Chapter **13**

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Chapter

An Integrated E-commerce Platform for the ASEAN Tourism Industry: A Smart Tourism Model Approach

> Meghdad Abbasian Fereidouni Hossein Nezakati Alizadeh

1. Introduction

The invention of the Internet, the rapid growth of digital devices, and the rise of userfriendly mobile apps motivate more than 3 billion people across the world to go online and use search engines, visit social networks, check email, play games, watch online videos, search for products, look up maps and directions, or listen to music. Electronic commerce (e-commerce) is the buying and selling of goods and services or conducting financial transactions via the Internet (Cao and Yang, 2016). In tourism, advanced information and communication technologies (ICTs) have facilitated not only cross-border e-commerce but also the use of smart technologies that shape the smart tourism ecosystem, aiming to improve tourism management and governance, facilitate service and product innovation, enhance tourist experiences, achieve competitive advantages for tourist firms and destinations, and increase the importance of ICTs themselves as strategic tools to develop tourism (Werthner et al., 2015).

The tourism industry, an important generator of gross domestic product (GDP) for the Association of Southeast Asian Nations (ASEAN), primarily adopted the digital economy and e-commerce applications such as flight ticket booking websites, online hotel reservation apps, and purchasing of tourist packages. However, while various countries have been taking advantage of smart technologies and social media platforms to create, manage, and deliver touristic services and experiences (Gretzel et al., 2015), ASEAN tourism has neglected to develop an integrated smart tourism platform to collect, process, and exchange tourism-relevant data to facilitate cross-border e-commerce (Werthner et al., 2015).

A smart tourism platform not only offers around-the-clock availability, access, trustworthiness, competitive prices, a wide selection of services, and co-creation experiences to visitors, but also fully utilises smart technologies and digital ecosystem benefits in the destination and helps reduce costs, enhance the operational system, remove market entry

barriers, hone countries' competitive advantage, increase stakeholder cooperation, and enhance cross-border e-commerce (Cao and Yang, 2016; Buhalis, 2000).

In the ASEAN Economic Community (AEC) Blueprint 2015, tourism was a priority for economic integration. Tourism's significant contribution to ASEAN's economic growth prompted the ASEAN national tourism organisations (ASEAN NTOs) to execute the ASEAN Tourism Strategic Plan (ATSP) 2016–2025 to (i) make ASEAN more competitive as a single tourism destination and (ii) ensure that ASEAN tourism is a sustainable and inclusive contribution to the socio-economic well-being of the ASEAN people. The proposed strategic directions and action programme address the core challenges facing the sustainable development of quality tourism and its integration within ASEAN member states: balancing the distribution of the benefits of tourism amongst ASEAN member states, reducing safety and security concerns, making cross-border formalities more convenient and less costly, and reducing transportation and destination infrastructure congestion (ASEAN, 2017).

ASEAN NTOs are responsible for targeting the ATSP 2016–2025's two strategic directions via 10 strategic actions. However, only six strategic actions – marketing and promotion, product development and standards, human resource development, tourism investment, quality tourism and sustainable growth, and inclusive tourism development – are under the control of ASEAN NTOs. The other four strategic actions – travel facilitation, safety and security, connectivity and infrastructure, and responsiveness to climate change – are beyond the NTOs' control, meaning they need the cooperation and actions of other entities. For example, to encourage tourists to choose ASEAN regional products over others and to stay longer and to spend more within the region, cross-border travel must be seamless and cost-competitive, not only well connected by air, sea, and land but also by more accommodative border control policies and procedures.

Most ASEAN member states continue to require visas from residents of non-ASEAN countries and, in some cases, from ASEAN residents. This makes multiple country visits, especially by long-haul travellers, expensive and inconvenient, reduces the price competitiveness of the region as a destination, and works against the goal of inclusive economic development. As the provision of cross-border customs, immigration, quarantine, and security (CIQS) services is outside the purview of NTOs and destination managers, a convergence strategy needs to be adopted between NTOs and the CIQS national agencies so that they can move towards a more integrated system of cross-border management and provide for the multi-country destination travel needs of the long-haul tourism markets (ASEAN, 2017).

This research aims to use the smart tourism model to (i) determine the barriers and opportunities of cross-border e-commerce in the ASEAN tourism industry, using the literature and available statistical data; (ii) identify the characteristics of ASEAN smart tourism; and (iii) develop an integrated e-commerce platform based on smart tourism indicators. Section 2 reviews the literature and statistical data of cross-border e-commerce and tourism annual reports to determine the challenges and opportunities of cross-border e-commerce, then conceptualises the smart tourism concept for ASEAN. Section 3 details the evaluation elements of the smart tourism destination platform (STDP) and the research methodology. The final two sections discuss the findings from the experts' evaluations and their managerial implications.

2. Literature Review and Statistical Background

ICTs have become a core part of every economy and are progressively underlying all aspects of socio-economic growth and development. In particular, the Internet and digital ecosystem offer an immense landscape of advanced and real-time communications; paperless and borderless transactions with easy access to comprehensive references; increased market networking; an elevated selling and advertising medium; and an innovative recreation and entertainment environment (ASEAN, 2016; Park et al., 2016; Gretzel et al., 2015). Internet penetration has been an important measure of a country's digital economic development. However, other factors indicate how much people can use the Internet and digital devices, such as mobile connection access, Internet speed, payment method options, transportation, regulatory support, and user-friendly websites and applications (Buhalis and Law, 2008; GSMA, 2016).

The ASEAN ICT Masterplan 2020 foresees a region that is digitally enabled, secure, and sustainable, with a transformative, innovative, inclusive, and integrated community (ASEAN, 2016). To realise this target, ASEAN countries must be prepared for the challenges and opportunities of digital-economy enablers.

Generally speaking, economic growth leads to an expanding middle class and increased purchasing power. ASEAN countries' economic growth has also advanced online markets. Indeed, ASEAN tourism partner countries' high economic growth allows the ASEAN tourism industry to increase its presence in the target partners' online markets. Brunei Darussalam and Singapore, with reported GDP per capita of US\$87,117 and US\$85,021, respectively, have the highest opportunities to expand their digital economies. Malaysia, Thailand, and Indonesia, all of whom report average GDP per capita, also have the opportunity to increase their market share of the digital economy and e-commerce. (Table 13.1).

	CDP	GDP	Internat	ional Merchand	ise Trade	
	at Current	per Capita at Current	Exports	Imports	Total Trade	Internet Penetration
Country	Prices	Prices	US\$ million	US\$ million	US\$ million	
	US\$ million	US\$ PPP				
Brunei	12,909	87,117	6,350	3,042	9,392	71.40%
Cambodia	18,463	3,578	8,839	10,838	19,676	25.50%
Indonesia	857,603	11,108	150,282	142,695	292,977	50.40%
Lao PDR	12,639	5,466	3,714	3,049	6,763	19.90%
Malaysia	294,390	26,515	199,869	175,961	375,830	69.60%
Myanmar	65,392	5,275	11,432	16,844	28,275	22.40%
Philippines	289,503	7,241	58,648	70,295	128,944	52.00%
Singapore	291,938	85,021	366,344	296,765	663,109	81.20%
Thailand	395,726	16,064	214,396	202,751	417,147	60.00%
Viet Nam	193,407	6,083	162,014	165,730	327,744	52.10%
ASEAN	2,431,969	11,009	1,181,889	1,087,970	2,269,859	50.45%

Table 13.1: ASEAN Economy and Internet Penetration

ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product, PPP = purchasing power parity. Sources: Internetworldstats (2017), ASEANSTATS (2017).

Internet penetration is defined as Internet users as a percentage of the total population. When people are provided with an accessible, secure, and high-speed Internet connection, they are motivated and empowered to buy and/or sell online. Table 13.1 shows that Cambodia, Lao PDR, and Myanmar (CLM) have Internet penetration lower than the world average level. In general, they are lagging behind to attract travellers using digital economy platforms such as social media and tourism websites.

When comparing ASEAN's digital economy and e-commerce data with that of selected ASEAN tourism partners, including China, the European Union (EU 28), Republic of Korea (hereafter, Korea), Japan, Australia, the United States (US), India, the Russian Federation (hereafter, Russia), and Taiwan. Figure 13.1 shows that all ASEAN tourism partner countries, except for India, have higher Internet penetration.¹ This provides good conditions for the ASEAN tourism sector to develop cross-border e-commerce using the digital economy.

¹Amongst the selected tourism partners, Japan has the highest rate of Internet penetration (94%), followed by Australia (92%). However, China (with 731 million Internet users), India (462 million), EU 28 (412 million), and the US (287 million) have the largest populations of Internet users (ASEANSTATS, 2017; Internetworldstats, 2017).



Figure 13.1: Global Internet Penetration Comparison

ASEAN = Association of Southeast Asian Nations, EU = European Union Source: Internetworldstats (2017), ASEANSTATS (2017).

Cross-border e-commerce development requires multi-stakeholder involvement to overcome its challenges. Regulatory issues, payment methods and processing, transportation, and organisation readiness are amongst the challenges faced by cross-border e-commerce expansion. In particular, to develop smart tourism, there are needs to prioritise development in (i) infrastructure, availability and quality of high-performance Internet coverage, (ii) affordability, availability of services and devices at price points that reflect the level of income across a national population, (iii) consumer awareness of the value of the Internet and capacity of using ICT tools, and (iv) service content availability of online content and services that are accessible and relevant to the local population (GSMA, 2016).

Above all, tourism practitioners, regulatory parties, and policymakers need to apply an integrative strategy to cross-border e-commerce that increases the trustworthiness, reliability, and responsiveness of online services (Szopiński and Staniewski, 2016).

Mobile and smartphones are ubiquitous platforms that afford everyone an Internet connection and allow them to use apps and communicate with others. Travellers use their mobile and smartphones to search for places of visit, track hiking routes, or share destinations with their friends. The mobile connectivity index score is a measurement of a country's mobile service development. GSMA introduced a connectivity index consisting of four enablers: infrastructure, affordability, consumer, and content. Figure 13.2 shows

that ASEAN's main sourcing countries and/or regions of tourists all (except India) score high on mobile connectivity, whilst ASEAN's mobile connectivity average score is lower than its tourism partners'. Myanmar, Lao PDR, and Indonesia need to improve their mobile connectivity enablers, as opposed to Singapore, Malaysia, and Thailand, which scored highest on connectivity in ASEAN.



Figure 13.2: Mobile Connectivity Index Score

ASEAN = Association of Southeast Asian Nations Source: GSMA.com.

