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REVOLUTIONIZING TRAVEL: THE ROLE OF SMART TOURISM TECHNOLOGIES IN ENHANCING TOURIST SATISFACTION AND SHAPING SUSTAINABLE DESTINATION IMAGES: INSIGHTS FROM ISTANBUL

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Abstract: Smart tourism technologies (STT) play a crucial role in enhancing traveler experiences by providing personalized, efficient, and data-driven services. Such technologies help tourism firms to optimize resource management, improve accessibility, and foster innovation in the industry. Keeping in view such an enhanced significance, this paper explores the role of smart tourism technologies (STT) on the perceived value experience of STT, tourists' experience satisfaction, and the sustainable image of a famous tourist destination. The role of smart tourism technologies was assessed by their attributes, i.e., information, accessibility, interactivity, personalization, and security to propose the research model and do exploration of the revolutionized travel experiences. The survey method is used to collect data from 142 tourists of Istanbul, a city in Türkiye, and analyze by Partial Least Square-Structural Equation Modeling (PLS-SEM). Results indicate that tourists place more value on what they perceive from smart tourism technologies. The measurement model has good reliability and validity. The structural model indicates the significance of relationships of smart tourism technologies (STT). The perceived smart tourism technologies experience has a significant impact on travel experience satisfaction, and tourist experience satisfaction has a significant impact on sustainable destination image. The exploration of the STT attributes towards tourist experience satisfaction and sustainable destination image through the proposed model are theoretical contribution. The availability of accurate, reliable information through user-friendly smart apps and websites with better personalization features to enhance tourists' experiences are the practical implications. The limitations of the study and directions for further research are discussed and presented in the conclusion.

Keywords: information, accessibility, interactivity, personalization, security, smart tourism technologies, tourist experience satisfaction, sustainable destination image, Istanbul, Türkiye

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INTRODUCTION

Digital innovations and rapidly changing technologies have influenced societies and economies greatly. Digital transformations can be seen in various industries as healthcare, banking, media and entertainment provide evidence of these trends. Traditional businesses have been transformed into digital by relying on advanced technologies. Likewise, the impact on the services sector, particularly the hospitality and tourism industry seems to be turned on its head (Balakrishnan et al., 2023; Shafiee et al., 2023; Suanpang & Pothipassa, 2024). According to the World Tourism Organization (n.d.), tourism is one of the first industries to adopt Information and Communication Technology (ICT), so considered a pioneer of digital technologies and platforms. The use of smart technologies in a set of tourism strategies greatly contributes to achieving business goals and objectives (Boes et al., 2015), allowing you to better understand the choice of customers and better serve them. To develop a smart destination, government and destination marketing organizations (DMOs) often create a rating system in line with smart city policies (Pai, et al., 2020).

The ultimate goal of smart tourism is to make travel more convenient and enjoyable for travelers (Pai et al., 2020; Wang et al., 2020). Most travelers use smart technologies to organize and enrich their trips including travel websites, travel apps, social networks and virtual reality for tourists as well as location queries, reviews of local restaurants or mobile payments via smartphones during their travels (Pai, et al., 2020). The image of a sustainable destination should maintain a high level of tourist satisfaction and provide a meaningful experience for tourists by raising their awareness of sustainable development issues and promoting sustainable tourism practices among them, as well as introducing digital technologies that encourage innovation. Smart cities also contributed to the evolution of smart tourism (Kiriwongwattana & Waiyasusri, 2024). In previous studies of smart tourism technologies conducted in different cities, it was explained that smart tourism technologies have created unforgettable tourism experiences and tourism happiness (Jeong & Shin, 2020; Lee, et al., 2018;

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Pai, et al., 2020; Zhang, et al., 2022), as well as revisit intention of tourists (Zheng et al., 2024). Some also evaluated the impact of smart tourism destinations on residents (Wei et al., 2024). However, the findings cannot be generalized as different countries with different tourists will have different experience and level of familiarity with smart tourism technologies.

Despite such significant importance, the relationships of smart tourism technologies, tourist satisfaction, and sustainable destination image are underexplored. In particular, Istanbul, Turkey has great potential for exploration in this direction due to its worldwide recognition as a popular tourist destination. Therefore, the main goal of our study is to determine how the adoption of smart tourism technologies facilitates the tourists' experience satisfaction as well as the transition to a more sustainable tourism destination image. Our research questions are:

RQ1: What attributes influence the perceived smart tourism technology experience and what is the relative importance of these attributes to the tourists' experience satisfaction?

RQ2: What is the impact of perceived smart tourism technologies experience on sustainable destination image?

RQ3: What is the relationship between the tourist experience satisfaction and sustainable destination image?

