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ABSTRACT

This research identifies the multi-channel electronic service quality of Thai e-tourism including various online channels such as websites, social networks, smartphones, and Internet of Things, and their impact on cognitive image. The analysis of the factors of electronic tourism based on the survey from Thai and foreign tourists, the service quality of multichannel E-tourism consists of 8 factors: tangibility, responsiveness, reliability, trust, accessibility, ease of use, real time IoT, and security. The results of the study showed that the tourists considered the service quality via the Internet of Things technology important because of immediate responsiveness through devices and applications which can create cognitive and affective image.

Keywords: E-service quality, multi-channel e-service quality, e-tourism, cognitive image

INTRODUCTION

Electronic tourism (E-Tourism) provides faster service to customers, generates more income, and reduces costs. E-tourism provides tourist information and services, makes contacts, shares information, and publishes video clips and pictures anytime and anywhere. These advantages of E-Tourism are considerably important to the tourism industry relating to services that can be provided directly to tourists in a digital format (Buhalis & Law, 2008). Tourists prefer E-Tourism to search for information and services from websites, exchange viewpoints via social networks, and use other tourist services. Tourists are able to search for information, make contacts for choosing places to go through various channels. The Internet of Things is a technology that allows the connection of devices and to intelligently manage a service process automatically with minimum human intervention. The Internet of Things also connects E-Tourism applications to communicate with destinations and services, for example tourist attractions, restaurants, geography, and weather. This technology is very beneficial to tourists and related businesses by adding value and optimizing business operations (Buhalis & Amaranggana, 2014). The IoT is very crucial to support a "Smart Tourism Destination". It requires infrastructure that supports the connection of information technology and communications with digital tools and the devices of tourists in order to facilitate the search for information, improve resource management, and create an impressive travel experience for tourists (Chui *et al*. 2010).

The government plays an important role to formulate a policy and plans to change a tourist city into a "Smart Tourism Destination". The Thai government has proposed investment to stimulate a continuous growth of the tourism industry in the future. This goal is a challenge for the government and agencies concerned because many countries are developing their tourist attractions and implementing smart cities as well. Tourism is one of the major sectors for Thailand and requires a continuous growth. The government needs to constantly promote tourism as one of the five main strategies of the tourism development plan, in particular increasing the quality of Thai E-Tourism to create the positive image of tourism to Thai and foreign tourists.

The objective of this research is to identify the feature of the electronic service quality of Thai e-tourism including various online channels such as websites, social networks, and smartphones. It includes the service quality via the Internet of Things. The impact of multi-channel service quality factors on cognitive image was investigated.

LITERATURE REVIEW

Electronic Service Quality (E-Service Quality)

The concept of service quality has been studied for a long time, particularly the SERVQUAL Model by Parasuraman *et al*. (1985) that assessed the attitude of consumers or users toward the service quality of human service providers. There are 10 factors determining service quality including reliability, responsiveness, competence, access, courtesy, communication, credibility, security, tangibles, and customer understanding. Grönroos (1994) adopted two main factors to evaluate a service quality, functional and technical quality.

The Internet has been used to provide customers with services ranging from the creation of an organization's website to give information and services to customers to the website and further formation of an organization's social networks to communicate with customers and members of the network (Beldona & Cai, 2006; Bevanda *et al*. 2008; Chow & Sheung, 2008; Ho & Lee, 2007; Shchiglik & Barnes, 2004). Service quality has been applied to services via the Internet or the electronic service delivery such as the E-S-QUAL (Parasuraman *et al*. 2005), the SITEQUAL Model (Yoo & Donthu, 2001) and the e-SQ Model*et al*. (Zeithaml *et al*. 2002). However, the results of this research somewhat vary. Some researches studied only some aspects of service quality such as a quality of information (Barnes & Vidgen, 2003; Lee & Lin, 2005; Lu *et al*. 2012; Parasuraman *et al*. 2005). Others focused only the quality of information and technology (Ranganathan and Ganapathy, 2002). Rotchanakitumnuai (2008) studied features of the whole process of electronic service including integrated website design, service design, technology, and customer service quality.