Most ASEAN countries scored below 50 on mobile infrastructure, which means they face the insurmountable task of developing mobile connections encompassing 2G, 3G, and 4G coverage and providing high speed for download. Without network coverage, people cannot go online, and without high-performing networks, it is difficult to access the Internet's full potential. Aside from prices and incomes, the affordability score shows that ASEAN countries provide affordable Internet access to their citizens, which is also affected by the level of taxation and inequality. However, without the necessary skills and supporting cultural environment, individuals may not understand how to use mobile Internet or appreciate how it can benefit them. Some, especially women, might find themselves prevented from accessing the mobile Internet in some countries. Table 13.2 indicates that CLM countries struggle with

the lack of Internet content. Consumers are less likely to connect to mobile Internet unless there is online content and services that are relevant and of benefit to them. This might be as simple as having content in their native language, or it could be the availability of certain apps or services such as social media, banking, or education (GSMA, 2016). In short, ASEAN tourism must improve Internet infrastructure and provide it at an affordable price, increase consumer readiness, and enhance tourism service content.

Country	Infrastructure	Affordability	Consumer	Content
Brunei	43.51	73.50	75.08	59.85
Cambodia	39.40	59.50	52.25	16.91
Indonesia	40.41	68.55	68.96	44.02
Lao PDR	34.12	60.62	56.60	18.63
Malaysia	53.11	72.76	74.14	63.74
Myanmar	22.55	44.89	60.70	10.83
Philippines	49.22	62.64	75.56	52.62
Singapore	76.43	75.48	85.70	86.43
Thailand	49.66	71.96	77.23	57.24
Viet Nam	39.72	66.76	72.68	45.52
ASEAN	44.81	65.67	69.89	45.58
ASEAN tourism partners	61.52	73.40	79.96	69.22
Australia	73.16	82.37	94.90	89.88
China	43.23	69.21	71.53	65.01
India	25.41	57.52	42.60	33.42
Japan	76.08	80.44	83.91	73.47
Korea, Republic of	82.70	81.04	86.64	73.13
Russian Federation	49.31	70.66	87.88	63.27
United States	80.72	72.53	92.25	86.36

Table 13.2: Mobile Connectivity Indicators

ASEAN= Association of Southeast Asian Nations. Source: GSMA.com.

Internet speed is an important challenge facing ASEAN countries as well. Google and Temasek (2016) reported that all ASEAN countries, except Singapore, have Internet speeds lower than the global average of 23.3 megabits per second (Mbps). Singapore reports a significantly higher Internet speed than most of the world at 122.3 Mpbs, whilst Indonesia and Philippines report the slowest at 3.6 Mbps and 2.5 Mbps, respectively (Figure 13.3) (Temasek and Google, 2016).



Figure 13.3: Global Internet Speed (Mbps)

ASEAN= Association of Southeast Asian Nations, Mbps = megabits per second. Source: Temasek and Google (2016).

Payment is also vital in developing e-commerce and the digital economy. Google and Temasek (2016) estimates that globally, around one-third of adults aged above 25 are without at least one banking account (so call the 'unbanked' population). The share of unbanked population is much higher in some ASEAN countries such as Viet Nam (71%), the Philippines (64.1%), and Indonesia (63.7%) (Figure 13.4). Their low rate of banking adoption will prevent them unleashing the potential in digital economy. In this regard, ASEAN needs to improve the banking system, especially online banking and e-payment, more quickly.





Source: Temasek and Google (2016).

It is worth noting that the lack of customer trust could also hinder the adoption of online purchasing. There seems to be higher risks of doing business online – more fraudulent incidents occurred in online transactions. Temasek and Google (2016) show that ASEAN has a high rate of fraudulent activities. For instance, in Indonesia, online users are 12 times more likely to experience fraud than they are in a normal transaction.

According to the technology acceptance model, travellers' perceived usefulness, trust, and risks are determinants of their attitudes towards e-purchasing, which, in turn, significantly influence e-purchase intent (Szopiński and Staniewski, 2016; Chung et al., 2015). Bloggers' recommendations may influence several components of the purchasing process, such as needs recognition, product information seeking, or recommendation seeking, which will, in turn, influence the final purchase decision. Sellers have mastered ways to monitor Internet user behaviour.

Website content is one of the main factors determining the frequency of visits. When preparing their tourism (including hotel booking, looking for restaurants, plan the itinerary, etc.), normally visitors try to obtain detailed information online such as addresses, pictures, map, facilities, reference rates, and reviews. As Cao and Yang (2016) points out, the websites serve not only as a key promotional vehicle but also as a major distribution channel for domestic and international tourism.

Regarding access to the website and social media, Table 13.3 shows the divide amongst ASEAN member states. Countries like Myanmar, Lao PDR, Cambodia, Viet Nam, and Indonesia have relative low scores of either website access and Facebook user penetration, e-government, or mobile application access. Viet Nam has very low website access. In comparison, Thailand, Singapore, the Philippines, Malaysia, and Brunei have higher rates of website access, Facebook penetration, mobile application access, and e-government in general.

Country	Online Service Index Score for E-Government	Websites Accessible to Population	Accessibility of Mobile Applications	Facebook User Penetration
Brunei Darussalam	36.22	39.15	79.89	81.75
Cambodia	17.32	0.35	2.87	22.14
Indonesia	36.22	0.71	57-9	31.6
Lao PDR	14.17	0.24	0	15.64
Malaysia	67.72	34.66	72	72.6
Myanmar	2.36	0.05	14.22	14.96
Philippines	48.03	56.3	59.22	53.13
Singapore	99.21	91.32	96.72	85.07

Table 13.3: Website and Social Media Accessibility

Country	Online Service Index Score for E-Government	Websites Accessible to Population	Accessibility of Mobile Applications	Facebook User Penetration
Thailand	44.09	27.52	72.18	59.5
Viet Nam	41.73	0.69	51.63	37.52
ASEAN	40.707	25.099	50.663	47.391
ASEAN tourism Partners	80.77	34.73	85.70	30.56
Australia	92.91	99.4	100	65.99
China	60.63	6.24	100	0
India	54.33	18.39	25.09	11.84
Japan	94.49	8.86	97.44	26.73
Korea, Republic of	97.64	1.03	95.49	30.66
Russian	70.87	14.38	83.02	10.65
United States	94.49	94.83	98.89	68.07

ASEAN= Association of Southeast Asian Nations. Source: GSMA.com.

However, some other studies show that the information overload on the Internet has a negative impact on the destination's image. Lepp, Gibson, and Lane (2011) concluded that customers with little or no Internet experience had a better perception of their destination than those who used the Internet to gather information, due to information overload. Figure 13.5 shows some factors that prevent people from purchasing online from abroad.²



Figure 13.5: ASEAN Country Respondents' Reasons to not Make a Cross-border Purchase

Source: Consumer Barometer (2015)

²The results are based on the feedback of an online survey by the Consumer Barometer.

There are two main factors preventing people in ASEAN tourism partner countries from engaging in cross-border e-purchase are that national websites meet their needs and that the return process of purchased products is difficult and costly. Equally important is the longer delivery time and inconvenience, which makes people in ASEAN tourism partners believe that cross-border purchase is not profitable. However, ASEAN-country respondents stated that price, delivery, and return options are the main reasons why they consider cross-border e-commerce (Consumer Barometer, 2015).

Roughly, online tourism information sources can be divided into four types: blogs, public websites, company websites, and social media websites (Werthner et al., 2015). Information shapes the destination's images. Tourists are not simply receivers of destination image information but also actively construct and share their own images via the Internet. An image is a reference of beliefs and impressions arising from information processing, which results in an internally accepted mental construct of a product (Chung et al., 2015). Information presented via the pictorial channel is salient and better remembered than information presented via verbal channels. A persuasive website effectively instils confidence in the consumers and helps them form attitudes that are more resistant to counter-arguments (Lee and Gretzel, 2012).

The findings from the Consumer Barometer, provided by Google, indicate the online source that people use to make a purchase decision (Figure 13.6). Online research on search engines, brand websites, and retail websites are the most important sources people in ASEAN tourism partner countries use when they want to search for product information. Social networks, online video websites, review websites, blogs, and forums are other important sources of information. ASEAN-country respondents pointed out that search engines, online research on retail websites, and brand websites are important sources of information when making a purchase decision. It seems that social networks are more prevalent amongst ASEAN countries than amongst their tourism partner countries.



Figure 13.6: ASEAN Countries: Online Sources Used to Make a Purchase Decision

Source: Consumer Barometer (2015).

3. Conceptualising a Smart Tourism Destination Platform Model

The notion of smart tourism is introduced as a holistic and sustainable approach to planning, development, operation, and marketing of tourism on the basis of smart technologies and ICT infrastructure and capabilities in improving tourism management and governance, enhancing tourist experiences, and achieving competitive advantages (Li et al., 2017; Werthner et al., 2015; Buhalis and Law, 2008). Smart tourism includes not only sensors application and data mining (location-based service information collation and dissemination) but also other techniques such as positioning technology, the social network system, and social networks (Li et al., 2017). Smart tourism is defined by the United Nations World Tourism Organization (UNWTO) as clean, green, ethical, and offering high-quality services at all levels of the service chain.

Park et al. (2016) describe smart tourism as a combination of tourism and smart technologies. The literature on sustainable tourism development says that tourism can be assessed in terms of human activities and biological diversity of the environment (Lee and Hsieh, 2016). Ko (2005) suggests that the tourism industry can be considered as two subsystems: the human system or the tourism stakeholders and the tourism ecosystem. The smart tourism destination can be conceptualised as the utilisation of smart technologies and advanced ICTs to connect the human system and tourism ecosystem.

To conceptualise the Smart Tourism Destination Platform Model, this section will elaborate on the smart tourism destination ecosystem, which has three sub-systems: tourism ecosystem, human and stakeholder system, and digital ecosystem. In stakeholder theory, the human and stakeholder system consists of nine players: tourists, residents, local community, non-governmental organisations (NGOs), government, destination management organisations (DMOs), touristic suppliers, support services, and other industries (Gretzel et al., 2015). The digital ecosystem in tourism is formed from three main components: cloud services, Internet of Things (IoT), and end-user Internet service (Wang et al., 2016).

3.1. Tourism Ecosystem

The literature on sustainable tourism planning and development defines the tourism ecosystem as the main physical and soft infrastructure, resources, and elements that tourism stakeholders provide or that are provided to the destination (Lee and Hsieh, 2016; Ko, 2005). The tourism ecosystem is composed of six dimensions: transportation, accommodation, food and beverage, attractions, things to do, and travel information (Brandt et al., 2017; Gretzel et al., 2015) (Figure 13.7). In the smart tourism destination model, the tourism stakeholders are connected with the tourism ecosystem dimensions. For example, touristic suppliers provide various services to tourists, and information on usage of these services is given to touristic suppliers to enhance their services. Unlike traditional tourism

planning, the smart tourism model engages all tourism stakeholders to realise common goals. Residents can use the Airbnb website to rent out their homes or utilise Uber and Grab mobile applications to earn an income using their own automobiles.