To achieve these goals, this research first sets out introduction. The second chapter includes the theoretical background of the study, providing a review of the literature on smart tourism technologies attributes such as, informativeness, accessibility, interactivity, personalization and security, tourist experience satisfaction and sustainable destination image followed by a summary of the research question. This article aims to develop and explore a conceptually comprehensive model of the perceived attributes of smart tourism technology, tourist satisfaction, sustainable destination image. The third chapter describes the research model and hypotheses used to address the research question and is followed by describing the data and research methodology. The fifth chapter contains a quantitative analysis based on empirical data collected from tourists for quantitative purposes, followed by empirical results. Final chapter attempts to provide solutions, guidelines and recommendations based on past experience and research on alternative routes and solutions to common problems in digitalisation, innovation and sustainability of tourism industry.

CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Smart Tourism Technologies Attributes

The services of smart tourism technologies in tourist destinations and attractions have a significant impact on the tourist experience (Buhalis & Amaranggana, 2015; Jeong & Shin, 2020; Zhang, et al., 2022). In the process of experiencing the services provided by smart tourism technologies, tourists' assessment of whether smart tourism technologies meet their expectations and requirements represents the perceived value of smart tourism technologies by tourists (Zhang, et al., 2022). This study examines the impact of the five smart tourism technology attributes from previous studies—information, accessibility, interactivity, personalization and safety on the perceived value of tourists' experiences (Huang et al., 2017; Jeong & Shin, 2020; Pai et al., 2020; Um et al., 2021).

Based on the arguments presented in the literature, the following hypotheses are suggested:

Hypothesis 1a: The information on smart tourism technologies significantly impacts the perceived value of smart tourism technologies experience in Istanbul.

Hypothesis 1b: The accessibility of smart tourism technologies significantly impacts the perceived value of smart tourism technologies experience in Istanbul.

Hypothesis 1c: The interactivity of smart tourism technologies significantly impacts the perceived value of smart tourism technologies experience in Istanbul.

Hypothesis 1d: The personalization of smart tourism technologies significantly impacts the perceived value of smart tourism technologies experience in Istanbul.

Hypothesis 1e: The security of smart tourism technologies significantly impacts the perceived value of smart tourism technologies experience in Istanbul.

Tourist Experience Satisfaction and Perceived Value of Smart Tourism Technologies Experience

Perceived value is a comprehensive assessment carried out by tourists based on perceived benefits and costs. Previous studies show a significant positive relationship between perceived value and satisfaction (Sustacha et al., 2023; Lee et al., 2018). When perception exceeds expectations, tourists will have a satisfactory psychological state. Smart tourism involves all aspects of tourism, including transportation, accommodation, and attractions.

When tourists have positive emotions and attitudes toward smart tourism technologies, their experience in the destination will be satisfied (Jeong & Shin, 2020). Suppose a tourist can access any information about a destination and interact with the resources provided by smart tourism technologies. In that case, the degree of immersion and involvement in smart destinations will increase, which in turn will increase tourist experience satisfaction (Jeong & Shin, 2020), which leads to revisit intention and customer loyalty (Javed et al., 2022) as well as corporate goodwill (Azis et al., 2020; Javed et al., 2020). Accordingly, a high level of perceived value can stimulate positive emotional responses from tourists, thereby increasing satisfaction. Based on the above, this study puts forward the following hypothesis.

Hypothesis 2: The perceived experience of smart tourism technologies has a significant impact on tourist experience satisfaction in Istanbul.

Perceived Value of Smart Tourism Technologies Experience and Sustainable Destination Image

Smart tourism technologies have changed the traditional travel experience while increasing the competitiveness of destinations (Pai, et al., 2021). Some studies depict that many destinations are using smart tourism technologies to improve the

image of tourism destinations and enhance sustainability (Chang, 2022; Tavitiyaman et al., 2021; Buhalis & Amaranggana, 2015; Pai et al., 2020). Such smart tourism technologies also help to reduce labour costs, the efficiency of work and better management at the administration level (Pai et al., 2021). In light of this, we propose the following hypothesis.

Hypothesis 3: The perceived experience of smart tourism technologies has a significant impact on the sustainable destination image in Istanbul.

Tourist Experience Satisfaction and Sustainable Destination Image: Mediation Relationships

One of the key elements of destination marketing success is tourist satisfaction because it influences the choice of destination and the revisit decision. Therefore, it is important to study the tourist experience satisfaction with the use of smart technologies and their relationship with the overall destination image. It is necessary to distinguish between attribute satisfaction and overall satisfaction. Overall satisfaction is based on the satisfaction of individual attributes along with other components that influence the experience, such as the natural environment and the social environment. Attribute satisfaction, used in our case, is based on the individual destination component and typically refers to hotels, technologies, restaurants, shops, attractions, etc (Leou, et al., 2015).

Destination image formation is a dynamic process, and the destination image is a multidimensional construct. With more destinations emerging, a common-unique dimension of the destination image has been proposed (Leou, et al., 2015). The common-unique dimension should be supplemented by the general functional and psychological characteristics of the destination where common features are the price level, transport, infrastructure, accommodation, climate, friendliness level, safety and quality of service etc (Leou, et al., 2015). The uniqueness of the destination image is also a determining factor in the destination selection process. Therefore, in the light of this aspect, the following hypothesis is put forward.

