

Review

# Systematic Review of Smart Tourism Research

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Received: 18 March 2020; Accepted: 16 April 2020; Published: 22 April 2020



**Abstract:** In recent decades, smart tourism has been attracting attention from practitioners and scholars. The current study used multiple analysis methods to conduct a systematic review of 124 related articles on smart tourism. Qualitative analysis was conducted to identify 10 categories of smart tourism articles. Results showed that the largest proportion focus on the influence of technology on tourists' perceptions, behaviors, and experiences. Co-occurrence analysis was performed to investigate the development trend of keywords used by academics in the last five years, while co-authorship (country) analysis was conducted to examine the collaborative relationship between different countries. The research regions, industries, methods, and theories applied in these articles were also analyzed. Theoretical and practical/managerial implications, as well as future research directions, were provided.

**Keywords:** smart tourism; literature review; qualitative analysis; co-occurrence analysis; co-authorship (country) analysis

## 1. Introduction

The advancement of information and communication technologies (ICTs) in general, and cloud computing technologies in particular, motivates tourism destination governments and practitioners to leverage smart technologies to optimize their decision making in business planning and enhance the tourist experience. Smart tourism refers to the burgeoning phenomenon in which tourism destinations, practitioners, and tourists depend accumulatively on emerging ICTs that enable colossal data transformation into value proposition [1]. Li, Hu, Huang and Duan [2] viewed smart tourism as a tour information service support system and an all-encompassing technology. Smart tourism is integrated into the idea of service co-creation under service-dominant logic [3].

The prevalence of Internet of Things (IoT), mobile applications (apps), location-based services, geo-tag services, Virtual Reality (VR), Augmented Reality (AR), social media, and smart devices offers immense opportunities for tourism stakeholders to generate, store, and retrieve big data that serve various purposes. Examples of these applications include tourist experience enhancement, destination competitiveness, and sustainability improvement [4–6]. Practitioners have started to apply software or applications to analyze and predict tourist behaviors [7]. Smart tourism benefits tourists, industry, and destinations. Governments, such as in the U.S., Mainland China, and South Korea, have been taking initiatives to build the prerequisite infrastructure and develop the necessary technologies to support smart tourism development [2,4]. For example, China National Tourism Authority issued “Guidance to Promote Smart Tourism Development” in 2015. The document stipulates key missions in the coming years, such as enhancing information infrastructure, building information-sharing platforms, improving smart tourism governance, and smart tourism marketing, to name a few. Since

the release of the guide, local governments in Mainland China have followed suit with promotional campaigns on smart tourism [8].

Many organizations around the world (e.g., telecommunication companies, social media, and e-commerce companies) have acquired colossal customer data that can be used for smart tourism. Online recommenders in e-commerce platforms are prevalent and many smart destinations are implementing flow control with visitor movement data. Although smart tourism development is still at an early stage, the advancement of 5G communication, which allows for speedy data transmission and the ubiquitous connectivity of things, can serve as an impetus for the development. Hence, smart tourism will experience remarkable growth in decades to come.

Smart tourism is a hot topic that has been gaining attention from academics and practitioners. Extant smart tourism research ranges from case study [9], conceptual paper [2], to methodology/technology-driven research [10,11] and behavioral model building study [12]. Prior studies have established a comprehensive knowledge of smart tourism by taking the perspectives of tourists [13], industry practitioners [14], and destination governments [15]. The idea of smart tourism destinations was initially proposed by tourism scholars [16–18] and enriched by further elaborating the idea of a smart tourism ecosystem in connection with conceptualizations of smart technologies, smart cities and smart tourism [1]. Li et al. [2] consolidated the concepts of smart tourism and proposed their new definition. In terms of theoretical foundation, some scholars viewed smart tourism initiatives through the service-dominant logic [19], which appears to be an important theoretical foundation for understanding the implications of smart tourism. In addition, existing behavioral models such as the Technology Acceptance Model, Theory of Planned Behavior and Technology Readiness and Acceptance Model were used as theoretical foundations to examine tourist behaviors of smart tourism [13,20].

Despite the proliferation of the pertinent literature, the research development in this realm is still at its infancy [21]. For example, consensus regarding the definition of smart tourism, which is a prerequisite for theory development, appears not have been achieved [2], not to mention theoretical foundations developed specifically for the field. Additionally, practitioners do not seem to have a consistent understanding of what constitutes a smart property (e.g., smart hotel) [14]. Because of the rapid development of smart technologies and its applications, there is a need to perform an up-to-date review of the extant literature to provide a solid foundation and direction for future research. The current paper aims to provide a systematic comprehensive review of the smart tourism literature by revealing the research trend, themes, regions, theories, methodologies, and industry applications. Implications are proposed for future research directions. The study mainly applied qualitative analysis, frequency analysis, co-occurrence analysis and co-authorship (country) analysis to examine the pertinent literature. The remaining structure of the paper is as follows. Section 2 describes data collection, data selection and data analysis methods. Section 3 systematically presents the findings. Section 4 is a general discussion of the findings. Section 5 discusses theoretical and practical implications. Lastly, Section 6 draws conclusions and discusses limitations and future research.

## 2. Methodology

### 2.1. Data Collection

This research conducted a systematic review. Two rounds of data collection were conducted by the researchers to collect more relevant smart tourism articles. In the first round, three databases, including Scopus, EBSCOhost, and Web of Science, were used to search all pertinent articles [22]. The search criteria were determined by the researchers to extract the collection results. First, the term “smart” was combined with “tourism,” “tourist,” “travel,” “hotel,” “restaurant” to formulate keywords, such as “smart tourism,” “smart tourist,” “smart travel,” “smart hotel,” and “smart restaurant.” Keywords were searched in three sections, including the title, abstract, and keywords. Second, in terms of time-frame, the researchers did not set the starting point, and articles published until February 2020 were collected. Third, in terms of document types, following Ramos-Rodríguez and Ruíz-Navarro [23],

only full-length journal articles were collected. Conference papers, reviews, and reports were excluded. Fourth, in terms of language, only English articles were collected. The researchers conducted a second-round search to refine the collection results. Following Mehraliyev, Choi, and Köseoglu [24], the researchers applied the same criteria within the mentioned smart tourism distribution journals to check for missing articles.

