Marchiori & Cantoni, 2015; Gretzel, Reino, Kopera, & Koo, 2015).

Table 3 shows the most frequent 26 keywords that were used at least three times which drew attention from scholars and

were used in article titles in this period. Several new words were introduced. In the early period, the researchers are more focused on defining the concept of smart tourism and explaining smart technologies’ emergence in the tourism sector. However, during this current period, the researchers are interested in implications of smart tourism as smart tourism technologies are becoming omnipresent and many destinations and industries are aggressively pushing the smart tourism agenda forward. Thus, the words “destination,” “utilization” were becoming popular and “application,” “heritage” and “content” were newly added.

Table 4 shows the degree and closeness centrality of the extracted keywords from the article titles in this period. During the early period evidently “smart” and “tourism” have had the highest centrality both in degree and closeness; however, in this period “destination” has a higher degree centrality than “tourism.” This means “destination” is connected to the other 26 nodes more closely and plays a significant role in smart tourism research. As mentioned earlier, in this period, “destination” was becoming the welcomed subject by the researchers as government and industry started to strive for smart tourism to enhance their competitiveness in the tourism market. Therefore, numerous papers regarding destinations were published to meet the field’s needs.

Table 3. Frequency and share of total of keywords used at least three times in titles of smart tourism research during the formative period (2015-2016)

Rank	Keyword	Frequency	Rate(%)	Rank	Keyword	Frequency	Share of total (%)
1	Tourism	42	21.9	14	Intention	4	2.0
2	Smart	35	18.3	15	Internet	4	2.0
3	Destination	16	8.3	16	City	3	1.6
4	Analysis	9	1.9	17	Competitiveness	3	1.6
5	Utilization	8	4.1	18	Content	3	1.6
6	System	7	3.6	19	Data	3	1.6
7	Technology	6	3.1	20	Development	3	1.6
8	Experience	5	2.6	21	Generative	3	1.6
9	Korea	5	2.6	22	Heritage	3	1.6
10	Tourist	5	2.6	23	Management	3	1.6
11	Application	4	2.0	24	Network	3	1.6
12	Ecosystem	4	2.0	25	Perspective	3	1.6
13	Information	4	2.0	26	Social	3	1.6



**Table 4.** Degree centrality and closeness centrality of keywords used at least three times during the formative period (2015-2016)

Keyword	Degree Centrality	Closeness Centrality	Keyword	Degree Centrality	Closeness Centrality
Tourism	0.121	0.80	Intention	0.036	0.59
Smart	0.231	0.96	Internet	0.011	0.52
Destination	0.129	0.70	City	0.011	0.50
Analysis	0.052	0.63	Competitiveness	0.019	0.53
Utilization	0.016	0.56	Content	0.025	0.56
System	0.041	0.58	Data	0.027	0.58
Technology	0.014	0.52	Development	0.027	0.57
Experience	0.047	0.59	Generative	0.011	0.52
Korea	0.008	0.49	Heritage	0.025	0.59
Tourist	0.030	0.59	Management	0.022	0.57
Application	0.016	0.56	Network	0.033	0.60
Ecosystem	0.044	0.60	Perspective	0.019	0.56
Information	0.025	0.58	Social	0.027	0.57

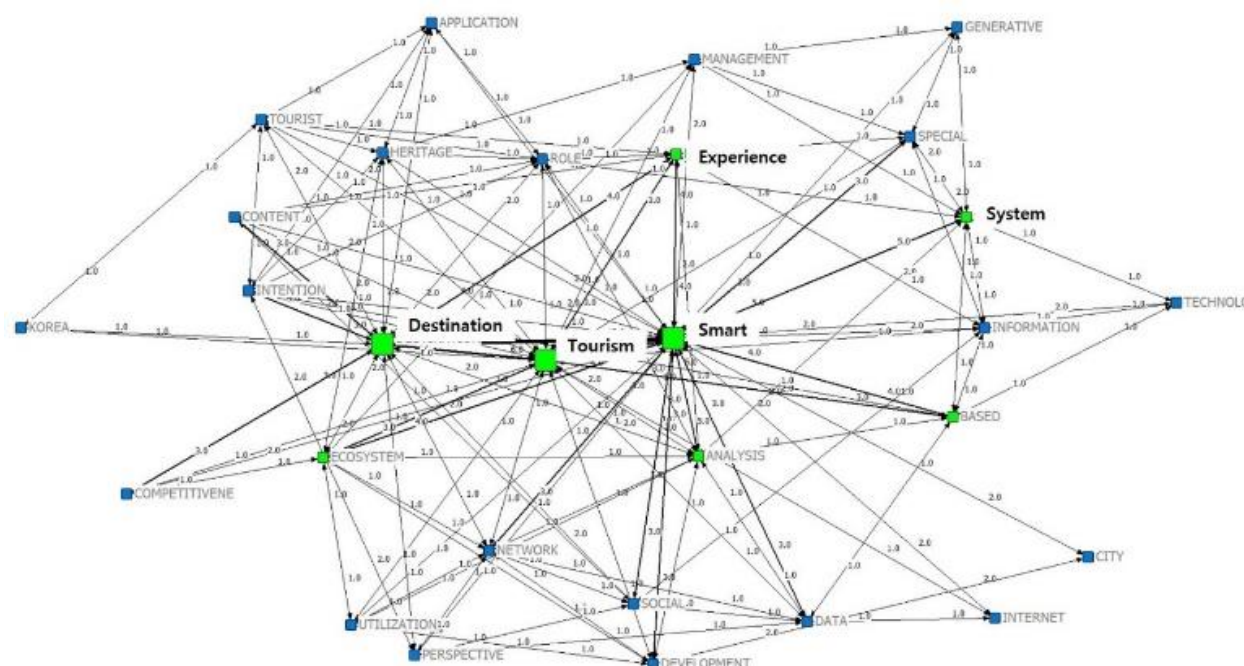
**Fig. 4.** Keywords of Semantic Networks during the formative period (2015-2016)

Figure 4 displays the semantic networks between the 26 words extracted from text analysis. “destination” joins “smart” and “tourism” to form the main hub and has strong relationships with experience, contents, and competitiveness. “City,” which scored among the lowest in terms of degree and closeness centrality is connected with the nodes “smart” and “data.” Since a destination is defined as city, town, country, or other areas that is dependent on tourism or is positioned as a place for tourists to visit, the keyword destination is significant for smart tourism research in this period. On the other hand, “city” as a destination is surfacing as a specific destination that can benefit the most from smart tourism research given the close nearby location of attractions, accommodation, transportation options etc. Hence, researchers in this period laid the foundation of the emergence of “smart city tourism” with a transformation of social soft infrastructure rather than smart “destination” which is limited tourism term.