Figure 13.7: Tourism Ecosystem: Main Components

Source: Authors.

In the STDP, accommodation refers to various kinds of lodging and housing services, which can be provided, rated, and facilitated by different stakeholders. For instance, the official tourism website of Korea, visitkorea.or.kr, classifies accommodations into four categories: Goodstay -motels and inns whose facilities and operations meet high standards endorsed by Goodstay; Koreastay - selected homestays and guesthouses providing international visitors with a special opportunity to experience Korean culture and lifestyle by living with a Korean family; BENIKEA - premium vacation accommodations at a reasonable price; and hotels classified according to the number of stars, from five to one, with five stars being the highest rating. The Korea Tourism Organization not only branded every accommodation for niche marketing and provision of good experiences but also sorted accommodations so that they are connected to other tourism stakeholders. Similarly, in the smart tourism destination model, other tourism ecosystems will be sorted according to their main components and search engine keywords. For example, K. Kim et al. (2017) pointed out that all online reviews can be classified into 14 categories: 'restaurants, sightseeing, hotels, things to do, night life, transportation, shopping, sporting & outdoors, favourites, off the beaten path, what to pack, tourist traps, warnings and danger, and local customs'.

3.2. Human System and Tourism Stakeholders

Many researchers identify stakeholder engagement as an important factor in sustainable tourism development (Ko, 2005; Lee and Hsieh, 2016). Stakeholders comprise tourists, residents, local communities, NGOs, government, DMOs, touristic suppliers, support services, and other industries. (Figure 13.8). They provide information and services to other stakeholders using digital devices, social media and network platforms, and tourism websites.

For instance, Chung et al. (2015) describe the information provided by DMOs as more reliable and trustworthy than user-generated content, which is provided by a blend of amateur, semi-professional, and professional entities, and is easily manipulated or abused. In Korea, the government-led Brain Korea 21 Plus supports research programmes in Korean universities to promote the government's creative economy policy, which includes the development of smart tourism. The Electronics and Telecommunications Research Institute, a non-profit and the largest government-funded research institute, developed Korean-English interpretation applications, which boast an 80% success rate in real-life situations. The Tourism Marketing Group, a travel agency based in New Zealand, provides guests and visitors with personalised itinerary services. This smart service allows its users to 'create tourism'. Peru, Colombia, and Ecuador have agreed to collaborate on a smart visa electronic system in the region to replace traditional visa procedures. Taiwan's Board of Science and the Institute for Information Industry worked with the Taipei City Government, the Taipei Computer Association, the External Trade Development Council, and Chunghwa Telecom Co. to establish 'Smart Tourism Taiwan', a web platform that can be synced across multiple platforms such as smartphones and web browsers.



Figure 13.8: Human System or Tourism Stakeholders

NGOs = non-governmental organisations. Source: Authors.

3.3. Digital Ecosystem

Smart tourism destination has six elements of smartness: (1) adapting: modifying behaviour to fit the environment; (2) sensing: bringing awareness to everyday things; (3) inferring: drawing conclusions from rules and observations; (4) learning: using experience to improve performance; (5) anticipating: thinking and reasoning about what to do next; (6) self-organising: self-generating and self-sustaining at the cellular or nanotechnology level (Wang, Li et al., 2013; Gretzel et al., 2015; Wang et al., 2016; Li et al., 2017).

The application of advanced ICTs and digital tools in tourism has three main components: (i) cloud services, (ii) IoTs, and (iii) end-user Internet services (Buhalis and Law, 2008; Gretzel, 2011; Wang, Li, and Li, 2013; Gretzel et al., 2015). First, cloud services provide convenient and scalable access to application, software, and data via web browsers. For example, a tour guide system can serve a large number of tourists without being installed on any personal devices. A centralised distribution system can serve any travel agent on a pay-per-use basis (K. Kim et al., 2017).

Second, the IoTs is the ubiquitous presence around us of things or objects such as Radiofrequency identification (RFID) tags, sensors, actuators, and mobile phones, which, through unique addressing schemes, are able to interact with each other and cooperate with their neighbours to reach common goals. The IoTs supports smart tourism in two ways:

- (i) Information and analysis. For instance, entrance tickets are embedded with RFID reader chips that help track tourists' location and consumer behaviour at tourist sites, and provide presence-based advertising and payments to visitors.
- (ii) Automation and control. For example, carrying capacity of heritage sites is monitored by a variety of sensors to control air quality, crowdedness, and electricity consumption. The monitoring system is connected to the ticketing system to implement pricing strategies that influence the number of visitors (Wang, Li, and Li, 2013; Wang et al., 2016).

Third, end-user Internet services are applications and equipment support of cloud services and the IoTs at various levels of end users. For example, the design of individual payment systems is based on personal telecommunication devices such as smartphones and tablets; wireless connections and touch screens are set up to serve tourists; tourism service providers and government organisations are equipped with portals and connections to the cloud service.

Accordingly, the smart tourism destination platform will have four key features as follows (Gretzel et al., 2015; Park et al., 2016; Brandt, Bendler, and Neumann, 2017):

- (i) Interaction and engagement. Communities of interaction between individual agents or groups of agents.
- (ii) Balance. Prevents system collapse.
- (iii) Loosely coupled actors with shared goals. Proactively try to increase individual benefits and achieve shared goals.
- (iv) Self-organisation. Considering ecosystems in their entirety rather than centring on specific actors and elements allows for more holistic perspectives, recognises that small changes can have substantial effects, encourages a focus on complex relationships, emphasises dynamic change, and acknowledges the importance of the physical environment or infrastructure that supports the system. Digital ecosystems are therefore focused on interactions amongst technological agents (devices, databases, programmes, etc.) and the respective information flows, and form the infrastructure for digital business ecosystems.

3.4. Smart Tourism Destination Platform

To identify the STDP indicators, this study summarises the digital ecosystem key attributes that interconnect and facilitate tourism ecosystem and human system interactions. As per Gretzel et al. (2015) and Wang et al. (2016), this study lists eight main digital ecosystem features that tourism ecosystem and human system elements employ to interact with other species in a smart tourism destination ecosystem: smart information system, smart sightseeing, intelligent tourism management, e-commerce system, smart forecast, smart traffic, smart safety, and virtual tourism attraction.

The STDP is underlined within three initiatives: transformation of tourist experiences (cocreated value); changes in destination marketing strategies (relationship management); and destination competitiveness (operant resources, big data) (Del and Baggio, 2015; Gretzel et al., 2015; Wang et al., 2016). For instance, a mobile application for smartphones provides comprehensive information about local attractions and location-based service, and tourists can instantly share photos and stories to receive and share the experience and feedback. This gets them involved in creating a unique experience. Co-creation is in real time and multidirectional (service provider-tourist, tourist-tourist, tourist-service provider). The STDP enhances destination marketing strategies and tools. For example, social media provides two-way and instant communication between tourist and DMO, unlike the traditional one-way communication tools such as advertisements, brochures, and road shows.



Figure 13.9: Smart Tourism Destination Platform (STDP) Graphical Framework

NGO = non-governmental organisation . Source: Authors.

Figure 13.9 indicates how every species of tourism stakeholder, tourism ecosystem, and digital ecosystem is shaping smart tourism destination big data. Woo et al. (2016) point out that using big data to support decision making and optimal resource allocation ultimately leads to sustainable tourism development. Analysing big data can exact new insights in ways that influence markets, organisations, and relationships between citizens and governments. The application of the cloud service, the IoTs, and contacts with tourists via the Internet result in big data – information relating to business transactions, tourism attractions, and tourist behaviour. China has proposed four modules of big data within 3–5 years: quality assurance (complaints filing system, mega-event coordinating system); tourist scenic area measurement (ticketing system, tourist geographic information system, parking statistics); travel agency (contract-filing system, tour guide system, GIS positioning of tourist coaches); and accommodation monitoring (online transaction filing system) (Wang, Li, and Li, 2013; Gretzel et al., 2015; Woo et al., 2016).

4. Methodology

This study employs the fuzzy Delphi method to evaluate the importance of STDP indicators vis-à-vis ASEAN tourism. The Delphi method is a useful technique that helps integrate expert knowledge by maintaining anonymity and controlled feedback. However, the traditional Delphi method's weakness of subjectivity and time-consuming features pushed scholars

to optimise this method using the fuzzy set theory (Zhang, 2017; Bouzon et al., 2016). In the fuzzy Delphi method, experts' judgements are represented by fuzzy numbers, where subjective opinions are transformed into objective data via a fuzzy operation. The final decision is obtained from only one round of survey, which reduces the time and costs of data collection. The procedures of the fuzzy Delphi used in this study are the following:

Step 1: Collect the decisions of the group experts. The judgment of every expert on every evaluation indicator is obtained using the semantic variables in the questionnaire. In this study, the evaluation linguistic term is set, and the triangular fuzzy numbers are shown in Table 13.4.

Step 2: Calculate the evaluation values of every indicator according to the triangular fuzzy number. Suppose that the evaluation value of the importance of the K *th* indicator given by the ith expert is $w_{ik} = (a_{ik}, b_{ik}, c_{ik})$, i =1,2,...,*m*. Then, the fuzzy weight of the K *th* indicator is defined as:

$$W_k = (\alpha_k, \beta_k, \gamma_k)$$
 (1)

Where : $\alpha_k = \min(a_{ik})$, $\beta_k = \frac{1}{m} \sum_{i=1}^m b_{ik}$, $\gamma_k = \max(c_{ik})$

Table 13.4: Evaluation Linguistic Term Set and ItsCorresponding Triangular Fuzzy Numbers

Fuzzy Linguistic Scale	Evaluation Linguistic Term Set	Triangular Fuzzy Number (a,b,c)
9	Very important	(7,9,9)
7	Important	(5,7,9)
5	Moderate	(3,5,7)
3	Unimportant	(1,3,5)
1	Very unimportant	(1,1,3)

Source: Bouzon et al. (2016).

Step 3: Defuzzification. To obtain the final weight S_k , the fuzzy weight of every evaluation indicator is defuzzied using a simple centre of gravity method by Equation (2)

$$S_k = \frac{\alpha k + \beta k + \gamma K}{3} \quad (2)$$

Step 4: Set a threshold r so as to select the more important evaluation indicators from the total group. If $S_k \ge r$, the K *th* indicator is retained; if $S_k < r$, the k*th* indicator is abandoned. In practice, if we want more indicators, r is set at a smaller value; whilst conversely, r is set at a larger one.

