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Research Paper

Smart Tourism Technology and Destination Loyalty

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Abstract: Tourism is a multi-billion-dollar industry that supports economies worldwide at all stages of development. Tourism is, therefore, deployed by various countries to support their economic growth. Saudi Arabia is among the countries that are often visited by religious pilgrims and is known for religious tourism with its many historic and natural attractions. Recently, it has expanded its focus beyond religious tourism and invested billions of USD in the tourism industry. This study investigates the impact of smart tourism technology on traveller destination loyalty in the context of Al-Ula, an emerging tourism destination in Saudi Arabia. Previously validated measures were adapted to gather information from the city's tourists. Of the total of 600 questionnaires that were distributed among tourists using convenience sampling, 445 completed questionnaires were found fit to be subjected to partial least squares structural equation modelling (PLS-SEM) for hypothesis testing. The results reveal that perceived smart tourism technology boosts its explorative and exploitative usage. Furthermore, findings suggest that the utilisation of explorative and exploitative smart tourism technology promotes experience satisfaction and destination loyalty. However, the results did not support the moderating role of tourist happiness in the relationship between experience satisfaction and destination loyalty.

Keywords: Smart tourism technology, Saudi Vision 2030, destination loyalty, travel experience satisfaction, tourist happiness

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Introduction

Tourism marketing research often examines loyalty as an aspect of consumer behaviour. Studies on loyalty have been conducted in different contexts, and its concept changes with the field, as a general concept remains to be developed (Kusdibyo, 2021). Another study (Jeong & Shin, 2020) recommended investigating loyalty in other emerging fields, such as tourist destinations. In this respect, understanding tourist loyalty and how it is formed has emerged as a maxim for managers of tourism businesses and destinations (Cossío-Silva et al., 2019). The attraction of new customers and the retention of existing markets are essential for tourist destinations because they serve as indicators of future behaviours as well as sources of competitiveness and financial success for businesses (Cheunkamon et al., 2021; Cossío-Silva et al., 2019). Factors that determine tourist destination loyalty and their relationships have become a major scholarly interest. Thus, studies of tourist destination loyalty predictors can support economic growth (Cossío-Silva et al., 2019; Kusdibyo, 2021).

On the other hand, tourism destination loyalty has been widely studied from a satisfaction perspective, which does not necessarily create loyalty (Kim & Thapa, 2018). For example, in their study, Kazancoglu and Dirsehan (2021) argued that the role of satisfaction and experience in destination loyalty is not sufficient. Several other studies have examined tourist loyalty in terms of perception, destination, and satisfaction (Chenini & Touaiti, 2018). In this regard, this study considers the role of perceived smart tourism technology in creating destination loyalty. In the context of smart tourism, the latest technological advancements have left no place untouched and has become a necessity, instead of a subsidiary tool (Pai et al., 2020). Smart technology is used everywhere from civil engineering to IT education (Hall et al., 2000). As a result, authorities can use smart technology to track incidents, real-time traffic, air pollution, etc. (Anthopoulos, 2017).

Tourism and tourist destinations are no exception to the use of smart technology (Huang et al., 2017). Tourist destinations utilise applications such as artificial intelligence, cloud computing, and mobile communications, to improve and enhance their tourist experience (Ghaderi, Hatamifar & Ghahramani, 2019; Jeong & Shin, 2020). Saudi Vision 2030 envisions Al-Ula, a cultural and historical city in Saudi Arabia, as a smart tourism destination (Ministry of Tourism [Saudi Arabia], 2022). Using 3D digital exhibitions, the Royal Commission for Al-Ula (RCU) has enabled tourists around the globe to explore Al-Ula's rich heritage from the comfort of their own homes (Saudi Gazette, 2020).

Additionally, it is worth acknowledging that smart technologies in tourism, such as location queries, local restaurant reviews, and mobile payments, play an important role in tourism. Other smart technologies such as social virtual reality are widely used by tourists to enrich their experiences (Pai et al., 2020). As there

is limited literature available on the influence of smart technology on the overall tourist experience, satisfaction, and other outcomes, more attention is being paid to this subject. Moreover, the focus of recent literature has been on describing smart tourism technology rather than empirically testing their influence on loyalty. Accordingly, further research is required to determine how smart tourism technology can contribute to destination loyalty (Jeong & Shin, 2020).

In addition to elucidating the relationship between smart tourism technology and destination loyalty (Chenini & Touaiti, 2018; Jeong & Shin, 2020), the present study also considered mediating effects. In this regard, the explorative and exploitative use of smart technology is believed to enhance travel experiences. It is worth noting that while destination loyalty has gained attention from both academia and industry, the conceptual development of the literature is still limited (Chenini & Touaiti, 2018). Additionally, while the driving factors of loyalty in the tourism industry are important, not enough attention has been paid to this topic; rather, most studies have focused on how destinations can create beneficial ties with tourists (Chenini & Touaiti, 2018). Nevertheless, Lee et al. (2018) contended that some past studies have considered aspects of smart tourism technology to determine satisfaction with experiences. The studies suggest that satisfaction with travel experiences due to tourism technology is vital in supporting tourist retention. Thus, the present study makes a valuable contribution to the literature by studying smart tourism technology in the context of an emerging tourist destination in Saudi Arabia.