## 2.2. Data Selection

Two rounds of data selection were conducted to confirm content relevance and article quality. In the first-round selection, two researchers identified the content of articles independently and then discussed and excluded articles that did not relate to smart tourism. In the second-round selection, only papers published in journals under SSCI (Social Science Citation Index) and SCI (Science Citation Index) were selected. Finally, 124 smart tourism articles were confirmed after two rounds of data collection and selection.

## 2.3. Data Analysis

Several types of analysis were conducted in this research. Qualitative analysis was conducted to identify the research focus of the selected articles. Frequency analysis was conducted to analyze the distribution based on published year, research category, research region, research industry, and theories applied in articles. Co-occurrence (keywords) and co-authorship (countries) analyses were conducted to examine the trend in keyword development in the last five years and the collaboration of different countries using the VOSviewer software.

## 3. Findings

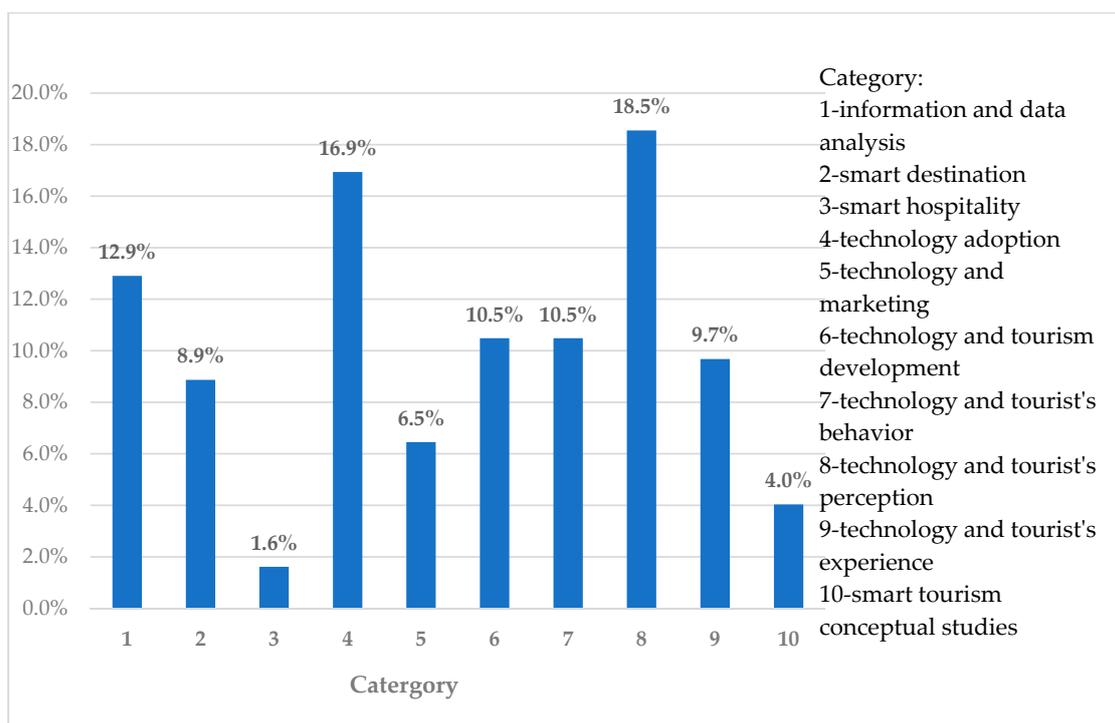
### 3.1. Research Categories

Three steps were followed by the researchers to categorize the selected 124 smart tourism articles. First, the researchers held several rounds of discussions to decide the initial categories in advance. Second, the researchers read the article's title, keywords, and abstract independently to decide the article's category. Third, dubious article categories were discussed by the researchers until a consensus was reached. Finally, the selected articles were categorized into 10 major categories. These categories are information and data analysis, smart destination, smart hospitality, technology adoption, technology and marketing, technology and tourism development, technology and tourist's behavior, technology and tourist's perception, technology and tourist's experience, and smart tourism conceptual studies (Figure 1).

The results show the category of technology and tourist's perception occupied the largest percentage (18.5%) and comprised 23 articles. Articles in this category study tourist's perception during travel with the influence of technology and used keywords, such as intention, perceived, satisfaction, and preference.

The category of technology adoption is studied by academics frequently and had 21 articles (16.9%). Articles in this category are commonly labeled with the keywords of innovation, adoption, application, implementation, technology. The contents of these articles are related to the actual use of technology in the tourism industry.

The category of information and data analysis accounted for 12.9% of the total articles, which includes 16 articles. Articles in this category analyze contents from social network sites (SNS), and the principal keywords are analytic, data, mining, review, and UGC (user-generated content).



**Figure 1.** Distribution of articles by category.

The next category is related to tourism development that uses technology as an influencing factor. The central keywords are development, planning, management, and challenges. Articles in the next category discuss the effects of technology on tourists' actual behavior, and the central keywords are behavior, selection, decision, and participation. These two categories each have 13 articles, accounting for 10.5%.

The category of technology and tourists' experience highlights the keywords of experience and service. This category had 12 articles (9.7%) that are related to the effect of technology on tourists' experience. Destination, city, and image are common keywords in the category of smart destination, which has 11 articles (8.9%). The article keywords with marketing, purchase, segmentation, and retail are categorized into the category of technology and marketing. The number of articles in this category is eight (6.5%). Articles in the category of smart tourism conceptual studies focus on smart-tourism-related concepts and include five articles (4.0%). Smart hospitality with the keywords hotel and hospitality had the fewest number of articles, with only two articles, accounting for 1.6%.

### 3.2. Number of Published Articles Per Year

The publications of smart tourism articles can be traced back to 1995, when smart cards were introduced in the hotel industry [25]. In 2012, studies on smart tourism regained academics' attention. In 2015, the number of smart tourism articles started to increase sharply. Among the 124 articles, 12 were published in 2015, 16 in 2016, and 30 in 2017, when the number of published articles reached its peak. In 2018, the number dropped back to 16 but rose again to 26 in 2019. Until February 2020, five articles were published within only two months, and 13 articles were published online (Figure 2).

