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Confirmation and Validation of Smart Tourism Technology Attributes: the case study of City of Tshwane

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Abstract

The Fourth Industrial Revolution has resulted in the proliferation of the word 'smart'. The continued use and adoption of smart tourism technologies by tourists is creating a new form of tourist consumption behaviour that is influenced by smart tourism technologies. The notion of smart cities has also emerged. The city of Tshwane has been making strides to become a world class African smart city and such offers the city of Tshwane an opportunity to position itself as a smart tourism destination. Prior to such positioning, it is critical that a research aimed at investigating digital behaviour of tourists visiting the city be conducted. The objective of the current study was to identify and validate the attributes (factors) of the smart tourism technologies that influence a tourist's destination choice. The study was quantitative in nature. Data was collected by means of a questionnaire with 29 seven-point Likert-scale items. A total of 208 questionnaires were collected. Confirmatory Factor Analysis was used to reduce and validate the factors (Attributes). The study identified seven smart tourism technology attributes that influence destination choice, such factors should therefore be considered when designing smart tourism tools aimed to supporting tourist decision making.

Keywords: Smart tourism, tourists, consumer behaviour, destination choice, technology.

Introduction

Societies and economies have always been subject to change. Information and Communications Technology has successfully penetrated people's lifestyle, communication habits, consumption patterns, work place and has also impacted the context of travel and tourist behaviour (Egger, Lei & Wassler, 2020). Moreover, the 21st century has witnessed inordinate

change within the spectrum of information and communications technology (ICT) (Buhalis, 2015). Cutting-edge technologies are being created and deployed into markets, and these innovations have an enormous impact on how industries operate and function (Boes, Buhalis & Inversini, 2015). Recent developments in ICT have resulted in the creation of a new buzzword, 'smart/smartness'.

The concept of smartness spread in the late 2000s and refers to the integration of ICT into sub-systems in order to improve processes (IBM, 2015). Continued development and innovation in ICT has resulted in the development of concepts such as smart planet, smart city, smart tourism, smart tourism destination and smart homes (Buhalis & Amaranggana, 2014; Hollands, 2015; IBM, 2015). Because tourism is mainly service dominant, its success and development depends primarily on process innovation in which information technology (IT) has played an important role in initiating services processes. Although such innovation can be traced back to the early days of computer networks for flight ticketing and hotel reservations, the advancement in ICT has further innovated tourism processes in ways that have developed online travel agencies such as Expedia.com. It can, therefore, be posited that the birth of smart tourism has taken place (Gretzel, Sigala, Xiang & Koo, 2015; Yoo, Kim & Sanders, 2016). The modern hand held device (smartphone) has created new avenues and frontiers which allows for instant information retrieval and sharing, which then affect tourist behaviour i.e decision making in profound ways (Egger, et al., 2020). Smart tourism is referred to as the conjunction of IT devices, tourism content and service, assisting tourists in travel planning, extending their cognitive boundary and enhancing decision-making with context-specific recommendations that are data driven (Yoo et al., 2016). Technology is an important infrastructure in smart tourism; it integrates software, hardware and network technologies to provide real-time data that is critical in decision-making (Kim & Law, 2015).

The primary objective of this study is to explore the concept of smart tourism and to identify the smart tourism factors that are important in persuading tourists to make destination choices through smart tourism platforms such as interactive websites, smartphone mobile applications and virtual reality. The findings of the study significantly contribute to both research and tourism practice. The study adds to the African tourism research body of knowledge since currently, there is insufficient research that addresses the influence of smart tourism technologies (STTs) on decision-making in relation to tourist destinations. Within the practice of tourism marketing, marketers can refer to the findings of the study when designing smart tourism tools that are aimed at persuading tourists in their destination choices.

Literature Review

Since 2008, the tourism industry has witnessed incredible growth of STTs such as online travel distribution channels, search technologies, virtual tourism communities and other social media channels that allow tourists to make smarter travel decisions (Gretzel et al., 2015). The growth in STTs development and adoption can be attributed to growing use of technology from the tourist perspective. According to Huang, Goo, Nam and Yoo, (2017) the growth and adoption of technologies in tourism is influenced by the global adoption of technology of which in 2015, the number of smartphone users was at 1.9 billion, whilst the number of internet users was at 3.2 billion. The notion of smart tourism can, therefore, be seen as a gradual evolution in tourism process innovation that is influenced by ICT development and widespread technological adoption (Wang & Xiang, 2012). The growth and development of smart tourism as a concept and practice can be attributed to the accelerated trend of mobile technology adoption, the growing capabilities of embedded technologies, the use of sensors, the adoption of smartphone mobile applications, the growing prevalence of interactive mobile websites and online transaction capabilities (Sigala, 2015).

The adoption of smart tourism by tourism service providers is fuelled by the need to meet tourists' demand for smart tourism. However, this demand is being directed by Generation Y tourism consumers whose behaviour is less understood (Femenia-Sera & Neuhofer, 2018). Buhalis and Law (2008) noticed that the development of ICT is creating a new breed of tourists who are referred to as smart tourists. Smart tourists present digitally influenced demands that include (1) pursuing personal travelling preferences and schedules, (2) valuing time and unwilling to wait or tolerate delays, (3) searching for travel-related information through the internet, (4) booking online tickets and making online reservations, (5) making online purchases, (6) conducting price comparisons on different websites, (7) communicating in the virtual travel communities, (8) participating in the e-complaint handling system, (9) asking for multimedia services, and (10) using mobile facilities and applications such as Wi-Fi, short message service and multimedia messaging service, tourists therefore want to collect and share information about travel trends and make decisions based on information found in smart tourism platforms (Kontogianni & Alepis, 2020).