Hypothesis 4: Tourist experience satisfaction mediates the relationship between perceived value of smart tourism technologies experience and sustainable destination image in Istanbul.

Hypothesis 4a: Tourist experience satisfaction mediates the relationship between information (perceived value of smart tourism technologies experience) and sustainable destination image in Istanbul.

Hypothesis 4b: Tourist experience satisfaction mediates the relationship between accessibility (perceived value of smart tourism technologies experience) and sustainable destination image in Istanbul.

Hypothesis 4c: Tourist experience satisfaction mediates the relationship between interactivity (perceived value of smart tourism technologies experience) and sustainable destination image in Istanbul.

Hypothesis 4d: Tourist experience satisfaction mediates the relationship between personalization (perceived value of smart tourism technologies experience) and sustainable destination image in Istanbul.

Hypothesis 4e: Tourist experience satisfaction mediates the relationship between security (perceived value of smart tourism technologies experience) and sustainable destination image in Istanbul.

The proposed theoretical research model explored the relationship between the five attributes of smart tourism technologies, the perceived value of tourists' smart tourism technologies experience, tourist experience satisfaction and sustainable destination image with all hypotheses of the study (Figure 1). All research constructs were adapted and modified from previous studies. The perceived value of smart tourism technologies by tourists was selected and classified according to a literature review that identified five attributes: information, accessibility, interactivity, personalization, and security. It was assumed that the perceived experience of smart tourism technologies would affect the tourists' experience satisfaction and sustainable destination image, accordingly, tourist experience satisfaction will affect sustainable destination image.

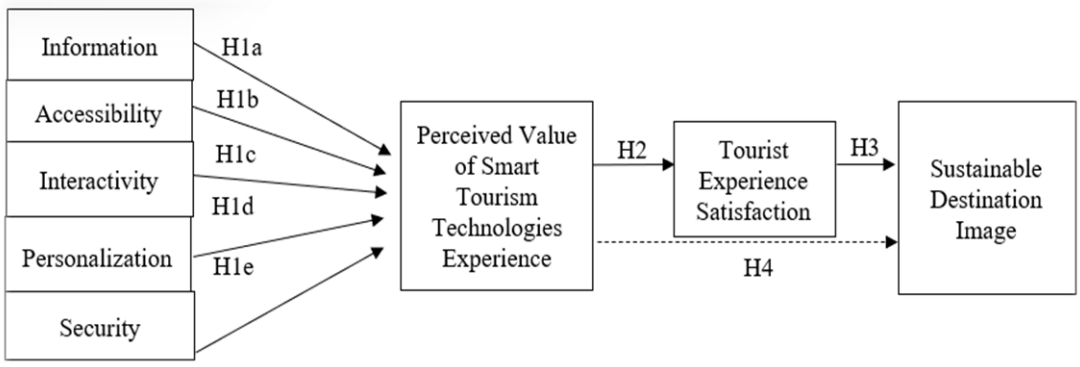

Figure 1. A proposed research framework from the literature (Sources: Authors' own)

MATERIALS AND METHODS

Data collection

To investigate and evaluate the possible effects of smart tourism technologies on visitor experience satisfaction and sustainable destination image, this research used a quantitative study methodology and an online survey technique. To prevent the collection of inaccurate data that may otherwise affect the analysis's findings, the questionnaire was made using Google Forms. A live survey URL was sent on social media sites like Facebook and LinkedIn along with a brief explanation of the study's methodology and a request for tourists to participate. Respondents were chosen using a non-

random sample technique called the snowball sampling method, which asks respondents to invite and recommend friends and acquaintances to take part in the study. In examining tourists' perceptions of how satisfied they are with the services provided by these tools or applications; it is assumed that they have already used smart tourism technologies. It seeks to determine how successfully Istanbul fits to the idea of smart tourism. Due to this method's capacity to meet certain requirements, including ease of accessibility, willingness to participate, proximity, availability of participants at a specified time, and cost-effectiveness, it was suitable and practical for the study. A total of 142 questionnaires from travelers to Istanbul were gathered. Since it guarantees validity and reliability, the sample size is thought to be appropriate.

Measurements

This study's questionnaire is based on two sections: demographic characteristics and the measurement of the constructs. Six questions about personal information are included in the first section. The second section of the survey consists of 27 questions about the tourists' opinions on the attributes of smart tourism technologies, the perceived value of smart tourism technologies, their satisfaction with their travels, and their perceptions of Istanbul's sustainable tourism industry. The attributes of smart tourism technologies such as information, accessibility, interactivity, personalization, and security are included. Three items of each attribute of smart tourism technologies are adapted for the literature (Pai et al., 2020; Zhang et al., 2022; Jeong & Shin, 2020). Likewise, three items from the studies of Zhang et al., (2022) and Jeong & Shin (2020) are included. In addition, tourism experience satisfaction is measured through three items (Zhang et al., 2022; Sandos-Roldán et al., 2020; Jeong & Shin, 2020). Lastly, the sustainable destination image is captured through the scale of six items (Mohaidin et al., 2017; Králiková et al., 2020).