5. Findings

To find the STDP indicators and determine the importance of each evaluation item, this study extracted the smart tourism indicators from Gretzel et al. (2015) and Wang et al. (2016) and consulted with the expert to prepare the questionnaire. The panel for this research consists of nine experts. Considering previous studies using the fuzzy Delphi method, Zhang (2017) with 5 experts, Hsu, Lee, and Kreng (2010) with 9, Bueno and Salmeron (2008) with 10, and Bouzon et al. (2016) with 10, this panel size is acceptable. The total nine selected experts include two government tourism officials, two industry experts, and five academic experts (Hsu, Lee, and Kreng, 2010; Bueno and Salmeron, 2008). The experts were asked to assess the importance of every STDP indicator for each tourism ecosystem element and the tourism stakeholders according to evaluation linguistic terms presented in Table 13.4.

The results of the initial calculation of fuzzy weights are presented in Annex I and II, where the data collected from the respondents and equation 1 were utilised to calculate the fuzzy weights $\alpha_{k'}$, $\beta_{k'}$ and γ_{k} . The final weights in the tables are calculated using equation 2. To assess the importance of each indicator, the final fuzzy weights are imported to Table 13.5.

To determine the best threshold r for this research, the average of final weights for all smart tourism indicators of each tourism ecosystem and tourism stakeholder is used. Indicators that rated above the average are selected as important elements for every single species of the tourism ecosystem and tourism stakeholder.

A comparison of the average weights of smart tourism indicators of the total tourism ecosystem and the stakeholders shows, for each smart tourism dimension, which indicators are rated as important parameters for developing the STDP for ASEAN tourism. In the 'smart information system', from seven evaluation items, 'tourist attraction home page', 'mobile application', 'online information access', and 'blogs of tourist attractions' are highlighted as very important STDP indicators. 'Free Wi-fi', electronic touch screen, and quick response code are indicated as unimportant.

In the category of 'smart sightseeing', the evaluations show that 'intelligent guide system', 'personal itinerary design', and 'e-tour map' are relatively important for an integrated e-commerce platform for ASEAN tourism. As for 'intelligent tourism management', two elements, 'e-complaint handling' and 'electronic ticketing system', have been highlighted. Factors like 'mobile payment' and 'online booking' turned out to the most important for the 'e-commerce system'. Regarding 'smart safety', 'traffic safety protection', 'smart emergency response system', and 'smart environment' are all important. Other representative indicators include 'weather forecast' in 'smart forecast', 'smart vehicle scheduling' in 'smart traffic', and 'virtual tourist experience' in 'virtual tourism attraction'. Table 13.6 summarizes the selection and presents a shorter list of most important/relevant factors of ASEAN STDP.

			I SCICT BIORI	nal vveignu	s oi Evaiu	auon In	alcar		sıng ru	zzy ue	w indi	noura					
Sn	lart Tourism Dimension		Smart Tourism Indicators	Accommodation	Transportation	Attraction	- Food	Thing to do	Travel Information	Touristic Consumer (TC)	Resident Consumer (RC)	Touristic supplier (TS)	Other industry supplier (OS)	Government	Non- Government Organization (NGO)	Destination Management Organization (DMO)	
		S11	Tourist attraction home page	7.59	5.67	5.74	4.93	5.52	5.52	7.52	6.26	5.22	4.26	3.59	3.59	5.44	
		S12	Mobile application	5.30	6.04	5.07	4.48	5.07	5.07	5.30	5.37	5.07	4.48	3.44	3.30	4.93	
	Smart	S13	Free Wifi	4.78	3.22	2.48	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	2.56	
S1	Information	S14	Online information access	6.04	6.04	5.30	4.48	5.07	5.07	5.30	5.37	5.07	4.48	3.44	3.30	4.93	
	System	S15	Quick response code	4.78	3.74	2.48	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	4.93	
		S16	Electronic touch screen	4.78	3.22	2.48	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	3.74	
		S17	Blogs of tourist attractions	7.37	5.59	5.74	4.85	6.41	6.33	7.52	6.26	5.15	4.26	3.59	3.59	5.44	
		S21	Intelligent-guide system	5.30	6.04	6.04	4.48	5.07	5.07	5.30	5.37	5.07	4.48	3.44	3.30	4.93	
		S22	Personal-itinerary design	5.30	6.04	4.56	4.48	5.07	5.07	5.44	5.37	5.07	4.48	3.44	3.30	5.44	
S2	Sidhteooind	S23	E-tourism-recommendation system	5.07	4.78	4.56	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	4.56	
	2181112001118	S24	E-tour map	5.30	6.04	4.56	4.78	5.07	5.07	5.44	5.37	5.07	4.48	3.44	3.30	5.44	
		S25	Guiding-information service	4.78	3.22	4.56	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	4.56	
		S31	Smart card (band)	4.78	4.78	4.78	2.56	2.41	2.41	5.07	4.56	5.00	4.33	3.22	2.63	4.78	
		S32	Electronic-entrance guard system	4.78	4.56	4.78	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	2.56	
		S33	Tourist-flow monitoring	4.56	4.78	4.78	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	5.37	
		S34	Crowd handling	4.56	4.78	4.78	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	5.37	
ŝ	Tourism	S35	Smart education	4.78	3.22	4.70	2.56	2.41	4.70	4.78	4.56	5.00	4.33	4.70	4.70	4.78	
ŝ	Management	S36	E-complaint handling	5.30	6.04	4.56	4.48	4.56	5.07	6.04	5.37	5.07	4.41	5.00	5.07	4.93	
		S37	Electronic-ticketing system	4.33	6.04	4.56	4.48	2.56	4.33	4.56	4.56	5.07	4.41	2.41	2.63	4.93	
		S38	Short-messaging service and multimedia-messaging service	4.78	4.56	4.56	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	2.56	
		S39	Call-service center	4.78	3.22	4.70	2.56	2.41	4.70	5.07	4.56	5.00	4.33	2.41	2.41	4.78	
	L	S41	Mobile payment	5.30	6.04	4.56	4.48	4.56	5.07	6.04	5.37	5.07	4.11	3.22	2.41	4.93	
S4	E-commerce Svictam	542	Online coupons	4.78	5.07	4.70	2.56	2.41	4.70	4.78	4.56	5.00	4.33	2.48	2.48	4.78	H .
	inclo	S43	Online booking	7.59	5.67	5.74	4.93	5.52	5.52	7.52	6.26	5.22	4.26	3.59	3.59	5.44	SIT
		S51	Festival-activity forecast	4.56	4.70	4.70	2.56	2.41	4.70	4.78	4.56	5.00	4.33	2.48	2.48	4.78	ial
Š	Smart	S52	Tourist-flow forecast	5.07	4.70	4.70	2.56	2.48	4.70	4.78	4.56	5.00	4.33	2.48	2.48	4.78	ι.
5	Forecast	S53	Queuing-time forecast	2.56	2.41	4.70	2.56	2.41	4.70	4.70	4.56	5.00	4.33	2.48	2.48	4.78	0
		S54	Weather forecast	4.56	4.70	4.56	4.56	5.07	5.07	5.00	4.70	5.07	4.48	3.44	3.30	4.70	ur
		S61	Electronic toll collection	2.56	5.07	4.70	2.56	2.41	3.37	4.63	4.85	5.00	5.07	4.56	2.48	4.78	sn
S6	Smart Traffic	S62	Smart vehicle sheduling	4.56	5.52	4.70	2.56	2.41	4.70	5.07	5.00	5.00	4.93	4.56	2.48	4.78	n /
		S 63	Real-time traffic broadcast	2.56	5.07	4.70	2.56	2.41	4.70	4.56	4.78	5.00	4.70	4.93	2.48	4.78	VIC
		S71	intelligent-environment monitoring	4.78	3.22	4.70	2.56	2.41	4.70	4.78	4.56	5.00	4.33	4.70	5.07	4.78	Ja
5	Cmart Cafaty	S72	Traffic-safety protection	5.30	6.04	4.56	2.56	5.07	5.07	5.30	5.37	5.07	4.41	4.70	5.07	4.93	ei -
ñ	טווומון טמוכוץ	S73	Smart emergency response system	4.56	4.48	5.30	2.56	2.41	5.07	5.30	5.37	5.07	4.41	4.70	4.48	4.93	ЯΙ
		S74	Smart Environment	5.30	6.04	4.56	4.48	2.41	5.07	5.07	5.37	5.07	4.41	4.70	5.07	4.93	ומנ
	Virtual	S81	Virtual Tourism experience	6.04	4.48	5.30	2.41	4.56	4.70	5.30	4.70	5.07	4.41	2.63	2.48	4.93	r O a
S8	Tourism	S82	Virtual travel community	4.70	4.70	4.56	2.56	2.41	2.41	4.78	4.56	5.00	4.33	3.22	2.63	2:96	1CI
	Attraction	S83	Augmented reality	5.07	4.41	5.30	2.41	4.56	4.70	4.56	5.30	4.70	4.41	2.56	2.56	4.93	

Table 13.5: Final Weights of Evaluation Indicators Using Fuzzy Delphi Method

Source: Authors.

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				Smart	Tourism Inc	dicators			
Tourism	Industry Ecosystem	Smart Information System	Smart Sightseeing	Intelligent Tourism Management	E-commerce System	Smart Forecast	Smart Traffic	Smart Safety	Virtual Tourism Attraction
	Accommodation	5.80	5.15	4.74	5.89	4.19	3.22	4.98	5.27
	Transportation	4.79	5.22	4.66	5.59	4.13	5.22	4.94	4.53
Tourism	Attractions	4.19	4.85	4.69	5.00	4.67	4.70	4.78	5.05
Ecosystem	Food	3.77	3.77	2.98	3.99	3.06	2.56	3.04	2.46
	Things to do	4.19	4.01	2.88	4.16	3.09	2.41	3.07	3.84
	Travel Information	4.17	4.01	3.43	5.10	4.80	4.26	4.98	3.94
	Touristic Consumer (TC)	5.71	5.15	4.96	6.11	4.81	4.75	5.11	4.88
	Resident Consumer (RC)	5.28	5.04	4.65	5.40	4.59	4.88	5.17	4.85
	Touristic supplier (TS)	5.07	5.04	5.02	5.10	5.02	5.00	5.06	4.93
Human System / Tourism	Other industry supplier (OS)	4.35	4.42	4.35	4.33	4.37	4.90	4.39	4.38
Stakeholders	Government	3.39	3.36	3.40	3.10	2.72	4.68	4.70	2.80
	Non-Government Organization (NGO)	3.10	3.03	3.11	2.83	2.69	2.48	4.93	2.56
	Destination Management Organization (DMO)	4.57	4.99	4.45	5.05	4.76	4.78	4.89	5.27

Table 13.6: Overview of Final Weight Evaluation Result

The key indicators for each tourism ecosystem and human system are demonstrated in Appendix III. Source: Authors.