### 3.3 The Progressive Period (2017)

In the progressive period (2017) 42 articles were published in English journals. Table 5 shows the result of text analysis for the most frequent 20 words that were used at least three times in publication titles: tourism, smart, destination, city, analysis, tourist, application, social, case, experience, data, designing,

development, digital, ICT, implication, internet, mobile, system, sustainable. “City” appeared eight times (4.6% share of total) but was mentioned only three times (1.6% share of total) in the previous formative period. Additionally, “mobile” and “digital” were mentioned for the first time. The issue of cultivating sustainable smart tourism by exploiting the smart city infrastructures developed dramatically: smart city demonstrates a new city ecosystem that encompasses digital technology, shared knowledge and convergent processes to provide more sustainable and efficient services to citizens such as mobility, health, education, and public safety (e.g., Khan, Woo, Nam, & Chathoth, 2017; Qin, 2017; Encalada, Boavida-Portugal, Cardoso Ferreira, & Rocha, 2017; Guerra, Borges, Padrão, Tavares, & Padrão, 2017).

Table 6 shows the degree and closeness centrality of the extracted keywords that were used at least three times. “social” has relatively high centrality (degree: 0.09, closeness: 0.65) compared to its centrality in formative period (degree: 0.027, closeness: 0.57). “social” is becoming a popular subject as social media plays a critical role in diverse aspects of tourism throughout each travel phase (before, during and after travel; especially in regards to decision-making behavior). Thus, several studies on social media and social network investigate the influence and impact of social media as part of tourism management or tourism marketing strategy including economic contribution of social media to the industry. For example, Brandt,

Bendler, and Neumann (2017) established the potential value of social media and outlined what its value creation can provide to smart tourism ecosystem. Del Vecchio, Mele, Ndou, and Secundo (2017) demonstrated how social big data is exploited in

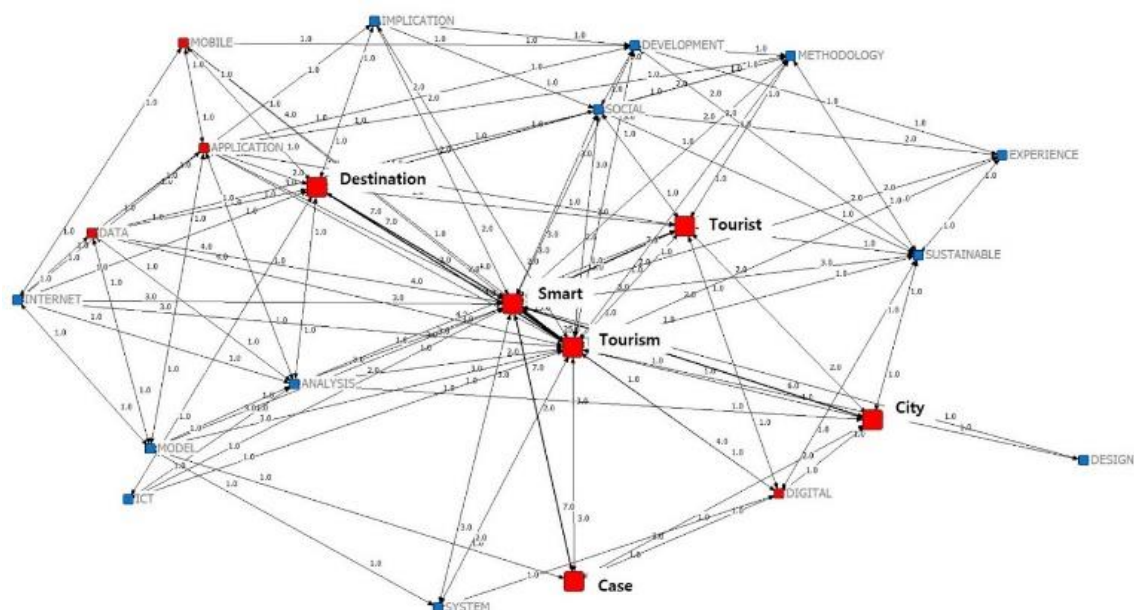
information-intensive industries like tourism and Chung, Tyan, and Chung (2017) investigated how traveler's technology perception and readiness factors affect geotag use intention to enhance smart tourism experience.

**Table 5.** Frequency and share of total of keywords used at least three times in titles of smart tourism research during the progressive period (2017)

Rank	Keyword	Frequency	Rate (%)	Rank	Keyword	Frequency	Share of Total (%)
1	Tourism	45	26.0	11	Data	4	2.3
2	Smart	39	22.5	12	Designing	4	2.3
3	Destination	10	5.7	13	Development	4	2.3
4	City	8	4.6	14	Digital	4	2.3
5	Analysis	7	4.0	15	ICT	4	2.3
6	Tourist	7	4.0	16	Implication	4	2.3
7	Application	6	3.47	17	Internet	4	2.3
8	Social	6	3.47	18	Mobile	4	2.3
9	Case	5	2.7	19	System	4	2.3
10	Experience	5	2.7	20	Sustainable	3	1.7

**Table 6.** Degree centrality and closeness centrality of keywords used at least three times during the progressive period (2017)

Keyword	Degree Centrality	Closeness Centrality	Keyword	Degree Centrality	Closeness Centrality
Tourism	0.141	1	Data	0.029	0.63
Smart	0.177	1	Designing	0.004	0.52
Destination	0.051	0.70	Development	0.027	0.63
City	0.027	0.60	Digital	0.019	0.60
Analysis	0.025	0.65	ICT	0.008	0.55
Tourist	0.034	0.65	Implication	0.015	0.58
Application	0.032	0.67	Internet	0.023	0.61
Social	0.029	0.65	Mobile	0.017	0.58
Case	0.027	0.56	System	0.013	0.55
Experience	0.015	0.56	Sustainable	0.023	0.63



**Fig. 5.** Keywords of Semantic Networks during the progressive period (2017)

Figure 5 displays the semantic network of the 20 keywords words extracted from text analysis. “experience” has relatively little centrality neither in closeness nor degree compares to the previous period. “smart” has a stronger relationship with “city” and “case” than “ICT” and “system” and thus also differs from the early period. “city” was discussed together with tourist, sustainable, digital followed by smart and tourism. In fact, “city” becomes a popular keyword with the emergence of smart city which has a broader meaning compared to smart destination which is limited tourism term. On the other hand, smart city is narrower as it focuses on a specific type of destination; specifically, on an urban destination where points of interest are

closer together, and more people move between the same places for various purposes giving rise to a much more data than in rural destinations (e.g., county or region). Hence, the keyword “city” saw an intriguing change: it become one of the main hubs and is heavily discussed in the paper together with keywords tourist, sustainable and digital.

### 3.4 Research Perspective and Publications

In terms of research perspectives, the sample is split into four categories: visitors, public sector, industry, and academic. In

particular, the number of studies that focused on visitors and the public sector' perspective was larger than that focused on the industry's and academic perspective (see Table. 7). In the public sector cities utilize data to provide more efficient and higher quality services to their citizens by monitoring and controlling over-tourism. Governments and businesses around the world are aggressively pushing the smart tourism agenda forward to win against competitive city destinations. The layers of smart city and

tourism provide systems which involve flows and exchanges of services generated from data and information. Such flows and exchanges fully hinge on interdependence and interact with external systems (e.g., transportation, healthcare, and payment systems) in conjunction with resource sharing for optimization. The optimization is embodied under the condition of vital interaction and initiatives between advance technologies in the ecosystems (Koo, Chung, & Ham, 2017).