Responses could range from 1 for disagree to 5 for agree on a five-point Likert scale. The questionnaire was drafted in English containing information about the reason for conducting the survey, instructions for responding, and a statement about maintaining respondent privacy and confidentiality. All questions of the questionnaire were designed in such a way as to obtain the most accurate data for accepting or rejecting hypotheses in the proposed model. The constructs were measured using multi-measurement items adapted from the extant literature and modified for this research (see details in Appendix A). The demographic details of the respondents included in the analysis of this study are summarized in Table 1 below. The demographic profile includes details like gender, age, education level, occupation, marital status, and respondent category.

Table 1. Demographic profile of the respondents (Source: Authors' Survey)

Demographic Variables	Details	Frequency	Percentage
Gender	Female	73	51.4
	Male	69	48.6
Age	Below 20 years	4	2.8
	21-35 years	100	70.4
	36-45 years	21	14.8
	46-60 years	14	9.9
	Above 60 years	3	2.1
Education	High school	21	14.8
	Bachelor's degree	70	49.3
	Master's degree or higher	51	35.9
	Other	0	0
Occupation	Student	60	42.3
	Employed	71	50
	Unemployed	2	1.4
	Retired	3	2.1
	Others	6	4.2
Marital status	Single	58	40.8
	In a relationship	43	30.3
	Married	36	25.4
	Divorced	5	3.5
Nationality	Local resident	43	30.3
	Domestic tourist	23	16.2
	Foreign tourist	76	53.5
Total respondents		142	100 %

Data Analysis

Using the computer program Smart PLS 3.3.9, partial least square structural equation modeling (PLS-SEM) empirical results were obtained. Over the past ten years, PLS-SEM has been widely used by researchers in the social sciences. It has excellent predictive abilities and the potential to estimate complex models with numerous constructs and indicator variables (Hair, et al., 2019). Because of the hypothesized nature of the proposed relationships in this study, this method was chosen in this study. Two phases make up the PLS-SEM analysis: validation of the measurement model and evaluation of the structural model. The relationship between latent variables and observed data is represented by the measurement model, while the relationship between latent variables is represented by the structural model. As a result, the questionnaire was thought to be very trustworthy. Additionally, after the preliminary test was distributed, some of the questions' wording was changed to avoid ambiguous statements until the official release of the final questionnaire.

According to the descriptive analysis of demographic data in Table 1, the sample consisted mainly of females (73 or 51.4%) from the age group 21-35 years (53 or 37.3%). Most tourists have a bachelor's degree education (70 or 49.3%) and are employed (71 or 50%). Mainly, foreign tourists took this survey (76 or 53.5%), followed by local residents (43 or 30.3) and domestic tourists (23 or 16.2%). The following section discusses the analyses and results.

Multicollinearity

In a multiple regression model, multicollinearity refers to a high level of linear intercorrelation between independent variables, which produces inaccurate regression analysis results (Kim, 2019). Variance inflation factors (VIF) were used for each element to test multicollinearity as diagnostic tools. According to Hair et al. (2017), VIF less than 5 generally denotes that multicollinearity is no longer a concern in the model. VIF values of 5 or 10 suggest that the multicollinearity may present a challenge. According to the study, variance inflation factor (VIF) values is ranged from 1.348 to 2.499 in Table 2, which indicates that multicollinearity does not exist in the data.

It is suggested that the presence of a VIF above 3.3 is a sign of pathological collinearity and also suggests that a model may be contaminated by common method bias. As a result, the model can be said to be free of common method bias if all VIFs obtained from the full collinearity test are equal to or lower than 3.3 (Kock, 2015; Hair, et al., 2017).

Table 2. Variance Inflation Factor (VIF) and Factor Loadings (Source: Authors' Estimations from Smart PLS 3.3.9)

Constructs	Items	Variance Inflation Factor	Factor Loadings
Accessibility	ACC1	1.893	0.865
	ACC2	2.288	0.893
	ACC3	1.951	0.857
Information	INF1	2.179	0.862
	INF2	2.419	0.897
	INF3	2.053	0.892
Interactivity	INT1	2.148	0.892
	INT2	1.791	0.854
	INT3	1.626	0.803
Perceived Value	PV1	1.477	0.777
	PV2	1.763	0.871
	PV3	1.495	0.813
Personalization	PER1	1.689	0.815
	PER2	1.636	0.846
	PER3	1.556	0.838
Sustainable Destination Image	SDI1	1.618	0.707
	SDI2	1.665	0.731
	SDI3	1.889	0.744
	SDI4	2.000	0.804
	SDI5	1.348	0.688
	SDI6	1.935	0.763
Security	SEC1	2.499	0.890
	SEC2	2.518	0.882
	SEC3	1.795	0.869
Tourist Experience Satisfaction	TES1	2.646	0.917
	TES2	2.099	0.873
	TES3	2.242	0.877

Factors Loadings

All items significantly loaded above the threshold level for the factor loadings of the latent construct. A factor loading of 0.7 or higher indicates, in the SEM approach, that the factor extracts enough variance from the variable.