In terms of e-tourism, Babu and Subramoniam (2015) analyzed the quality of E-tourism through websites using SERVQUAL including reliability, access, responsiveness, ease of use, security, tangibles, trust, personalization, credibility, and empathy. In past studies, the quality of multichannel electronic service in the tourism industry has not been studied yet.

Multichannel e-service quality
Multichannel e-service quality is assessed by tourists or users of online channels including websites, social networks, mobile phones, email, etc. (Chatterjee, 2010; Sousa & Voss, 2011; Vesa & Heck, 2005). Currently, the Internet of Things Technology has become a fast and convenient channel of communication and information search for tourists via mobile devices. However, the management of multichannel electronic service quality becomes essential to the country's image and benefits for the tourism industry (Choi & Kimes, 2002; Lai, 2010; Pearce, 2009; Pearce & Taniguchi, 2008). Multichannel e-service quality is an overall quality evaluated by the tourists through online channels such as websites, social networks, mobile phones, and email. This research will identify the service quality of multichannel electronic service delivery. The importance of the Internet of Things in providing quality online information and service delivery to tourists is considered.

The Internet of Things
Information technology and the Internet have been employed in the service industry, particularly in the tourism industry, especially wireless communication system and mobile devices which are widely used. The link between tourists and the cyber world has moved forward to a connection without human beings which is called "Cyber-Physical System (CPS)". This means communications can be done through information technology and communications. The Internet of Things is one of the CPS technologies. The Internet of Things Technology helps the connection of operations of devices able to work autonomously and more intelligently with less human intervention. The IoT also creates a connection of the Internet to communicate with the external systems and activities that are processed and calculated automatically. For example, the Internet of Things consisting of RFID (Radio Frequency Identification) and Sensors embedded in devices connected to the Internet to exchange information. The Internet of Things brings about considerable benefits to the logistics business, production control, environment control, climate forecast and healthcare because the IoT can communicate from device to device or from device to human beings. For the tourism industry, the IoT can improve the process of services to be more productive, for instance, an application that provides real-time tourist information and location-based services to identify attractive destinations or restaurants nearby (Buhalis & Amaranggana, 2014; Buhalis & Law, 2008).

Cognitive and Affective Image
Cognitive evaluation refers to beliefs and knowledge about an object whereas affective evaluation refers to feelings about the object (Baloglu & Brinberg, 1997; Lee & Lijia, 2011). Cognitive destination image can be measured based upon images of natural environment, built environment and technology, socially responsible environment (Baloglu & Brinberg, 1997). In the tourism literature, cognitive and affective destination image is the antecedent of destination behavior, which in turn affects tourist' behavioral intentions towards the destination.

RESEARCH METHODOLOGY
This research project collected data from a sample of Thai and foreign tourists. Judgment sampling was used by selecting the behavior of tourists who searched for travel information from the Internet or used travel services through the Internet. The questions were developed from the literature review. The items were reviewed and tested by e-commerce experts. The edited questionnaire

was translated from Thai to English with a back translation to Thai to ensure that the Thai and English questionnaires were consistent. The details of respondents are presented in Table 1.

Table 1**:** Respondent Profile

Detail	Foreigner		Thai	
	No.	%	No.	%
Gender				
Male	59	48.0	60	41.7
Female	64	52.0	84	58.3
Age				
< 20	9	7.3	0	0.0
20 – 30	61	49.6	54	37.5
> 30 – 40	31	25.2	41	28.5
> 40 – 50	12	9.8	30	20.8
> 50 – 60	7	5.7	19	13.2
> 60	3	2.4	0	0.0
Education				
Lower than Undergraduate	16	13%	5	3%
Undergraduate	59	49%	84	58%
Master	39	32%	54	38%
Doctoral	7	6%	1	1%

DATA ANALYSIS

Confirmatory factor analysis indicated that the weight of factor loading of each variable passed the requirement specified, more than 0.5. Tangibility had the highest weight of factor loading at 0.917 followed by responsibility (0.912), reliability (0.906), trust (0.868), accessibility (0.863), ease of use (0.849), real time IoT (0.757), and security (0.675). The composite reliability showed high reliability. All components have an average variance extracted demonstrating that the measurement has discriminant validity (Table 2)

The descriptive statistics of e-service quality of a multichannel e-service show that security was the highest at 4.45 (Table 2). A majority of tourists agreed that the most important variable of security was that users' personal data are kept confidentially, with a sore 4.58 (Table 2). Next, a channel for online tourism services should have a reliable security technology (4.49), and no risk of fraud when making a travel itinerary via online channels (4.25).