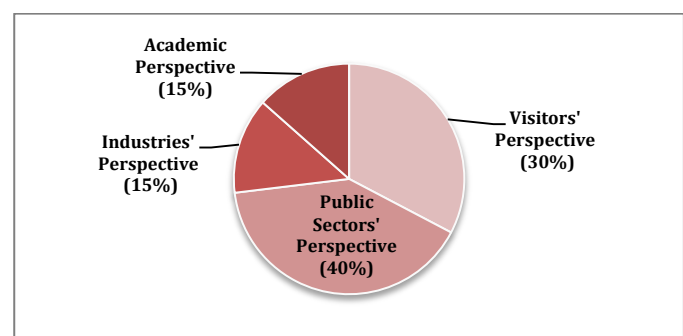
**Table 7.** A comparison of the number of articles from the point of different perspectives

Research Categories	Publications
Public Sector	Adedoyin and An (2017); Amarawat, Imran, Kumar, and Qureshi (2017); Boes et al. (2016); Brandt et al. (2017); Buhalis and Amaranggana (2013); Buhalis and Amaranggana (2015); Buonincontri and Micera (2016); Cacho et al. (2016); Cho, Cho, Kwon, and Yoo (2015); Choe and Fesenmaier (2017); Chung and Han (2017); de Esteban Curiel et al. (2017); Del Vecchio and Passiante (2017); Garau (2017); Gontar, Pamula, and Gontar (2013); Graziano (2014); Gretzel et al. (2016); Guerra et al. (2017); Guo, Liu, and Chai (2014); Han, Chung, and Koo (2016); Handayani, Ivanov, and Korstanje (2017); Huang, Yuan, and Shi (2012); Hwang et al. (2015); Ivars, Celdrán, Mazón, and Perles (2017); Jovicic (2017); Khan et al. (2017); Kim and Kim (2017); Koo et al. (2016); Lee (2017); Liburd, Nielsen, and Heape (2017); Maoying and Keji (2014); Mekawy (2015); Park and Yim (2015); Pan, Lin, Fang, & Chen, (2016) ; Presenza, Micera, Splendiani, and Del Chiappa (2014); Qin (2017); Romão and Neuts (2017); Ruíz, Bohorquez, and Molano (2017); Sun, Song, Jara, and Bie (2016); Sung (2005); Wan, Ma, Zhou, and Zhang, (2015); Wanchun (2017); Wang, Li, and Li (2013); Wu (2017); Yunpeng, Hu, Chao, and Liqiong (2014)
Industry	Becheru, Bădică, and Antonie (2015); Gretzel, Zhong, and Koo (2016); Guo et al. (2014); Han (2013); Huang and Chen (2015); Kaur and Kaur (2016); Kim and Kim (2016); Kim and Kim (2017); Kim et al. (2017); Koo et al. (2016, 2017); Lim, Mostafa, and Park (2017); Perfetto, Vargas-Sánchez, and Presenza (2016); Ruíz et al. (2017); Ryu and Lee (2016); Silva-Pedroza, Marin-Calero, and Ramirez-Gonzalez (2017); Tüzünkan (2017)
Visitor	Almobaideen, Krayshan, Allan, and Saadeh (2017); Bae, Lee, Suh, and Suh (2017); Brandt et al. (2017); Byun, Kim, Ko, and Byun (2017); Chung and Koo (2015); Chung, Han, & Joun, (2015); Chung, Lee, Lee, & Koo, (2015); Chung et al. (2017); Encalada et al. (2017); Gontar et al. (2013); Gretzel et al. (2016); Guerra et al. (2017); Han, Park, Chung, & Lee, (2016); Handayani et al. (2017); Huang and Chen (2015); Huang, Goo, Nam, and Yoo (2017); Kim and Kim (2017); Kim and Canina (2015); Kim and Kim (2016); Kim et al. (2017); Koo et al. (2016); Lee (2017); Lim et al. (2017); Maoying and Keji (2014); Marchiori and Cantoni (2015); Nemade, Deshmane, Thakare, Patil, & Thombre, (2017); Pan, Lin, Fang, and Chen, (2016); Wang et al. (2013); Wang, Li, Zhen, and Zhang (2016); Watfa and Sobh (2017); Yoo, Goo, Huang, Nam, and Woo (2016); Yoo, Kwon, Na, and Chang (2017); Zacarias, Cuapa, De Ita, and Torres (2015)
Academic	Al-Omari, & Al-Marghirani, (2017); Angelaccio and Zappitelli (2017); Vvasavada and Padhiyar (2016); Boes et al. (2016); Chung et al. (2017); Del Chiappa and Baggio (2015); Feng et al. (2014); Gretzel, Sigala, et al. (2015); Gretzel, Werthner, et al. (2015); Gretzel, Koo, Sigala, and Xiang (2015); Gretzel, Reino, Kopera, and Koo (2015); Jovicic (2017); Koo et al. (2017); Liburd et al. (2017); Maoying and Keji (2014); Presenza et al. (2014); Werthner, Koo, Gretzel, and Lamsfus (2015); Xiang and Fesenmaier (2017); Xu et al. (2013); Yunpeng et al. (2014)

Articles with a public sector perspective have a specific focus on destination competitiveness. Del Vecchio et al. (2018) proposed the importance of exploiting big data in tourism and eventually create value for smart tourism destinations through improving decision-making, creating marketing strategies, and supporting the emergence of new business models. Guerra et al. (2017) conducted the research related to city tourists in Porto, Portugal and identified potential determinants for the choice of a tourism destination under the emerging smart cities concept.

Meanwhile only a small number of studies have been conducted toward the industry perspective. Nevertheless, continuous efforts are being made to identify the adoption level of smartphone users. Kim, Moon, et al. (2017) examined an Internet of Things (IoT) based virtualization platform that the provided tourism services can be modified or expanded without changing the underlying data structure for providing smart tourism services. As for the visitor perspective, Chung and Koo (2015) employed the value-based adoption model to examine factors that influence users to search travel information from social media. They found both benefits (information reliability, enjoyment) and sacrifices (complexity, perceived effort) as influencing factors. The most significant contribution to academic perspectives is a paper named "Smart tourism: foundations and developments" written by Gretzel, Sigala, et al. (2015). The paper highlighted the strong theoretical grounding in smart tourism by providing definitional clarity of smart tourism concept and its three basic components: smart destinations, smart business ecosystems and smart experiences. Importantly, there were no publications in the data that pertained to the resident perspective.

The analysis of the publications in terms of their focus on particular smart tourism perspectives suggest that a lot of research is conducted regarding specific smart tourism applications and experiences.



**Fig. 6.** A comparison of the number of articles from the point of different perspectives

### 3.5 Ranking of the Most Used Keywords

In the article selection process, only publications with the keyword "smart tourism" in the title, keywords or abstract were included in the sample. Not all 96 sample articles include the term "smart tourism" in the title even though the study is on this topic. Thus, it is important to look into the keywords of each article to identify the most related terms of the smart tourism context.