Literature Review

Theoretical Background

The underlying framework for this study is the stimulus-organism-response (SOR) theory. This theory considers three factors, namely stimuli, organisms, and responses (Asyraff et al., 2023). An individual tends to change his or her behavioural response by processing a particular stimulus in the external environment that brings about changes (Zhai et al., 2020). This theory establishes a connection between stimuli, which may be external factors influencing organisms such as the emotional and cognitive states of individuals, and their responses. It is worth noting that organisms are things that will respond to a stimulus such as emotions, and emotions to stimuli. Cheng et al. (2021) stated that individual behaviours are triggered by a stimulus that requires a corresponding response. The present study posits that the use of smart tourism technology as an external stimulus alters the emotional states of tourists, and that the explorative and exploitative use of these technologies ultimately leads to a positive travel experience as well as destination loyalty and tourist happiness.

Perceived Smart Tourism Technology and its Exploitative Use

Information and communication technology (ICT) is regarded as a significant factor in the development of smart tourism (Pai et al., 2020). Thus, smart technologies such as smart devices, cloud computing, the Internet of Things, artificial intelligence, and augmented reality enhance tourism activities and form what is known as smart tourism technology (Pai et al., 2020). It is worth mentioning that different authors have identified different features of perceived smart tourism technology, such as informativeness, accessibility, interactivity, personalisation, and security (No & Kim, 2015) as well as informativeness, accessibility, interactivity, and personalisation (Huang et al., 2017). Notably, smart tourism technology has been widely used and given importance in recent years, but to date, research that explores the role of this technology towards tourist well-being has been limited (Gani et al., 2023). Another study (Torabi et al., 2023) contended that understanding the relationship between smart tourism technology and experience is critical for tourism development due to the rising dominance of developed countries in the industry and emergence of rural destinations after COVID-19. Therefore, the study aimes to examine the perceived smart tourism technology in the context of developing countries.

The attributes of smart tourism technology, such as information, accessibility, interaction, and personalisation, tend to influence attitudes toward their utilisation (Hunter et al., 2015; No & Kim, 2015). As an example, informativeness denotes the quality and trustworthiness of online data. Informativeness is vital because not all data is reliable (Um & Chung, 2021). Based on the literature, the reliability and amount of information (Islam et al., 2023) provided to travellers by smart tourism technology enables the exploration and search for matters related to tourism. Hence, we propose the following hypothesis:

> *H1: Informativeness is positively related to the exploitative use of smart tourism technology.*

Accessibility is an important aspect of smart tourism technology because mobile Internet services is helpful for smart decision-making. It denotes the extent to which online travel information sources and services can be easily obtained and used (Pai et al., 2020). The higher accessibility helps tourists easily obtain and use information about their desired destinations leading to satisfaction (Jeong & Shin, 2020). In other words, a traveller can utilise smart technologies to make informed decisions, such as choosing a destination or hotel. Hence, the following hypothesis is proposed:

> *H2: Accessibility is positively related to the exploitative use of smart tourism technology.*

Interaction refers the extent to which tourists may receive real-time feedback, and respond accordingly while using smart tourism technology. Additionally, the information-sharing aspect of interactivity in real-time enhances the utility of tourism technology (Su et al., 2011). The interactivity of smart tourism technology tends to boost the usage of this technology and promotes the multilateral interaction between stakeholders (Jeong & Shin, 2020). The interactivity aspect also helps tourists make decisions based on available information. Hence, we posit the following hypothesis:

H3: Interactivity is positively related to the exploitative use of smart tourism technology.

Personalised information is required when making specific decisions. Personalisation denotes the ability of a tourist to obtain specific information that meets his/her travel plan requirement. Tourists become engaged when they can obtain personalised information that meets their needs (Lee et al., 2018; Torabi et al., 2023). The personalised information provided to tourists enables them to make decisions based on available information. For instance, tourists may apply price filters when selecting accommodation according to their budget. Accordingly, the following hypothesis is posited:

H4: Personalisation is positively related to the exploitative use of smart tourism technology.

Finally, security is another important aspect of smart tourism technology which has been included in this study. Users tend to be concerned about the security and privacy of the technology they use and this can influence their usage. When choosing a website or mobile application to buy products and services, or to plan travel, security risks are often taken into account (Huang et al., 2017). In a recently conducted study, Xiong et al. (2023) contended that due to technological advancements, digital technology is integrated and smart cities are gaining importance. They also maintained however, that security remains a vital aspect of the adoption of such technology. In other words, the feelings of comfort and security with smart tourism technology tends to boost their use and user engagement. Hence, we propose the following hypothesis:

H5: Security is positively related to the exploitative use of smart tourism technology.