It is currently asserted that future travel consumers will be better educated, informed, more digitally active and smart (Gardiner, Grace & King, 2014). Tourism Destinations should therefore start positioning themselves as destination that can meet the digital demands of modern smart tourists. Huang et al., (2017) indicated that most of the change in tourism consumer behaviour is being propagated by the internet and information technologies. The role played by IT in shaping the nature of modern and future tourism demand and supply patterns has become very apparent since the vast majority of tourists search for travel information online. In addition, reservations and payments are being done online via websites and mobile applications (Huang et al., 2017). The impact of IT on tourism has resulted in the creation of the term 'smart tourism', which refers to tourism supported by integrated efforts at a destination to collect and aggregate data derived from physical infrastructure, social connections, government sources and human minds in combination with the use advanced technologies to transform that data into on-site experiences and business value propositions with a clear focus on efficiency, sustainability and experience enhancement (Gretzel et al., 2015). The emergence and adoption of smart tourism should therefore be viewed as an evolution in the service-scape of tourism.

It is well established that ICTs and STTs are revolutionising the tourism industry on a global scale. It should be of interest to researchers to investigate STTs and their influence within the context of African countries and cities, which have been described as digitally divided (Minghetti & Buhalis, 2010). In the presence of such a digital divide, it would be difficult for tourism destinations to position themselves as smart tourism destinations and compete in the online platforms. However, when cities embark on Smart city project, such creates opportunities for such cities to position themselves as a smart tourism destination and would then be in position to influence smart tourist decision to visit the city.

It must be noted that smart tourism is distinctively different from e-tourism, especially in conjunction with the definition of smart tourism given above. The major differentiating factor between smart tourism and e-tourism is that smart tourism technology is an infrastructure that encompasses different computing technologies, integrating hardware, software and network technologies that aim to create real-time awareness of the world, whilst analytics allow individuals to make informed decisions about what to consume (Washburn et al., 2010) on the other hand e-tourism can be viewed as a form of tourism evolution that was mainly digital, used during pre-travel and post-travel, driven by information and mainly served an intermediating purpose. The differences between smart tourism and e-tourism are conceptualised by Gretzel et al. (2015) as shown in Table 1 below. According to the table, it can be clearly deduced that smart tourism is driven by sensors and smartphones whilst e-

tourism is driven by websites, smart tourism is more of an ecosystem with stakeholders such as public-private-consumer's collaboration whilst e-tourism is more of a value chain system driven by bits of information not big data.

Table 1. Smart tourism vs e-tourism

	e-tourism	Smart tourism
Sphere	Digital	Bridging digital and physical gap
Core technology	Websites	Sensors and smartphones
Travel phase	Pre-travel and post-travel	During trip
Life blood	Information	Big data
Paradigm	Interactivity	Technology-mediated and co-creation
Structure	Value chain/intermediaries	Ecosystem
Exchange	B2B, B2C and C2C	Public-private-consumer collaboration

(Source: Gretzel et al., 215)

Tourist Decision Making

Most of the tourist decision-making models indicate that decision-making in tourism is a staged process that usually involves four stages: motivation, information search, evaluation of alternatives, and decision-making. The theory of Mathieson and Wall (1982) added two additional stages: preparation and experience, and evaluation of satisfaction. In the current digital age, a tourist's decision-making process has been subject to morphology due to the advent of extensive information available through ICT tools.

In order to fully comprehend the concept of tourist decision making, Table 2 indicates the decision making paradigms that have been influential in the study of consumer behaviour and development of tourist decision making theories.

Table 2: Consumer decision making paradigms

Decision making paradigm	**Assumptions of the paradigm**	**Source**
Classical concept of prescriptive	• Individuals collect and analyse information until an optimal solution is chosen from a set. • Decisions are driven by subjected expected utility aimed at achieving best outcome.	Edwards, 1954; Von Neumann & Morgenstern, 1944
Prospect Paradigm	• People decide between alternatives that involves uncertainty and risk. • Therefore, tourists aim to make more benefits that losses in their decision making.	Kahneman & Tversky, 1979
Bounded rationality	• Incomplete information, time constraints and cognitive capacity enforces individuals to make decisions that a good enough instead of optimal. • The theory critically assumes that because of limits tourists as actors in decision making aim to achieve some level of 'good enough' states of decision making using limited rationality	March & Simon, 1958; Simon, 1955
Contingent or Adaptive decision making	• Choice is based on cognitive or economic biases. • Problem solving strategies are used in accordance to an individual traits and characteristics.	Payne, 1982; Payne, Bettman and Johnson, 1993
Political Decision making	• Recognises the influence of groups in decision making. • It assumes that multiple inconsistent actors are less inclined to emphasize eliminating conflicts in identities and the struggle for power and coalition are two common occurrences in political decision making paradigm.	Pettigrew, 1973; Pfeffer, 1981
Naturalistic Decision Making	• The paradigm is used in the study of real world decision makers. • Applicable in high risk environments.	Klein, 1998; Lipshitz, Klein and Carroll, 2006

(Source: Author's own creation, 2020)

The paradigms presented in table 2 offers some valuable insights into the factors that consumers consider prior to decision making. The *Classical* paradigm stresses the importance of collection and evaluation of information prior making a choice, and the *prospect* paradigm involves the assessment of alternatives prior decision making, whilst bounded rationality addresses the limitation in cognitive capacity, time constraints, and incomplete information of which then results in choosing of a 'good enough' choice instead of an optimal one. The contingent paradigm addresses in influence of personal traits and biases, whilst the *Political* paradigm addresses the influence of groups such as family. All these paradigms have formed theoretical foundations in development of tourist decision making theory.

A number of theories have been developed in the context of tourism to explain the essence of tourist decision making. To a certain extent, tourist decision making theories have been influenced by three authors, which includes Crompton (1970), Moutinho (1987) and Wood-side (1989). Crompton's model argues that tourist decision making process is a two-step system wherein the first step involves generic decision of deciding to go on holiday, followed by a second step of deciding to visit a specific destination (Crompton, 1977). The former model was however further developed into a complete framework by Um and Compton (1991) wherein they developed a five step process of decision making which includes, (1) Formation of beliefs about a destination, (2) the initiation of the destination choice after decision to travel has been made, (3) the evolution of an evoked set from the awareness of destinations, (4) the formation of beliefs about an evoked destination attributes by active information search, (5) the selection of a specific travel destination form the evoked set. Um and Crompton (1991) five step process enforces the importance of information when deciding to visit a specific destination and the modern world has changed and advanced in terms of information search and retrieval.