The result shows that Internet of Things, smart tourism destination, big data, smart city, and tourism experience are the most related term. From the result we can infer that research status of smart tourism is more focused on destination and tourist. However, in the context of smart city academia may reveal more resident-oriented research cross-disciplinary. Figure 7 demonstrates the most frequent keywords from the sample.

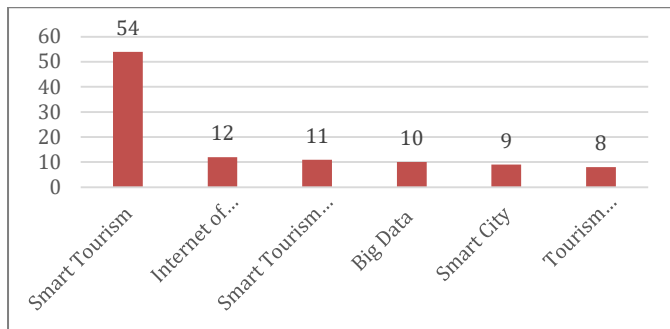


Fig. 7. Ranking of the most used keywords

### 3.6 Ranking of the Most Frequent Journals

For an interdisciplinary field like tourism it is worthwhile to look at the journals that published articles on smart tourism to understand the acceptance of smart tourism across different fields. We identified seven journals with three to eight smart tourism publications each. "Sustainability" published eight articles with a distinct interest in smart tourism as all eight articles were published in the same year. "Technological Forecasting and Social Change" published six articles since 2015 focusing on destination competitiveness, tourists and tourism and information technology. Three additional journals published four articles each: Computers in Human Behavior, Information & Management, Journal of Destination Marketing and Management.

Figure 8 shows a ranking of the most frequent journals regarding smart tourism.

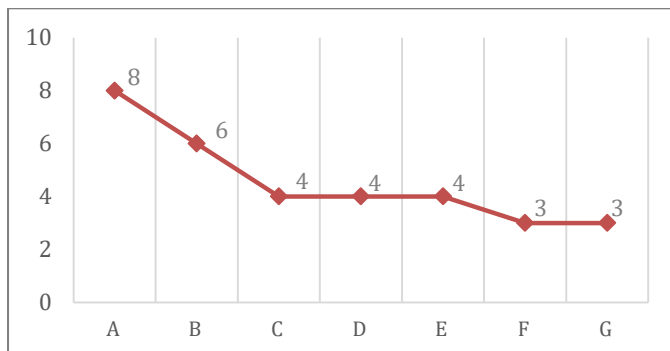


Fig. 8. Ranking of most frequent journals

A: Sustainability, B: Technological Forecasting and Social Change, C: Computers in Human Behavior, D: Information & Management, E: Journal of Destination Marketing and Management, F: International Journal of Information Management, G: Tourism Tribune

### 3.8 Key Scholars in the Field

Figure 9 displays the most prolific authors on the topic of smart tourism over the study period. We identify five South Korean authors – Koo, Chung, Han, Nam, and Joun – among the most frequent authors whereby Koo and Chung are the top ranked authors in terms of total publications. Looking at the authors of the publications and their university affiliations, it indicates that South Korea emerged as the most important country for smart tourism research. This is not surprising given the heavy emphasis on smart tourism initiatives by various levels of governments and

smart tourism funding opportunities available in South Korea.

Koo and Chung have 17 and 14 publications, respectively. And both of them are from Kyung Hee university, Seoul, Korea together with other most frequent authors Han and Joun. Based on the result, Kyung Hee University is without doubt the foremost institutional contributions to smart tourism. The authors Chulmo Koo and Namho Chung have been providing several special issues on diverse journals as a guest editor; it may be the reasons why they can be the most frequently ranked.

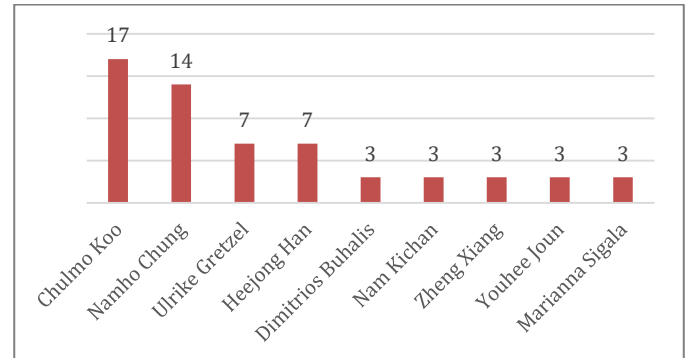


Fig. 9. Smart tourism publications by authors (total)

### 3.8 The Most Cited Papers

While the total number of publications by author shows how prolific a researcher is, it does not demonstrate how influential their work is. Thus, it is imperative to look at citations. This study used Google Scholar to identify the most cited papers and Web of Science to learn the impact factors of the journals that published the most cited papers. This provides a holistic perspective on the impact of these papers (see Figure 10).

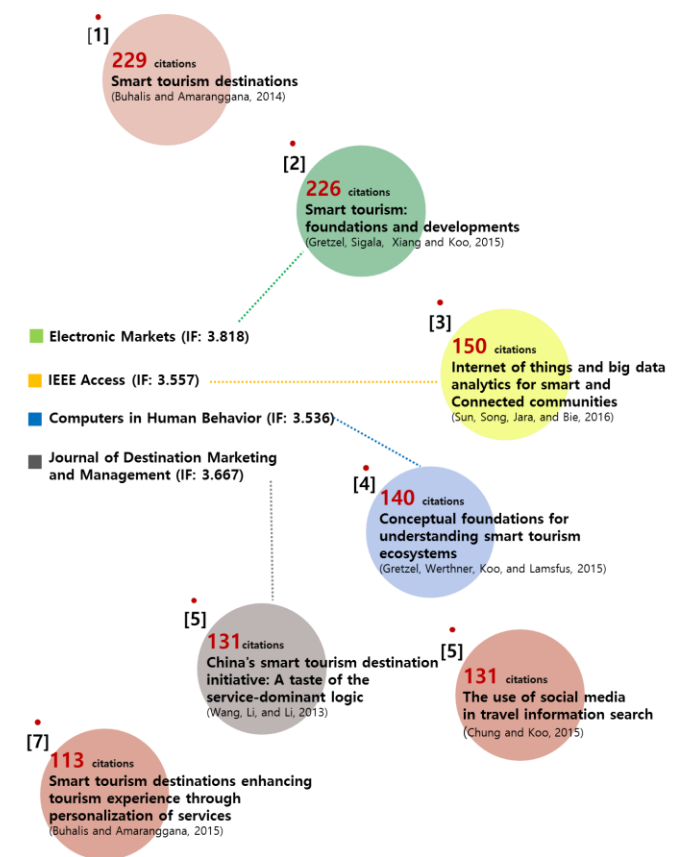


Fig. 10. The most cited smart tourism paper

The top paper, with 229 citations, is "Smart tourism destinations, 2014," by Buhalis and Amaranggana. Published in



2015, the paper assessed the advantage from the development of smart cities by implementing framework for competitive smart tourism destinations; applying the smartness concept to enrich travelers' experiences before, during and after their trip.