6. Concluding Remarks

This study proposes a framework of an integrated e-commerce platform for the ASEAN tourism industry based on a smart tourism model and then identifies its key components using the fuzzy Delphi method.

In the case of ASEAN, there are 17 important STDP indicators received most concern: tourist attraction home page, mobile application, online information access, blogs on tourist attractions, intelligent-guide system, personal-itinerary design, e-tour map, e-complaint handling, e-ticketing system, mobile payment, online booking, traffic-safety protection, weather forecast, smart vehicle scheduling, smart emergency response system, smart environment, and virtual tourism experience.

In general, the development of cross-border e-commerce in ASEAN still face challenge from low Internet speed; the high rate of unbanked people; the high rate of fraud incidents; and difficulties in cross-border customs, immigration, connectivity, security, and safety. Moreover, promoting cross-border online tourism service needs support from high Internet penetration, high mobile connection access, and high social media and social network

penetration. In practice, adapting STDP in practices may help national tourism organisations set the priority and overcome the challenges strategically.

References

- ASEAN (2016), *The ASEAN ICT Masterplan 2020*. <u>http://www.asean.org/storage/</u> <u>images/2015/November/ICT/15b -- AIM 2020_Publication_Final.pdf</u> (accessed 18 April 2017).
- ASEAN (2017), ASEAN Tourism Strategic Plan 2016–2025. <u>http://aseantourism.travel/</u> <u>media/kcfinder/docs/asta-doc/atsp-2016-2025.pdf</u> (accessed 20 July 2017).
- ASEANSTATS (2017), ASEAN Statistics Database. https://data.aseanstats.org/ (accessed 11 May 2017).
- Bouzon, M., K. Govindan, C.M. Taboada Rodriguez, and L.M.S. Campos (2016), 'Identification and Analysis of Reverse Logistics Barriers Using Fuzzy Delphi Method and AHP', Resources, Conservation and Recycling, 108, pp.182–97. doi: 10.1016/j. resconrec.2015.05.021 (accessed 20 July 2017).
- Brandt, T., J. Bendler, and D. Neumann (2017), 'Social Media Analytics and Value Creation in Urban Smart Tourism Ecosystems', *Information & Management*, 54(2016), pp.1–11. doi: 10.1016/j.im.2017.01.004 (accessed 20 July 2017).
- Bueno, S. and J.L. Salmeron (2008), 'Fuzzy Modeling Enterprise Resource Planning Tool Selection', *Computer Standards & Interfaces*, 30(3), pp.137–47.
- Buhalis, D. (2000), 'Marketing the competitive destination of the future', *Tourism Management*, 21(1), pp.97–116. doi: 10.1016/S0261-5177(99)00095-3 (accessed 20 July 2017).
- Buhalis, D. and R. Law (2008), 'Progress in Information Technology and Tourism Management: 20 Years On and 10 Years After the Internet — The State of eTourism Research', *Tourism Management*, 29, pp.609–23. doi: 10.1016/j. tourman.2008.01.005 (accessed 20 July 2017).
- Cao, K. and Z. Yang (2016), 'A Study of E-commerce Adoption by Tourism Websites in China', Journal of Destination Marketing and Management, 5(3), pp.283–9. doi: 10.1016/j.jdmm.2016.01.005 (accessed 20 July 2017).
- Chung, N, H. Lee, S.J. Lee. and C. Koo (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, pp.130–43. doi: 10.1016/j.techfore.2015.03.004 (accessed 20 July 2017).

Consumer Barometer (2016), Consumer Barometer with Google. <u>https://www.</u> <u>consumerbarometer.com/en/</u> (accessed 20 May 2017).

Del, G. et al. (2015), 'Knowledge Transfer in Smart Tourism Destinations: Analyzing the Effects of a Network Structure', *Journal of Destination Marketing and Management*, 4(3), pp.145–50. doi: 10.1016/j.jdmm.2015.02.001 (accessed 20 July 2017).

- Gretzel, U., H. Werthner, C. Koo, and C. Lamsfus(2011), 'Intelligent Systems in Tourism A Social Science Perspective', Annals of Tourism Research, 38(3), pp.757–79. doi: 10.1016/j.annals.2011.04.014 (accessed 20 July 2017).
- Gretzel, U. et al. (2015), 'Conceptual Foundations for Understanding Smart Tourism Ecosystems', *Computers in Human Behavior*, 50, pp.558–63. doi: 10.1016/j. chb.2015.03.043 (accessed 20 July 2017).
- GSMA (2016), Connected Society Mobile Connectivity Index Launch Report. <u>http://www.mobileconnectivityindex.com/widgets/connectivityIndex/pdf/ConnectivityIndex_V01.pdf</u> (accessed 15 May 2017).
- Hsu, Y.-L., C.-H. Lee, and V.B. Kreng (2010), 'The Application of Fuzzy Delphi Method and Fuzzy AHP in Lubricant Regenerative Technology Selection', *Expert Systems with Applications*, 37(1), pp.419–25.
- Internetworldstats (2017), Internet World Stats. <u>http://www.internetworldstats.com/stats.</u> <u>htm</u> (accessed 13 July 2017).
- Kim, K., O-J. Park, S.Yun, and H.Yun (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, pp.362– 69. doi: 10.1016/j.techfore.2017.01.001 (accessed 20 July 2017).
- Ko, T.G. (2005), 'Development of a Tourism Sustainability Assessment Procedure: A Conceptual Approach', *Tourism Management*, 26(3), pp.431–45. doi: 10.1016/j. tourman.2003.12.003 (accessed 20 July 2017).
- Lee, T. H. and H. Hsieh (2016), 'Indicators of Sustainable Tourism : A Case Study from a Taiwan's Wetland', *Ecological Indicators*, 67, pp.779–87. doi: 10.1016/j. ecolind.2016.03.023 003 (accessed 20 July 2017).
- Lee, W. and U. Gretzel (2012), 'Designing Persuasive Destination Websites: A Mental Imagery Processing Perspective', *Tourism Management*, 33(5), pp.1270–80. doi: 10.1016/j.tourman.2011.10.012 003 (accessed 20 July 2017).
- Lepp, A., H. Gibson, and C. Lane (2011), 'Image and Perceived Risk : A Study of Uganda and Its Official Tourism Website', *Tourism Management*, 32(3), pp.675–84. doi: 10.1016/j. tourman.2010.05.024 003 (accessed 20 July 2017).

- Li, Y., C. Hu, C. Huang, and L. Duan (2017), 'The Concept of Smart Tourism in the Context of Tourism Information Services', *Tourism Management*, 58, pp.293–300. doi: 10.1016/j.tourman.2016.03.014 003 (accessed 20 July 2017).
- Park, J.H., C. Lee, C. Yoo, and Y. Nam (2016), 'An Analysis of the Utilization of Facebook by Local Korean Governments for Tourism Development and the Network of Smart Tourism Ecosystem', *International Journal of Information Management*, 36(6), pp.1320– 27. doi: 10.1016/j.ijinfomgt.2016.05.027 (accessed 20 July 2017).
- Szopiński, T. and M.W. Staniewski (2016), 'Socio-economic Factors Determining the Way E-tourism is Used in European Union Member States', *Internet Research*, 26(1), pp.2–21. doi: 10.1108/IntR-03-2014-0065 (accessed 20 July 2017).
- Temasek and Google (2016), e-conomy SEA Unlocking the \$200 Billion Digital Opportunity in Southeast Asia. <u>https://www.thinkwithgoogle.com/_qs/</u> <u>documents/4859/e-conomy_handout_1_20160525_eXq5Gdl.pdf</u> (accessed 16 May 2017).
- Wang, D., X. Li, and Y. Li (2013), 'China 'Smart Tourism Destination' Initiative : A Taste of the Service-dominant Logic', *Journal of Destination Marketing and Management*, 2(2), pp.59–61. doi: 10.1016/j.jdmm.2013.05.004 (accessed 20 July 2017).
- Wang, X., X. Li, F. Zhen, and J.H. Zhang (2016), 'How Smart is Your Tourist Attraction? Measuring Tourist Preferences of Smart Tourism Attractions via a FCEM-AHP and IPA Approach', *Tourism Management*, 54, pp.309–20. doi: 10.1016/j. tourman.2015.12.003 (accessed 20 July 2017).
- Werthner, H. (2015), 'Special Issue on Smart Tourism Systems: Convergence of Information Technologies, Business Models, and Experiences', *Computers in Human Behavior*, 50, pp.556–7. doi: 10.1016/j.chb.2015.03.042 (accessed 20 July 2017).
- Woo, C.W., J. Goo, C.D. Huang, K. Nam, and M. Woo (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, pp.330–41. doi: 10.1016/j.techfore.2016.10.071 (accessed 20 July 2017).
- Zhang, J. (2017), 'Evaluating Regional Low-carbon Tourism Strategies Using the Fuzzy Delphi- Analytic Network Process Approach', *Journal of Cleaner Production*, 141, pp.409–19. doi: 10.1016/j.jclepro.2016.09.122 (accessed 20 July 2017).

