Impact of Smart Tourism Technologies on Tourist Experience Satisfaction and Sustainable Destination Image: Evidence from Istanbul

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Zásady pro vypracování

Introduction
Define the objectives and the application methods used in the Master Thesis.
I. Theoretical Part

- Compile the theoretical information about smart city, smart tourism and smart tourism technologies.

II. Practical Part

- Analyze the impact of perceived value of smart tourism technologies on tourist satisfaction and sustainable destination image.
- Extract practical implications from data analysis.
- Provide guidelines to the government and destination marketing organizations (DMOs) to create specific activities regarding the enrichment of tourist experiences.
- Provide clear and easy-to-follow guidelines for relevant stakeholders to improve the sustainable image of the destination.

Conclusion

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ABSTRAKT

V dnešní době patří digitalizace k nejdůležitějším změnám v našem uspěchaném světě. Rozšířené používání technologií chytrého cestovního ruchu je trvalým zvykem moderních technicky zdatných turistů. Neustálé přizpůsobování a zdokonalování chytrých technologií v odvětví cestovního ruchu, které je založeno na interakci široké škály produktů a služeb, je proto předpokladem produktivity a konkurenceschopnosti a rovněž důležitým krokem ke zlepšení image udržitelné destinace. Stále více turistických destinací se spoléhá na chytré technologie, aby přilákalo více turistů, obohatilo kulturní zážitek z cestování a spokojenost s cestováním. Fenomén technologií chytrého cestovního ruchu spolu s jejich dopadem na spokojenost turistů a image udržitelné destinace však není dostatečně prozkoumán. Na případu tureckého Istanbulu se proto tato práce pokouší prozkoumat fenomén technologií chytrého cestovního ruchu spolu s jeho souvisejícími asociacemi identifikovanými v přehledu literatury. Tato studie využívá metodologii založenou na průzkumu, která zkoumá, zda jsou turisté spokojeni se svými technologiemi chytrého cestovního ruchu (tj. informace, dostupnost, interaktivita, personalizace a bezpečnost), a také dopad vnímaných zkušeností s technologiemi chytrého cestovního ruchu na spokojenost turistů a image udržitelné destinace v Istanbulu. Odpovědi byly kvantifikovány pomocí statistického softwaru Smart PLS 3.3.9 pro modelování strukturálních rovnic metodou nejmenších čtverců (PLS-SEM). Výsledky této studie založené na průzkumu mezi 142 turisty, kteří navštívili Istanbul v Turecku, naznačují, že turisté pravděpodobně přikládají větší hodnotu tomu, co vnímají z technologií chytrého cestovního ruchu. Výsledky analýzy cest ukázaly, že vnímaná zkušenost s technologiemi chytrého cestovního ruchu měla významný vliv na spokojenost s cestováním a spokojenost s turistickými zkušenostmi měla významný vliv na image udržitelné destinace. Důsledky a omezení studie budou diskutovány a uvedeny v závěru. Výsledky studie mají významný dopad na destinační manažery.

Klíčová slova: technologie chytrého cestovního ruchu, chytrý cestovní ruch, image udržitelné destinace, spokojenost s turistickými zkušenostmi.

ABSTRACT

Nowadays digitalization is among the most important changes in our fast-paced world. The widespread use of smart tourism technologies is a permanent habit of modern tech-savvy tourists. Therefore, the continuous adaptation and driving improvement of smart technologies in the tourism industry, which is based on the interaction of a wide range of products and services, is a prerequisite for both productivity and competitiveness, as well as an important step for improving the sustainable image of any destination.

More and more travel destinations are relying on smart technologies to attract more tourists enrich the cultural travel experience, and travel satisfaction. However, the phenomenon of smart tourism technologies along with their impact on tourist satisfaction and sustainable destination image is under-researched. Therefore, by taking the case of Istanbul city of Turkey, this thesis attempts to explore the phenomenon of smart tourism technologies along with its related associations identified through the literature review.

This study uses a survey method to collect data for examining whether tourists are satisfied with their smart tourism technologies (i.e. information, accessibility, interactivity, personalization and security) as well as the impact of perceived smart tourism technologies experience on tourists' experience satisfaction and sustainable destination image in Istanbul.

The responses were quantified by using Partial Least Square-Structural Equation Modeling (PLS-SEM) statistical software Smart PLS 3.3.9. version. The results of this master's thesis, based on a survey of 142 tourists who visited Istanbul, Turkey, indicate that tourists are likely to place more value on what they perceive from smart tourism technologies. A path analysis results indicated that perceived smart tourism technologies experience had a significant influence on the travel experience satisfaction and tourist experience satisfaction had a significant influence on sustainable destination image. The implications and limitations of the study will be discussed and presented in the conclusion.

Keywords: smart tourism technologies, smart tourism, sustainable destination image, tourist experience satisfaction

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CONTENTS

1 INTRODUCTION

The rapid pace of digital innovation and technology has given societies and economies a positive boost to think outside the box globally and align their operating mechanisms accordingly. Digital transformation trends are now widely visible in various industries such as healthcare, banking, media and entertainment. It transformed the traditional business economy into a digital one, and the digital transformation of the economy is largely based on advanced technologies. However, the industry that seems to have been turned on its head, is the hospitality and tourism industry. Tourism was one of the first industries to adopt Information and Communication Technology (ICT), is considered a pioneer of digital technologies and platforms. (World Tourism Organization, n.d.). The use of smart technologies in a set of tourism strategies makes a huge contribution to the effective achievement of business goals and objectives, making them able to better understand the choices of customers and serve better. With this trend, many tourism-related businesses have adopted various smart technologies to promote their destinations. In order to develop a smart destination, government and destination marketing organizations (DMOs) often create an evaluation system in line with smart city policies (Pai, et al., 2020).

Quality tourism has become a new kind of life experience, often considered an important way to achieve satisfaction. A sustainable destination image must maintain a high level of tourist satisfaction and provide meaningful experiences 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. Our task is to continue to use this power for the offered products, protecting our societies and businesses against risks.