Internal consistency reliability

The composite reliability, also called construct reliability or Cronbach's alpha, can be used to assess the internal consistency reliability. According to researchers, Dijkstra-Henseler rho and Cronbach's alpha coefficients were used to analyze and test the model for construct reliability and internal consistency (Hair et al., 2017).

According to Hair et al. (2017), it is advised that the composite reliability and Cronbach's alpha values for exploratory studies must be higher than 0.70. All Cronbach's alphas were greater than 0.7, as shown in Table 3, indicating good reliability for all items. Additionally, the analysis complied with the criteria for composite reliability (CR), as determined by Dijkstra-Henseler and Joreskog rho with threshold values of 0.9 and 0.7, respectively.

Accessibility (0.905), Information (0.915), Interactivity (0.887), Personalization (0.872), Security (0.912), Perceived Value of Smart Tourism Technologies Experience (0.861), Sustainable Destination Image (0.879), and Tourist Experience Satisfaction (0.919) are all shown to have acceptable composite reliability values in the results. All items consequently exhibit a higher degree of internal consistency.

Table 3. Construct Reliability and Validity

Constructs	Cronbach Alpha (α)	Dijkstra-Henseler's rho_A (ρA)	Jöreskog's rho (ρc) Composite reliability (>0.7)	Average variance extracted (AVE) (>0.5)
Accessibility	0.842	0.843	0.905	0.760
Information	0.861	0.876	0.915	0.781
Interactivity	0.809	0.816	0.887	0.724
Perceived Value	0.758	0.768	0.861	0.674
Personalization	0.781	0.791	0.872	0.694
Security	0.856	0.866	0.912	0.775
Sustainable Destination Image	0.836	0.844	0.879	0.548
Tourist Experience Satisfaction	0.867	0.873	0.919	0.790

Convergent validity

To demonstrate the reliability of the survey data, validity analysis was done for both convergent validity and discriminant validity. The new scale's convergent validity describes how well it correlates with other variables and measures of the same construct. The construct must not only not correlate with dissimilar, unrelated variables but also not correlate with related variables. Convergent validity can be assessed using the factor loading of each indicator and the average variance extracted (AVE) (Hair, et al., 2017). According to statistics, convergent validity is established when the factor indicator loading is higher than 0.708, as the AVE is 50% and the number squared (0.7082) equals 0.50. Indicators with a lower loading, however, can only be taken into account if other indicators have an AVE of 0.50 or higher. 0.708 is a suitable benchmark. The findings demonstrate that every construct indicator had higher loadings, or an AVE above 0.50 and above 0.70. The AVE scores for Accessibility (0.760), Information (0.781), Interactivity (0.724), Perceived Value (0.674), Personalization (0.694), Security (0.775), Sustainable Destination Image (0.548), and Tourist Experience Satisfaction (0.790), as shown in Table 3, supported the measurement model's convergent validity.

Discriminant validity. Fornell-Larcker criterion

The Fornell-Larcker test, which suggests that a construct is empirically distinct and represents a phenomenon of interest that other measures in the model do not capture, was also used to examine discriminant validity (Henseler et al., 2015). The findings demonstrate that discriminant validity is established and that the basic and strict assumptions of the Fornell-Larcker test are satisfied. It is important to note that each construct measured must have an AVE value greater than 0.5 and that the diagonal values in Table 4 represent AVE. To establish discriminant validity, each construct's coefficient value must also be higher in both the column and row (Henseler, et al., 2015).

Table 4. Discriminant Validity – Fornell-Larcker Criterion (Source: Authors' Estimations from Smart PLS 3.3.9)

	Accessibility	Information	Interactivity	PV	Person	Security	SDI	TES
Accessibility	**0.872**							
Information	0.778	**0.884**						
Interactivity	0.732	0.647	**0.851**					
PV	0.697	0.639	0.573	**0.821**				
Personalization	0.550	0.478	0.701	0.636	**0.833**			
Security	0.501	0.513	0.565	0.556	0.639	**0.880**		
SDI	0.440	0.489	0.440	0.398	0.481	0.447	**0.740**	
TES	0.660	0.658	0.632	0.691	0.614	0.526	0.535	**0.889**

Heterotrait-Monotrait ratio

Heterotrait-Monotrait ratio (HTMT) result displayed in Table 5 was below the minimum threshold of 0.85, which is appropriate for this study.