Perceived Smart Tourism Technology and its Explorative Use

Tourism technology not only involves exploitative usage but also explorative usage. Evidence from literature illustrates how various attributes of smart tourism technology encourage exploration.

Informativeness denotes the volume and frequency of information. It also denotes the accuracy and authenticity of information received through digital means (Lee et al., 2018). Smart tourism technology also plays a significant role in determining its usage. In other words, when a tourist assesses digital information, it can reduce the time and effort of decision-making and improve the travel experience (Yoo et al., 2015). Accordingly, we propose the following hypothesis:

H6: Informativeness is positively related to the explorative use of smart tourism technology.

Technology attributes, such as ease of use and usefulness, potentially enhance user experience (Hornbæk & Hertzum, 2017). Similarly, technology accessibility can influence the experiences supported by smart tourism technology (Balakrishnan et al., 2021). Accessibility makes it effortless for travellers to access content, ultimately allowing them to explore more opportunities (Huang et al., 2017). The high accessibility of smart tourism technology also boosts its widespread use. Hence, we hypothesise that:

H7: Accessibility is positively related to the explorative use of smart tourism technology.

The interactive features of smart tourism technology are constantly evolving (Nunkoo et al., 2020). This interactivity enables tourists to enjoy the features maximally while putting in the least effort (Balakrishnan et al., 2021). It should be noted that tourists utilising interactive smart technologies can explore more options regarding destinations and tourism-related products and services because it enables real-time interactions. Hence, we suggest the following hypothesis:

H8: Interactivity is positively related to the explorative use of smart tourism technology.

Personalised data provided to tourists related to their queries enhances their experience such that, based on latest updates and data about past consumer behaviours, a tourist can make an informed decision (Zanker et al., 2019). Data on past consumer behaviour that can be personalised facilitates the explorative use

of this technology to make decisions regarding the choice of products or services related to tourism or destination. Accordingly, we propose that:

H9: Personalisation is positively related to the explorative use of smart tourism technology.

Security denotes the safety of personal information when using multiple smart technologies. Tourists tend to use smart technologies when they perceive them to be safe based on their personal experience. Thus, security is a fundamental attribute of smart tourism technology (Huang et al., 2017). Accordingly, the explorative use of this technology depends on the security of personal information as well as browsing activities and transactions. Hence, we suggest the following:

H10: Security is positively related to the explorative use of smart tourism technology.

Use of Smart Tourism Technology and Travel Satisfaction

Exploration refers to the search for, discovery, and testing of new options and concepts. It emphasises problem-solving by adopting new methods. By contrast, exploitation refers to expanding the current definition of activities that result from improving the operational effectiveness and development of existing knowledge (Koo et al., 2015). In the tourism context, the exploitative use of smart tourism technology refers to the assessment of options for travel products and services. However, the explorative use of smart tourism technologies pertains to the search for new destinations and activities (Torabi et al., 2022). A recently conducted study reported that smart tourist technology is inclusive of the tools, goods, and services widely used for increasing tourist interaction, connection, and personalisation along with co-creation. This is not just limited to devices but is inclusive of new and emerging technologies such as social media, big data (Xiong, Luo & Lu, 2023), artificial intelligence, and virtual reality (Suhartanto et al., 2022).

The present study contends that by using smart tourism technology, tourists may discover new alternatives while continuing to use those that already exist, which are already satisfactory. The literature also reveals that by using smart tourism technology, travellers tend to look for new destinations, products or services (Torabi et al., 2022). According to Huang et al. (2017), the utilisation of exploitative and explorative smart tourism technology facilitates travellers at different stages, such as trip planning, idea generation, and information browsing, typically leading to overall satisfaction. Accordingly, the following hypothesis is suggested:

H11: Exploitative use of smart tourism technology is significantly associated with travel experience satisfaction.

H12: Explorative use of smart tourism technology is significantly associated with travel experience satisfaction.

Travel Experience Satisfaction and Destination Loyalty

Satisfaction refers to an individual's cognitive or emotional reaction towards a specific product or service, and indicates that the expectations related to that product or service have been met (McDowall, 2010). However, in the hospitality and tourism industry, travel satisfaction is a function of the expectations and experiences of tourists in distinctive domains or in general (Chi & Qu, 2008). Individuals while visiting a particular destination tend to have certain expectations, and when they are met, this translates into travel satisfaction resulting in destination loyalty (Joo etal., 2020)

Various studies have presented empirical evidence on the relationship between travel satisfaction and destination loyalty. Similarly, Torabi et al. (2022) reported that tourists are more likely to visit a destination if they are satisfied. Moreover, it is also stated that visitors tend to revisit a destination if they are delighted. In other words, satisfaction leads directly to loyalty. Based on these studies, it can be asserted that when tourists visit a destination, they have certain expectations related to that destination. When their expectations are successfully met, they tend to visit the destination repeatedly, which can be regarded as destination loyalty. Hence, we propose the following hypothesis:

H13: Travel experience satisfaction is significantly associated with destination loyalty.