The point of view of tourists clarifies, that smart technologies are an essential element of experience and play an indispensable role throughout the whole traveling process. Traditionally, people had to stand in long lines to buy bus, train or airline tickets. Now it's easy to book a ticket online in a jiffy which has been a positive impact on our daily lives. The ultimate goal of smart tourism is to make travel more convenient and enjoyable for travellers (Pai, et al., 2020). Most travellers 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). 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; Pai, et al., 2020; Zhang, et al., 2022). However, the findings cannot be generalized as different countries with different tourists will have different experiences and familiarity with smart tourism technologies.

Despite such significant importance, the relationships of smart tourism technologies, tourist satisfaction, and sustainable destination image are underexplored. Particularly, in the context of Istanbul, Turkey has great potential to be explored on such lines, 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 tourist experience satisfaction and sustainable destination image?

A new theoretical model to achieve these answers is proposed. An empirical study was conducted to understand tourists' perceptions of smart tourism technology attributes, the relationship between smart tourism technology attributes, tourist experience satisfaction, and sustainable destination image in Istanbul, Turkey. The analysis is based on additional secondary data sources, a quantitative online questionnaire and research studies.

OBJECTIVES AND METHODS OF MASTER THESIS PROCESSING

The objective of this thesis is to explore the role of the perceived value of smart tourism technologies on tourist experience satisfaction, and the sustainable destination image in Istanbul, Turkey. To achieve its goals, this research first sets out the introduction. The second chapter includes the theoretical background of the study, providing pre-existing definitions of the main concepts of smart city, smart tourism, smart tourism destinations, the tourism industry in Istanbul and smart tourism applications used in Istanbul, as well as 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, and 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. Lastly, the sixth chapter provides a discussion and conclusion of this thesis, including the theoretical and practical contribution of this research as well as limitations and future research directions related to digitalisation, innovation, and sustainability of the tourism industry.

I.   THEORY

2 THEORETICAL FRAMEWORK

2.1 Tourism Industry

Over the past decades, the World Travel and Tourism Council (WTTC) has been evaluating the economic effect of travel and tourism, emphasizing the significance of this sector to the worldwide economy as it provides social and economic development, poverty reduction, job creation, prosperity, and significant positive social impact, including unique opportunities for women, minorities and youth (World Travel & Tourism Council, 2021). The tourism industry spans many different sectors, from transportation services such as airlines and rail companies and car rental services to the production and distribution of leisure products such as paper or digital guides and translators. It can be defined by the services, infrastructure and products that make leisure travel possible. According to World Travel & Tourism Council, in 2019, travel and tourism was one of the largest sectors in the world, accounting for 10.4% of global GDP ($9.2 trillion), 10.6% of all jobs (334 million), and accounted for the creation 1 in 4 of all new jobs in the world. In addition, the expenses of foreign visitors amounted to $1.7 trillion in 2019 (6.8% of total exports, 27.4% of global service exports).

Since the end of 2019, the COVID-19 pandemic has wreaked havoc on communities around the world and has had a devastating impact on the travel and tourism sector. The travel and tourism sector suffered a loss of almost $4.5 trillion, while its global contribution to GDP decreased by 49.1% compared to 2019 and reached only $4.7 trillion in 2020; compared to a 3.7% drop in global GDP. In 2020, 62 million jobs were lost worldwide. (World Travel & Tourism Council, 2021). The considerable decline in mobility resulting from the lockdowns and social distancing measures has led to a downturn in the tourism service business. Since many elements of tourism have been forced to slow down, the demand for innovative technology in the tourism industry is higher than ever.

According to the World Tourism Organisation, secretary-general Zurab Pololikashvili, this crisis provides an opportunity to rethink the tourism sector and its contribution to people and the planet; an opportunity to better rebuild a more resilient, inclusive, and sustainable tourism sector that will ensure that the benefits of tourism are widely and equitably shared (UNWTO, 2021).

Tourism is an area of the economy that is strongly connected with the natural environment. Therefore, it is necessary to integrate tourism activities with the objectives of environmental protection, as well as to form new pro-environmental attitudes of tourism participants. This

approach is in line with the concept of sustainable tourism. Achieving sustainable tourism is an ongoing process that requires consistent monitoring of impacts and taking preventive and corrective measures when it is necessary (World Tourism Organization, n.d.).

As 2020 was marked by economic shocks, massive social protests around the world and devastating natural disasters, the United Nations and other international organizations are increasingly focusing on the urgency and importance of achieving sustainable development. Thus, sustainable tourism is becoming an increasingly important topic in national programs, as it aims to promote economic growth, social inclusion, and the protection of cultural and natural wealth. However, sustainable tourism development has only recently emerged and therefore has not been explored as extensively as mainstream tourism. This is a gap that my research hopes to fill, although it is a constantly evolving phenomenon.

2.1.1 Tourism Industry in Istanbul

Turkey is world-famous for its tourism thanks to the country's stunning coastlines of sandy beaches and blue waters as well as for its diverse and rich history, incredible Byzantine and Ottoman architecture and thousands of Roman ruins that scatter the land. Tourism is one of the most dynamic and fastest-growing sectors of the Turkish economy.

For over ten thousand years territory of Turkey has been the home of the great cultures and civilizations including Hittites, Phrygians, Lydians, Persians, Greeks, Romans, Seljuks, and Ottomans. This led to an impressive culture with numerous influences. From Greek temples to Roman aqueducts, cathedrals, cave churches and amphitheatres, Turkey offers touristic destinations from many eras.

Turkey is surrounded by the Mediterranean, the Aegean Sea, and the Black Sea. The Marmara Sea, the Bosphorus and the Dardanelles separate the boundary between Thrace and Anatolia; also separate Europe and Asia making their location geographically important. With its 7,200 km of coastline, Turkey ranks 3rd among all countries with 463 blue flag beaches. There are 18 World Heritage Sites in Turkey as of 2018.