The results of the analysis of variance of the Thai and foreign tourists indicated that the mean scores of security were significant at the 95% level of confidence, except maintenance of personal data of travel service users (Table 2).

All variables of reliability had an average score of 4.22 (Table 2). The most important variable was the information on reliable websites of travel service providers (4.30). This was followed by the technologies on reliable websites providing travel services (4.22). The ANOVA found that there is no significant difference in the reliability of information between Thai and foreign tourists (Table 2).

The ease of use for multichannel service quality was the next priority with a mean of 4.17 (Table 2). Well-designed websites with multichannel had an average score of 4.21. Websites that are designed to be simple with a variety of digital devices such as notebook and smartphone were rated at 4.18. The ANOVA showed that the ease of use with multichannel is significantly different between Thai and foreign tourists (Table 2).

The tourists mostly agreed that the trust in the electronic tourism providers was important. Trust in electronic tourism providers had an overall mean score of 4.14 (Table 2). The average scores of 3 items of trust. These were the problem-solving ability of customers employing tourism services through online channels (4.16), reliable travel services through online multichannel (4.14), and the problem-solving ability of customers employing tourism services through online channels (4.11). Based on the ANOVA, there are some significant differences in trust in the electronic travel service providers between Thai and foreign tourists (Table 2).

Responsiveness had an average of all variables at 4.01 (Table 2). Overall, the tourists considered the importance of providing a quick assistance (3.97) and an immediate enquiry service to users of various online service providers (3.98). The ANOVA showed that the average of responsiveness and its three items were significantly different between Thai and foreign tourists (Table 2).

Tangibility factor had an overall mean score of 3.99. The tourists found that providing clear information on services and products via multichannel (4.15) and providing package tour information meeting customers' need were important (4.05). Having pictures, videos and 3D images to demonstrate products and services through online channels was rated at 3.77. The ANOVA indicated significant difference of all items except providing package tour information meeting customers' need (Table 2).

The accessibility factor had an average score of 3.98. The tourists agreed that providing a contact information on a website, for example email, Facebook and telephone, were very important at an average 4.29. Providing a service system via mobile phone that the tourists can use at any time was rated at 3.88. Having online channels for public relations and communication with customers such as Facebook and Twitter scored 3.76. The average of accessibility and variables were significantly different between Thai and foreign tourists (Table 2).

The quality of real time IoT had an average of 3.80. The three items had an average lower than 4.00. The infrastructure of the Internet of Things of the public or private sector is already available to connect tourists' digital devices to provide more convenient tourist and travel information or assistance had a score of 3.92. The average score of the real time IoT was significantly different between Thai and foreign tourists (Table 2).

Table 2: Confirmatory factor analysis, descriptive and ANOVA analysis

Factor / Item	Factor Loading	Thai Tourists		Foreign Tourists		All Tourists		Sig.
		Mean	S.D.	Mean	S.D.	Mean	S.D.	
Reliability (CR = 0.777, AVE = 0.525)	0.906	4.26	.637	4.16	.680	4.22	.659	.203
Tourism service providers have websites to provide correct information.	0.690	4.29	.754	4.31	.850	4.30	.800	.885
Tourism service providers have websites to provide complete information and pictures.	0.680	4.24	.774	4.13	.876	4.19	.824	.314
Tourism service providers have web channels to make reservation or other tourism services.	0.639	4.22	.805	4.07	.856	4.15	.832	.140
Tourism service providers use reliable technology on website to provide tourism services.	0.712	4.31	.729	4.13	.876	4.22	.805	.079
Accessibility (CR = 0.792, AVE = 0.562)	0.863	4.29	.676	3.65	.861	3.98	.833	.000**
Tourism service providers provide contact information on website e.g. email, Facebook, telephone number.	0.680	4.44	.702	4.12	.965	4.29	.851	.002**
Tourism service providers have mobile applications to provide online services at any time.	0.850	4.26	.903	3.46	1.157	3.88	1.105	.000**
Tourism service providers use other online channels to contact their customers e.g. Facebook Twitter.	0.707	4.16	.792	3.31	1.103	3.76	1.042	.000**