Table 5. Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT)

Constructs	Access	Inform	Interact	PV	Person	Security	SDI	TES
Accessibility	0.810							
Information	0.778	0.773						
Interactivity	0.729	0.664	0.849					
Perceived Value	0.695	0.627	0.568	0.819				
Personalization	0.531	0.462	0.693	0.663	0.829			
Security	0.494	0.508	0.563	0.549	0.639	0.881		
SDI	0.439	0.491	0.438	0.404	0.482	0.444	0.746	
TES	0.662	0.678	0.637	0.715	0.619	0.524	0.537	0.888

Structural model and hypotheses testing

The path analysis of the structural model can be used to continue examining the model's quality of fit. This analysis is highly relevant for identifying and establishing causal relationships or construct relationships that underlie research assumptions and hypotheses (Figure 2).

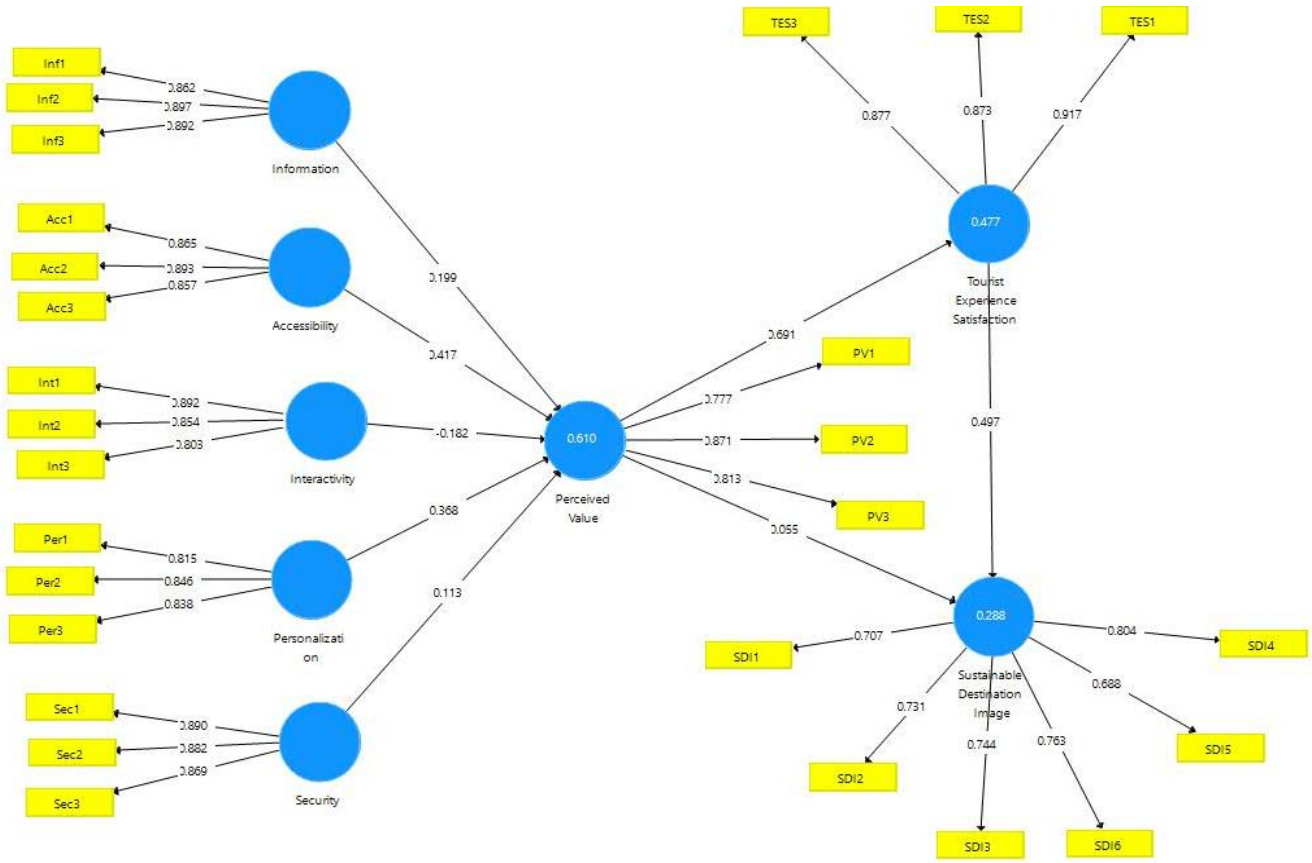

Figure 2. Structural Equation Model extracted from Smart PLS 3.3.9

Direct effect

The findings shed light on tourist satisfaction and Istanbul's reputation as a sustainable destination. To approximate the parameter's statistical significance, a bootstrapping method with a 5000-sample size and one-tailed significance was utilized. There are eight variables in this study. In the "decision" column of the table below, relationships with significant impacts and support for the corresponding hypothesis are labelled "Supported." The direct relationship results revealed accessibility having the highest value (H1a, β = 0.417, t = 2.915, p = 0.002), followed by personalization (H1d, β = 0.368, t = 4.419, p = 0) and information (H1b, β = 0.199, t = 2.148, p = 0.016) which were significantly positively related with the perceived value of smart tourism technologies experience. H1a, H1b, and H1d hypothesis are supported, as shown in Table 6. The results showed that the perceived value of smart tourism technologies experience (H2, β = 0.691, t = 11.618, p = 0) was significantly positively related to tourist experience satisfaction. Tourist experience satisfaction (H4, β = 0.497, t = 5.066, p = 0) was significantly positively related to sustainable destination image.