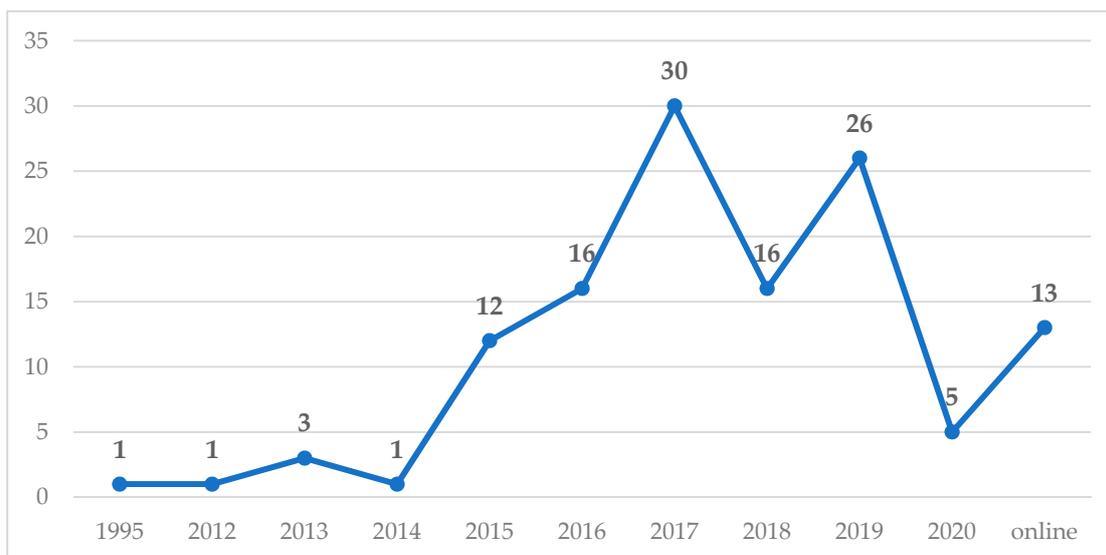


Figure 2. Number of articles published by year.

### 3.3. Development Trend of Smart Tourism-Related Keywords

Co-occurrence keywords analysis was conducted to analyze the trend of development of keywords in smart tourism articles by VOSviewer. The results are shown in Figure 3. Each node represents a keyword. Keywords in cool color (blue) were frequently used by academics in the first half of the five-year study period. Keywords in warm color (red) were commonly adopted in the next half of this period, and the font size of the node represents the co-occurrence frequency of this keyword with other keywords. Each line represents the network between keywords.

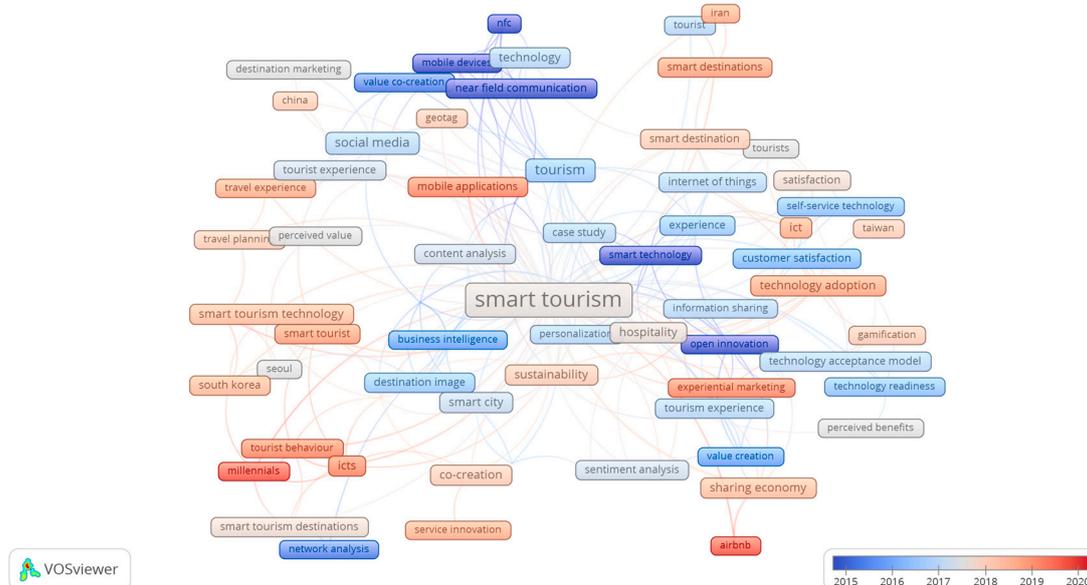


Figure 3. Development trend of keywords within five years (2015–2020).

The development trend of keywords from 2015 to 2020 is visualized on the map. “NFC (near field communication)”, “mobile devices”, “smart technology”, and “open innovation”, were central keywords in 2015, when the number of smart tourism articles started increasing. “Airbnb”, “millennials”, “mobile application”, and “experiential marketing”, appeared in articles from 2019

to 2020. “Smart tourism” had the most frequent keyword co-occurrence with other keywords in all selected articles.

### 3.4. Distribution of Research Regions

Smart tourism research was conducted in more than 20 countries or regions. The results of the research region studied more than once are illustrated in Figure 4. South Korea is the most popular research region, with 26 articles. Spain is studied in 12 articles, followed by the U.S. (11 articles). Mainland China and Taiwan were selected by academics frequently, with eight and six articles, respectively. Six articles were situated in Italy and four articles in the United Kingdom. France, Iran, and Portugal were selected by academics twice. Four articles also conducted smart tourism research in a multi-country setup.