Tourist Happiness as a Moderator

Tourists seek hedonic experiences; however, the happiness of a tourist changes according to their destination, personality, and travel activities (Chen & Li, 2018). It is worth noting that positive experiences on a trip can significantly increase tourist happiness. In this regard, interactions can be regarded as a significant factor that enhances happiness (Chen et al., 2019).

This study considers tourist happiness as an emotional state that boosts destination loyalty. It is worth mentioning that emotions are the mental state produced by the cognitive appraisal of events or thoughts, and happiness is one of the five primary categories of emotional prototypes (Russell, 1991). A previous study found that sense of happiness is related to the experience in the mind of a tourist which will result in repeat visits and recommendation of the destination to others (Loureiro et al., 2019) Therefore, the present study contends that tourist happiness

as a positive emotional state will result in increased destination loyalty created by travel experience satisfaction. Based on the above, we hypothesise the following.

H14: Tourist happiness moderates the relationship between travel experience satisfaction and loyalty to the tourist destination.

Methodology

The present study adopted a cross-sectional quantitative approach. The following section discusses the study design, sampling, and data collection procedure.

Questionnaire Design and Pre-Testing

A multi-item questionnaire was used as the measuring instrument to collect data from respondents. All the items in the questionnaire were adapted from previous studies. First, the perception of the five dimensions or attributes of smart tourism technology were measured using 23 items. The items are as follows: A five-item measure was adapted each for informativeness and accessibility, a four-item measure was adapted each for interactivity and personalisation and finally, a five-item measure was adapted to measure the security aspect of perceived smart tourism technology (Pai et al., 2020). All items were measured using a 5-point Likert scale with response values ranging from 1 (strongly agree) to 5 (strongly disagree).

Next, 11 items and seven items were adapted to measure the explorative use of smart tourism technology and exploitative use of smart tourism technology, respectively (Huang et al., 2017). Additionally, six items for travel experience satisfaction and four items for tourist happiness were adapted from a previous study (Pai et al., 2020). A two-item measure was adapted to obtain responses on destination loyalty (Jeong & Shin, 2020), validated by Azis et al. (2020). The questionnaire was validated with the help of five experts, including professionals from the tourism industry and academics. Before starting data collection, a pilot study was conducted with 35 respondents. Based on the feedback, the questionnaire did not require any amendments.

Sample Design and Data Collection

Saudi Arabia is rapidly changing its identity from an exclusively religious country to a renowned global tourist destination. In 2019, the government took the initiative to issue tourist visas for travellers worldwide. Its Vision 2030 led to a planned investment of USD 810 billion in culture, leisure, and entertainment over the next decade (Poncet, 2020). Additionally, Saudi Arabia is determined to create digitally enabled tourism destinations and new start-ups for digital tourism (Ministry of Tourism [Saudi Arabia], 2022). Following Vision 2030, Saudi Arabia has invested

heavily in Al-Ula City to transform it into a tourist destination. For instance, Al-Ula is expected to generate USD 32 billion in revenue along with the creation of 38,000 jobs and two million visitors annually (Cascone, 2021). The Saudi government has implemented various measures to facilitate digital tourism in Al-Ula, including the establishment of autonomous pod vehicle service (Gulf Business, 2022), and a memorandum of understanding with the private sector for the development of smart safety technology in Al-Ula (Arab News, 2021). In this context, the study employed a deductive approach with the survey questionnaire method. Data was collected from tourists in Al-Ula. Convenience sampling was used to select respondents because the exact size of the population was unknown. A total of 600 questionnaires were distributed to tourists at Al-Ula to obtain responses and 445 completed questionnaires were found fit for data analysis. Both SPSS and Smart-PLS software were used for the data analysis.

Findings

As the aim of the study was to test and elucidate the relationships between the study variables, partial least squares structural equation modelling (PLS-SEM) was selected for data analysis. PLS-SEM is regarded as a powerful tool for predicting and explaining variables. PLS-SEM is also a non-parametric approach that does not specifically require data normality and can process complex models as well (Hair et al., 2016). Thus, PLS-SEM was deemed appropriate for the data analysis because the research framework is complex and contains multi-item measures.

Data Normality

Although PLS-SEM does not necessarily require data normality, it is necessary to verify whether the data is normally distributed or not (Hair et al., 2007). Skewness and kurtosis are recommended for data normality assessment. The range for both parameters is +2 to -2 (Munro, 2005). Statistical Package for Social Sciences (SPSS) was used to assess data normality. The skewness and kurtosis values for all variables ranged from 2 to +2, indicating data normality.