	αk = min (aik	<) , ßk =	1/m ∑ (i=1)^mbik , yk = max (cik)	Touri	istic Co (TC)	insume	Re	sident o (RG	onsume	ч Ч	uristic	supplier	· (TS)	Ot	her ind pplier	ustry (OS)		Gove	nment		Non Orgar	-Gove	rnment n (NGC	ō "	Dest Mana ganiza	tinatio ageme tion (I	0) WO	
- ^R	art Tourism imension		Smart Tourism Indicators	ಶ	ø	⊢ Lani7	ک Meight	θ	⊢ Leni T	thgieW	х В	~	Isni 1 Hgi9W	æ	B	⊢ Isni7	Meight A	g	~	Final Meight	ø	g	⊢ Leni	Meight A	g	~	Final Meight	
		S11	Tourist attraction home page	5.00	8.56 9.	.00 7.5	2 3.00	6.78	9.00 6.	.26 1.0	00 5.6	7 9.00	5.22	1.00	2.78 9	.00 4.2	6 1.00	2.78	7.00	3.59	1.00	2.78 7	:00 3.5	59 1.0	0 6.33	9.00	5.44	
		S12	Mobile application	1.00	5.89 9.	.00 5.3	00.1	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	8.44 9	.00 4.4	8 1.0C	2.33	7.00	3.44	1.00	1.89 7	00 3.3	30 1.0	0 4.78	9.00	4.93	
	Smart	S13	Free Wifi	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00 3	00.9	00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.0	63 1.0	0 1.67	9.00	2.56	
Sı	Information	S14	Online information access	1.00	5.89 9.	.00 5.3	00.1	6.11	9.00 5.	37 1.0	00 5.2	2 9.00	5.07	1.00	3.44 9	.00 4.4	8 1.0C	2.33	7.00	3.44	1.00	1.89 7	:00 3.3	30 1.0	0 4.78	9.00	4.93	
	System	S15	Quick response code	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.0	63 1.0	0 4.78	3 9.00	4.93	
		S16	Electronic touch screen	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00 3	00.9	00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.0	63 1.0	0 3.22	9.00	3.74	
		S17	Blogs of tourist attractions	5.00	8.56 9.	.00 7.5	2 3.00	6.78	9.00 6.	.26 1.0	00 5.4	4 9.00	5.15	1.00	2.78 9	.00 4.2	6 1.0C	2.78	7.00	3.59	1.00	2.78 7	:00 3.5	59 1.0	0 6.33	9.00	5.44	
		S21	Intelligent-guide system	1.00	5.89 9.	.00 5.3	0 1.00	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	8.44 9	.00 4.4	8 1.0C	2.33	7.00	3.44	1.00	1.89 7	:00 3.3	30 1.0	0 4.78	9.00	4.93	
	1	S22	Personal-itinerary design	1.00	6.33 9.	.00 5.4	4 1.00	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	8.44 9	.00 4.4	8 1.0C	2.33	7.00	3.44	1.00	1.89 7	:00 3.3	30 1.0	0 6.33	9.00	5.44	
S2	Sidhteeeind	S23	E-tourism-recommendation system	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00	00.1	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.0	63 1.0	0 3.67	9.00	4.56	
	JIGHTSCOURS	S24	E-tour map	1.00	6.33 9.	.00 5.4	4 1.00	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	8.44 9	00 4.4	.8 1.OC	2.33	7.00	3.44	1.00	1.89 7	:00 3.5	30 1.0	0 6.33	9.00	5.44	
		S25	Guiding-information service	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	00.6 0	5.00	1.00 3	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.(63 1.0	0 3.67	0.00	4.56	
		S31	Smart card (band)	1.00	5.22 9.	.00 5.0	7 1.00	3.67	9.00 4.	.56 1.0	00 5.0	00.6 0	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.(63 1.0	0 4.33	9.00	4.78	
		S32	Electronic-entrance guard system	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.(63 1.0	0 1.67	9.00	2.56	
		S33	Tourist-flow monitoring	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	00.9.00	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	00 2.0	63 1.0	0 6.11	9.00	5.37	
	:	S34	Crowd handling	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.0	63 1.0	0 6.11	9.00	5.37	
J	Intelligent	S35	Smart education	1.00	4.33 9.	00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	.00 4.3	3 1.00	4.11	9.00	4.70	1.00	4.11 9	00 4.7	70 1.0	0 4.33	9.00	4.78	
ñ	Manadement	S36	E-complaint handling	3.00	6.11 9.	00 6.0	4 1.00	6.11	9.00	37 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	00 4.4	1 1.00	5.00	9.00	5.00	1.00	5.22 9	00 5.0	07 1.0	0 4.78	3 9.00	4.93	
	0	S37	Electronic-ticketing system	1.00	3.67 9.	.00 4.5	6 1.00	3.67	9.00 4.	56 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	.00 4.4	1.00	1.22	5.00	2.41	1.00	1.89 5	.00 2.6	63 1.0	0 4.78	9.00	4.93	
		S38	Short-messaging service and multimedia-messaging service	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	.00 4.3	3 1.00	1.67	7.00	3.22	1.00	1.89 5	.00 2.6	63 1.0	0 1.67	5.00	2.56	
		S39	Call-service center	1.00	5.22 9.	00 5.0	7 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.9	00 4.3	3 1.00	1.22	5.00	2.41	100	1.22 5	00 2	41 1.0	0 4.33	9.00	4.78	
	L	S41	Mobile payment	3.00	6.11 9.	.00 6.0	4 1.00	6.11	9.00	37 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	.00 4.4	1.00	1.67	7.00	3.22	100	1.22 5	.00	41 1.0	0 4.78	3 9.00	4.93	
S4	E-commerce	542	Online coupons	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	.56 1.0	00 5.0	00.6 0	5.00	1.00 3	00.9	.00 4.3	3 1.00	1.44	5.00	2.48	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
	manche	S43	Online booking	5.00	8.56 9.	.00 7.5	2 3.00	6.78	9.00 6.	.26 1.0	00 5.6	7 9.00	5.22	1.00	2.78 9	00 4.2	6 1.OC	2.78	7.00	3.59	100	2.78 7	:00 3.5	59 1.0	o 6.33	9.00	5.44	
		S51	Festival-activity forecast	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00 3	00.9	.00 4.3	3 1.00	1.44	5.00	2.48	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
ů	Smart	S52	Tourist-flow forecast	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	56 1.0	00 5.0	0 9.00	5.00	1.00 3	00.9	.00 4.3	3 1.00	1.44	5.00	2.48	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
ç	Forecast	S53	Queuing-time forecast	1.00	4.11 9.	.00 4.7	0 1.00	3.67	9.00 4.	.56 1.0	00 5.0	0 9.00	5.00	1.00	00.1	.00 4.3	3 1.00	1.44	5.00	2.48	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
		S54	Weather forecast	1.00	5.00 9.	.00 5.0	0 1.00	4.11	9.00 4.	.70 1.0	00 5.2	2 9.00	5.07	1.00	8.44 9	.00 4.4	8 1.0C	2.33	7.00	3.44	100	1.89 7	00 3.3	30 1.0	0 4.11	9.00	4.70	
		S61	Electronic toll collection	1.00	3.89 9.	.00 4.6	3 1.00	4.56	9.00 4.	.85 1.0	00 5.0	0 9.00	5.00	1.00	5.22 9	00 5.0	7 1.00	3.67	9.00	4.56	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
S6	Smart Traffic	S62	Smart vehicle sheduling	1.00	5.22 9.	.00 5.0	7 1.00	5.00	9.00 5.	00 1.0	00 5.0	0 9.00	5.00	1.00 4	4.78 9	.00 4.9	3 1.OC	3.67	9.00	4.56	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
		S63	Real-time traffic broadcast	1.00	3.67 9.	00 4.5	6 1.00	4.33	9.00 4.	.78 1.0	00 5.0	0 9.00	5.00	1.00	4.11 9	.00 4.7	0 1.00	4.78	9.00	4.93	100	1.44 5	.00 2.4	48 1.0	0 4.33	9.00	4.78	
		S71	intelligent-environment monitoring	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00	00.1	.00 4.3	3 1.00	4.11	9.00	4.70	100	5.22 9	000 5.0	07 1.0	0 4.33	9.00	4.78	
J	Contract Cafatra	S72	Traffic-safety protection	1.00	5.89 9.	.00 5.3	00.1	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	00 4.4	p1 1.0C	4.11	9.00	4.70	100	5.22 9	00 5.0	07 1.0	0 4.78	9.00	4.93	
ò	טווומוו טמופוץ	S73	Smart emergency response system	1.00	5.89 9.	.00 5.3	00.1	6.11	9.00 5.	37 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	.00 4.4	1 1.0C	4.11	9.00	4.70	100	3.44 9	00.4	48 1.0	0 4.78	9.00	4.93	
		S74	Smart Environment	1.00	5.22 9.	.00 5.0	7 1.00	6.11	9.00 5	37 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	.00 4.4	1.00	4.11	9.00	4.70	100	5.22 9	000 5.0	07 1.0	0 4.78	9.00	4.93	
	Virtual	S81	Virtual Tourism experience	1.00	5.89 9.	.00 5.3	00.1	4.11	9.00 4.	.70 1.0	00 5.2	2 9.00	5.07	1.00	3.22 9	.00 4.4	p 1.0C	1.89	5.00	2.63	100	1.44 5	.00 2.4	48 1.0	0 4.78	9.00	4.93	
S8	Tourism	S82	Virtual travel community	1.00	4.33 9.	.00 4.7	8 1.00	3.67	9.00 4.	-56 1.0	00 5.0	0 9.00	5.00	1.00	00.1	.00 4.3	3 1.00	1.67	7.00	3.22	100	1.89 5	.00 2.0	63 3.0	0 5.89	9.00	5.96	
	Attraction	S83	Augmented reality	1.00	3.67 9.	.00 4.5	6 1.00	5.89	9.00 5.	30 1.0	00 4.1	1 9.00	4.70	1.00	3.22 9	.00 4.4	p 1.0C	1.67	5.00	2.56	100	1.67 5	.00 2.5	56 1.0	0 4.78	9.00	4.93	
Sourc	e: Authors.																											