The runners-up is "Smart tourism: foundations and developments, 2015," published in *Electronic Markets* (IF: 3.818), with 226 citations. The paper was written by Ulrike Gretzel, Marianna Sigala, Zheng Xiang, and Chulmo Koo. The paper defines smart tourism, outlines current smart tourism trends, and then details its technological and business foundations. Hence this paper draws great attention from the smart tourism researchers regarding the development and management of smart tourism.

Ranked third is "Internet of things and big data analytics for smart and Connected communities, 2016," published in *IEEE Access* (IF: 3.557), with 150 citations by Sun, Song, Jara, and Bie.

Considering the top seven cited papers with at least 100 citations (see Figure 10), Buhalis, Amaranggana, Koo and Gretzel are the most influential smart tourism researchers.

#### 4. Conclusions and Limitations

"Smart" has become an increasingly popular term to illustrate technological, economic and social developments fueled by smart technologies (Gretzel et al., 2015). Ever since mobile technologies have become a prerequisite of our daily lives, the proliferation of smart phones enables people to communicate, access, and share information, and indulge location-based services anytime and anywhere (Sultan et al., 2009). The growth of smart ICTs has significant impacts on the energetic growth and development of the tourism industry. Today smartphones are a leading marketing channel to enhance destination competitiveness and provide mobile services to visitors (Stienmetz, Levy, & Boo, 2013). Furthermore, the growth of Social Network Services is swiftly spreading in the tourism industry: the use of Facebook and similar social media platforms allows destinations to offer a wide range of information to promote smart tourism ecosystem (Pan et al., 2016).

Simply put the significant role of smart technologies in tourism industry is underlined and its many opportunities to enrich travel experiences (Wang & Xiang, 2012) are reviewed by many researchers. Consequently, smart tourism is a social phenomenon originating from the convergence of information technology together with the tourism experience. Smart tourism offers new ways of doing business and new patterns of travel experience (Hwang et al., 2015). It enables cities to perform resident-friendly destination management by leveraging advanced soft infrastructure and mobile devices.

Moreover, with the dawn of the Artificial Intelligence and robotics in the tourism industry, the advanced ICT infrastructure which is closely related to smart tourism and urban city

development creates opportunities for the tourism industry. Tourism based on smart technologies enables altering consumer experiences by transforming and enhancing the visitor experience with predictive analytics. In this context, governments and businesses around the world are aggressively pushing the smart tourism agenda forward and investing in smart tourism initiatives. This means that they believe that a successful application of advanced technology in tourism will play a crucial role to enhance national competitiveness and business development. Hence tourism is expected to deliver more outstanding contributions and become a key economic ramification of a country. In academia, smart tourism is ever more highlighted as an emerging topic but smart tourism research initiatives are still in their infancy and seem to not fully cover the whole spectrum of smart tourism-related issues and questions.

The theme is very trendy with technology development; however, smart tourism would be not only a technology and data issue, but also a management and governance issue of organizations and city. It is furthermore a political agenda in some areas for tourism to converge across industries. Tourism by default does not operate in a vacuum and smart tourism can enhance the experiences of both citizens and visitors simultaneously in today's global era that is seamlessly connected and stated. In the meantime, by weakening the physical border, tourists will be able to utilize the necessary tourist attractions and facilities with citizens at anytime and anywhere.

In this research, we conducted a systematic review of existing smart tourism literature to determine the status quo of smart tourism research. The present paper contributes to extant literature by providing a comprehensive overview. It informs academics to identify important smart tourism issues. Further by identifying the major authors in the field, it helps researchers identify potential collaborators, assists editors in identifying reviewers and supports students when looking for potential mentors.

To perform innovative destination marketing to lead the competitiveness in the market, it is essential to exploit new technologies (Buhalis, 2000). Especially, smartphones become a leading marketing channel in enhancing destination competitiveness; providing mobile services to visitors (Stienmetz et al., 2013). The sharing of local customs, food, traditions, festival and events are main driving forces of experiential and authentic travel, which is a new trend and enables personal exchanges between residents and visitors. Therefore, a successful application of advanced technology in tourism will play a crucial role to enhance destination competitiveness for visitors and city competitiveness for residents. However, while in recent years, obvious progress has been made in developing approaches in smart tourism research, its main focus has yet to develop to a level which benefits certain stakeholders such as the residents.

**Table 8.** The most cited smart tourism paper

Rank	No. of citation	Title	Author	Journal	
				Name	IF(2017)
1	229	Smart tourism destinations	Buhalis & Amaranggana	Information and Communication Technologies in Tourism	N/A
2	226	Smart tourism: foundations and developments	Gretzel, Sigala, Xiang & Koo	Electronic Markets	3.818
3	150	Internet of things and big data analytics for smart and connected communities	Sun, Song, Jara & Bie	IEEE Access	3.557
4	140	Conceptual foundations for understanding smart tourism ecosystems	Gretzel, Werthner, Koo & Lamsfus	Computers in Human Behavior	3.536
5	131	China's "smart tourism destination" initiative: A taste of the service-dominant logic	Wang, Li, & Li	Journal of Destination Marketing and Management	3.667
5	131	The use of social media in travel information search	Chung & Koo	Telematics and Informatics	4.15
6	113	Smart tourism destinations enhancing tourism experience through personalisation of services	Buhalis & Amaranggana	Information and Communication Technologies in Tourism	N/A

Since much attention has been paid to “industry and visitors’ perspective” from Asian researchers, mainly South Korea and China, newcomers to the study of smart tourism might benchmark with industry best practices from South Korea and China. However, tourism marketing organizations should aim to provide creative and effective applications and services based on soft infrastructure which ultimately built for residents’ quality of life and visitors’ unique experience. Ultimately, tourism is expected to deliver more outstanding contributions and become a key economic sector of a country.

#### 4.1 Concluding Remarks

This paper indicates the existing literature by identifying what types of research have been conducted in the smart tourism context. Smart tourism research focuses either on finding reductive and generalizable solutions to information technology or focusing on the impacts of tourism and context specific social issues. Furthermore, we found that this new and emerging area of tourism research has arisen by diverse authors and across disciplines. The researchers denote a genesis of smart tourism in the contexts of backgrounds of disciplines and exploitation in the industry. Based on our review and the result of the works studied, we identify dynamic trends in the production of research: the prolific growth of research in 2015-2017, the research dedicated to four perspectives, the majority of researchers are from Asia and Europe.

#### 4.2 Limitations

However, this paper is subject to the common limitations of such studies in that only the publications that appeared on Google Scholar were included in the analysis. Further, the searches were conducted using English keywords and thus only extracted English-language publications. In the future research may consider the growth of smart tourism research region

#### Declaration of competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

#### Acknowledgements

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A3A2098438).

#### References

Adedoyin, F., & An, H. (2017). Smart tourism via digital governance: A case for Jeju volcanic island and lava tubes. *Journal of Tourism, Hospitality and Sports*, 31, 26–39.

Aguinis, H., Ramani, R. S., & Alabduljader, N. (2018). What you see is what you get? Enhancing methodological transparency in management research. *Academy of Management Annals*, 12(1), 1–28.