Moutinho (1987) proposed a tourist vacation decision model which is divided into 3 phases that includes pre-purchase, post-purchase and future decision making. Moutinho argues that during pre-purchase there influences such as personality, lifestyle, role set, attitude, family set, etc., he further argues that these variables create a preference structure that enforces the nature of intention, which then predetermines information search, comprehension, biasness and develops into a choice critea which addresses perceived risk of which by aversion results into decision and purchase. Part two of Moutinho's model addresses the essence of post-purchase evaluation which addresses satisfaction and dissatisfaction of which then influences part three of the model which is future decision making. Form moutinho's model it can be deduced that the decision to purchase is influenced by variables such as personality, family, motives and satisfaction thereof influences future decision making. Woodside and Lysonki (1989) proposed a model which was essentially similar to Um and Crompton's model. Woodside and Lysonki the destination choice of tourists is influenced by marketing variables (Marketing mix), traveller variables (previous experience, socio-demographics, lifestyle), destination awareness and traveller destination preferences which then in turn creates intention to visit moderated by situational variables and as such results in destination choice.

Smart tourism has created impacts and changes within the tourism industry, including how tourists make consumption decisions. The classical concept of decision-making argues that individuals collect and analyse information and thereafter select an optimal solution from the alternatives (Von Neumann & Morgenstern, 1944; Edwards, 1954; Smallman & Moore, 2010). In addition, smart tourism has affected information availability, information access and information relevance. Much work has been done within the tourism decision-making context (Schmoll, 1977; Mathieson & Wall, 1982; Mansfeld, 1993; Middleton & Clarke, 2001; Lew & McKercher, 2006; Litvin, Goldsmith & Pan, 2008; Sigala, 2010). The advent and growth of ICT in tourism has caused some form of change in tourist decision making process. Tourists

no longer seek traditional sources of information such as print media. Tourists make use of online comparison tools such as expedia.com, tripadvisor, trivago, hotels.com etc; they make travel decisions based on technological tools used, and they prefer online transactions and cashless consumption. Figure 1 demonstrates the role that ICT plays in tourist decision making process. From the figure it becomes clear that ICT plays a critical persuasive role when tourists make a decision to purchase a tourism product of which in the context of the current study the decision is to visit a destination.

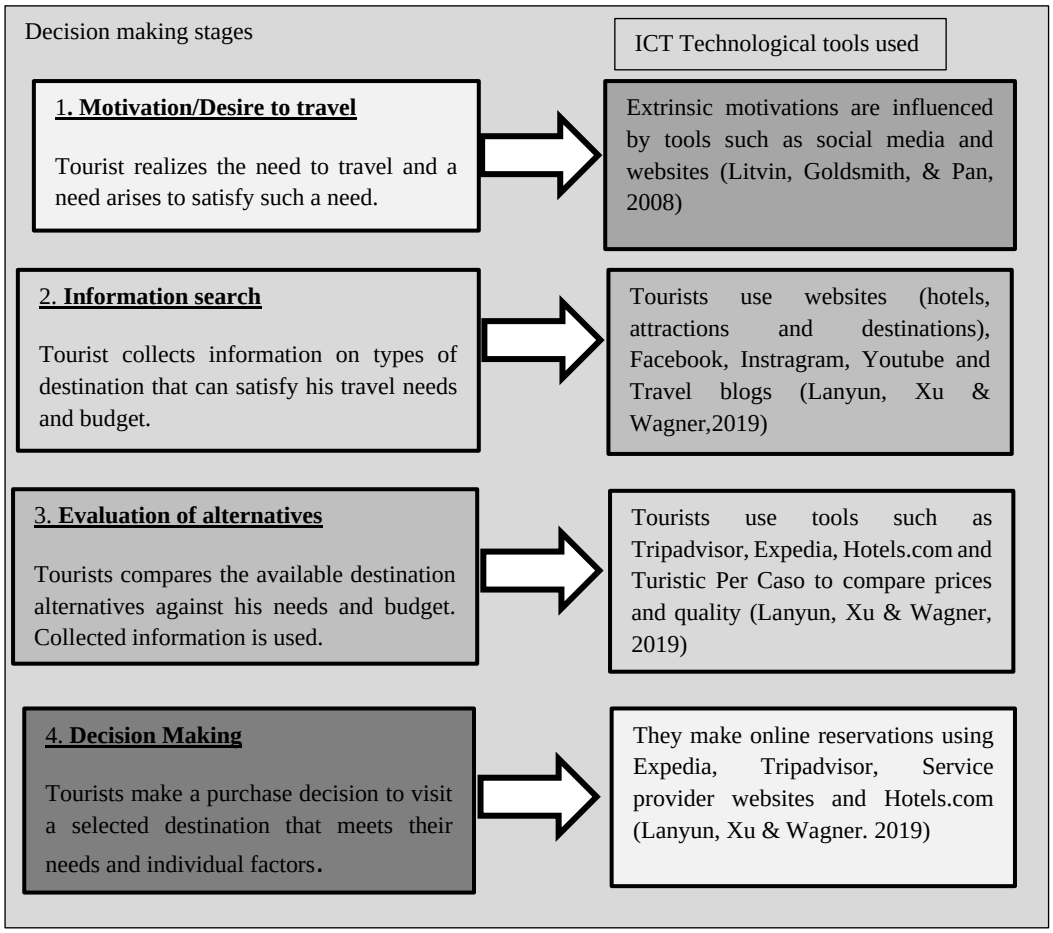

Figure 1: Impact of ICT on tourist's decision making
Source: Author's own creation

Smart tourism technologies sustain travellers in a variety of ways, including 1) sharing their travel experiences so that they can help other travellers in their decision-making process; 2) enhancing traveller's on-site experiences by providing relevant information; 3) anticipating user needs and making relevant recommendations; and 4) enhancing tourists' decision-making processes (Gretzel et al., 2015). By 2015, the number of internet users had reached 3.2 billion, with 1.9 billion people using smart phones (Huang et al., 2017). According to Xiang et al., (2015), the majority of information searches and reservations are done online, representing internet usage saturation point. This means that STTs are being used for decision-making purposes, transaction purposes and sharing purposes. Table 3 below summarises some of the STTs used by tourists.