Istanbul is one of the fastest-growing metropolitan areas in the world. The city has a very unique position. It lies on the Bosphorus strait between the Black Sea and the Sea of Marmara which makes Istanbul a transcontinental city with its commercial center located in Europe and the rest of the city located in Asia. European and Asian sides are linked by three bridges. 50 years ago, the population of the urban areas was just around a million inhabitants. Since then, it has ballooned to 16 million residents. Istanbul´s popular attractions which are worth a visit include Hagia Sophia, Grand Bazaar, Topkapi Palace, Maiden´s Tower,

Dolmabahce Palace, Basilica Cistern, Blue Mosque, Galata tower, Rumeli Fortress, the Spice Bazaar, and many others. Istanbul has also one of the biggest shopping malls in Europe such as Cevahir Mall, Forum Istanbul, and Mall of Istanbul.

With rare exceptions, the number of travelers in Turkey increases every year. In 2016, tourism dropped markedly due to the Syrian crisis and the associated terrorist threat. Also, in 2020 and 2021, as in almost all countries, the number of tourists remained much lower than usual due to the COVID-19 pandemic.
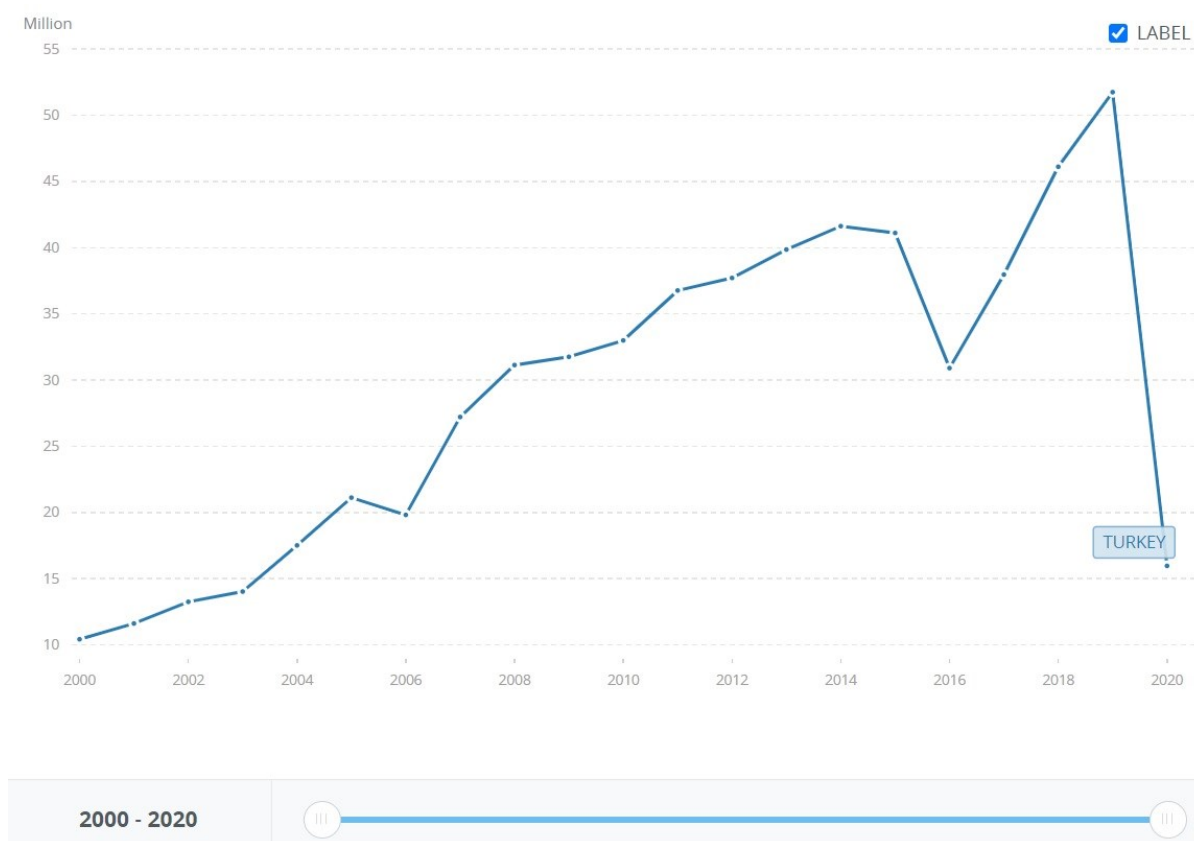
Source: The World Bank (2020)

Figure 1. International tourism, number of arrivals in Turkey

According to The World Bank statistics, international tourist arrivals in Turkey have shown rapid growth every year and the highest growth in 2019. Prior to the Covid-19 crisis, Turkey attracted around 51 million foreign tourists, ranking it the sixth most popular tourist destination in the world. As for the nationalities, Russia took first place with 7 million visitors. Turkey's tourism revenue reached $34.5 billion in 2019, which is a new record ranking the country 15th on the list of world tourism income. While individual spending accounted for $25.3 billion of total tourism income, around $9 billion of tourism income

came from spending on package tours (Turkish Statistical Institute, 2020). Foreign visitors visited Turkey mainly for "travel, entertainment, sports and cultural activities" with 73.6%.

Istanbul was ranked as the 8th most visited city in the world with nearly 15 million tourists followed by Antalya with 14.65 million (Mastercard Global Destination Cities Index, 2019).

In 2019, the contribution of travel and tourism to employment for Turkey was 2,346 million people. In 2019, the total contribution of travel and tourism to employment to Turkey's GDP was 11% of the total economy. The total contribution of travel and tourism to employment was 9.3% of total employment. International visitor spending included 16.9% of total exports (World Travel & Tourism Council, 2021). As we analyze the data, tourism is one of the most dynamic and fastest-growing sectors of the Turkish economy that needs to be developed.