Almobaideen, W., Krayshan, R., Allan, M., & Saadeh, M. (2017). Internet of things: Geographical routing based on healthcare centers vicinity for mobile smart tourism destination. *Technological Forecasting and Social Change*, 123, 342–350.

Amarawat, G., Imran, M., Kumar, A., & Qureshi, A. H. (2017). Implementation of smart tourism in digital India. *International Journal of Recent Advances in Information Technology & Management*, 1(1).

Angelaccio, M., & Zappitelli, L. (2017). Social “Smar tourism”. A sustainable development methodology for smart urban lands. *Athens Journal of Tourism*, 4(2).

Al-Omari, A. H., & Al-Marghirani, A. (2017). Smart Tourism Architectural Model. *International Journal of Advanced Computer Science and Applications*, 8(10), 76–81.

Bae, S. J., Lee, H., Suh, E. K., & Suh, K. S. (2017). Shared experience in pretrip and experience sharing in posttrip: A survey of Airbnb users. *Information & Management*, 54(6), 714–727.

Becheru, A., Bădică, C., & Antonie, M. (2015). *Towards social data analytics for smart tourism: A network science perspective*. In *Workshop on social media and the web of linked data*. Chicago: Springer International Publishing.

Boes, K., Buhalis, D., & Inversini, A. (2016). Smart tourism destinations: Ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities*, 2(2), 108–124.

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *Ucinet for Windows: Software for social network analysis*. Harvard, MA: analytic technologies. 6.

Brandes, U., & Erlebach, T. (2005). Fundamentals. In *Network analysis: Methodological foundations*. Berlin: Springer.

Brandt, T., Bendler, J., & Neumann, D. (2017). Social media analytics and value creation in urban smart tourism ecosystems. *Information & Management*, 54(6), 703–713.

Buhalis, D. (2000). Marketing the competitive destination of the future. *Tourism Management*, 21(1), 97–116.

Buhalis, D., & Amaranggana, A. (2013). Smart tourism destinations. In *Information and communication technologies in tourism 2014* (pp. 553–564). Cham: Springer.

Buhalis, D., & Amaranggana, A. (2015). Smart tourism destinations enhancing tourism experience through personalisation of services. In *Information and communication technologies in tourism* (pp. 377–389). Cham: Springer.

Buonincontri, P., & Micera, R. (2016). The experience co-creation in smart tourism destinations: A multiple case analysis of European destinations. *Information Technology & Tourism*, 16(3), 285–315.

Byun, J., Kim, B. W., Ko, C. Y., & Byun, J. W. (2017). 4G LTE network access system and pricing model for IoT MVNOs: Spreading smart tourism. *Multimedia Tools and Applications*, 76(19), 19665–19688.

Cacho, A., Figueredo, M., Cassio, A., Araujo, M. V., Mendes, L., Lucas, J., & Prolo, C. (2016). Social smart destination: A platform to analyze user generated content in smart tourism destinations. In *New Advances. Information Systems and Technologies* (pp. 817–826). Cham: Springer.

Cho, W. S., Cho, A., Kwon, K., & Yoo, K. H. (2015). Implementation of smart Chungbuk tourism based on SNS data analysis. *Journal of the Korean Data and Information Science Society*, 26(2), 409–418.

Choe, Y., & Fesenmaier, D. R. (2017). The quantified traveler: Implications for smart tourism development. In *Analytics in smart tourism design* (pp. 65–77). Cham: Springer International Publishing.

Chung, N., & Han, H. (2017). The relationship among tourists’ persuasion, attachment and behavioral changes in social media. *Technological Forecasting and Social Change*, 123, 370–380.

Chung, N., & Koo, C. (2015). The use of social media in travel information search. *Telematics and Informatics*, 32(2), 215–229.

Chung, N., Han, H., & Joun, Y. (2015). Tourists’ intention to visit a destination: The role of augmented reality (AR) application for a heritage site. *Computers in Human Behavior*, 50, 588–599.

Chung, N., Lee, H., Lee, S. J., & Koo, C. (2015). The influence of tourism website on tourists’ behavior to determine destination selection: A case study of creative economy in Korea. *Technological Forecasting and Social Change*, 96, 130–143.

Chung, N., Tyan, I., & Chung, H. C. (2017). Social support and commitment within social networking site in tourism experience. *Sustainability*, 9(11), 2102.

De Esteban Curiel, J., Jalón, M. L. D., Herráez, B. R., & Antonovica, A. (2017). *Smart tourism destination in Madrid. Sustainable smart cities* (pp. 101–114). Cham: Springer International Publishing.

Del Chiappa, G., & Baggio, R. (2015). Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure. *Journal of Destination Marketing & Management*, 4(3), 145–150.

Del Vecchio, P., & Passiante, G. (2017). Is tourism a driver for smart specialization? Evidence from Apulia, an Italian region with a tourism vocation. *Journal of Destination Marketing & Management*, 6(3), 163–165.

Del Vecchio, P., Mele, G., Ndou, V., & Secundo, G. (2018). Creating value from social big data: Implications for smart tourism destinations. *Information Processing & Management*, 54(5), 847–860.

Drieger, P. (2013). Semantic network analysis as a method for visual text analytics. *Procedia-social and Behavioral Sciences*, 79, 4–17.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107–115.

Encalada, L., Boavida-Portugal, I., Cardoso Ferreira, C., & Rocha, J. (2017). Identifying tourist places of interest based on digital imprints:

- Towards a sustainable smart city. *Sustainability*, 9(12), 2317.
- Feng, W. L., Duan, Y. C., Huang, M. X., Dong, L. F., Zhou, X. Y., & Hu, T. (2014). A research on smart tourism service mechanism based on context awareness. *Applied Mechanics and Materials*, 519–520, 752–758.
- Garau, C. (2017). Emerging technologies and cultural tourism: Opportunities for a cultural urban tourism research agenda. In *Tourism in the city* (pp. 67–80). Cham: Springer International Publishing.
- Gontar, B., Pamuła, A., & Gontar, Z. (2013). Deployment of smart city concept in Poland. Selected aspects. *Organizacijų vadyba: sisteminiai tyrimai*, 67, 39–51.
- Graziano, T. (2014). Boosting innovation and development: The Italian smart tourism, a critical perspective. *European Journal of Geography*, 5(4), 6–18.
- Gretzel, U., Koo, C., Sigala, M., & Xiang, Z. (2015). Special issue on smart tourism: Convergence of information technologies, experiences, and theories. *Electronic Markets*, 25(3), 175–177.
- Gretzel, U., Reino, S., Kopera, S., & Koo, C. (2015). Smart tourism challenges. *Journal of Tourism*, 16(1), 41–47.
- Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets*, 25(3), 179–188.
- Gretzel, U., Werthner, H., Koo, C., & Lamsfus, C. (2015). Conceptual foundations for understanding smart tourism ecosystems. *Computers in Human Behavior*, 50, 558–563.
- Gretzel, U., Zhong, L., & Koo, C. (2016). Application of smart tourism to cities. *International Journal of Tourism Cities*, 2(2).
- Guerra, I., Borges, F., Padrão, J., Tavares, J., & Padrão, M. H. (2017). Smart cities, smart tourism? The case of the city of Porto. *Revista Galega de Economía*, 26(2), 129–142.
- Guo, Y., Liu, H., & Chai, Y. (2014). The embedding convergence of smart cities and tourism internet of things in China: An advance perspective. *Advances in Hospitality and Tourism Research*, 2(1), 54–69.
- Han, R. E. N. (2013). The localization of smart tourism. *Ecological Economy*, 4, 142–145.
- Han, H., Chung, N., & Koo, C. (2016). Utilizing smart technologies to enhance tourists. *The Journal of Internet Electronic Commerce Research*, 16(5), 1–19.
- Han, H., Park, A., Chung, N., & Lee, K. J. (2016). A near field communication adoption and its impact on expo visitors' behavior. *International Journal of Information Management*, 36(6), 1328–1339.
- Handayani, B., Ivanov, S., & Korstanje, M. E. (2017). Smart tourism for dark sites: The sacred site of the dead, Trunyan Cemetery. In M. E. Korstanje & B. Handayani (Eds.), *Gazing at death: Dark tourism as an emergent horizon of research* (pp. 15–42). Hauppauge, NY: Nova Science Publishers.
- Huang, C. D., Goo, J., Nam, K., & Yoo, C. W. (2017). Smart tourism technologies in travel planning: The role of exploration and exploitation. *Information & Management*, 54(6), 757–770.
- Huang, C. M., & Chen, S. C. (2015). Smart tourism: Exploring historical, cultural, and delicacy scenic spots using visual-based image search technology. *Applied Mechanics and Materials*, 764, 1265–1269.
- Huang, X. K., Yuan, J. Z., & Shi, M. Y. (2012). Condition and key issues analysis on the smarter tourism construction in China. In *Multimedia and signal processing* (pp. 444–450). Berlin, Heidelberg: Springer.
- Hwang, J., Park, H. Y., & Hunter, W. C. (2015). Constructivism in smart tourism research: Seoul destination image. *Asia Pacific Journal of Information Systems*, 25(1), 163–178.
- Ivars, J. A., Celdrán, M. A., Mazón, J., & Perles, Á. (2017). Towards an ICT roadmap for smart tourism destinations based on prospective analysis. *E-Rev. Tourism Research*, 8, 1–5.
- Jovicic, D. Z. (2017). From the traditional understanding of tourism destination to the smart tourism destination. *Current Issues in Tourism*, 22(3), 276–282.
- Kaur, K., & Kaur, R. (2016). Internet of things to promote tourism: An insight into smart tourism. *International Journal of Recent Trends in Engineering Research*, 2(4), 357–362.
- Khan, M. S., Woo, M., Nam, K., & Chathoth, P. K. (2017). Smart city and smart tourism: A case of Dubai. *Sustainability*, 9(12), 2279.
- Kim, D., & Kim, S. (2017). The role of mobile technology in tourism: patents, articles, news, and mobile tour app reviews. *Sustainability*, 9(11), 2082.
- Kim, H. C., & Kim, Y. S. (2016). Smart tourism information system using location-based technology. *International Journal of Software Engineering and Its Applications*, 10(11), 11–24.
- Kim, J. Y., & Canina, L. (2015). An analysis of smart tourism system satisfaction scores: The role of priced versus average quality. *Computers in Human Behavior*, 50, 610–617.
- Kim, K., Park, O. J., Yun, S., & Yun, H. (2017). What makes tourists feel negatively about tourism destinations? Application of hybrid text mining methodology to smart destination management. *Technological Forecasting and Social Change*, 123, 362–369.
- Kim, N. D., Moon, J., & Chung, T. Y. (2017). Design and implementation a virtualization platform for providing smart tourism services. *Channels*, 3(16), 1.
- Koo, C., Chung, N., & Ham, J. (2017). Assessing the user resistance to recommender systems in exhibition. *Sustainability*, 9(11), 2041.
- Koo, C., Joun, Y., Han, H., & Chung, N. (2016). A structural model for destination travel intention as a media exposure: Belief-desire-intention model perspective. *International Journal of Contemporary Hospitality Management*, 28(7), 1338–1360.
- Koo, C., Shin, S., Gretzel, U., Hunter, W. C., & Chung, N. (2016). Conceptualization of smart tourism destination competitiveness. *Asia Pacific Journal of Information Systems*, 26(4), 561–576.
- Koo, C., Yoo, K. H., Lee, J. N., & Zanker, M. (2016). Special section on generative smart tourism systems and management: Man-machine interaction. *International Journal of Information Management*, 6(36), 1301–1305.
- Lee, P., Hunter, W. C., & Chung, N. H. (2020). Smart tourism city: Developments and transformations. *Sustainability*, 12(10), 3958.
- Lee, S. J. (2017). A review of audio guides in the era of smart tourism. *Information Systems Frontiers*, 19(4), 705–715.
- Liburd, J. J., Nielsen, T. K., & Heape, C. (2017). Co-designing smart tourism. *European Journal of Tourism Research*, 17, 28–42.
- Lim, C., Mostafa, N., & Park, J. (2017). Digital Omotenashi: Toward a smart tourism design systems. *Sustainability*, 9(12), 2175.
- Maoying, W. U., & Keji, H. U. A. N. G. (2014). Appraising netnography: Its adoption and innovation in the smart tourism era. *Tourism Tribune/Lyyou Xuekan*, 29(12).
- Marchiori, E., & Cantoni, L. (2015). The role of prior experience in the perception of a tourism destination in user-generated content. *Journal of Destination Marketing & Management*, 4(3), 194–201.
- Marsal-Llacuna, M. L., Colomer-Llinàs, J., & Meléndez-Frigola, J. (2015). Lessons in urban monitoring taken from sustainable and livable cities to better address the Smart Cities initiative. *Technological Forecasting and Social Change*, 90, 611–622.
- Mekawy, M. A. (2015). Smart Tourism investment: Planning pathways to Break the poverty Cycle. *Tourism Review International*, 18(4), 253–268.
- Nemade, G., Deshmane, R., Thakare, P., Patil, M., & Thombre, V. D. (2017). Smart tourism recommender system. *International Research Journal of Engineering and Technology*, 4(11).
- Newman, M., Barabasi, A. L., & Watts, D. J. (2006). *The structure and dynamics of networks*. Princeton, NJ: Princeton University Press.
- Pan, L., Lin, B., Fang, M., & Chen, M. J. (2016). An empirical examination of continuance intention of tourism app: Based on the context of smart tourism. *Tourism Tribune*, 31(11), 65–73.
- Park, B., & Yim, J. (2015). Design of an android app for Gyeongju smart tourism. In *Computer science and its applications* (pp. 991–995). Berlin, Heidelberg: Springer.
- Park, H. W., & Leydesdorff, L. (2004). Understanding and Implication of KrKwic for text analysis. *Journal of the Korean data Analysis Society*, 6(5), 1377–1387.
- Perfetto, M. C., Vargas-Sánchez, A., & Presenza, A. (2016). Managing a complex adaptive ecosystem: Towards a smart management of industrial heritage tourism. *Journal of Spatial and Organizational Dynamics*, 4(3), 243–264.
- Presenza, A., Micera, R., Splendiani, S., & Del Chiappa, G. (2014). Stakeholder e-involvement and participatory tourism planning: analysis of an Italian case study. *International Journal of Knowledge-Based Development*, 5(3), 311–328.
- Qin, Y. (2017). Analysis of key elements for smart tourist city construction with G1-entropy methods. *Revista Facultad de Ingeniería*, 32, 759–763.
- Romao, J., & Neuts, B. (2017). Territorial capital, smart tourism specialization and sustainable regional development: Experiences from Europe. *Habitat International*, 68, 64–74.
- Ruiz, M. A. C., Bohorquez, S. T., & Molano, J. I. R. (2017). Colombian tourism: Proposal app to foster smart tourism in the country. *Advanced Science Letters*, 23(11), 10533–10537.
- Ryu, K. H., & Lee, M. S. (2016). A study on smart tourism based on face recognition using smartphone. *International Journal of Internet, Broadcasting and Communication*, 8(4), 39–47.
- Silva-Pedroza, D., Marin-Calero, R., & Ramirez-Gonzalez, G. (2017). NFC evaluation in the development of mobile applications for MICE in tourism. *Sustainability*, 9(11), 1937.
- Stienmetz, J. L., Levy, S. E., & Boo, S. (2013). Factors influencing the usability of mobile destination management organization websites. *Journal of Travel Research*, 52(4), 453–464.
- Sultan, F., Rohm, A. J., & Gao, T. T. (2009). Factors influencing consumer