Table 3. Smart tourism technologies used by tourists

Smart Tourism Technology	Usage from Tourist Perspective	Source
Internet (websites)	Travel-related searches and transactions; price comparisons	Huang et al. 2015; Xiang et al. 2015; Lanyun et al. 2019
Mobile Applications	Making transactions; interacting with tourism service providers; accessing information	Xiang et al. 2015
Geo-Tagging	Smart recommender systems used by tourists in order to improve their experiences whilst at the destination	Gretzel, 2011; Sigala & Chalkiti, 2014; Gretzel et al. 2015
Social Media	Use of social media to search for information and to share information with society	Xiang & Gretzel, 2010
Internet of Things and Cloud Computing	Although not technologies used by tourists directly, these are used by service providers to store, correlate and suggest products and services to tourists, which ultimately increases the usage of other tools and tourists' satisfaction	Xiang et al. 2015

(Source: Author's own creation, 2020)

The conceptual framework of this study is based on that of Yoo et al. (2016), which used attributes of STTs as factors within the central and peripheral route of the Elaboration Likelihood Model (ELM) of persuasion. The core of the ELM is that the elaboration continuum is based on a person's motivation and ability to think about and assess the qualities of the issue that is relevant in the persuasion context (Petty & Cacioppo, 1986). Therefore, when subjects have high motivation and high ability, the elaboration likelihood, which is change in attitude, will be high. Modern technologies such as the internet and mobile technology are prevalent within the travel industry, posing an impact on the consumption behaviour of tourists (Wang, So & Sparks, 2017).

Such a paradigm shift can be comprehended through a usage analysis of the ELM, which is modified to accommodate attributes of STTs as variables within the dual route of persuasion. An adopted theory of ELM was used by Yoo et al. (2016) and was implemented in this study to achieve the objectives of the study. The theoretical variables used in the current study were most fitting since they were the attributes of STTs that were used by other researchers such as Yoo et al. (2016). Information relevance was added as a variable because although information may be of good quality, if the information is not relevant, it will not induce a positive behavioural intention. Within the conceptual framework, travel decision is regarded as one of the main functions of STTs and thus was adopted as the persuasion construct. The theoretical variables used in the current study are discussed below.

Information quality

Petty and Cacioppo (1986) refer to a strong message/information as containing arguments that are considered agreeable by a subject and consequently generate predominantly favourable thoughts. In their study Petty and Cacioppo (1986) indicated that a message can be classified into two, that includes strong and weak messages that relates to a specific, further more they referred to a topic of raising tuition fees at a university, they then subjected respondents to rating the strength of two messages that relates to the topic (Message 1:We should raise tuition so that more books can be purchased for the library; Message 2: we should raise tuition so that more trees can be planted in campus), from their analysis they found that respondents viewed message 1 to be of strong nature and more persuasive, the authors further found that respondents rated message 1 as being strong because it raised predominantly positive thoughts. Furthermore, messages demonstrating poor information quality generate unfavourable thoughts about the information. Yoo et al. (2016) indicate that information quality encourages rational and cognitive judgement rather than emotional judgement. Moreover, the quality of information depends on its persuasiveness and completeness. Persuasiveness is defined as the extent to which the reader views the argument contained in the information as convincing (Luo

et al., 2013). Therefore, the message and its appeal must be persuasive in order to influence a consumption or purchase decision.

Information relevance

Relevant information is information that creates a meaningful task-orientated response (Streufert, 1971). Studies have found that an increase in information that is considered irrelevant has a negative effect on persuasion and performance (Giambra, 1969; Edmonds & Mueller, 1970; Goldstein & Allen, 1971; Hodge & Reid, 1971). However, in the context of smart tourism persuasion, information relevance has not been studied as a factor that determines the outcome of smart tourism-based persuasion. Information relevance is directly related to information quality (Yoo et al., 2017); however, the relevance is influenced by the motivation of the tourists. If persuasive information presented to a tourist does not relate to his/her travel motivation, it is less likely that such a tourist will experience attitude change.

Source credibility

Source credibility can be referred to as the reader's perception of the expertise and trustworthiness of the source of the information. A highly persuasive argument and a credible source will have a stronger influence on attitude change than highly persuasive information with less credibility (Eagly & Chaiken, 1975; Eagly, Wood & Chaiken, 1978).

Interactivity

Tan et al., (2018) refer to interactivity as a high level of consumer and buyer engagement. Interactivity is, therefore, a psychological state of mind experienced by users of STTs during the interaction process. The dimensions of interactivity include two-way communication, synchronicity and active control (Hackel, 1998). Jensen et al. (2014) argue that interactivity should include a degree of information exchange, responsiveness to the consumer's request and the consumer's ability to control the available information. Modern interactive websites and mobile applications determine the degree of information exchange by including chatbots in websites and smartphones, such chatbots are able to generate reports on information exchange in the platform. Literature indicates that users of STTs perceive smart tourism tools and systems as collaborating when they are reciprocal, responsive and speedy in response. Cyr et al. (2018) indicate that the creation of online interactivity and connectedness of technological tools aids business organisations in converting users of technological tools into customers.