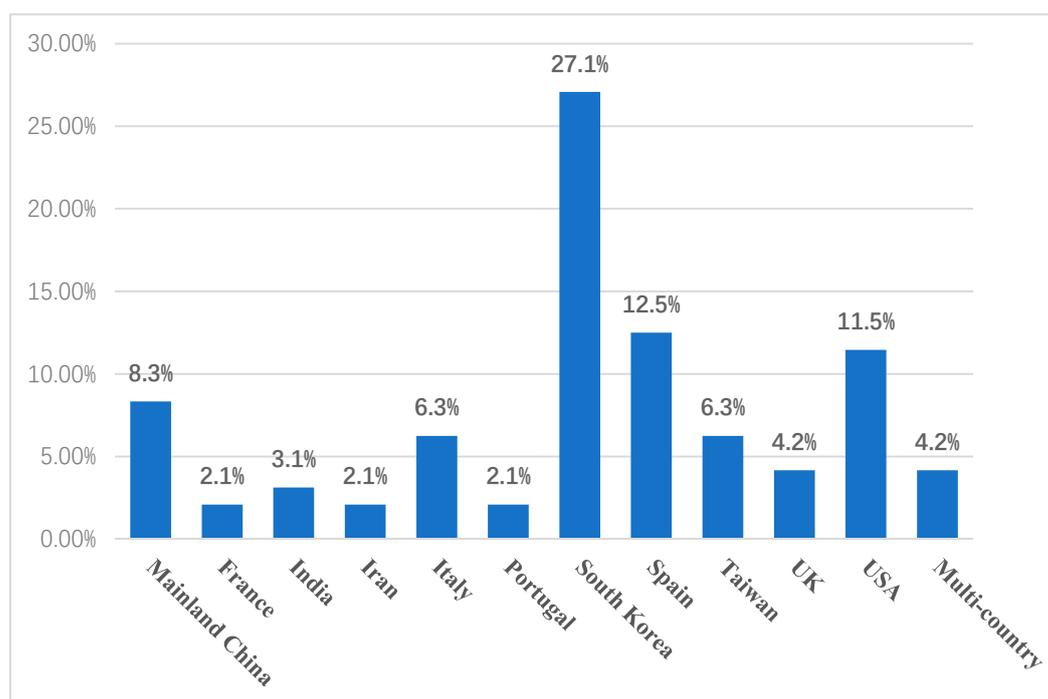


Figure 4. Distribution of research regions (studied more than once).

### 3.5. Collaboration of Countries/Regions

Co-authorship country analysis was conducted to explore the collaboration of different countries by VOSviewer. The results are shown in Figure 5. Each node represents an author’s country. The font size of the country represents the collaboration frequency with other countries, which means the larger the font size, the more frequently this author’s country collaborates with others. Each line represents the network between countries. Line darkness represents the collaboration intensity between them. Each node color represents a network cluster, and countries in the same color share a similar research area.

Authors from South Korea had the highest frequency of collaboration with authors from other countries, and its collaboration with the U.S. is the strongest. The U.S., the U.K., and Spain had relatively high collaboration relationships with other countries. Meanwhile, article countries are divided into several clusters by research areas. Articles written by authors from the United Arab Emirates and Bhutan had a similar research area with articles written by authors from South Korea. Articles from Colombia, Malaysia, and the U.S. form a research area cluster. Articles from Taiwan, Mainland China, Hong Kong, Macau, Canada, Turkey, and the U.K. form a cluster. Articles from Australia, Austria,

Mexico, Switzerland, and Spain comprise another cluster. Other countries' collaboration relationships are shown in detail on the map.

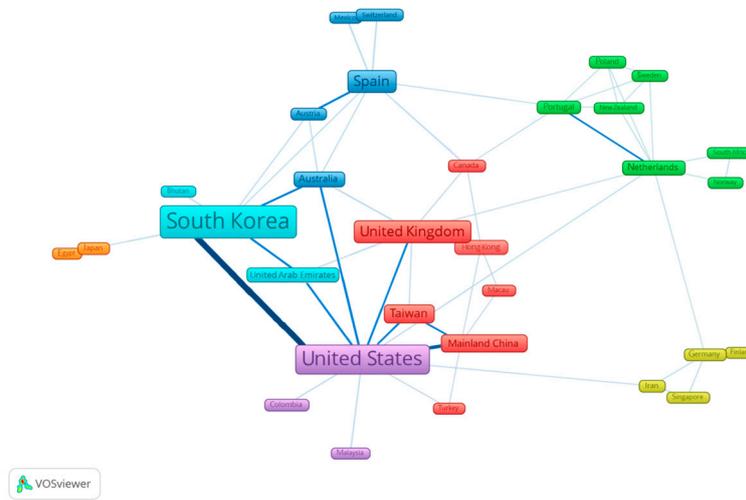


Figure 5. Collaboration of countries/regions.

3.6. Distribution of Research Industry

The results of the distribution of research industries among selected articles are shown in Figure 6. Articles' research industry applied in destination ranked first (33 articles, 26.6%), followed by the tourism industry (29 articles, 23.4%). Hotel/resort and social media are the third most common research industries in smart tourism articles (18 articles, 14.5%). The number of articles applied in attraction/site is 11 (8.9%). Seven articles were applied in convention/event (5.6%). The number of articles applied in transportation is five (4.0%). Only two articles (1.6%) were applied in restaurants and one article (0.8%) in a travel agency.

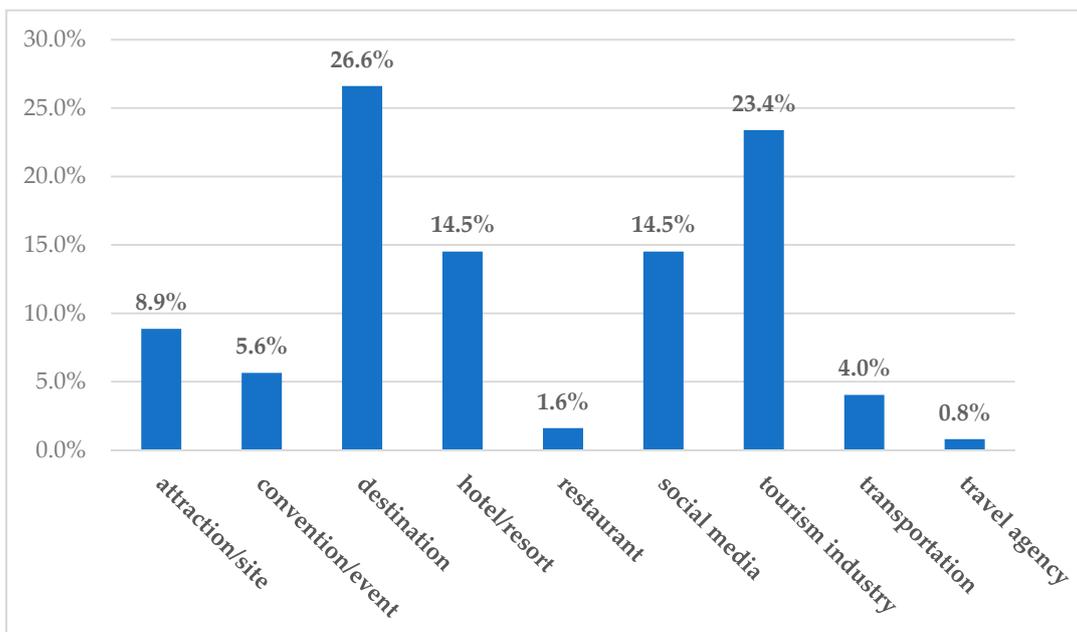


Figure 6. Distribution of research industries.