	kk = min (aik)	ВК = 1	lm \C_li=1\/mhik_vk = mav.(cik)					F					0			-				Think to		_	Lessen T		
Sma	rt Tourism	- - - -			0		ight Ial				jug			tdbi Isr		2 	3	jer Jak	-			the second			lant Isr
ä	mension		Smart Fourism Indicators	ਲ	<u>م</u>	-	ni 1 i9W	ಶ	<u>م</u>	nifi	ieW	<u>2</u>	-	ni 1 Wei	ਰ	л	-	ni 1 i9W	a a	<u>م</u>	⊢ 	iəW	ਤ ਸ	-	ni 1 Wei
		S11 S13	Tourist attraction home page Mobile application	5.00	8.78 E 80	00.00	7.59	00.1	00 9.6	00 5.6	1.00	0 7.22 C 2 2	0.00	5.74	1.00	4.78	00.6	4.93	1:00	5.56	000	52 1.0	0 6.5	0.00	5.52
	Smart	S13	Free Wifi	1.00	4.33	00.6	4.78	00.1	67 7.0	00 3.2	1.00	1.44	5.00	2.48	1.00	1.67	5.00	2.56	1.00	1.22	00		1.2	2 0 2 0 2 0	2.41
S1	information	S14	Online information access	3.00	6.11	9.00	6.04	2.00	5.11 9.0	0.9 0.0	4 1.00	0 5.89	9.00	5.30	1.00	3.44	9.00	4.48	1.00	5.22 9	000 5	.07 1.0	0 5.2	2 9.0	5.07
	system	S15	Quick response code	1.00	4.33	9.00	4.78	1.00	.22 7.6	00 3.7	4 1.00	0 1.44	5.00	2.48	1.00	1.67	5.00	2.56	1.00	1.22 5	00	.41 1.C	1.2	2 5.0	2.41
		S16	Electronic touch screen	1.00	4.33	9.00	4.78	1.00	.67 7.0	00 3.2	2 1.00	0 1.44	5.00	2.48	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 1.2	2 5.0	2.41
		S17	Blogs of tourist attractions	5.00	8.11	9.00	7.37	1.00 6	.78 9.0	00 5.5	9 1.00	0 7.22	9.00	5.74	1.00	4.56	9.00	4.85	3.00	7.22 9	000 6	.41 3.0	0 7.0	0.0	6.33
		S21	Intelligent-guide system	1.00	5.89	9.00	5.30	3.00 6	5.11 9.6	00 6.0	4 3.0	0 6.11	9.00	6.04	1.00	3.44	9.00	4.48	1.00	5.22 9	000 5	.07 1.C	0 5.2	2 9.0	5.07
		S22	Personal-itinerary design	1.00	5.89	9.00	5.30	3.00	5.11 9.6	00 6.0	4 1.00	3.67	9.00	4.56	1.00	3.44	9.00	4.48	1.00	5.22 9	000 5	.07 1.C	0 5.2	2 9.0	5.07
S2	Sidhtseeind	S23	E-tourism-recommendation system	1.00	5.22	9.00	5.07	1.00 4	.33 9.0	00 4.7	8 1.00	0 3.67	9.00	4.56	1.00	1.67	5.00	2.56	1.00	1.22 5	00	.41 1.0	0 1.2	2 5.0	2.41
	JIBILISCOLLIB	S24	E-tour map	1.00	5.89	9.00	5.30	3.00	5.11 9.0	00 6.0	4 1.00	0 3.67	9.00	4.56	1.00	4.33	9.00	4.78	1.00	5.22 9	000 5	.07 1.C	0 5.2	2 9.0	5.07
		S25	Guiding-information service	1.00	4.33	9.00	4.78	1.00	.67 7.0	00 3.2	2 1.00	3.67	9.00	4.56	1.00	1.67	5.00	2.56	1.00	1.22 5	00 2	.41 1.C	0 1.2	2 5.0	2.41
		S31	Smart card (band)	1.00	4.33	9.00	4.78	1.00 4	.33 9.0	00 4.7	8 1.00	0 4.33	9.00	4.78	1.00	1.67	5.00	2.56	1.00	1.22 5	00 2	41 1.C	0 1.2	2 5.0	2.41
		S32	Electronic-entrance guard system	1.00	4.33	9.00	4.78	1.00 3	.67 9.0	00 4.5	6 1.00	0 4.33	9.00	4.78	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	0 1.2	2 5.0	2.41
		S33	Tourist-flow monitoring	1.00	3.67	9.00	4.56	1.00 4	.33 9.0	00 4.7	8 1.00	0 4.33	9.00	4.78	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 1.2	2 5.0	2.41
	-	S34	Crowd handling	1.00	3.67	9.00	4.56	1.00 4	.33 9.0	00 4.7	8 1.00	0 4.33	9.00	4.78	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	0 1.2	2 5.0	2.41
S	Touview	S35	Smart education	1.00	4.33	9.00	4.78	1.00	.67 7.0	00 3.2	2 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	1.1	1 9.0	4.70
< م	Aanagement	S36	E-complaint handling	1.00	5.89	9.00	5.30	3.00	5.11 9.6	00 6.0	4 1.00	0 3.67	9.00	4.56	1.00	3.44	9.00	4.48	1.00	3.67 9	000 4	.56 1.0	0 5.2	2 9.0	5.07
	0	S37	Electronic-ticketing system	1.00	3.00	9.00	4.33	3.00	5.11 9.6	00 6.0	4 1.00	3.67	9.00	4.56	1.00	3.44	9.00	4.48	1.00	3.67 9	00.4	.56 1.C	0 3.0	0 9.0	4.33
		S38	Short-messaging service and multimedia-messaging service	1.00	4.33	9.00	4.78	1.00 3	.67 9.0	00 4.5	6 1.00	0 3.67	9.00	4.56	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	.41 1.C	0 1.2	2 5.0	2.41
		539	Call-service center	1.00	4.33	9.00	4.78	1.00	.67 7.0	00 3.2	2 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 4.1	1 9.0	4.70
		S41	Mobile payment	1.00	5.89	9.00	5.30	3.00	5.11 9.6	00 6.0	4 1.00	0 3.67	9.00	4.56	1.00	3.44	9.00	4.48	1.00	3.67 9	00.4	.56 1.C	0 5.2	2 9.0	5.07
S4	Commerce	S42	Online coupons	1.00	4.33	9.00	4.78	1.00 5	.22 9.0	00 5.0	7 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 4.1	1 9.0	4.70
	Illalskc	S43	Online booking	5.00	8.78	9.00	7.59	1.00 7	00 9.6	00 5.6	7 1.00	0 7.22	9.00	5.74	1.00	4.78	9.00	4.93	1.00	5.56 9	000 5	-52 1.C	0 6.5	6 9.0	5.52
		S51	Festival-activity forecast	1.00	3.67	9.00	4.56	1.00	1.11 9.6	00 4.7	0 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 4.1	1 9.0	4.70
j.	Smart	S52	Tourist-flow forecast	1.00	5.22	9.00	5.07	1.00	1.11 9.0	00 4.7	0 1.00	4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	.44 5	.00 2	.48 1.C	0 4.1	1 9.0	4.70
ŝ	Forecast	S53	Queuing-time forecast	1.00	1.67	5.00	2.56	1.00	.22 5.0	00 2.4	1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	.41 1.C	1.1	1 9.0	4.70
		S54	Weather forecast	1.00	3.67	9.00	4.56	1.00	1.11 9.0	00 4.7	0 1.00	0 3.67	9.00	4.56	1.00	3.67	9.00	4.56	1.00	5.22 9	000 5	.07 1.C	0 5.2	2 9.0	5.07
		S61	Electronic toll collection	1.00	1.67	5.00	2.56	1.00 5	.22 9.0	00 5.0	7 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	0 2.1	1 7.0	3.37
S6	Smart Traffic	S62	Smart vehicle sheduling	1.00	3.67	9.00	4.56	1.00 6	.56 9.0	00 5.5	2 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	00 2	41 1.C	0 4.1	1 9.0	4.70
		S63	Real-time traffic broadcast	1.00	1.67	5.00	2.56	1.00 5	.22 9.0	00 5.0	7 1.00	9.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	00	41 1.C	0 4.1	1 9.0	4.70
		S71	intelligent-environment monitoring	1.00	4.33	9.00	4.78	1.00	.67 7.0	00 3.2	2 1.00	0 4.11	9.00	4.70	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	0 4.1	1 9.0	4.70
J J	Coferin	S72	Traffic-safety protection	1.00	5.89	9.00	5.30	3.00	5.11 9.0	00 6.0	4 1.00	0 3.67	9.00	4.56	1.00	1.67	5.00	2.56	1.00	5.22 5	00	.07 1.C	0 5.2	2 9.0	5.07
2	טווומור טמובוא	S73	Smart emergency response system	1.00	3.67	9.00	4.56	1.00 3	.44 9.0	00 4.4	8 1.00	0 5.89	9.00	5.30	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	41 1.C	0 5.2	2 9.0	5.07
		S74	Smart Environment	1.00	5.89	9.00	5.30	3.00	5.11 9.6	00 6.0	4 1.00	3.67	9.00	4.56	1.00	3.44	9.00	4.48	1.00	1.22 9	000 2	41 1.C	0 5.2	2 9.0	5.07
	Virtual	S81	Virtual Tourism experience	3.00	6.11	9.00	6.04	1.00 3	.44 9.0	00 4.4	8 1.00	5.85	9.00	5.30	1.00	1.22	5.00	2.41	1.00	3.67 5	.00	.56 1.C	0 4.1	1 9.0	4.70
S8	Tourism	S82	Virtual travel community	1.00	4.11	9.00	4.70	1.00	1.11 9.0	00 4.7	0 1.00	3.67	9.00	4.56	1.00	1.67	5.00	2.56	1.00	1.22 5	.00	.41 1.C	0 1.2	2 5.0	2.41
	Attraction	S83	Augmented reality	1.00	5.22	9.00	5.07	1.00	.22 9.0	00 4.4	1.00	5.85	9.00	5.30	1.00	1.22	5.00	2.41	1.00	3.67 5	.00 4	.56 1.C	0 4.1	1 9.0	4.70

Annex II: Tourism Ecosystem-Related Fuzzy Weights and Final Weight of Smart Tourism Destination Platform Evaluation Indicators. Using Fuzzy Delphi Method

Source: Authors.

An Integrated E-commerce Platform for the ASEAN Tourism Industry: A Smart Tourism Model Approach

		ļ	Accommodation	
5	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight
	с	S11	Tourist attraction home page	7.59
c.	Smart	S12	Mobile application	5.30
51	Information	S14	Online information access	6.04
	System	S17	Blogs of tourist attractions	7.37
		S21	Intelligent-guide system	5.30
	Current	S22	Personal-itinerary design	5.30
S2	Sightseeing	S23	E-tourism-recommendation system	5.07
		S24	E-tour map	5.30
S3	Intelligence Tourism	S36	E-complaint handling	5.30
c .	E-commerce	S41	Mobile payment	5.30
34	System	S43	Online booking	7.59
S5	Smart forecast	S52	Tourist-flow forecast	5.07
c-7	Smart cafety	S72	Traffic-safety protection	5.30
3/	Smart salety	S74	Smart environment	5.30
60	Virtual Tourism	S81	Virtual tourism experience	6.04
38	Attraction	S83	Augmented reality	5.07

Annex III: Selected Smart Tourism Destination Platform Indicators

			Transportation	
5	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight
		S11	Tourist attraction home page	5.67
с.	Smart	S12	Mobile application	6.04
51	System	S14	Online information access	6.04
	System	S17	Blogs of tourist attractions	5.59
	C	S21	Intelligent-guide system	6.04
S2	Smart	S22	Personal-itinerary design	6.04
	Signiseeing	S24	E-tour map	6.04
50	Intelligence	S36	E-complaint handling	6.04
33	Tourism	S37	Electronic-ticketing system	6.04
	F	S41	Mobile payment	6.04
S4	E-commerce System	S42	Online coupons	5.07
	System	S43	Online booking	5.67
		S61	Electronic toll collection	5.07
S6	Smart Traffic	S62	Smart vehicle sheduling	5.52
		S63	Real-time traffic broadcast	5.07
c-	Constant on first of	S72	Traffic-safety protection	6.04
37	Smart safety	S74	Smart environment	6.04

Attraction					
S	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight	
	Smart	S11	Tourist attraction home page	5.74	
S1	Information	S12	Mobile application	5.07	
	System	S17	Blogs of tourist attractions	5.74	
S2	Smart Sightseeing	S21	Intelligent-guide system	6.04	
		S31	Smart card (band)	4.78	
	1.1.10.1	S32	Electronic-entrance guard system	4.78	
5-	Intelligence Tourism Management	S33	Tourist-flow monitoring	4.78	
53		S34	Crowd handling	4.78	
		S35	Smart education	4.70	
		S39	Call-service center	4.70	
54	E-commerce	S42	Online coupons	4.70	
54	System	S43	Online booking	5.74	
	Smart Forecast	S51	Festival-activity forecast	4.70	
S5		S52	Tourist-flow forecast	4.70	
		S53	Queuing-time forecast	4.70	
		S61	Electronic toll collection	4.70	
S6	Smart Traffic	S62	Smart vehicle sheduling	4.70	
		S63	Real-time traffic broadcast	4.70	
S7	Smart Safety	S71	Intelligent-environment monitoring	4.70	
		S73	Smart emergency response system	5.30	
58	Virtual Tourism	S81	Virtual tourism experience	5.30	
30	Attraction	S83	Augmented reality	5.30	