Accessibility

Accessibility refers to the degree to which tourists can easily access information from STTs (Huang et al., 2017). Highly interactive STTs allow for ease of use, which positively facilitates tourists' search for information and comparisons in addition to their purchase choice and expression of post-purchase behaviour (Li & Huang, 2013; Huang et al., 2017). Thus, the accessibility of STTs positively influences a tourist's purchase decision.

Self-efficacy

Within the conceptual framework, self-efficacy serves as the elaboration likelihood moderator since the usage of STTs is voluntary. Self-efficacy moderates the effects of central and peripheral cues for the travel decision. From a psychological viewpoint, self-efficacy refers to an individual's perceived ability of performing an activity to acquire an expected outcome (Bandura, 1997). Within the context of the current study, self-efficacy refers to the perceived ability of tourists to use STTs in order to make travel choices and arrangements.

Conceptual Framework

The conceptual framework of the study was adapted from Yoo et al. (2016). Primarily the Elaboration Likelihood Model of dual persuasion which was first developed by Petty and Cacioppo (1986) is used as adapted by Yoo et al. (2016). The Elaboration Likelihood Model (ELM) was developed to explore, investigate attitude change through dual routes of persuasion. Petty and Cacioppo (1986) indicated that there are two simple ways in which a person's attitude can be changed, first being through the presentation of quality and relevant information (central route) and second being through a simple cue such as an attractive message source which induces attitude change without cognitive efforts (peripheral route).

For this study, central and peripheral routes constructs where adapted from the work of Yoo et al. (2016), within the framework information quality and information relevance were used as constructs indicating attitude change through the central route. Source credibility, interactivity, accessibility and self-efficacy was adapted as constructs within the peripheral route. The ELM was selected due to its ability in explaining attitude change and persuasion of consumers. ELM is therefore adapted as a theory to explain attitude change through smart tourism attributes in order to induce destination choice. The primary objective however is to confirm the factors i.e the attributes of smart tourism persuasion, not to test the influence of such factors on tourist destination choice.

Methodology

Study area

The study was conducted in South Africa, at the City of Tshwane (see Figure 3).

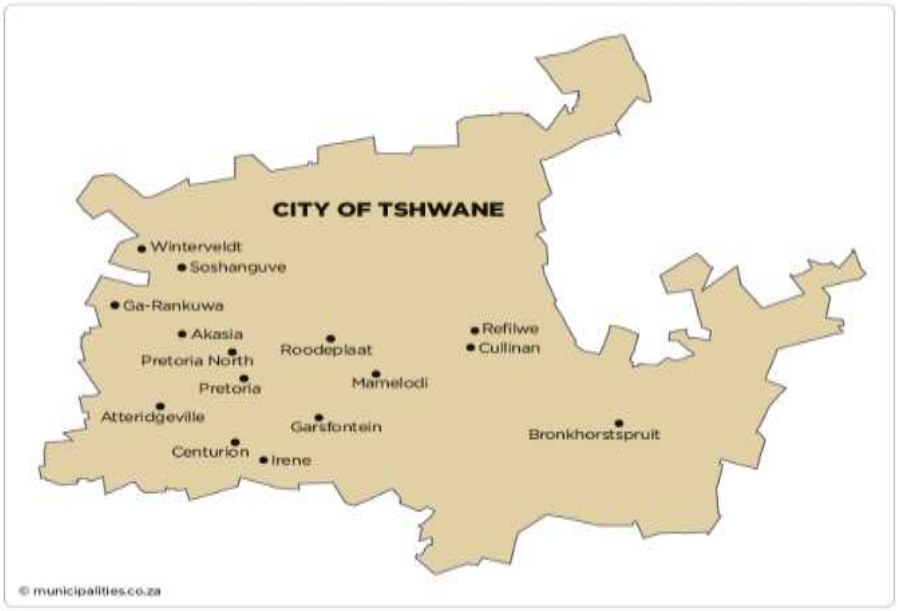

Figure 3: City of Tshwane Map
Source: Author's own creation

The research by means of a questionnaire was conducted during the summer of 2019 at local attractions and accommodation establishments within the city of Tshwane. The City of Tshwane Metropolitan Municipality is a Category A municipality situated in the Gauteng Province. It merged with the Metsweding District, which was a consequence of the Gauteng Global City Region Strategy to reduce the number of municipalities in Gauteng to at least four by 2016 (Municipality of South Africa, 2019). Figure 3 shows the city of Tshwane.

The population of the study was comprised of tourists who visit Tshwane. According to City of Tshwane (2013), the city received a total of 2 375 958 tourists between 2010 and 2011 financial year, whilst Gauteng Tourism Authority (2014) indicated that a total of 10, 3 million tourists visited Gauteng province, with the city of Tshwane getting 18, 3% of tourists (1 884 900). As such the total population of tourists visiting Tshwane is estimated to be 2 million. With regard to the population of 2 375 958 as per Gauteng Tourism Authority (2014), the sample size of 250 was chosen with reference to Israel (1992 who indicates that when one has a population size of more than 100 000 and seeking a 95% confidence interval, the researcher used a sample size of 250.