2.2   Smart Tourism and Smart Tourism Destination

Rapid technological development and digital transformation define a significant shift in the structure of businesses and is the result of the fourth industrial revolution. The fourth industrial revolution marked the beginning of the introduction of smart technologies in the industrial sector, carried out in the tourism sector. The term smart has been applied to tourism based on how integrated technology, real-time data and physical infrastructure have been combined into a single complex environment much like a city, resulting in great achievements (Pai, et al., 2020). Smart tourism is considered to be customer-centric and aims to fully meet the needs of tourists in terms of food, accommodation, travel, shopping and entertainment. The main goal is to use the system to promote the tourist experience and improve the efficiency of resource management in terms of maximizing both the competitiveness of the destination and the satisfaction of the tourists, as well as ensuring sustainability over a while. Smart tourism is not only application of information and communication technologies, but also an ecosystem that allows tourists, destination management organisations, and other stakeholders in the tourism industry to interact, thereby leading to the co-creation of value between tourists and providers (Pai, et al., 2020).

Over the past two decades, the widespread adoption and use of information and communication technologies have led to a radical shift in consumer behaviour in the tourism industry (Neuhofer, et al., 2015; Shen, et al., 2020; Buhalis & Amaranggana, 2015). Tourists are now independent and active; they create and share information, and also try to influence others. In most cases, they usually do not have enough experience and have limited information about the places where they go on holiday, as well as they always have different

requirements and personal qualities. In this smart context, smartphones, social networks, and applications have become much more than just a source of information for tourists, as it is used for various purposes. The main impact which has shaped the smart tourist is the widespread use of mobile technologies, applications, smart devices and location-based services (Shen, et al., 2020). As a result, smart tourism technologies help tourists integrate content and improve the quality of their decision-making. More educated and engaged tourists are actively interacting with target locations, collaboratively creating tourist attractions for value creation (Neuhofer, et al., 2015). It is also important to note that smart technologies contribute to the competitiveness as well as the sustainable development of tourism destinations.

The idea of smart tourism destinations originated from the smart city and, in particular, from the concept of smart tourism. Smart tourism destinations aim to increase the attractiveness and improve the living standards of all stakeholders, including residents and visitors (Buhalis & Amaranggana, 2015). Most of the research on smart tourism and smart tourism destinations is theoretical and mainly focuses on the importance of growing the tourism industry and co-creating events to promote the tourist experience (Buhalis & Amaranggana, 2015). Smart tourism destinations are the center of tourism objects and data resources supported by the Internet of things and cloud computing, aimed at popularizing the knowledge of tourists through the process of intelligent recognition and control (Acar, et al., 2019). The true logic behind smart tourism destinations is to focus on the needs of tourists, combining information and communication technology with spontaneous beliefs to raise the quality standard of tourism services, promote tourism management and further expand the industry.

2.3 Smart City Concept

A smart city is defined as a city where information and communication technologies (ICT) are integrated into traditional infrastructure through the use of technological advances (Acar, et al., 2019). In this context, the term "smart" means intelligent, digital, green, sustainable, integrated and ubiquitous. While the end goal is providing a sustainable high-quality life for future generations, smart cities' pillars include a smart economy, smart mobility, smart environment, smart people, smart living and smart governance (Buhalis & Amaranggana, 2014). According to Chung, et al. (2021), the attributes of a smart city are connectivity through information and communication technologies, increased efficiency, sustainability,

eco-friendliness, and improved quality of life. To ensure the quality of residents' life, the smart city aims to improve urban governance, organizational structures and identify common problems related to urban infrastructure, risks, transportation, urban mobility, waste management, water and energy supply, hazards and other issues. Through the effective use of information and communication technologies and efficient management systems, smart cities achieve their goals and thus contribute to transparency and customer satisfaction. In smart cities, residents have a high level of interaction through efficient communication networks that enable people to access essential services such as healthcare, education, tourism, sustainable environments and safe buildings (Acar, et al., 2019). The main idea is that smart infrastructure is the key to unleashing the full potential of the smart city and preparing for the tourism of the future. Smart technologies and applications are revolutionizing the way tourists experience cities and new destinations. Celikyay (2017) states that applying the concept of intelligence to all areas of governance will make Istanbul the center of attention in the world and undoubtedly lead to global competitiveness.

Chung, et al. (2021) considered a smart tourism city as a combination of smart tourism and a smart city as a tourism and urban life intersect in smart cities. Applications such as Google Maps, mobility (such as Uber, iTaksi, BiTaksi) and accommodation (such as Airbnb) play an important role in making the city smarter and more accessible, allowing tourists and residents to blend and help turn ordinary houses or cars into tourism offerings. From their perspective, smart tourism cities are "an innovative sustainable tourism destination that facilitates and enhances visitor interactions with experiences at their destination and ultimately improves the quality of life for residents."

2.4   Smart Tourism Technologies

The advent of technologies, from process automation to data analysis, has greatly accelerated some processes, and this is only a small part of the digitalization of the tourism industry. The reason it took so long is that almost all the procedures were done manually. Traditional one-way communication tools such as advertising, brochures or road shows are being replaced by smart technologies such as interacting with tourists through websites, social networks, mobile applications, etc. While your name and personal information now appear on the screen, retrieved from a database, in the past it required extensive searching through years of paperwork that was easy to forget, lose, or even copy. Just twenty years ago, you spent hours going through tons of supporting documents and forms to book just one ticket at the

travel agency, and we're not even talking about the time spent waiting in endless lines at hotel check-in counters, airports, car rental counters and more.

According to Buhalis & Foerste (2015), smart destinations are integrating new technologies into their travel resources and using them as a marketing platform. Smart tourism technologies are specific tools, products and services that tend to create added value through increased connectivity, interaction, personalization and co-creation, and enrich tourists' overall experience, satisfaction and behavioural intention (Zhang, et al., 2022; Neuhofer, et al., 2015). It is worth noting that "smart" is not the progress of one technology, but the interconnection and continuous development of various technologies at the same time (Shen, et al., 2020). Smart technologies include different computing and information technologies offering more attractive, efficient, inclusive and economically, socially and environmentally sustainable than its predecessor.