Measurement Model Assessment

In PLS-SEM, the measurement model is initially assessed to ensure convergent and discriminant validity. Confirmatory factor analysis (CFA) was performed. Factor loadings, composite reliability (CR), and average variance extracted (AVE) were also used to assess convergent validity. The results for CFA are presented in Tables 1, 2, and 3. First, the factor loadings for each item of each variable were assessed. As shown in Table 1, all values for factor loadings were greater than 0.70. Additionally, the values of CR and AVE should be greater than 0.7 and 0.5, respectively (Hair et

al., 2016). All the CR and AVE values reported for the variables (Table 1) met these parameters. Hence, there was no issue with convergent validity.

Table 1. Convergent validity

Constructs	Items	Loadings	Alpha	CR	AVE
Informativeness	Info1	0.846	0.904	0.929	0.723
	Info2	0.841			
	Info3	0.849			
	Info4	0.857			
	Info5	0.858			
Accessibility	A1	0.851	0.841	0.904	0.759
	A2	0.879			
	A3	0.882			
Interactivity	I1	0.843	0.907	0.935	0.782
	I2	0.906			
	I3	0.89			
	I4	0.898			
Personalisation	P1	0.859	0.909	0.936	0.785
	P2	0.892			
	P3	0.903			
	P4	0.89			
Security	S1	0.883	0.874	0.911	0.675
	S2	0.861			
	S3	0.874			
	S4	0.593			
	S5	0.86			
Exploitative Use of Smart Tourism Technology	STE1	0.813	0.93	0.944	0.705
	STE2	0.821			
	STE3	0.84			
	STE4	0.841			
	STE5	0.861			
	STE6	0.85			
	STE7	0.849			

Table 1. (con't)

Constructs	Items	Loadings	Alpha	CR	AVE
Explorative Use of Smart Tourism Technology	STEX1	0.85	0.958	0.964	0.706
	STEX2	0.843			
	STEX3	0.849			
	STEX4	0.835			
	STEX5	0.831			
	STEX6	0.845			
	STEX7	0.846			
	STEX8	0.852			
	STEX9	0.856			
	STEX10	0.841			
	STEX11	0.795			
Travel Experience Satisfaction	TES1	0.852	0.937	0.95	0.762
	TES2	0.876			
	TES3	0.885			
	TES4	0.879			
	TES5	0.868			
	TES6	0.875			
Tourist Happiness	TH1	0.894	0.926	0.948	0.819
	TH2	0.913			
	TH3	0.911			
	TH4	0.901			
Tourist Destination Loyalty	TDL1	0.955	0.903	0.954	0.912
	TDL2	0.954			

Discriminant Validity

Once convergent validity was established, discriminant validity was assessed. It is necessary to assess whether all the variables in a study are different. Henseler et al. (2015) introduced a new criterion known as the HTMT ratio to assess discriminant validity. The HTMT values for all variables should be less than 0.85. Even, if the values exceed the threshold of 0.85, they should not go beyond 0.90 (Gold et al., 2001). All the HTMT values presented in Table 2 are less than 0.9, which establishes discriminant validity.

Table 2. Discriminant validity

	Access	Info	Inter	Pers_	STE	STEX	Sec	TDL	TES	TH
Access										
Info	0.824									
Inter	0.866	0.867								
Pers_	0.796	0.846	0.737							
STE	0.85	0.781	0.846	0.835						
STEX	0.821	0.798	0.826	0.832	0.66					
Sec	0.875	0.74	0.858	0.853	0.834	0.794				
TDL	0.689	0.663	0.711	0.683	0.718	0.751	0.699			
TES	0.811	0.728	0.788	0.756	0.822	0.843	0.758	0.837		
TH	0.737	0.716	0.749	0.75	0.79	0.82	0.766	0.888	0.801	

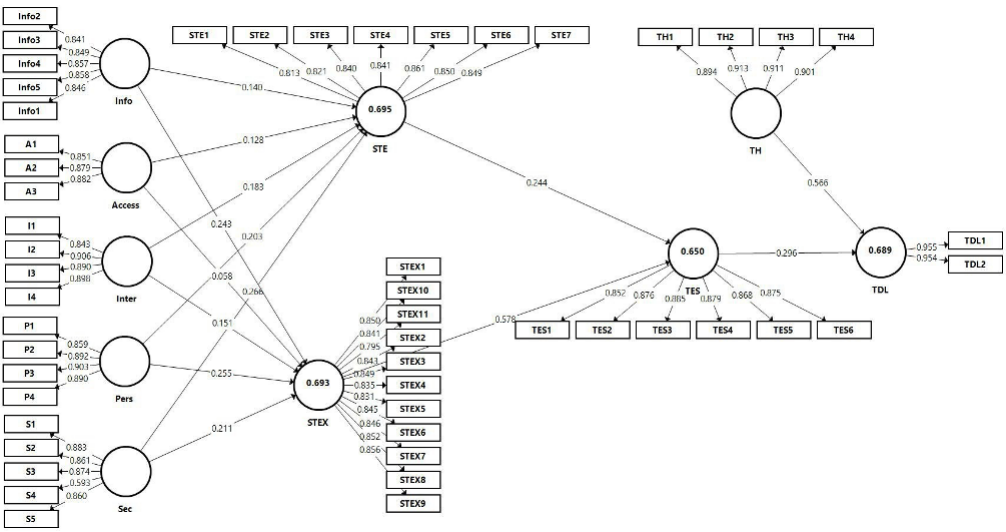

Figure 1. Measurement model assessment

Structural Model Assessment

The structural model was assessed based on path coefficients, t-values, and p-values. The bootstrapping procedure was used to test the direct and indirect effects of the variables. The SEM results are presented in Table 3 and Figure 2.