	Travel Information					
2	Smart Tourism Dimension		Smart Tourism Indicators			
		S11	Tourist attraction home page	5.52		
c.	Smart	S12	Mobile application	5.07		
21	System	S14	Online information access	5.07		
	oystern	S17	Blogs of tourist attractions	6.33		
	C .	S21	Intelligent-guide system	5.07		
S2	Smart	S22	Personal-itinerary design	5.07		
	Jightseeling	S24	E-tour map	5.07		
	Intelligence Tourism	S36	E-complaint handling	5.07		
S3		S37	Electronic-ticketing system	4.33		
		S39	Call-service center	4.70		
	E-commerce System	S41	Mobile payment	5.07		
S4		S42	Online coupons	4.70		
		S43	Online booking	5.52		
	Smart Forecast	S51	Festival-activity forecast	4.70		
C -		S52	Tourist-flow forecast	4.70		
35		S53	Queuing-time forecast	4.70		
		S54	Weather forecast	5.07		
56	Current Traffic	S62	Smart vehicle sheduling	4.70		
30	Smart frame	S63	Real-time traffic broadcast	4.70		
		S71	Intelligent-environment monitoring	4.70		
S7	Smart Safety	S72	Traffic-safety protection	5.07		
		S73	Smart emergency response system	5.07		
		S74	Smart environment	5.07		
60	Virtual Tourism	S81	Virtual tourism experience	4.70		
58	Attraction	S83	Augmented reality	4.70		

	Thing to do				
Smart Tourism Dimension			Smart Tourism Indicators	Fuzzy Weight	
		S11	Tourist attraction home page	5.52	
с.	Smart	S12	Mobile application	5.07	
51	System	S14	Online information access	5.07	
		S17	Blogs of tourist attractions	6.41	
	Smart Sightseeing	S21	Intelligent-guide system	5.07	
S2		S22	Personal-itinerary design	5.07	
		S24	E-tour map	5.07	
	Intelligence Tourism Management	S36	E-complaint handling	4.56	
S3		S37	Electronic-ticketing system	4.56	
۰.	E-commerce	S41	Mobile payment	4.56	
54	System	S43	Online booking	5.52	
S5	Smart Forecast	S54	Weather forecast	5.07	
S7	Smart Safety	S72	Traffic-safety protection	5.07	
60	Virtual Tourism	S81	Virtual tourism experience	4.56	
28	Attraction	S83	Augmented reality	4.56	

Food				
Smart Tourism Dimension			Smart Tourism Indicators	Fuzzy Weight
		S11	Tourist attraction home page	4.93
c.,	Smart	S12	Mobile application	4.48
51	System	S14	Online information access	4.48
		S17	Blogs of tourist attractions	4.85
	Smart Sightseeing	S21	Intelligent-guide system	4.48
S2		S22	Personal-itinerary design	4.48
		S24	E-tour map	4.78
	Intelligence	S36	E-complaint handling	4.48
S3	Tourism Management	S37	Electronic-ticketing system	4.48
с.	E-commerce	S41	Mobile payment	4.48
54	System	S43	Online booking	4.93
S5	Smart Forecast	S54	Weather forecast	4.56
S7	Smart Safety	S74	Smart environment	4.48

Touristic Consumer (TC)						
Smart Tourism Dimension		Smart Tourism Indicators Fuzzy Weight				
		S11	Tourist attraction home page	7.52		
c.,	Smart	S12	Mobile application	5.30		
51	Information System	S14	Online information access	5.30		
		S17	Blogs of tourist attractions	7.52		
	Smart Sightseeing	S21	Intelligent-guide system	5.30		
S2		S22	Personal-itinerary design	5.44		
		S24	E-tour map	5.44		
S3	Intelligence Tourism Management	S36	E-complaint handling	6.04		
с.	E-commerce	S41	Mobile payment	6.04		
54	System	S43	Online booking	7.52		
c-	Current Calaty	S72	Traffic-safety protection	5.30		
37	Smart Safety	S73	Smart emergency response system	5.30		
S8	Virtual Tourism Attraction	S81	Virtual tourism experience	5.30		

	Resident Consumer (RC)					
Smart Tourism Dimension			Smart Tourism Indicators	Fuzzy Weight		
	6	S11	Tourist attraction home page	6.26		
C 1	Smart	S12	Mobile application	5.37		
51	System	S14	Online information access	5.37		
	System	S17	Blogs of tourist attractions	6.26		
	Smart Sightseeing	S21	Intelligent-guide system	5.37		
S2		S22	Personal-itinerary design	5.37		
		S24	E-tour map	5.37		
S3	Intelligence Tourism Management	S36	E-complaint handling	5.37		
C 4	E-commerce	S41	Mobile payment	5.37		
54	System	S43	Online booking	6.26		
S6	Smart Traffic	S62	Smart vehicle sheduling	5.00		
		S72	Traffic-safety protection	5.37		
S7	Smart Safety	S73	Smart emergency response system	5.37		
		S74	Smart environment	5.37		
S8	Virtual Tourism Attraction	S83	Augmented reality	5.30		

Touristic supplier (TS)					
Smart Tourism Dimension			Smart Tourism Indicators		
		S11	Tourist attraction home page	5.22	
с.	Smart	S12	Mobile application	5.07	
31	System	S14	Online information access	5.07	
		S17	Blogs of tourist attractions	5.15	
	Smart Sightseeing	S21	Intelligent-guide system	5.07	
S2		S22	Personal-itinerary design	5.07	
		S24	E-tour map	5.07	
	Intelligence Tourism Management	S36	E-complaint handling	5.07	
S3		S37	Electronic-ticketing system	5.07	
ς ،	E-commerce System	S41	Mobile payment	5.07	
34		S43	Online booking	5.22	
S5	Smart Forecast	S54	Weather forecast	5.07	
S7		S72	Traffic-safety protection	5.07	
	Smart Safety	S73	Smart emergency response system	5.07	
		S74	Smart environment	5.07	
S8	Virtual Tourism Attraction	S81	Virtual tourism experience	5.07	

Other Industry Supplier (OS)				
9	Smart Tourism Dimension		Smart Tourism Indicators	
	Smart	S12	Mobile application	4.48
S1	Information System	S14	Online information access	4.48
	C	S21	Intelligent-guide system	4.48
S2	Smart Sightseeing	S22	Personal-itinerary design	4.48
		S24	E-tour map	4.48
	Intelligence	S36	E-complaint handling	4.41
S3	Tourism Management	S37	Electronic-ticketing system	4.41
S4	E-commerce system	S41	Mobile payment	4.41
S5	Smart Forecast	S54	Weather forecast	4.48
		S61	Electronic toll collection	5.07
S6	Smart Traffic	S62	Smart vehicle sheduling	4.93
		S63	Real-time traffic broadcast	4.70
		S72	Traffic-safety protection	4.41
S7	Smart Safety	S73	Smart emergency response system	4.41
		S74	Smart environment	4.41
co	Virtual Tourism	S81	Virtual tourism experience	4.41
58	Attraction	S83	Augmented reality	4.41

Destination Management Organization (DMO)					
2	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight	
		S11	Tourist attraction home page	5.44	
	Smart	S12	Mobile application	4.93	
S1	Information	S14	Online information access	4.93	
	System	S15	Quick response code	4.93	
		S17	Blogs of tourist attractions	5.44	
	Current	S21	Intelligent-guide system	4.93	
S2	Smart	S22	Personal-itinerary design	5.44	
	Signiseeing	S24	E-tour map	5.44	
		S31	Smart card (band)	4.78	
	Intelligence Tourism Management	S33	Tourist-flow monitoring	5.37	
		S34	Crowd handling	5.37	
S3		S35	Smart education	4.78	
		S36	E-complaint handling	4.93	
		S37	Electronic-ticketing system	4.93	
		S39	Call-service center	4.78	
	E-commerce system	S41	Mobile payment	4.93	
S4		S42	Online coupons	4.78	
		S43	Online booking	5.44	
	Smart Forecast	S51	Festival-activity forecast	4.78	
S5		S52	Tourist-flow forecast	4.78	
		S53	Queuing-time forecast	4.78	
		S61	Electronic toll collection	4.78	
S6	Smart Traffic	S62	Smart vehicle scheduling	4.78	
		S63	Real-time traffic broadcast	4.78	
		S71	intelligent-environment monitoring	4.78	
S7	Smart Safety	S72	Traffic-safety protection	4.93	
		S73	Smart emergency response system	4.93	
		S74	Smart environment	4.93	
	Virtual Tourism	S81	Virtual tourism experience	4.93	
S8	Attraction	S82	Virtual travel community	5.96	
	, and choir	S83	Augmented reality	4.93	

	Government					
2	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight		
	Smart	S11	Tourist attraction home page	3.59		
S1	Information System	S17	Blogs of tourist attractions	3.59		
	Intelligence	S35	Smart education	4.70		
S3	Tourism Management	S36	E-complaint handling	5.00		
S4	E-commerce system	S43	Online booking	3.59		
		S61	Electronic toll collection	4.56		
S6	Smart Traffic	S62	Smart vehicle scheduling	4.56		
		S63	Real-time traffic broadcast	4.93		
S7		S71	intelligent-environment monitoring	4.70		
	Smart Safety	S72	Traffic-safety protection	4.70		
	,	S73	Smart emergency response system	4.70		
		S74	Smart environment	4.70		

	Non-Government Organization (NGO)					
5	Smart Tourism Dimension		Smart Tourism Indicators	Fuzzy Weight		
	6	S11	Tourist attraction home page	3.59		
с.	Smart	S12	Mobile application	3.30		
51	System	S14	Online information access	3.30		
		S17	Blogs of tourist attractions	3.59		
	Smart Sightseeing	S21	Intelligent-guide system	3.30		
S2		S22	Personal-itinerary design	3.30		
		S24	E-tour map	3.30		
	Intelligence Tourism Management	S35	Smart education	4.70		
S3		S36	E-complaint handling	5.07		
S5	Smart Forecast	S54	Weather forecast	3.30		
S7		S71	intelligent-environment monitoring	5.07		
	Smart Safety	S72	Traffic-safety protection	5.07		
		S73	Smart emergency response system	4.48		
		S74	Smart environment	5.07		