**Sig < .05

Table 2: Confirmatory factor analysis, descriptive and ANOVA analysis

Factor / Item	Factor Loading	Thai Tourists		Foreign Tourists		All Tourists		Sig.
		Mean	S.D.	Mean	S.D.	Mean	S.D.	
Responsiveness (CR = 0.815, AVE = 0.596)	0.912	4.22	.816	3.78	.779	4.01	.827	.000**
Tourism service providers reply user question via online channels responsively.	0.714	4.21	.912	3.87	.937	4.05	.939	.002**
Tourism service providers assist users via online channels immediately.	0.751	4.21	.925	3.71	1.015	3.97	.998	.000**
Tourism service providers use a variety of online channels to provide service to solve user problems faster e.g. website, Facebook.	0.844	4.24	.812	3.69	1.004	3.98	.948	.000**
Ease of Use With Multichannel (CR = 0.853, AVE = 0.659)	0.849	4.33	.708	3.99	.848	4.17	.794	.000**
Website of tourism service providers was designed for users to search information easily with a variety of digital equipment e.g. Notebook, Smartphone.	0.804	4.34	.766	3.99	.980	4.18	.890	.001**
Website structure of tourism service providers was designed for users to make transaction easily with variety of digital equipment e.g. Notebook, Smartphone.	0.823	4.31	.787	3.88	.989	4.11	.913	.000**
Website of tourism service providers uses a well-organized structure for users to enact a transaction easily with the least amount of effort.	0.807	4.34	.764	4.06	.944	4.21	.864	.010**
Security (CR = 0.714, AVE = 0.515)	0.675	4.59	.588	4.30	.645	4.45	.632	.000**
E-tourism is low risk of transaction embezzlement via a variety of online channels.	0.729	4.57	.769	3.89	.835	4.25	.869	.000**
Online tourist service channels must use reliable secure technology.	0.655	4.58	.635	4.39	.756	4.49	.701	.025**
Tourist service providers must keep users privacy.	0.627	4.63	.650	4.54	.785	4.58	.717	.290
Trust (CR = 0.823, AVE = 0.608)	0.868	4.30	.709	3.97	.656	4.14	.702	.000**
Tourist service providers can solve customer problems via a variety of online channels.	0.769	4.28	.787	4.02	.890	4.16	.845	.014**
Tourist service providers can provide reliable tourism service via a variety of online channels.	0.783	4.31	.795	3.96	.811	4.14	.819	.001**
Tourist service providers are willing to assist online users via a variety of online channels.	0.783	4.31	.830	3.89	.758	4.11	.822	.000**

**Sig < .05

Table 2: Confirmatory factor analysis, descriptive and ANOVA analysis

Factors / Items	Factor Loading	Thai Tourist		Foreign Tourist		All Tourist		Sig.
		Mean	S.D.	Mean	S.D.	Mean	S.D.	
Tangibility (CR = 0.745, AVE = 0.533)	0.917	4.11	.745	3.86	.734	3.99	.750	.004**
Websites of tourist service providers demonstrate information of services and products via a variety of online	0.716	4.31	.786	3.97	.799	4.15	.809	.001**