According to Tshwane smart city Project (2007), the vision of Tshwane smart city project is to continue sustained economic growth and a high quality of life for citizens, by aligning, integrating and developing a common vision between industry, research institutes, universities and local government. Through innovation projects, the city wants to create an environment that grows high technology cluster-based businesses, attracts creative people and deploy significant broadband connectivity within the city. In light of the afore mentioned, an opportunity exists for the City of Tshwane to position itself as a smart tourism destination and initiatives are currently being undertaken towards this initiative. Before such initiatives are fully rolled out, information is required that clarifies the role played by Smart Tourism Technologies with specific emphasis on tourist decisions to visit the city. Data was collected at the following tourist attractions and accommodations:

Table 4: Data collection sites

Data Collection Centre	Description of the Data collection centre	Period of data collection
DITSONG: National Museum of Natural History	Located in the city of Tshwane, Ditsong Museum of Cultural History offers exhibitions of South African cultures, the exhibitions include rock paintings of San people, Artefacts indicating ritual behaviour dating back to the early iron age and exhibitions which represents Marabastad.	19 August 2019 – 10 December 2019
DITSONG: Kruger Museum	Built in 1884 as the original home of Paul Kruger, the Kruger museum consist of two exhibition halls, Kruger house and two coaches. The exhibition halls illustrates the international admiration of the former president of South Africa.	19 August 2019 – 10 December 2019
DITSONG: Pioneer Museum	The pioneer house was built in 1848 and currently serves as an open air museum with sites and facilities for picnics. The stone building dating 1875 was built as overnight rooms and horse exchange centre.	30 November 2019 – 20 January 2020
The National Zoological Garden of South Africa	Established in 1889, South Africa National Zoological Gardens houses over 209 mammals, 190, 7 amphibian species, 93 reptiles, and 202 bird species. It is one of the renowned tourist attractions in the city of Tshwane.	15 November 2019 – 10 January 2020
Silverton Travel lodge	Silverton Travel Lodge is a luxury 4 star graded accommodation based in the city of Tshwane. The establishment offers accommodation and conference facilities.	19 August 2019 – 10 December 2019
Tsibana Guest House	Tsibana Guest House is a luxury accommodation located in Arcadia, Tshwane, a few kilometres from the University of Pretoria and University of South Africa.	19 August 2019 – 10 December 2019

(Source: Author's own creation, 2019)

The study was quantitative in nature whilst a positivist worldview was used in the quest of the study. The study undertook a cross-sectional survey design. A sample comprising 250 respondents was anticipated for the study. Respondents were approach and asked to participate in the study, they were further informed of their responses to be anonymous, furthermore respondents were informed that they are not forced to participate in the study, they were also presented with an ethical clearance letter from the university. However, 208 questionnaires

were collected and used for the study, indicating a response rate of 83%. The margin of error was calculated using the following formula:
Where:

P = sample proportion
n = sample size
N= population size
z = z-score

$$MOE = \mathrm{z} * \sqrt{\mathrm{p}} * (\frac{1-\mathrm{p}}{\sqrt{\mathrm{N}-1}}) * \mathrm{n}/(\mathrm{N}-\mathrm{n}), MOE = 1.96 * \sqrt{0.5} * \frac{1-0.5}{\sqrt{1800000-1}} * \frac{250}{180000-250} = \pm 6.198\%$$

and was deemed acceptable according to Bartlett, Kotrlik and Higgins (2001) who indicated that a Margin of Error that ranges between 3% and 8% for a confidence interval of 95% when used for survey studies. The ±6.198% Margin of Error therefore means that the statistic of the study will be within the 6 points of the study population. A probability sampling procedure was implemented using a simple random sampling technique. Respondents were randomly approached and asked to participate in the study. When respondents were in a group, only one was selected and asked to participate. Data were collected by means of questionnaires, which were distributed in strategic tourist points within the City of Tshwane as indicated in table 4.

The questionnaire consisted of 29 Likert-scale items relating to the seven smart tourism technology attributes that influence a tourist's destination choice. The 29 Likert items were adapted from previous studies. Of the 29 statements, 25 were developed with reference to previous work (Fishbein & Ajzen, 1975; Taylor & Todd, 1995; Luo, 2002; Bhattacherjee & Sanford, 2006; No & Kim, 2015; Yoo et al., 2016) and the remaining four were developed for the study, representing information relevance as an attribute/factor.

Information quality as a construct was adapted from No and Kim (2015) and Pavlou, Liang and Xue (2007) and was operationalised and represented by three Likert items representing, accuracy, sufficiency, and correctness of information contained in STTs. Source credibility was adapted from Bhattacherjee and Sanford, (2006) and was operationalised to represent trustworthiness, professionalism, etc. accessibility was operationalised to represent respondents' ease of access to STTs and was adapted from the work of No and Kim (2015). Interactivity was measured by three items adapted from No and Kim (2015) and was operationalised for the current study. In order to represent respondents' ability and confidence in using STTs, the concept of self-efficacy was adapted from Taylor and Todd (1995) and was operationalised for the current study. Destination choice was adapted from No and Kim (2015) represented by five Likert scale items. As recommended by Fishbein and Ajzen (1975), all constructs were represented by and related to the usage of STTs rather than general computer usage. Information relevance was developed specifically for this study. The collected data were analysed using SPSS version 25. Factor analysis was carried out using SPSS in order to identify the latent factors persuading tourists through STTs.

Findings

A descriptive analysis was initially conducted to analyse the demographic profile of the respondents. The analysis indicated that there were more female respondents (53.4%) than male respondents (46.6%). The majority of the respondents were within the age range of 16–25 years (42.8%), followed by those in the age range of 26–35 years (34.1%). The remainder of the respondents were in the age range of 36–60+ years. Thereafter, Confirmatory Factor Analysis (CFA) was conducted prior to conducting the CFA, reliability analysis was undertaken to determine the reliability of the data and their constructs. The analysis showed that the data set had a Cronbach's alpha based on standardised items of .814, which is greater

that the acceptable threshold of .7 as suggested by Tabachnick and Fidell (2007). Furthermore, inspection of the item-total correlation revealed the presence of coefficients ranging from .3 to .9. Hajjar (2018) recommended that the minimum acceptable value should be .3 and thus, none of the items were dropped from the analysis. A further inspection was conducted to assess the violation of multi-collinearity and singularity by evaluating the squared multiple correlation; there were no variables close to 1.0 (Tabachnick & Fidell, 2007). The determinant score was at 2.220E-7, surpassing the required criterion of .00001 and thus supporting non-violation of multi-collinearity further. It was, therefore, determined that the data were fit for CFA (Tabachnick & Fidell, 2007; Hajjar, 2008).