### 3.7. Distribution of Methodology

The methods applied in smart tourism articles are divided into three categories, namely qualitative, quantitative, and mixed analysis methods. The frequency of methods applied in articles more than once are shown in Table 1. Quantitative analysis is dominant in selected articles, with 68 articles, while 38 articles adopted qualitative analysis methods.

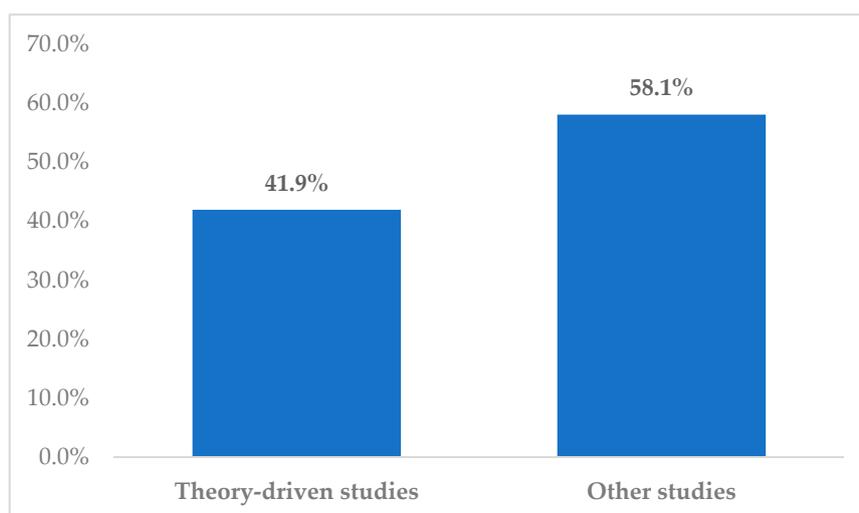
**Table 1.** Methodological analysis (applied more than once).

	Method	Number of Articles	Total
Qualitative	Ethnography (Autoethnography, Netnography)	2	38
	Case Study	5	
	Conceptual	16	
	Descriptive	9	
	Interview	6	
Quantitative	Empirical method (descriptive, factor, and regression analyses, ANOVA)	17	68
	Experimental design	2	
	Structural equation modeling (SEM)	37	
	Content analysis	5	
	Network analysis	4	
	Spatial analysis	3	
Mixed methods			12

As for qualitative analysis methods, conceptual work was applied by the largest number of articles, with 16 articles. Besides this, descriptive, interview, case study, and ethnography (autoethnography, netnography) methods are applied more than once in articles (details are shown in Table 1). As for quantitative analysis methods, structural equation modeling (SEM) is the most dominant applied method, whereby the number of articles applying this method reached 37. The second commonly adopted method is an empirical method with descriptive, factor, and regression analyses, and ANOVA. Content, network, and spatial analyses and experiment are applied more than once in the articles (details are shown in Table 1). Twelve articles used mixed methods in the research.

### 3.8. Distribution of Applied Theory

Among the 124 selected smart tourism articles, 72 (58.1%) did not apply theory in the article and 52 (41.9%) are theory-driven studies (Figure 7). More than 50 theories were used in selected articles. The theories that were applied more than once are listed in Table 2. As the results illustrated, the Technology Acceptance Model is the most frequently applied theory among articles, with a frequency of eight. Theory of Planned Behavior ranked second and was applied in seven articles. Perceived Value Theory ranked third and was used in five articles, and service-dominant logic was applied in four articles. Attachment Theory, Motivation Theory, Use and Gratification Theory, Technology Readiness and Acceptance Model, and Theory of Reasoned Action were applied three times. Examples of other theories applied twice were Balance Theory, Expectation Confirmation Theory, and Flow Theory.



**Figure 7.** Use of theories in articles (%).

**Table 2.** Theories applied in articles (applied more than once).

Rank	Theory	Frequency
1	Technology Acceptance Model	8
2	Theory of Planned Behavior	7
3	Perceived Value Theory	5
4	Service-Dominant Logic	4
5	Attachment Theory	3
5	Motivation Theory	3
5	Technology Readiness and Acceptance Model	3
5	Theory of Reasoned Action	3
5	Use and Gratification Theory	3
10	Balance Theory	2
10	Expectation Confirmation Theory	2
10	Flow Theory	2
10	Fuzzy Theory	2
10	Self-Determination Theory	2
10	Technology-Based Service Adoption Model	2

#### 4. General Discussion

The current study conducted a systematic review of the pertinent literature on smart tourism. We contributed to the extant literature by offering an up-to-date holistic picture and identified the historic trend, themes, regions, theories, methodologies, and industrial applications. In research progress, since 2015, the number of articles has increased sharply, reaching 30 in 2017 and 26 in 2019. Our data search ended in late February 2020, and the number of articles online and published this year reached 18. Thus, we expect a record high number of publications in 2020.

The themes revolved around 10 categories. The themes of technology and tourist behavior, perception, and experience constituted nearly two-fifths of all publications, followed by technology adoption, which reflected that the research emphasis on how smart tourism affects individuals remains a top priority. According to service-dominant logic, a service-centered view is inherently customer-oriented and relational [26]. Importantly, companies cannot create value independently but can offer applied resources to collaboratively create value following customer acceptance of value propositions [27]. Hence, the critical point is to understand the individual evaluation and acceptance of value propositions regarding smart tourism, and particularly their perceived benefits, costs, or risks. Under the service-dominant logic, value creation is not feasible without customer acceptance of value

propositions. This result can explain in part this research priority on technology and tourist behavior, perception, and experience. This area of research will continue gaining momentum, as future research still has a lot of room, which will be discussed later.

Another important theme was information and data analysis, with many articles from the technology discipline. Pertinent research focus reflected an urgent need for practitioners to effectively develop and apply methods to analyze big data regarding smart tourism. Big data analytics will continue its research momentum in the near future. Nevertheless, the question remains of how technical or application-oriented studies contribute to theory development in this area of research [21]. One plausible answer may be building a link to generic social science theories (e.g., psychology) if possible. Hence, additional cross-disciplinary research is encouraged. Further details will be discussed later.