As shown in Table 3, perceived smart tourism technology, namely informativeness (β = 0.14, t = 1.975; p < 0.024), interactivity (β = 0.183, t = 1.821; p < 0.035), personalisation (β = 0.203, t = 1.969; p < 0.025), and security

(β = 0.266, t = 4.213; p < 0.05) were found to be significantly associated with STE. Hence, Hypotheses H1, H3, H4, and H5 are supported. However, accessibility was not found to have a significant relationship with STE (β = 0.128, t = 1.575; p < 0.058); therefore, H2 is not supported.

Similarly, the relationship between perceived smart tourism technology and STEX was tested. A few of the dimensions of perceived smart tourism technology, namely, informativeness (β = 0.243, t = 3.515; p < 0.05), personalisation (β = 0.255, t = 2.345; p < 0.01), and security (β = 0.211, t = 3.252; p < 0.001), were found to have significant relationships with STEX, thereby supporting hypotheses H6, H9, and H10. By contrast, some aspects of perceived smart tourism technology, namely accessibility (β = 0.058, t = 0.729; p < 0.233) and interactivity (β = 0.151, t = 1.422; p < 0.075), were not found to be significantly related to STEX; thus, H7 and H8 are not supported.

Additionally, the relationship between the explorative and exploitative use of smart tourism technologies and tourist experience satisfaction was tested. The results revealed significant positive influences of STE (β = 0.244, t = 2.759, p < 0.003) and STEX (β = 0.578, t = 6.612, p < 0.05) on tourist experience satisfaction. Thus, Hypotheses H11 and H12 are supported. Moreover, the results revealed a significant positive relationship between TES and TDL (β = 0.242, t = 2.330; p < 0.01), thus supporting H13. Finally, the results revealed that tourist happiness is a significant moderator of the relationship between tourist experience satisfaction and tourist destination loyalty (β = –0.077, t = 1.912; p < 0.028).

Table 3. Path analysis

H	Relationships	Info Beta	SD	t-value	p-value	LL	UL	Decision
H1	→ STE	0.14	0.071	1.975	0.024	0.027	0.257	Supported
H2	Access → STE	0.128	0.081	1.575	0.058	–0.011	0.252	Not Supported
H3	Inter → STE	0.183	0.101	1.821	0.035	–0.02	0.315	Supported
H4	Pers_ → STE	0.203	0.103	1.969	0.025	0.035	0.381	Supported
H5	Sec → STE	0.266	0.063	4.213	0	0.173	0.381	Supported
H6	Info → STEX	0.243	0.069	3.515	0	0.129	0.345	Supported
H7	Access → STEX	0.058	0.08	0.729	0.233	–0.057	0.201	Not Supported
H8	Inter → STEX	0.151	0.105	1.442	0.075	-0.036	0.301	Not Supported
H9	Pers_ → STEX	0.255	0.109	2.345	0.01	0.056	0.421	Supported
H10	Sec → STEX	0.211	0.065	3.252	0.001	0.118	0.324	Supported
H11	STE → TES	0.244	0.088	2.759	0.003	0.102	0.395	Supported

Table 1. (con't)

H	Relationships	Info Beta	SD	t-value	p-value	LL	UL	Decision
H12	STEX → TES	0.578	0.087	6.612	0	0.405	0.696	Supported
H13	TES → TDL	0.242	0.104	2.33	0.01	0.078	0.424	Supported
H14	TES*TH → TDL	–0.077	0.04	1.912	0.028	–0.143	-0.008	Not Supported