The 29 Likert-scale items were subjected to CFA. Prior to further analysis, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's test of Sphericity were evaluated. The general criterion is that the significance level of the Bartlett's test of Sphericity should be p <.05 to ensure that the data set has a patterned relationship and the KMO should be greater than .50 (Kaiser, 1960). Upon running the CFA, the KMO value was .774, surpassing the threshold of .50. The significance level was .000, meeting the required value of <.05. Varimax rotation was used to simplify the factor structure and to enable easy interpretation of the factors (Kaiser, 1958). Factor extraction and retention was based on the 'Kaiser criterion' and the suggestion of Tabachnick and Fidell (2007). Kaiser (1960) indicated that factors with an Eigenvalue of 1 should be retained, and Tabachnick and Fidell (2007) indicated that a factor should be composed of at least three variables. Through CFA, the factor structure of 7 components had resulted with an Eigenvalue of >1. The scree plot below shows the factor extraction and the factors that were retained.

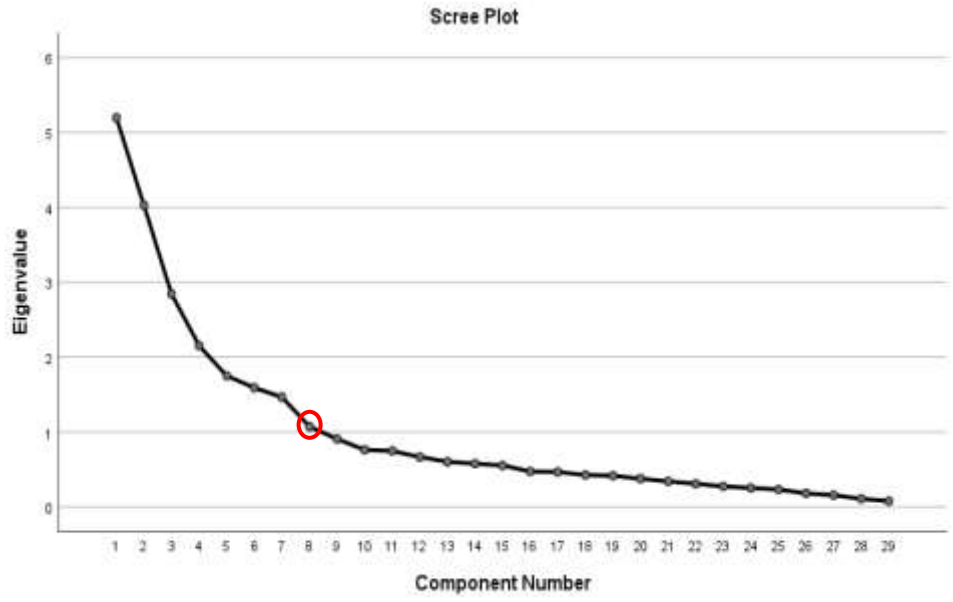

Figure 4: Scree Plot
Source: Author's Own Creation

Figure 4 above demonstrates that in total, there were eight factors with an Eigenvalue of >1. However, the eighth factor (circled in red) was not retained because it did not meet the requirement of having a minimum of three variables as indicated by Tabachnick and Fidell (2007). Therefore, a total of seven factors were retained, explaining a total variance of 65.598%. Table 5 below indicates the factor structure that was retained.

Table 5: Factor Structure

Factor	Factor loading	Eigenvalue	Variance explained %	Cronbach's alpha
Factor 1: Information Quality		1.465	5.052	.653
Tourism website and mobile applications enable me to complete my travel with detailed information provided.	.650			
Tourism website and mobile applications provide accurate information of destination and trip.	.620			
Tourism mobile applications and websites provide up-to-date information of the destination and the trip.	.656			
Factor 2: Source Credibility		1.749	6.032	.747
Tourism websites and mobile applications providing travel information and services are reliable.	.791			
Tourism websites and mobile applications providing travel planning information and services are established.	.749			
Tourism websites and mobile applications providing travel planning information and services are trustworthy.	.708			
Tourism websites and mobile applications providing travel planning information and services appear to be professional.	.599			
Tourism websites and mobile applications providing travel planning information and services are well known for their credibility.	.559			
Factor 3: Self-Efficacy		2.152	7.420	.772
I find tourism websites and mobile applications easy to use.	.722			
I have knowledge of using tourism websites and mobile applications.	.774			
I am confident in using tourism websites and mobile applications even if there is no one around to show me how to do it.	.771			
I find tourism websites and mobile applications easy to navigate.	.653			
Factor 4: Destination Choice		5.196	17.916	.943
My choice of destination is highly influenced by smart tourism technologies.	.947			
I mostly visit destinations that I can find on websites and mobile applications.	.919			
Decision support provided by smart tourism technologies improves my destination satisfaction.	.912			
Mobile applications and websites help me to choose a destination.	.893			
Smart tourism technologies improve my satisfaction with destination choice.	.819			
Factor 5: Information Relevance		2.843	9.804	.840
It is easy to relate the tourism websites and mobile applications to my travel motivations.	.872			
Many other users' questions and the relevant answers can be found on the tourism websites and mobile applications.	.847			
Tourism mobile applications and websites capture the needs of their prospective users.	.835			
Tourism mobile applications and websites provide information that is relevant to my travel needs.	.745			
Factor 6: Interactivity		4.027	13.886	.844
Tourism websites and mobile applications provide help in making more effective destination choices.	.792			
Tourism websites and mobile applications build the foundation for prioritisation when making destination choices.	.745			
Tourism websites and mobile applications provide help for better travel planning.	.726			
Tourism websites and mobile applications that I use are highly responsive to users	.726			
It is easy to share and find tourism information on the tourism website and mobile applications	.690			
Factor 7: Accessibility		1.591	5.487	.751

I can easily search the tourism websites and mobile applications on the internet.	.862			
I always have enough time to use and consider information from tourism websites and mobile applications.	.806			
I can easily access the contents of the tourism websites and mobile applications anywhere and anytime.	.745			

Table 5 clearly indicates the factors that are critical in persuading tourists through STTs. The resultant factor structure demonstrated a good model fit of 17% non-redundant residuals with absolute values that were greater than .50, as recommended by Field (2009). The identified seven factor were successfully through CFA. Factor 1 was termed information quality of which represents the quality of information that is contained and presented in smart tourism platforms, it had an Eigen value of 1.465 and representing a variance of 5.052% with a Cronbach alpha of .653. The second factor was labelled source credibility of which was addressing the credibility of information contained in smart tourism platforms and the credibility of the tool as a whole as presented in the literature review section. Source credibility as the second factor had a Cronbach Alpha of .747 and an Eigen value of 1.749 and was therefore retained as an important attribute of Smart Tourism Technology.