Table 6. Path Coefficient direct and indirect relationship

Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation	t-value	P-Values	Decision
Direct Relationship						
H1a: Accessibility → PV	0.417	0.383	0.143	2.915	0.002	**Supported**
H1b: Information → PV	0.199	0.208	0.092	2.148	0.016	**Supported**
H1c: Interactivity → PV	-0.182	-0.150	0.142	1.287	0.099	Not Supported
H3: PV → SDI	0.055	0.060	0.101	0.543	0.294	Not Supported
H2: PV → TES	0.691	0.691	0.059	11.618	0.000	**Supported**
H1d: Personalization →PV	0.368	0.357	0.083	4.419	0.000	**Supported**
H1e: Security → PV	0.113	0.119	0.077	1.459	0.072	Not Supported
H4: TES → SDI	0.497	0.504	0.098	5.066	0.000	**Supported**

Indirect effect

This research examined the potential mediation mechanism of tourism experience satisfaction (Table 7). Mediation analysis was performed to test H4, H4a, H4b and H4d, which hypothesized a positive mediating effect on tourist experience satisfaction in relationship between perceived value of smart tourism technologies experience, accessibility, information, personalization and sustainable destination image (H4: β =0.343, t = 4.410, H4a: β =0.068, t =1.969, p =0.024, H4b: β = 0.143, t = 2.315, p = 0.01 H4d: β =0.126, t = 2.992, p = 0.001). Conversely, H4c and H4e show tourist experience satisfaction with an insignificant mediation relationship between the perceived value of smart tourism technologies experience, interactivity, security, and sustainable destination image (β =-0.063, t= 1.214, p =0.112, β =0.039, t=1.367, p =0.086).

Table 7. Mediation Analysis (Indirect Effect)

Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation	T-Statistics	P-Values
H4: PV → TES → SDI	0.343	0.349	0.078	4.410	0.000
H4a: Information → PV → TES → SDI	0.068	0.072	0.035	1.969	0.024
H4b: Accessibility → PV→ TES →SDI	0.143	0.135	0.062	2.315	0.010
H4c: Interactivity → PV → TES → SDI	-0.063	-0.053	0.052	1.214	0.112
H4d: Personalization → PV → TES → SDI	0.126	0.125	0.042	2.992	0.001
H4e: Security → PV → TES → SDI	0.039	0.041	0.028	1.367	0.086

Coefficient of determination (R^2)

Additionally, the coefficient of determination was assessed to examine the constructs' predictive abilities. The percentage of change in the dependent variable that was explained by the independent variable is represented by the coefficient of determination (R^2) value. The coefficient of determination values listed in Table 8 adequately explain the variability. As a result, the R^2 of perceived value (0.610) indicates that independent constructs (accessibility, information, interactivity, personalization, and security) account for 61% of the variance.

According to Table 8, the sustainable destination image has an R^2 of 0.288, indicating that the perceived value of smart tourism technologies and tourist experience satisfaction (an independent construct) account for approximately 29% of the variance. The tourist experience satisfaction R^2 of 0.477 indicates that the perceived value of smart technologies (an independent construct) accounts for approximately 48% of the variance.

Table 8. Coefficient of determination

Coefficient of determination (R^2)		
	R-Square	**R-Square Adjusted**
Perceived Value	0.610	0.595
Sustainable Destination Image	0.288	0.278
Tourist Experience Satisfaction	0.477	0.473

DISCUSSION AND CONCLUSION

Smart technology integration into current business processes is crucial for businesses today. This not only saves time and improves organizational performance overall, but it also makes sure that the company stays one step ahead of the competition in the long run. Technology in an organization must be perfectly aligned with the values, mission, culture, and current business processes to enable successful digital transformation. Smart tourism technologies have revolutionized tourism businesses, products, and experiences as well as business ecosystems and destinations, bringing about significant changes to the tourism industry (Idris et al., 2021). One of the key elements in the growth of sustainable and smart tourism is information and communication technology. To give visitors a convenient, welcoming, and personalized travel experience and increase their satisfaction, many tourist destinations and attractions have adopted smart tourism technologies (Zhang et al., 2022). Smart technologies assist tourist destinations in managing tourism resources better, promoting their best possible use and sustainable development of tourism resources, and enhancing the standard of living for locals and visitors.

A customer's ability to visit an attraction before departing using augmented reality tools is a trend that cannot be ignored when examining technological developments in the travel industry. Although the technology is already available, adoption is still at a low level. One of the barriers to adoption may be the severe lack of interesting content, which should soon change. Another tool that promises to raise customer satisfaction while decreasing customer service expenses is the use of chatbots and virtual assistants. We believe that over time, the majority of communication-related to obtaining basic information about a product or planning a trip can be automated. They might not be intelligent enough to replace a human right now, and they probably won't replace travel agent communication anytime soon.