Huang et al. (2017) define smart tourism technologies as including all forms of online travel applications and information sources such as online travel agencies, personal blogs, public websites, company websites, social media, mobile apps, and platforms, etc. Various smart tourism technologies are used to meet tourists' needs by providing correct information, better decision support, greater mobility and quality tourism experiences, as well as reduce service costs, limit time replaced with digital communication, facilitate and increase the availability of services offered. Thanks to smart technologies and digitalisation, more travelers are planning their own trips rather than through third parties such as travel agencies (Pai, et al., 2020). When you go on a trip, there is a lot to plan for your trip to run as smoothly as possible starting with train tickets to the airport, a flight to your destination and a hotel for your stay and a taxi in minutes. The so-called e-tourism has already reached the level of maturity as the norm for the tourism industry, online searches and transactions increasingly include secondary products such as museum tickets, shopping or restaurants (Huang, et al., 2017). Now tourists can easily obtain information on destination transportation, accommodation, and attractions, book and pay for the entire trip with a few clicks via smartphone, tablet or laptop. At the destination point, they can find top-rated restaurants/ attractions/leisure activities nearby from a wide selection of review platforms, websites and apps. In addition, tourists can connect to Wi-Fi and make mobile payments by scanning a QR code at their destination (Pai, et al., 2020).

The other literature indicates that it includes also the Internet of Things (IoT), cloud computing, big data, artificial intelligence (AI), augmented reality (AR), virtual reality (VR),

ubiquitous connectivity through Wi-Fi, near field communication (NFC), and radio-frequency identification (RFID), location-based services, geo-tag services, sensors, beacon technology, social networking sites, usage of smart devices and mobile payment and blockchain which are related to tourism activities (Pai, et al., 2020; Huang, et al., 2017; Jeong & Shin, 2020). The Internet of Things, which is already being used in many ways, will play a key role in the tourism industry. VR and AR are new smart tourism technologies that have become popular in recent years in the context of tourism allowing tourists to experience an interactive environment supported by a computer (Zhang, et al., 2022). AI facilitates the careful design of products and experiences that match consumer preferences, based on the processing of big data. Strategically placed sensors can provide real-time actionable data to make it easier for travel organizations to optimize operations and improve customer satisfaction. This technology also provides travelers with optimal destinations detecting seasonal and situational influences at specific travel destinations, also known as smart destinations. For example, a travel booking platform that uses these algorithms is not likely to recommend you a holiday destination with bad weather or predicted overcrowding. Other examples of smart devices include wearables and portable devices such as smartphones, smart glasses, and smart watches. In addition, all facilities and departments of the tourism industry are connected to smart devices such as self-service check-in kiosks at hotels, check-in machines at airports, self-service ticket machines and guide systems at tourist attractions. Tourists are benefiting from convenient and efficient services by using these smart devices (Pai, et al., 2020).

2.5   Smart City and Tourism Applications in Istanbul

Turkey's largest city Istanbul, home to one in five Turkish residents, is on its way to becoming a permanent member of the global mega-list of around 16 million people. The rapid urbanization of Turkey is forcing the country to quickly enter the smart city ecosystem. Istanbul has a rich culture and history, as well as an identity based on being the "capital of civilizations". Being a unique place as a cultural and historical center, which is important from a national and global point of view, therefore it is essential to preserve its unique identity through sound policies and measures. With a rapidly growing population, Istanbul faces many urban challenges such as urban transport, energy, infrastructure, and pollution.

Istanbul Metropolitan Municipality (IMM) considers the concept of a smart city to be a useful approach to address these challenges. Along with subsidiary companies such as Smart

City Technologies Inc. (ISBAK) and Istanbul Information Technologies, Istanbul Metropolitan Municipality (IMM) launched a comprehensive smart city transformation initiative project "Smart City Istanbul" in 2015. The project includes various stakeholders, government agencies, private companies, local communities, non-governmental organizations, and universities. According to Istanbul Metropolitan Municipality, 8 main activities have been identified for urban life: smart mobility, smart environment, smart healthcare, smart life, smart governance, smart economy, smart people and smart security (Netherlands Enterprise Agency (RVO), 2020).

ISBAK considers "Smart City" work not as a project, but as a journey, because Istanbul, which is among the top 25 brands in the world, will demonstrate both the value of its brand in the near future and the distinction among cities with integrated work and joint projects carried out throughout the journey, according to top officials of the company. ISBAK aims to contribute to the formation of happy cities with globally competitive, sustainable, and innovative smart city technology solutions (Istanbul Computing and Smart City Technologies Inc., 2021). The smart city is seen by ISBAK as a comprehensive urban framework to increase citizen participation, grow the local economy, enable data-driven urban governance, create a flexible governance structure and development of the tourism sector to increase GDP, which are the most important indicators for a smart city. Istanbul's smart city vision developed under this transformation project is to "by 2029 become the smartest city in the world that contributes the most to improving the quality of life" along with short-term (2019), medium-term (2023) and long-term (2029) strategic goals and smart city roadmap (Netherlands Enterprise Agency (RVO), 2020). It aims to take into account the needs, demands and expectations of residents as well as visitors to make Istanbul a Smart City Tourism Destination. About 15 million foreign tourists visited Istanbul in 2019 and the tourism sector is critical to the development of the local and national economy in Istanbul. Therefore, Istanbul has always needed funding and progress to solve problems and manage the whole mechanism of municipal work.