In regions where the studies were conducted, South Korea, Spain, and the U.S. are the top three regions. This finding somehow indicated the number of initiatives and efforts that these countries have made to promote smart tourism and city development in recent years. Although Mainland China has put much emphasis on smart tourism and achieved notable progress, the number of high-quality academic research articles seems unable to keep up with the pace of its rapid development. With the leading role in 5G network construction, one can anticipate a remarkable advancement in smart tourism in Mainland China in the coming years. A remarkable increase in novel industry applications, related research grants, and international collaborations may propel progress in smart tourism research in Mainland China.

The methods used were varied and ranged from case study to quantitative behavioral model testing. Unsurprisingly, the largest number of articles applied quantitative analysis with SEM, which is a typical analytical method for studying customer behavior. This finding is consistent with Mehraliyev, Chan, Choi, Koseoglu, and Law's [21] identification of SEM-based effect and adoption studies in the smart tourism literature. In comparison, experimental design is still very scant, which is unsurprising in tourism research, as this method remains not as popular as others. The number of conceptual papers is prominent, as concept clarification and idea generation at the early stage of research development is essential. After a consensus of definitions has been achieved, theoretical refinements and/or debates revolving around smart tourism may still serve as an impetus for the increase in conceptual papers. The mixed method plays an important role in the extant literature, as the method enables a comprehensive understanding of smart tourism. Applications and practices of smart tourism may vary from country to country, and thus the mixed method is preferable. Moreover, the mixed method, which mutually complements qualitative and quantitative studies, is a trend for tourism research.

In industry applications, destination remained the largest sector, while hospitality received less attention. Most articles focused on destination management, ranging from destination image to smart ecosystem. This emphasis implies that destination scholars are keen to examine a smart ecosystem that can be integrated with smart cities, and these studies are concerned with the possible evolution of assessment criteria regarding destination image. This unbalanced distribution of the number of papers across disciplines may reflect smart technology applications across different sectors. The construction of smart tourism infrastructures, development, and applications of smart technologies can be costly at an early stage. Hospitality firms, as compared with destination governments, may be less affordable to apply smart technologies. In the future, when smart technologies become mature and more affordable, hospitality firms (e.g., hotels, restaurants) may tend to adopt smart applications. As a result, the proliferation of the literature on smart hospitality can be expected.

The co-occurrence analysis of keywords revealed that smart tourism is central with its technologies and applications surrounded, and fundamental concepts in tourism and marketing seem peripheral (e.g., experiential marketing, service innovation, and sustainability). This finding may imply research potential in bridging and narrowing the gap between smart technologies/applications and fundamental theories in the tourism and service literature. As depicted by the colors of each keyword, early studies tended to focus more on technologies and devices. Then, a shift toward big data analytics, experiential

marketing, and service innovation was found. A customer-centric perspective may shape the future smart tourism research landscape.

In co-authorship (country) network analysis, the U.S., the U.K., and South Korea seem to have a frequent global presence with more internationalized cooperation networks. Mainland China, Spain, Australia, and the Netherlands, which showed potential for the internationalization of research collaboration, have varying degrees of connections with those countries. Other countries focused on domestic and/or regional (e.g., within the same continent) collaborations. Although smart tourism practices vary from country to country, the sharing of ideas, intelligence, and good practices across the globe is desirable. A proliferation of the literature can be expected with more globalized research networks and/or research centers emerging.

## 5. Implications

### 5.1. Theoretical Implications

The current analysis of the smart tourism literature identified several research gaps. First, research into government policy on smart tourism is scant and thereby providing areas for future research. Scholars have studied the knowledge transfer network [28,29], government's effort in using social media [30], and tourism's role in a regional smart specialization strategy [31]. However, under global competition and cooperation networks, which strategies governments should adopt to promote smart tourism development remain unclear. In addition, further investigation is needed on how regional governments cooperate to promote smart tourism development. Studies on how a cooperation and governance mechanism can be built from a supplier's perspective are necessary. Lastly, smart destination competitiveness should be thoroughly studied. For example, indicators that can best reflect the smartness of a destination need to be developed and validated systematically.

Second, more academic endeavors should be dedicated to elucidate tourist preferences of smart tourism. Although prior research used smart tourists as novel market segmentation [32], a more nuanced segmentation of tourist based on their preferences on smart tourism features and their psychological trait/status is necessary. More psychological variables should be considered to understand the nuances of customer behavior. Furthermore, cultural, generational, and geographical comparison studies regarding tourist preferences should be conducted. How cultural or generational value orientations can affect customers' adoption of smart technologies is an area that is largely unexplored. For example, would Asian tourists who generally emphasize the interpersonal relationship of service providers to evaluate quality be less inclined to accept smart service by machines or devices?

Third, the effects of smart tourism on tourists should be studied carefully. Prior research mainly focused on the positive consequences brought by smart tourism with cross-sectional questionnaire surveys. Extant research tended to apply traditional behavioral constructs (e.g., satisfaction and perceived value) to develop research models without original constructs about smart tourism. The application of new constructs from other disciplines (e.g., psychology) or even the development of novel constructs particularly relevant to smart tourism is preferred. However, such a task is not easy. In addition, further studies can elucidate the underlying mechanism that allows smart tourism to exert a positive effect on tourist experience and behaviors. Lab experiments and field studies with wearable devices (e.g., wrist band and smart glasses) can be conducted to vigorously test the cause and effect of smart tourism. Another advantage of using experiments for smart tourism research is the offering of critical implications on the use of smart technology before its prospective prevalent applications in the industry.

At the same time, future studies can quantify the economic benefits of smart tourism. In this regard, a modeling approach is useful. Another interesting topic is examining how smart tourism plays a role in tourism demand forecasting. We would suggest an intelligent system to monitor and forecast tourism demand [31]. Undoubtedly, the rich data in smart tourism offer tremendous information for forecasting tourism demand. The question is how and to what extent such data can help.

Apart from these research areas, groundbreaking studies are needed to verify smart tourism's potential positive and negative effects on an individual's fundamental psychological state, well-being (e.g., life satisfaction, happiness, and loneliness), and behavioral changes in social life. In this regard, longitudinal studies are appropriate. A more nuanced understanding of the effects of smart tourism should consider boundary conditions. Scholars may consider contextual and psychological moderators that may contribute to a deep understanding of the effects.