The primary objective of this article was to comprehend the characteristics of the perceived experience of smart tourism technologies and to investigate the connection between the tourists' perception of the value of smart tourism technologies, their satisfaction with their experiences, and the image of sustainable destinations. To begin, the perceived value of experience associated with smart tourism technologies has been measured. Accessibility, personalization, information, security, and interactivity are in descending order of importance. Particularly, when comparing the findings of the analysis on the attributes of smart tourism technologies that tourists perceive to be of the highest perceived value, tourists are most likely to recognize accessibility when employing smart tourism technologies. The fact that it is easily accessible to tourists traveling through Istanbul could be one of the reasons. Tourists use the smart technologies that are currently available to make decisions, such as making travel arrangements on their mobile phones, interacting with other tourists, and exchanging travel stories. Travellers can enjoy a technology-based travel experience at their destination because smart tourism technologies are readily available and require little time or effort to learn how to use (Pai et al., 2020).

Another significant factor that affected how the perceived smart tourism experience was personalization. Since relevant and appropriate offers are made to tourists, saving them time while boosting travel satisfaction in the destinations, smart tourism technologies offer insight and better knowledge of consumer preferences. In addition, this article does not endorse the significance of security and interactivity, contrary to expectations. Whilst, accessibility, personalization, information, and play an important role in improving the travel experience based on smart technologies. This study claims that if smart tourism and smart city applications are used in all facets of governance, Istanbul will become the center of attention and take the lead in the global race for leadership. Smart technologies are being implemented to improve the lives of both

residents and visitors. Accordingly, the Istanbul Metropolitan Municipality should continually upgrade the use of smart tourism technology infrastructure and services, simplify the use of smart tourism technologies, and strengthen contact and communication between tourists and other stakeholders, thereby further enhancing tourists' perception of the usability and usefulness in the context of smart tourism technologies. Lastly, when developing related platforms, applications, websites, etc., software developers should plan for more diverse experiences and pay more attention to individual service performance.

Theoretical Contributions

This article theoretically makes significant contributions. The proposed research model and identified constructs contribute to the expanding body of knowledge regarding the investigation of specific connections and relationships. Numerous studies have explored the impact of technologies, and sustainable destination image on tourist experience satisfaction. However, reverse exploration is relatively rare, hence the exploration of the relationships of smart tourism technologies, and tourist experience satisfaction toward sustainable destination image is the contribution of this article. Additionally, as a world-famous tourist destination, using tourism technologies was an ideal context to carry out such research. As a result, another contribution of this research is the examination of the aforementioned relationships in the context of Istanbul, Turkey.

Practical Implications

This article also has important practical implications. Firstly, the findings indicate the significance of information quality, reliability, and accuracy for the perceived value of smart tourism technologies. Therefore, the management and administration of tourist destinations should value and incorporate accurate and reliable information to be transmitted through smart tourism technologies, and all such information should be updated quite frequently.

Secondly, the tourists have placed a high value on accessibility and ease of information access. Therefore, all sources of information through smart tourism technologies should be user-friendly and create smart travel applications or websites that better meet the expectations of tourists with better personalization features.

Thirdly, the perceived value of smart tourism technologies experience showed the highest impact on tourism experience satisfaction (H2), indicating that perceived smart tourism technologies experience can lead tourists to higher satisfaction. Travel apps or websites provide tourists with the services they require, replacing traditional manual processes. This not only increases the sense of participation among tourists but also saves money on transportation and labour costs (Pai et al., 2021). As a result, local smart tourism websites, applications, and software can get more attention. This could further develop Istanbul's travel industry experience fulfilment. Fourthly, as shown by the study's findings tourist experience satisfaction positively affects sustainable destination image (H4). In this manner, to support and encourage more explorations, destination management should seriously focus on enhancing the tourist experience satisfaction by using tourism-related smart technologies to improve the destination's image and competitiveness.

Limitations and Recommendations for Future Research

The first limitation is the survey's use of the snowball sampling method and online data collection. The sample size of respondents is relatively small and may not be representative of the entire population due to time restrictions and accessibility. To increase the diversity of the study sample, it is advised that future research prepare surveys in a variety of languages and enrich sample types from various nations. Additionally, information could be gathered from well-known tourist attractions. Secondly, this study was carried out in Istanbul, which might have a unique tourist type and urban environment. Respondents of different genders, ages, regions, and experiences with smart technologies may have different attitudes toward the smart tourism technologies experience. The findings of this study may not apply to other regions and may differ depending on the demographic and geographic characteristics.

Thirdly, this study focused on the perceived value of the smart tourism experience, tourist experience satisfaction, and sustainable destination image. The applicability of these constructs is limited and needs further investigation. To better understand current smart tourism technologies, future research should keep looking into additional factors that affect the experience, as well as exploring the phenomenon on a broader level.

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