Using technology as a tool to improve the quality of life for citizens is critical to the success of smart city applications. Therefore, the municipality has launched a series of projects aimed at achieving the sustainable development goals aimed at becoming a smart city which includes Intelligent Transportation Systems, Smart City Technology and Applications, Intelligent Camera and Security Systems, Transportation Planning and Geographical Information Systems, National and International Consultancy and Planning Services,

Maintenance & Repair Services, Intelligent Lighting Systems, Fleet Management Systems (Istanbul Computing and Smart City Technologies Inc., 2021). ISBAK has already completed the management of Istanbul's broadband fibre-optic infrastructure and the control of "IBB Wi-Fi Wireless Communication Service" hotspots, which the municipality offers to citizens and guests free of charge in many parts of the city (Sezer, 2018). Istanbul Municipality took first place in the Smart Cities category with IMM WiFi service and won the Telecoms World Awards 2020 (Sezer, 2021). Residents of Istanbul began to use free internet services in the Istanbul metro lines as the internet infrastructure in the metro is critical in terms of transportation for residents, especially in case of emergencies, earthquakes, etc (Sezer, 2021).

IMM Data Center was established to provide continuous data protection and consolidate the information and documents among its 28 subsidiaries together with its affiliates, Istanbul Water and Sewerage Administration (ISKI) and Istanbul Electricity and Tramway and Tunnel General Directorate (IETT). Consequently, opportunities are created for significant savings and productivity gains by avoiding duplication of information technology investment costs (Sezer, 2020). Continuing its digital transformation work without interruption, Istanbul Metropolitan Municipality ensures that all files, documents, and papers from the past and present are compatible with digital archiving transformation technology (Sezer, 2021). The first public data center of international standards, IMM Open Data Portal, was launched to provide researchers and investors with the opportunity to explore existing data and develop innovative solutions using the data provided (Sezer, 2018). It is planned that an ecosystem for start-up firms that can use the open data provided by this platform will contribute to the economic development, help improve the well-being of its population and achieve the sustainability goals and innovation potential in Istanbul (Acar, et al., 2019). IMM Open Data Portal will be able to continue serving even during natural disasters and other emergencies.

CEVKO (Turkish Foundation for Environmental Protection and Packaging Waste Recycling), authorized by the Ministry of Environment and Urbanization, has launched the recycling mobile application called "Nereye atayim (Where to throw it away)", which is used to monitor waste collection and disposal processes in real-time (Nereye Atayim, 2022).

Istanbul, which is of central strategic importance to Turkey's economy joined the European Bank for Reconstruction and Development Green Cities (EBRD) Initiative in 2021, becoming one of the largest cities in the programme (EBRD Green Cities, 2021).

Commitment to the Green City Action Plan (GCAP) will be able to develop a green and sustainable vision while also revitalizing its urban landscape.

Moreover, major infrastructure projects have changed the tourism landscape, and this is expected to continue in ongoing projects which aim to improve the situation with urban mobility in the city. The Istanbul Sustainable Urban Mobility Plan (SUMP) was developed by the Istanbul Metropolitan Municipality under the "Global Future Cities Programme Turkey" of the United Kingdom Foreign Commonwealth and Development Office (UK FCDO) and its delivery partner Arup and strategic partner the United Nations Human Settlements Programme (Beduk, 2022). Istanbul SUMP which is the first of its kind in Turkey, was announced to the public on March 28, 2022. The plan constructs a human-centric transportation system compatible with Istanbul's unique geography and historical values for a sustainable future. The completed megaprojects such as "Istanbul New Airport", "Yavuz Sultan Selim Bridge" which is the third bridge across the Bosphorus strait, the undersea railway tunnel linked between the Asian and European shores of Istanbul called "Marmaray Tunnel", the road tunnel under the Bosphorus called the "Eurasian Tunnel" all aim to improve deteriorating traffic conditions and make it easier to travel and cross the Bosphorus strait, which is also important for the tourist experience (Acar, et al., 2019). The planned Canal Istanbul, an artificial sea-level waterway connecting the Black Sea to the Marmara Sea on the European side will create another waterway beside the Bosphorus and will be of value to the tourism industry. The project aims to minimize marine traffic in the strait of Bosphorus, which has serious implications for urban transport (Canitez, et al., 2020).

Challenges with urban transport including finding information about the public transport network, timetables, fares, finding places to buy smart cards used in all modes of transportation, and getting stuck in traffic while going to popular tourist destinations cause inconvenience not only to residents, but also to new visitors (Acar, et al., 2019). Istanbul has cutting-edge information and communication technology applications that support smart mobility. These include traffic measurement systems, traffic information systems, intelligent traffic signal systems, adaptive traffic management systems, EDS traffic management systems, emergency management center, traffic control center, electronic enforcement systems, smart parking management systems, automatic car parking payment systems, talking roads & talking vehicles, mobile applications, smart bus stops, special info points at bus stops for disabled people carrying cards, public transport information systems and public transport camera systems (Dener, 2018).

Nevertheless, an integrated mobile app that will include all modes of transport, such as bus, tram, subway, metrobus, ferry, and taxi, as well as parking lot location, traffic information, and alternative routes, can make it easier for the visitor to navigate through the complex and labyrinthine streets of Istanbul (Acar, et al., 2019). Istanbul's municipal bus operator, IETT (Istanbul Electricity, Tramway and Tunnel General Directorate), offers two mobile apps. The first is "Mobiett", which provides instant information about bus routes, timetables, location and expected arrival time to any bus stop displayed in real-time on a city map, and the second is "Nasil giderim (How to get there)", which helps travelers plan the most suitable routes.

"IBB Navi" is a navigation application developed by IMM's Department of Transportation for sustainable and effective traffic management. It helps users reach their destination as quickly as possible by following routes created using real-time traffic information in all cities in the Marmara region, especially in Istanbul, and rating travel experiences through the mobile app provides a customer-centric service experience. With IBB Navi, Istanbul residents and tourists can better manage their time in traffic jams and plan their trips intelligently considering both driving and public transport options in Istanbul (Roadmaps for energy, 2018). The Taxi Associations, the Chamber of Taxi Operators and the IMM cooperated at all stages of the planning, implementation and control of the project. Improving the taxi experience using ICT is expected to develop the quality of urban transport, which is one of the weakest points in the tourism experience in Istanbul (Acar, et al., 2019).