Fourth, the negative consequences of smart tourism should receive more academic attention. Echoing Mehraliyev et al.'s [21] study, we believe that the potential negative effects of smart tourism on tourists should be further investigated. Prior research included alienation and authenticity to study the negative experience brought by ICT [33]. Another area of concern may be the protection of customer privacy. Scholars have studied customer's privacy concern and their effect on their intention to create user-generated content [34]. Future studies can be conducted to examine customer privacy regarding smart tourism from supply and demand perspectives. From the supply side, research can examine existing policies on customer privacy protection, as well as customer reaction and evaluation. From the demand side, antecedents to tourist behavior regarding smart tourism (e.g., opt-in for personal information collection) should be thoroughly examined. Prior research suggests that customers may balance the pros and cons (i.e., perceived benefits and risks) before allowing companies to collect their data for customization of products or services. Examining other antecedents in smart tourism context would be interesting. Importantly, factors that may attenuate the negative consequences deserve thorough investigation. Prospective results from these future studies can offer important theoretical and practical implications regarding further implementation of smart tourism.

Lastly, what constitutes theoretical contributions in the research area of smart tourism needs exploration. The existing literature focuses on methods, technologies, and other applications of smart tourism to advance understanding in this realm. Nevertheless, the practical relevance and implications of smart tourism research outweighed its theoretical implications. Less effort has been made to develop and even advance theories. The concern over theoretical contribution is consistent with Mehraliyev et al. [21]. We further extend this idea by adding specific directions for future research. For example, individuals may show psychological and/or behavioral changes in an era of the prevalence of smart technologies, which may offer potential for theory refinement and/or development. Theoretical prescience "giving meaning to ambiguous informational cues and articulating viable interpretations and actions to cope with coming organizational and environmental demands" [35] (p. 24) has yet to be developed in smart tourism research.

## 5.2. Practical/Managerial Implications

First, governments should play a more proactive role in the smart tourism ecosystem in formulating policies, establishing regulations, promotion, and coordinating the efforts of different stakeholders. Examples of these stakeholders include tourism destinations, online travel agents, telecommunication companies, and big data analytic companies. In addition, to maximize the benefits of smart tourism, information or big data sharing is essential between/among governments.

Second, cooperation between/among tourism practitioners and other smart technology companies should be strengthened. Regular seminars or conferences regarding the opportunities and challenges of smart technology applications should be held at the regional level. Information and idea sharing and generation is essential to propel smart tourism development. A collaborative promotion of smart tourism to enhance tourist awareness and strengthen destination brand competitiveness is deemed necessary.

Third, a large-scale consumer survey regarding smart tourism demand and preferences would be necessary. The success of smart tourism mainly relies on its end-users' satisfaction, which is determined by whether or not their needs are fulfilled and expectations are met. As such, governments and practitioners should work hand-in-hand to fully understand customer needs and wants in order to

improve the co-creation of tourism experiences [36]. Such surveys should be conducted on a regular basis, as customer demand may change over time.

Finally, incubators on smart technologies should be given public policy priority. To achieve long-term destination competitiveness, governments should take a more proactive stance to facilitate smart technology innovations and applications in terms of funding support, land use policy, and tax preference.

## 6. Conclusions, Limitation and Future Research

Technology has been developing at an unprecedented pace, which fundamentally changes and will continue to change our way of life. People must embrace technology advancements. Smart tourism is one of the exciting technology applications that are shaping the future landscape. Recent years witnessed a remarkable growth of smart tourism that attracted attention from practitioners and scholars. The current paper conducted a state-of-the-art review of the existing literature in different disciplines regarding smart tourism and identified research trends, themes, regions, and industrial applications. The study offers several important implications for future research directions. In particular, the role of the government, the dark side of smart tourism (e.g., customer privacy), long-term psychological and social effects, and theory development are important areas awaiting breakthroughs.

Limitations of the current review include the scope of the review being confined to SSCI/SCI-listed full-length research articles, and other aspects of the literature were not covered (e.g., authorship, co-authorship, big data, virtual reality). In addition, our review did not cover academic conference proceedings (e.g., ENTER). Future studies may extend this line of research by covering additional aspects of analysis and use up-to-date literature from both SSCI/SCI listed journals and top academic conference proceedings. Increased efforts should focus on theory building. An interdisciplinary review of related areas (e.g., the service literature) with broad scope may also yield interesting findings.

**Author Contributions:** Supervision, Conceptualization, Validation, Writing—Original Draft Preparation, B.H.Y.; Literature Search, Methodology, Data Curation, Formal Analysis, Writing—Original Draft Preparation, H.Y.; Initiation, Idea Generation, Writing-Review, Revision, and Editing, R.L. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Public Policy Research Funding Scheme from Policy Innovation and Co-ordination Office of the Hong Kong Special Administrative Region Government (Project Number: 2019.A6.136.19C).

**Conflicts of Interest:** The authors declare no conflict of interest. The funding sponsor had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript and in the decision to publish the results.

## References

1. Gretzel, U.; Werthner, H.; Koo, C.; Lamsfus, C. Conceptual foundations for understanding smart tourism ecosystems. *Comput. Hum. Behav.* **2015**, *50*, 558–563. [[CrossRef](#)]
2. Li, Y.; Hu, C.; Huang, C.; Duan, L. The concept of smart tourism in the context of tourism information services. *Tour. Manag.* **2017**, *58*, 293–300. [[CrossRef](#)]
3. Kamboj, S.; Gupta, S. Use of smart phone apps in co-creative hotel service innovation: An evidence from India. *Curr. Issues Tour.* **2020**, *23*, 323–344. [[CrossRef](#)]
4. Gretzel, U.; Zhong, L.; Koo, C. Application of smart tourism to cities. *Int. J. Tour. Cities* **2016**, *2*. [[CrossRef](#)]
5. Cimbaljević, M.; Stankov, U.; Demirović, D.; Pavluković, V. Nice and smart: Creating a smarter festival—The study of EXIT (Novi Sad, Serbia). *Asia Pac. J. Tour. Res.* **2019**. [[CrossRef](#)]
6. Shen, S.; Sotiriadis, M.; Zhou, Q. Could Smart Tourists Be Sustainable and Responsible as Well? The Contribution of Social Networking Sites to Improving Their Sustainable and Responsible Behavior. *Sustainability* **2020**, *12*, 1470. [[CrossRef](#)]
7. Pantano, E.; Priporas, C.-V.; Stylos, N. ‘You will like it!’ using open data to predict tourists’ response to a tourist attraction. *Tour. Manag.* **2017**, *60*, 430–438. [[CrossRef](#)]