channels clearly.								
Websites of tourist service providers have pictures, video, and 3D pictures to demonstrate services and products via a variety of online channels clearly.	0.698	3.91	.941	3.61	1.070	3.77	1.014	.013**
Websites of tourist service providers provide information about traveling packages which respond to customers' needs.	0.688	4.14	.858	3.95	.884	4.05	.874	.088
Real Time IoT (CR = 0.806, AVE = 0.580)	0.757	4.03	.872	3.55	.944	3.80	.937	.000**
Tourist service providers use Internet of things technology to link with digital devices of tourists for providing travel and transportation information or assistance e.g. putting a sensor in tourist's luggage that can be tracked where it is via an application on a smartphone.	0.747	3.96	1.007	3.54	1.160	3.76	1.101	.001**
Tourist service providers use Internet of things technology to link with digital devices of tourists for making transactions or services more convenient e.g. tourist can open a hotel room with his/her smartphone in which an interactive key has been downloaded.	0.788	4.04	.936	3.38	1.154	3.73	1.095	.000**
Internet of things technology infrastructure of Thai government / private sectors is available to link with digital devices of tourists for providing information, making service transactions, and requesting for assistance more conveniently e.g. A tourist is reminded if he/she is late for boarding and a map guides him/her to the gate from his/her smartphone.	0.744	4.09	.971	3.74	1.128	3.92	1.061	.008**

**Sig < .05

Path analysis was conducted to determine the impact of multichannel factors on cognitive image. Table 3 showed that reliability and real-time IoT have the greatest impact on cognitive and affective image. Ease of use of multichannel has positive impact on affective image. Accessibility has negative impact on cognitive and affective image. Security has negative impact on enhancing affective image.

Table 3: Impact of Multichannel Service Quality on Cognitive and Affective Image

Factor	Cognitive Image		Affective Image	
	Coefficient	Sig.	Coefficient	Sig.
Reliability	.613	.010**	.437	.000**
Accessibility	-.117	.002**	-.548	.000**
Responsiveness	.928	.354	.066	.468
Ease of Use With Multichannel	.538	.591	.361	.005**
Security	-1.183	.238	-.443	.001**
Trust	1.300	.195	.068	.713
Tangibility	-.796	.427	.054	.780
Real Time IoT	.526	.000**	.269	.002**

**Sig < .01

CONCLUSION AND DISCUSSION

This study has expanded the research on the quality of electronic tourism of Thailand using multiple channels including websites, Facebook, Twitter, smartphones, and the Internet of Things. According to the analysis of the factors of electronic tourism based on the survey from Thai and foreign tourists, the service quality of multichannel E-tourism comprises 8 factors: tangibility, responsiveness, reliability, trust, accessibility, ease of use, real time IoT, and security. The results of the study showed that the tourists considered the service quality via the Internet of Things technology important because of immediate responsiveness through devices and applications. The Internet of Things is a key factor in the quality of electronic tourism that Thai tourism entrepreneurs need to focus on.

For the quality of the electronic tourism service, security is the top priority. This means that channels of online travel service need to have a reliable security technology. The personal data of the users and travel transactions through online channels must have no risk of fraud. The study also confirmed the similar results of past studies that security quality plays an important role in the creation of e-service quality.

Tourists concentrate on the importance of reliability of information, which is the next priority including websites of service providers and technologies. Thai and foreign tourists' emphasis this factor is important, particularly the reliability of the information on the websites of tourist service providers.Ease of use with all channels is another important factor including access to websites and travel transactions via digital channels. Thai and foreign tourists rated the reliability of the information on the websites of tourist service providers as critical. This factor is important as it has major impact on cognitive image creation.

The score for trust supports previous studies for both the reliability of electronic service providers and the problem-solving ability for customers to use the services through online channels. The tourists highly rated the importance of accessibility to information that enables the users to contact the travel service providers on the websites including emails or Facebook. They did not give much priority to other online channels for public relations and contact to customers through social media. Foreign tourists gave the lowest scores on this factor.

Similarly, the tourists viewed the quality of service tangibility including giving the clear information through channels and information on travel packages responding to the need of customers as very necessary. Having pictures, videos and 3D images to show the services and products relevant to tourism via online channels was less important.

Relating to the IoT technology connecting devices to receive information immediately, foreign tourists considered the quality of this aspect in Thailand relatively very low compared to the other quality factors. This can be because the country has just initially employed IoT. The creation of smart destination probably will take a very long time to develop IoT to improve the quality of Thai electronic tourism in the future as this factor have impact on cognitive creation.

Future research may expand the scope of electronic service quality through multiple electronic service channels related to specific tourist destinations such as Phuket. It may include research on the service quality of each electronic channel in order to improve the channels for further quality development.

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