Istanbul's metrobus line, which is the special name for the bus rapid transit (BRT) was unveiled in March 2009 (United Nations Climate Change, n.d.). World-class sustainable bus rapid transit (BRT), pedestrian zones, and strong demand for improved cycling infrastructure underline the growth of sustainable transport in the city through which Istanbul is working to improve transport accessibility, healthcare, road safety, and reduce greenhouse gas emissions and traffic congestion (Tekir, 2014). Istanbul BRT is reported to have a positive impact on the environment. Savings in travel time amounted to 52 minutes per person per day. Every day, public transport consumes 242 tons less fuel. It is reported that 80,000 vehicles are taken off the roads every day, resulting in 623 tones less CO_2, 282 tones less nitrous oxide and hydrocarbons by 25 tones daily that cause smog, acid rain, and global warming and many other health complications (Cengiz, 2017). The fewer cars on the D-100 highway means fewer traffic jams and accidents.

One of the following problems traveling in Istanbul that cause a bad travel experience and a negative impact on the image of the city can be rude taxi drivers, higher fees for tourists, and choosing passengers based on their destination (Acar, et al., 2019). "iTaksi" is another official application of Istanbul Metropolitan Municipality which is a part of the smart city project aiming to improve the taxi travel experience as well as to reduce traffic congestion caused by cruising on the streets in search of passengers. Thanks to the function of calculating the cost of the trip, iTaksi allows you to know the cost and the duration of the trip in advance. In addition to cash, there are alternative payment options such as credit card or IstanbulKart. iTaksi will connect you to the nearest available taxi with one click of a button in the app. Communication between taxi drivers and travelers is recorded to improve the quality of service and traveler satisfaction. iTaksi offers three modes of transport depending on your needs: a standard yellow taxi, a turquoise taxi for more comfortable rides, and a black taxi for luxury travel (Justuseapp, 2021). All taxis are controlled by the IMM Transportation Control Center to ensure safety as iTaksi vehicles are equipped with dual cameras and record video without sound.

Supported by the Ministry of Culture and Tourism of the Republic of Turkey, Istanbul Convention and Visitors Bureau, Istanbul Chamber of Commerce, and Istanbul Metropolitan Municipality, a mobile city guide app called "One Istanbul" is available free of charge for local and foreign tourists since 2016 as an official destination marketing office. This mobile app provides tourists with detailed information about historical sites and many alternative routes to explore the city in a self-organized (App Advice, 2019) Accordingly, the application creates smart tourists who want to explore the destination on their own.

Sustainable bicycle-sharing systems using the mobile apps, electronic card payments, and GPS monitoring devices facilitate the use of bicycles when exploring the sights of the city and create a more cyclist-friendly urban mobility environment at the same time. Isbike is a smart bike-sharing system with 3,000 bikes and 300 stations throughout the city, offering a pleasant and unique view of Istanbul, especially along the Bosphorus and Marmara Sea coastline (Akarçay, 2022). It was established by Ispark, a municipal subsidiary company of Istanbul Metropolitan Municipality in 2012, which is responsible for managing parking lots and establishing the bike-share system and bike lanes aiming to increase the role of the bike in urban mobility. There is also another popular electric vehicle rental solution. "MARTI Scooter and Moped" which you can rent through an application, is the most enjoyable, fast and eco-friendly way of travel in Istanbul (Akarçay, 2022).

Additionally, tourism information offices provide information and documents about popular tourist attractions, events and activities, mobile applications providing accommodation, ticket and flight bookings, restaurant reviews, e-scooter and bicycle rental, car sharing, traffic information, location-based emergency service, route planning, interactive mobile maps and travel guides, wireless network to ensure uninterrupted internet access in public places such as squares, bus stations, public transportations, parks, etc., are all examples of smart tourism tools that can potentially improve the tourist experience in Istanbul.

2.6 Smart Tourism Technologies Attributes

This article examines the value that results from and is generated based on five perceived smart tourism technology attributes from previous studies. The existing literature has explored the individual effects of specific smart tourism technologies on the travel experience. Smart tourism technologies related experience was classified according to four key attributes such as informativeness, accessibility, interactivity, and personalization (No & Kim, 2015). This study further explores the fifth attribute - safety (Pai, et al., 2020; Zhang, et al., 2022; Jeong & Shin, 2020). Smart tourism technologies influence tourists' opinions and perceptions and influence their behavioural intentions. Using these key smart tourism technologies attributes, this study identifies the most important attributes influencing tourist satisfaction in smart tourism destinations like Istanbul.

2.6.1 Information

Tourism is an information-driven business, and because of the characteristics of tourism products and services, including intangibility, information is essential (No & Kim, 2015). The information is a combination of quality, reliability, and accuracy derived from smart tourism technologies in destinations (Huang, et al., 2017). The attribute of information plays an important role in smart tourism technologies directly affecting the attitude of tourists toward them. Using smart tourism technologies, tourists can easily expand the depth and breadth of relevant tourism information by gathering inspiration (Zhang, et al., 2022). When smart tourism technologies provide up-to-date, sufficient and accurate information about events, accommodation and transportation, the time and effort to find information is reduced and tourists are satisfied with their experience. The information encourages travelers to make rational judgments about their destinations and helps them make effective decisions.

2.6.2 Accessibility

Accessibility refers to the degree of difficulty for tourists to access and obtain the travel-related information offered by destinations through various types of smart tourism technologies (No & Kim, 2015). The quality accessibility of smart tourism technologies at the destinations makes it easier for tourists, thereby increasing the perceived ease of use of smart tourism technologies (Zhang, et al., 2022). Tourists tend to explore more information at all stages of their trips and visits when smart tourism technologies are widely and easily accessible (Pai, et al., 2020). At the same time, tourists enhance their experience and level of satisfaction.