8. Shao, J.; Li, X.; Morrison, A.M.; Wu, B. Social media micro-film marketing by Chinese destinations: The case of Shaoxing. *Tour. Manag.* **2016**, *54*, 439–451. [[CrossRef](#)]
9. Woo, M.; Nam, K.; Chathoth, P. Smart City and Smart Tourism: A Case of Dubai. *Sustainability* **2017**, *9*, 2279.
10. Yuan, H.; Xu, H.; Qian, Y.; Li, Y. Make your travel smarter: Summarizing urban tourism information from massive blog data. *Int. J. Inf. Manag.* **2016**, *36*, 1306–1319. [[CrossRef](#)]
11. Raheleh, H.; Ali Vatankhah, B.; Zhi, L.; Habib, A. Web-Based Recommendation System for Smart Tourism: Multiagent Technology. *Sustainability* **2019**, *11*, 323.
12. Han, H.; Park, A.; Chung, N.; Lee, K.J. A near field communication adoption and its impact on Expo visitors' behavior. *Int. J. Inf. Manag.* **2016**, *36*, 1328–1339. [[CrossRef](#)]
13. Chung, N.; Han, H.; Joun, Y. Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site. *Comput. Hum. Behav.* **2015**, *50*, 588–599. [[CrossRef](#)]
14. Leung, R. Smart hospitality: Taiwan hotel stakeholder perspectives. *Tour. Rev.* **2019**, *74*, 50–62. [[CrossRef](#)]
15. González, R. Building Sustainable Smart Destinations: An Approach Based on the Development of Spanish Smart Tourism Plans. *Sustainability* **2019**, *11*, 6874. [[CrossRef](#)]
16. Buhalis, D.; Amaranggana, A. Smart tourism destinations. In Information and Communication Technologies in Tourism 2014. In Proceedings of the International Conference, Dublin, Ireland, 21–24 January 2014; Xiang, Z., Tuessyadiah, I., Eds.; Springer: Berlin/Heidelberg, Germany, 2013; pp. 553–564.
17. Buhalis, D.; Amaranggana, A. Smart tourism destinations enhancing tourism experience through personalisation of services. In Information and Communication Technologies in Tourism 2015. In Proceedings of the International Conference, Lugano, Switzerland, 3–6 February 2015; Tussyadiah, I., Inversini, A., Eds.; Springer: Berlin/Heidelberg, Germany, 2015; pp. 377–389.
18. Lopez de Avila, A. Smart destinations: XXI century tourism. In Proceedings of the ENTER2015 Conference on Information and Communication Technologies in Tourism, Lugano, Switzerland, 4–6 February 2015.
19. Wang, D.; Li, X.R.; Li, Y. China's "smart tourism destination" initiative: A taste of the service-dominant logic. *J. Dest. Mark. Manag.* **2013**, *2*, 59–61. [[CrossRef](#)]
20. Ghaderi, Z.; Hatamifar, P.; Ghahramani, L. How smartphones enhance local tourism experiences? *Asia Pac. J. Tour. Res.* **2019**, *24*, 778–788. [[CrossRef](#)]
21. Mehraliyev, F.; Chan, I.C.C.; Choi, Y.; Koseoglu, M.A.; Law, R. A state-of-the-art review of smart tourism research. *J. Travel Tour. Mark.* **2020**, *37*, 78–91. [[CrossRef](#)]
22. Belley-Ranger, E.; Carbonneau, H.; Trudeau, F. Recreational and sport-related risk-taking behaviors among men during adolescence and early adulthood: A scoping review. *Loisir Soc. Soc. Leis.* **2016**, *39*, 467–480. [[CrossRef](#)]
23. Ramos-Rodríguez, A.R.; Ruíz-Navarro, J. Changes in the intellectual structure of strategic management research: A bibliometric study of the Strategic Management Journal, 1980–2000. *Strateg. Manag. J.* **2004**, *25*, 981–1004. [[CrossRef](#)]
24. Mehraliyev, F.; Choi, Y.; Koseoglu, M.A. Progress on smart tourism research. *J. Hosp. Tour. Technol.* **2019**, *10*, 522–538. [[CrossRef](#)]
25. Friel, M. The application of smart cards in hotels. *J. Vacat. Mark.* **1995**, *1*, 222–230. [[CrossRef](#)]
26. Vargo, S.; Lusch, R. Evolving to a New Dominant Logic for Marketing. *J. Mark.* **2004**, *68*, 1–17. [[CrossRef](#)]
27. Vargo, S.L.; Lusch, R.L.; Akaka, M.A.; He, Y. Service-dominant logic: A review and assessment. *Rev. Mark. Res.* **2009**, *6*, 125–167.
28. Baggio, R.; Cooper, C. Knowledge transfer in a tourism destination: The effects of a network structure. *Serv. Ind. J.* **2010**, *30*, 1757–1771. [[CrossRef](#)]
29. Del Chiappa, G.; Baggio, R. Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure. *J. Dest. Mark. Manag.* **2015**, *4*, 145–150. [[CrossRef](#)]
30. Park, J.H.; Lee, C.; Yoo, C.; Nam, Y. An analysis of the utilization of Facebook by local Korean governments for tourism development and the network of smart tourism ecosystem. *Int. J. Inf. Manag.* **2016**, *36*, 1320–1327. [[CrossRef](#)]
31. Del Vecchio, P.; Passiante, G. Is tourism a driver for smart specialization? Evidence from Apulia, an Italian region with a tourism vocation. *J. Dest. Mark. Manag.* **2017**, *6*, 163–165. [[CrossRef](#)]
32. Gajdošík, T. Smart tourists as a profiling market segment: Implications for DMOs. *Tour. Econ.* **2019**. [[CrossRef](#)]
33. Tribe, J.; Mkono, M. Not such smart tourism? The concept of e-lienation. *Ann. Tour. Res.* **2017**, *66*, 105–115. [[CrossRef](#)]

34. Hew, J.-J.; Tan, G.W.-H.; Lin, B.; Ooi, K.-B. Generating travel-related contents through mobile social tourism: Does privacy paradox persist? *Telemat. Inform.* **2017**, *34*, 914–935. [[CrossRef](#)]
35. Corley, K.G.; Gioia, D.A. Building theory about theory building: What constitutes a theoretical contribution? *Acad. Manag. Rev.* **2011**, *36*, 12–32. [[CrossRef](#)]
36. Buonincontri, P.; Micera, R. The experience co-creation in smart tourism destinations: A multiple case analysis of European destinations. *Inf. Technol. Tour.* **2016**, *16*, 285–315. [[CrossRef](#)]



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