As presented in table 5, the third factor was labelled Self-efficacy, of which it was addressing the confidence and ability of smart tourism users in their knowledge and ability of using smart tourism tools. The factor was represented by four Likert items. Self-efficacy then had a Cronbach Alpha of .772 and an Eigen value of 2.152 and was therefore retained as an independent factor. Factor 4 was labelled Destination choice; of which it was composed of five Likert items. The factor had an Eigen value of 5.196 and a Cronbach Alpha of .943, representing a variance of 17.916% and was therefore retained as factor. The fifth factor was labelled Information relevance of which was composed of four Likert items, the factor had an Eigen value of 2.843 and a Cronbach Alpha of .840 and was therefore retained as a factor. Interactivity was the sixth factor, of which was composed of five Likert items, the factor had a Cronbach Alpha of .844, explaining a variance of 13.886 percent, whilst having an Eigen value of 4.027. The Seventh factor was labelled accessibility whilst being represented by three Likert items and having a Cronbach Alpha of .751 with an Eigen value of 1.591 and was therefore retained as a factor. All the retained factors explained a total variance of 65.598%.

Discussions

Smart tourism technologies provide a platform for tourists to search for information on aspects of a destination (e.g. tourist activities, attractions, climate and weather, cost of living, safety and security, shopping facilities, etc), make comparisons, make bookings, share experiences, post reviews, etc. Thus, STTs provide tourists with support in decision-making and offer platforms for post-purchase experience sharing. This posits that STTs are designed for persuading tourists to make purchase decisions. The question that drove this study was if STTs are designed to persuade tourists, and which factors/attributes of persuasion should these technologies have? The identification of such factors could facilitate academic research aimed at exploring the essence of persuasion through STTs. It must still be noted that it was not the objective of the study to test the influence of the identified factors on tourist's destination choice.

The primary objective of the study was then to identify and validate factors or attributes of STTs that are important in persuading prospective tourists to make purchase decisions using STTs, as per the previous literature. The study successfully met this objective by identifying seven factors that are important in persuading tourists to make purchases using smart-tourism tools, using CFA as shown in table 5. The study found that to persuade tourists to visit a specific destination, smart tourism tools/technologies must have the following attributes: (1)

information quality; (2) information relevance; (3) source credibility; (4) accessibility; (5) interactivity; and (6) self-efficacy; (7) Destination choice.

Information quality as an attribute of the STTs addressed the essence of accuracy, completeness, sufficiency and correctness of information presented in STTs information arguments. Retaining information quality as a factor was in line with Yoo et al. (2016), No and Kim (2015), and Pavlou, Liang and Xue (2007) who made similar finding. Information relevance as a newly formulated variable relates to how the information and the aesthetics of STTs relate to the travel motivation of tourists. The imaging and aesthetic design of STTs must reflect the travel interest and the motivation of tourists in order to induce persuasion. Furthermore, arguments and information must be relevant and must target specific individuals in order to increase effectiveness.

Source credibility was operationalised as referring to trustworthiness, credible information, certification and having a professional outlook. Smart tourism technologies with high source credibility are likely to induce trust and confidence, thereby persuading tourists positively Yoo et al. (2016). Both governmental and private institutions can create STT certification bodies and associations to increase the effectiveness of STTs. Accessibility refers to how easy it is for tourists to access STTs and the usability of the STTs. Apart from good quality information, when STTs are easily accessed and have good usability, they set positive cues that reinforce positive decision-making. Interactivity refers to how STTs respond to their users; the dimensions of interactivity have been said to include two-way communication, synchronicity and active control (Hackel, 1998). Jensen et al. (2014) argue that interactivity should include a degree of information exchange, responsiveness to consumer request and consumer's ability to control available information. Persuasion, however, still depends on individual user ability, which in this case is termed 'self-efficacy' and states that persuasion will only occur when tourists have the ability and the confidence to use STTs.

Conclusions and Recommendations

The primary objective of the study was to identify attributes of smart tourism technologies that are considered to be important in persuading tourists to make purchase decisions. The development of such attributes was done in line with previous literature. The study successfully managed to identify such factors of which included, (1) information quality; (2) information relevance; (3) source credibility; (4) accessibility; (5) interactivity; and (6) self-efficacy; (7) Destination choice. The findings of the study are in line with those of Yoo et al. (2016), who identified similar factors as attributes of smart tourism technologies that induce attitude change in tourists. It is recommended that the identified factors are considered when designing smart tourism tools that are aimed at persuading tourists visit destinations and/or make purchase decisions. In addition, the study has managerial implications for STT design, in the sense that when organisations design STTs they ought to ensure that they have the identified attributes/factors that have been identified in this study, furthermore in the advent of digital marketing, the study makes important contributions that informs the essence of attitude change through smart digital technologies. It is concluded that the design of STTs must ensure that tools have the attributes/factors identified in the study. Future studies should however be aimed at empirically investigating how smart tourism tools change customer attitude, and in that way more body of knowledge can be generated within the context of Africa on how consumer behaviour can be changed using smart tourism technologies.

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