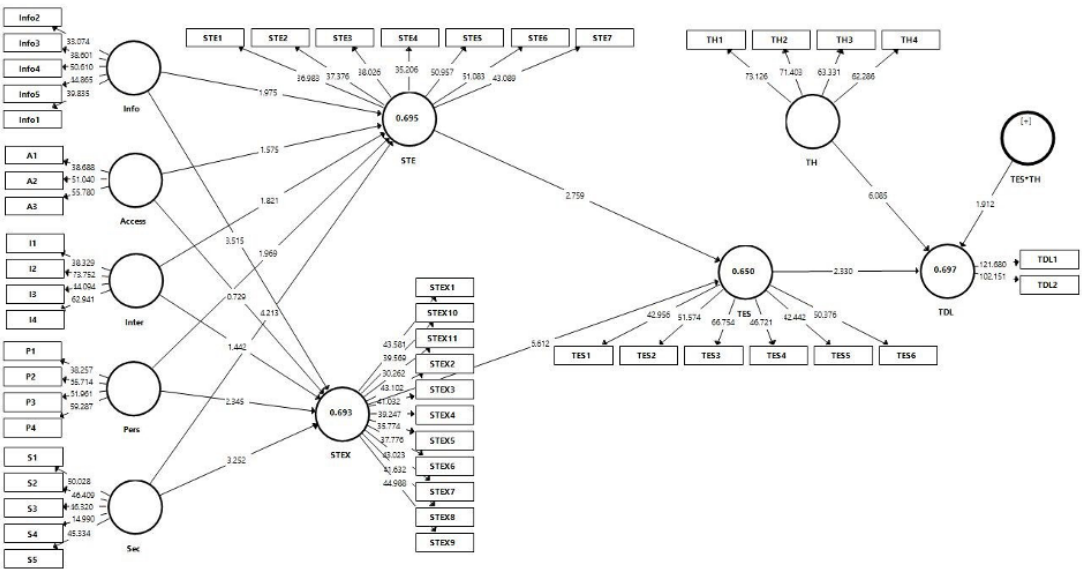

Figure 2. Structural model assessment

Discussion

This study examined the role of perceived smart tourism technology in creating destination loyalty. Existing literature reveals information reliability as a key determinant of the exploitative use of smart tourism technology (Um & Chung, 2021). In addition, information accessibility encourages the use of smart tourism technology because it enables good decision-making (Kim & Garrison, 2009). On the other hand, interactivity in real-time (Su et al., 2011) and personalised information (Lee et al., 2018) related to the needs of tourist, and security while buying products and services (Huang et al., 2017) tend to support the exploitative utilisation of smart tourism technologies. The present study aligns with these studies, except for one relationship between accessibility and exploitative utilisation of smart tourism technologies, which did not receive statistical support. Moreover, the study answers the questions related to how visitor satisfaction can be increased (Torabi et al., 2023) for tourism improvement.

Additionally, literature identified various aspects of perceived smart tourism technology that lead to its explorative use. Existing literature put forward that accuracy, reliability (Lee et al., 2018), and the quantity of information reduces time and effort; thus, allowing travellers to explore more options (Yoo et al., 2015). Similarly, accessibility, interactive features that offer enjoyment to tourists (Balakrishnan et al., 2021), personalisation (Zanker et al., 2019), and secure experiences (Huang et al., 2017) enable the explorative use of smart tourism technology. The current findings align with these past studies; however, accessibility and interactivity do not significantly influence the explorative use of tourism technology. While accessibility and interactivity did not get the statistical support, they are still considered important factors. The findings also establish that tourist satisfaction can be increased by adopting a multifaceted approach in designing and implementing smart tourism technology.

Additionally, this study tested and reported a positive influence of both explorative and exploitative uses of smart tourism technology on tourist experience satisfaction, leading to destination loyalty. These findings corroborate with that of previous studies. For instance, according to Torabi et al. (2022), access to alternatives related to travel products and services and exploring new destinations would capture tourist attention. Similarly, when a tourist explores or exploits smart technologies to make better decisions, the satisfaction level increases (Huang et al., 2017). Thus, tourist experience satisfaction significantly drives loyalty to tourist destinations.

The results also revealed that tourist experience satisfaction is significantly associated with destination loyalty. These findings align with those of previous studies; for instance, a tourist is likely to revisit a destination if they are satisfied (Torabi et al., 2022). Finally, the results did not support tourist happiness as a moderator in the relationship between tourist experience satisfaction and tourist destination loyalty. Essentially, this means that tourist happiness does not necessarily boost loyalty, although it is an important aspect in determining tourist satisfaction.

The study establishes that different aspects of perceived smart tourism technology trigger its explorative and exploitative utilisation. In the same way, when a tourist benefits from this technology, he/she becomes satisfied and develops loyalty to a particular destination. It is more likely that when a tourist visits a particular site for the very first time, the facilitation provided by smart tourism technology tends to drive their intention to use it which help them discover new options or discover other information that help them make a decision.

Additionally, a visitor's experience is enhanced, and revisit intentions develop when they are satisfied with the offerings of smart tourism technology. The findings also establish that the explorative and exploitative use of this technology

enables the tourist to discover destinations, attractions and plan trips. In summary, the implementation of smart tourism technology significantly enhances the overall satisfaction of tourists.

Conclusion

The findings of the study indicate that tourists' perceptions of smart tourism technology tend to result in its explorative and exploitative use which aids in their decision-making. The use of this technology can facilitate decision-making on accommodation, new options as well as personalised suggestions at a particular destination. Smart destinations can help tourists to create memorable experiences through booking assistance for accommodations and tickets, virtual exploration of diverse routes to a specific destination, as well as recording and sharing of events and experiences. Tourists can also obtain personalised information related to food, activities and transportation at their destinations. Ultimately, tourists are presented with more opportunities for a satisfactory trip. Additionally, the study results establish that smart tourism technology enriches the experience satisfaction of tourists, resulting in destination loyalty.