- acceptance of mobile marketing: A two-country study of youth markets. *Journal of Interactive Marketing*, 23(4), 308–320.
- Sun, Y., Song, H., Jara, A. J., & Bie, R. (2016). Internet of things and big data analytics for smart and connected communities. *IEEE Access*, 4, 766–773.
- Sung, T. K. (2005). The creative economy in global competition. *Technological Forecasting and Social Change*, 96, 89–91.
- Tussyadiah, I. P., & Zach, F. J. (2012). The role of geo-based technology in place experiences. *Annals of Tourism Research*, 39(2), 780–800.
- Tüzüncan, D. (2017). The relationship between innovation and tourism: The case of smart tourism. *International Journal of Applied Engineering Research*, 12(23), 13861–13867.
- Vasavada, M., & Padhiyar, Y. J. (2016). “Smart Tourism”: Growth for tomorrow. *Journal for Research*, 1(12).
- Wan, B., Ma, R., Zhou, W., & Zhang, G. (2015). Smart city development in China: One city one policy. *ZTE Communications*, 13(4), 40–44.
- Wanchun, Z. (2017). Study on the application frame analysis of the internet of things model in smart tourism from big data perspectives. *Boletín Técnico*, 55(19), 269–276.
- Wang, D., & Xiang, Z. (2012). The new landscape of travel: A comprehensive analysis of smartphone apps. In M. Fuchs, F. Ricci, & L. Cantoni (Eds.), *Information and communication technologies in tourism* (pp. 308–319). Wien: Springer.
- Wang, D., Li, X. R., & 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, X., Li, X. R., Zhen, F., & Zhang, J. (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.
- Wassermann, S., & Faust, K. (1994). *Social network analysis: Methods and application*. Cambridge: Cambridge University Press.
- Watfa, M. K., & Sobh, D. (2017). Generative smart tourism, the road for big data. *Journal of Advanced Management Science*, 5(6).
- Werthner, H., Koo, C., Gretzel, U., & Lamsfus, C. (2015). Special issue on smart tourism systems. *Computers in Human Behavior*, 50(C), 556–557.
- Wu, X. (2017). Smart tourism based on internet of things. *Revista de la Facultad de Ingeniería*, 32(10), 66–170.
- Xiang, Z., & Fesenmaier, D. R. (2017). Big data analytics, tourism design and smart tourism. In *Analytics in smart tourism design* (pp. 299–307). Vienna: Springer.
- Xu, Li, Qian, & Liu. (2013). Smart tourism: A new travel tendency: A Review on existing research. *Resource Development & Market*, 7.
- Yoo, C., Kwon, S., Na, H., & Chang, B. (2017). Factors affecting the adoption of gamified smart tourism applications: An integrative approach. *Sustainability*, 9(12), 2162.
- Yoo, C. W., Goo, J., Huang, C. D., Nam, K., & Woo, M. (2016). Improving travel decision support satisfaction with smart tourism technologies: A framework of tourist elaboration likelihood and self-efficacy. *Technological Forecasting and Social Change*, 123, 330–341.
- Yunpeng, L., Hu, C., Chao, H., & Liqiong, D. (2014). The concept of smart tourism under the context of tourism information service. *Tourism Tribune/Lyyou Xuekan*, 29(5).
- Zacarias, F., Cuapa, R., De Ita, G., & Torres, D. (2015). Smart tourism in 1-click. *Procedia Computer Science*, 56, 447–452.

## Author Biographies

**Pam Lee**, received her Ph.D. in Tourism from the College of Hotel and Tourism Management of Kyung Hee University, Korea. She worked in the field of advertising, hotel, and international conference at Cheil Communications, Marriott Hotel, and Alphabet Media in Singapore, Zurich, and Tokyo. Her research interests include Smart Tourism City, Smart Tourism, and Psychological Distance and her latest published papers are; Smart Tourism City: Developments and Transformations (2020.05); The Threats of North Korea's Missile and Visitors' International Conference Choice Behavior (2019.11); Islamic vs. non-Islamic attributes for smart tourism city in Korea. (2018.06).

**Florian J. Zach** is an Assistant Professor in the Howard Feiertag Department of Hospitality and Tourism Management, Pamplin College of Business, Virginia Tech, USA. He received his PhD in Business Administration from Temple University, USA and his Master in International Economics and Business Studies from the University of Innsbruck, Austria. He is a management researcher and focuses his research on innovation in tourism and hospitality, mostly on innovation adoption issues. His research interests include drivers of innovation adoption such as interorganizational relationships and impacts of innovation adoption on firm value as well as firm and destination performance. To further innovation research in tourism and hospitality he co-founded and currently co-chairs the Alliance for Innovators and Researchers in Tourism and Hospitality (AIRTH; [www.airth.global](http://www.airth.global)) to connect professionals and academics and provide free innovation case studies for teaching.

**Namho Chung** is a Professor at the Smart Tourism Education Platform and the Director of Smart Tourism Research Center at Kyung Hee University in Seoul, Republic of Korea. He had received his Ph.D. degree in Management Information Systems from Sungkyunkwan University in Seoul. Also he had been a Visiting Research Fellow at School of Hospitality and Tourism Management, University of Surrey in Guildford, UK. His research interests lie in the tourist behaviour & information systems, human-computer interface design and knowledge management. His research has been published in *Tourism Management*, *Journal of Travel Research*, *International Journal of Contemporary Hospitality Management*, *International Journal of Hospitality Management*, *International Journal of Information Management and Information & Management* among others. Currently, he leads smart tourism cities research projects in the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea. His name listed in the Hall of Fame at Kyung Hee University as a Kyung Hee Fellow for his outstanding achievements.