Theoretical Implications

This study has several theoretical implications. For instance, it is one of the few studies that has examined perceived smart tourism technology and added to the understanding of how this technology may benefit the hospitality and tourism industry in attracting and retaining tourists.

Furthermore, this study is theoretically noteworthy because all five aspects of smart tourism technology were tested, in contrast to previous research (Azis et al., 2020; Huang et al., 2017), which considered only four aspects. This study enhances the understanding and validates the five-dimensional measure of smart tourism technology, aligned with previous attempts (Pai et al., 2020). Moreover, the study is a significant attempt to provide empirical evidence on how smart tourism technology boosts its explorative and exploitative use. In this way, the study enriches the theoretical understanding of the factors that boost tourists' exploitative and explorative use of smart tourism technology.

In addition to exploring the direct relationships between the variables, this study examined the mediating effect of smart tourism technology on destination loyalty. In doing so, this study adds to the existing literature on the mechanism by which destination loyalty can be developed. It also advances the literature on the creation of destination loyalty by using Al-Ula as an emerging tourist destination. This establishes and increases our understanding of how destination loyalty can be created in the context of emerging tourist destinations.

Finally, the study offers valuable insights into how destination loyalty can be created within the parameters of tourist happiness. The insights advance our understanding on how tourist happiness can enhance the influence of travel experience satisfaction on destination loyalty. In summary, the study presents a comprehensive understanding of the drivers of destination loyalty by developing a framework comprising the relationships among perceived smart tourism technology, its use, tourist satisfaction, and destination loyalty.

Practical Implications

From a practical perspective, the study is call to tourism authorities and industry stakeholders to emphasise smart tourism technology, because the findings reveal that this technology is a primary determinant of destination loyalty. If tourists are satisfied with destinations that utilise these technologies, they are more likely to visit them again and are more inclined to recommend them to others. In contrast, failure to capitalise or utilise such technologies will not only result in destinations losing out to their competitors, but also lose existing market segments that have embraced digital transformations in the tourism industry. Therefore, smart tourism technology should receive appropriate attention, particularly for newly emerging tourism destinations, such as Al-Ula.

In particular, tourism proprietors and managers should focus on aspects of informativeness, personalisation, and security as these are the dominant factors that promote the utilisation of smart tourism technology. For instance, if a tourist wants to find an accommodation, smart tourism technology can assist by providing reliable and personalised information to help him or her explore and make informed decisions. In this respect, destinations or lodgings that do not utilise smart technologies to advertise or allow online booking will lose out due to limited exposure in the market. In the long run, it becomes difficult for a destination or lodging to attract first-time visitors and retain them.

Further, to increase tourist engagement, publicity and marketing about events and activities of a destination is important. Additionally, tourism operators should build their social space in the digital environment to advertise and for customers to share their experiences. In this way, the exploitative and explorative use of the technologies can be capitalised.

From the personalisation perspective, it is vital that this technology is user-friendly, and tourists are provided maximum personalisation. For instance, they should be able to filter accommodation options based on price, location, and facilities. Tourists visit destinations and make their experience memorable by engaging in different activities. In this regard, operators and managers must make sure that their customers can enjoy their privacy and are free from any worries at

their destinations (Jeong & Shin, 2020) by providing a secure and safe environment. Additionally, customer private data and online transactions must be secure from any scams or fraud.

Notably, the implementation of smart tourism technology offers valuable benefits for industry stakeholders including effective use of resources, effective management for tourism, as well as reduced time and effort for decision-making. On the other hand, the use of smart tourism technology for travel offers tourists the opportunity to explore more alternatives in planning trips smoothly. Going further, smart tourism technology allows tourists to share their experiences on social media platforms such as Facebook, Twitter, and TripAdvisor for interaction and recommendation (Azis et al., 2020). Therefore, it is recommended that both tourists and tourist destinations capitalise on smart tourism technology for a smooth and memorable travel experience.

Limitations and Future Directions

There are a number of limitations in this study that should be highlighted. This study is based on tourists who only visited Al-Ula (Saudi Arabia). Therefore, the results cannot be generalised to represent tourists at all smart city destinations in Saudi Arabia. Future studies can replicate the present research framework at other smart cities in Saudi Arabia. Additionally, future studies should consider adopting a multi-city tourist perspective within the same framework to obtain comparative findings on destination loyalty. For instance, destination loyalty can be compared between Dubai and Al-Ula, which enhances our understanding of the factors influencing loyalty in the context of advanced and newly emerging destinations.

This study was quantitative in nature and used convenience sampling for data collection. Accordingly, future studies should consider a mixed-methods approach to obtain more robust results. As this study found that tourist happiness does not moderate the relationship between travel experience satisfaction and destination loyalty, it is recommended that future studies use other moderating variables such as memorable experience (Azis et al., 2020; Torabi et al., 2022) and transaction satisfaction (Huang et al., 2017).

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