2.6.3 Interactivity

Interactivity is defined as the mediator that facilitates real-time traveler feedback and active communication between involved stakeholders when using smart tourism technologies, which influences how tourists respond to it (Pai, et al., 2020). The attribute of interactivity greatly facilitates the task of finding information. When tourists experience a high level of interactivity, they tend to provide feedback through comments and reviews. The result of this attribute is a significant and positive impact on the smooth flow of the tourism experience (Zhang, et al., 2022).

2.6.4 Personalization

Personalization can be thought of as the degree to which a website or application can tailor services to suit the personal needs of the user of smart tourism technologies (No & Kim, 2015). According to users' previous consumption patterns, personalities and preferences, tourists can get suitable recommendations through big data or cloud computing (Pai, et al., 2020). This attribute includes custom design and provides them with relevant and suitable offerings that will meet their specific needs resulting in an optimal online experience (No & Kim, 2015). Personalized service with tailored communication can meet tourists' requirements for customization, save time, maximize tourists' satisfaction in tourism destinations and attractions and even increases the perceived quality of the service (Zhang, et al., 2022).

2.6.5 Security

Protection and safety of personal information is a required attribute in the technology-mediated environment to enhance the tourism experience at the destinations. When tourists

feel that their personal information security is at risk, they will not complete the transaction for privacy and security reasons (Lee, et al., 2018; Jeong & Shin, 2020). Tourists who are sensitive to security risks may find their smart tourism technologies experience less memorable (Jeong & Shin, 2020). The key evaluation factors used in tourism-related web assessment studies, security was described in the following three ways: protection of information during transmission and subsequent storage, online shopping/booking security, and claims of confidentiality/privacy. (No & Kim, 2015)

Based on previous research, potential data breach risks and inevitable security and privacy issues are key factors that can affect the use of smart tourism technologies (Huang, et al., 2017). The degree of use of smart tourism technologies in travel destinations is determined by the credible attitude of tourists to the protection of transmitted personal information, especially when making various online transactions (Zhang, et al., 2022). If a tourist destination cannot meet the needs of individual tourists for security and privacy, this will be a major barrier to tourists visiting that place.

2.7   Perceived Value of Smart Tourism Technologies Experience

Tourism perception is also considered an important research content in social psychology. Back in 1988, Zeithaml defined perceived value, which emerged from consumer behaviour theory and is still relevant today as "a consumer's overall assessment of the utility of a product or service based on the perception of what is received and what is given" (Zeithaml, 1988). In a nutshell, it means a trade-off between perceived benefits and perceived costs.

Smart tourism technologies and related services are a factor contributing to the improvement of the tourist experience (Zhang, et al., 2022). The perception of smart tourism technologies by tourists is an integral part of the tourism experience and a prerequisite for influencing tourist satisfaction and the image of a sustainable destination. Therefore, it is necessary to examine the tourists' perception of the impact of smart tourism technologies as a comprehensive set of facilitating digital technologies and not separately, on the tourist experience.

2.8   Tourist Experience Satisfaction

The concept of tourist satisfaction comes from the theory of marketing. According to Kotler (1994), customer satisfaction is a 'person's feeling of pleasure or disappointment, which resulted from comparing a product's perceived performance or outcome against his/her

expectations'. According to Chen & Chen (2010), tourist satisfaction is the result of comparing tourists' expectations before the trip with the actual tourist experience after the trip, which can lead to either feeling of gratification when the tourist is satisfied or displeasure when the tourist is dissatisfied. Tourist satisfaction is a subjective evaluation based on the feelings and opinions of tourists, making it difficult to correctly determine. Furthermore, various studies have suggested that different factors influence tourist satisfaction. Thus, even if tourists are not particularly satisfied with a certain service, if they review and evaluate the whole experience positively, they can still be satisfied with the whole experience. This study focuses on satisfaction based on tourists' perceptions of the impact of smart tourism tools on experiences rather than the services of the travel service providers themselves.

2.9 Sustainable Destination Image

Destination image is one of the most important factors in attracting and retaining tourists. There is no doubt that destination image influences tourists' decision-making process and destination choice, a successful and positive image contributes to the tourist experience and generates satisfaction that encourages tourists to return. An attractive destination image will encourage tourist visits and contribute to the sustainable development of the destination (Zhu, et al., 2022). One of the most used definitions of the destination image concept is "the expression of all the objective knowledge, impressions, preconceptions, imaginations, and emotional thoughts of an individual or group of people about a particular place" (Lawson & Baud- Bovy, 1977). Gutiérrez & Rodríguez-del-Bosque (2008) argue that the destination image is shaped by five different factors: the infrastructure system, climatic conditions, environmental conditions, destination impression, and the cultural environment. However, due to the fact that people are exposed to many influential factors on a daily basis, their perceptions can easily change. Ibrahim & Gill, (2005) also found a positive relationship between destination image and customer satisfaction, indicating that the more positively perceived a destination leads to higher satisfaction of visitors. However, the present work also focuses on the impact of tourist experience satisfaction on sustainable destination image, which is fairly limited in the literature.

3   RESEARCH MODEL AND HYPOTHESES

3.1   Research Hypotheses

3.1.1   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; Zhang, et al., 2022). Based on the arguments presented in the literature, the following hypotheses are suggested:

Hypothesis 1a: The information of 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.

3.1.2   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. According to previous studies, there is a significant positive relationship between perceived value and satisfaction. 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 satisfactory. For example, if a tourist can access any information about a destination and interact with the resources provided by smart tourism technologies, the degree of immersion and involvement in smart destinations will increase, which in turn will increase the tourist experience satisfaction (Jeong & Shin, 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.

3.1.3 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 destinations (Buhalis & Amaranggana, 2015; Pai, et al., 2020). Such smart tourism technologies also help to reduce labor 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 sustainable destination image in Istanbul.

3.1.4 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.

3.2 Proposed Research Model

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. Figure 2 shows the proposed research model with all hypotheses of the study. 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 will affect the tourists' experience satisfaction and sustainable destination image, accordingly, tourist experience satisfaction will affect sustainable destination image.
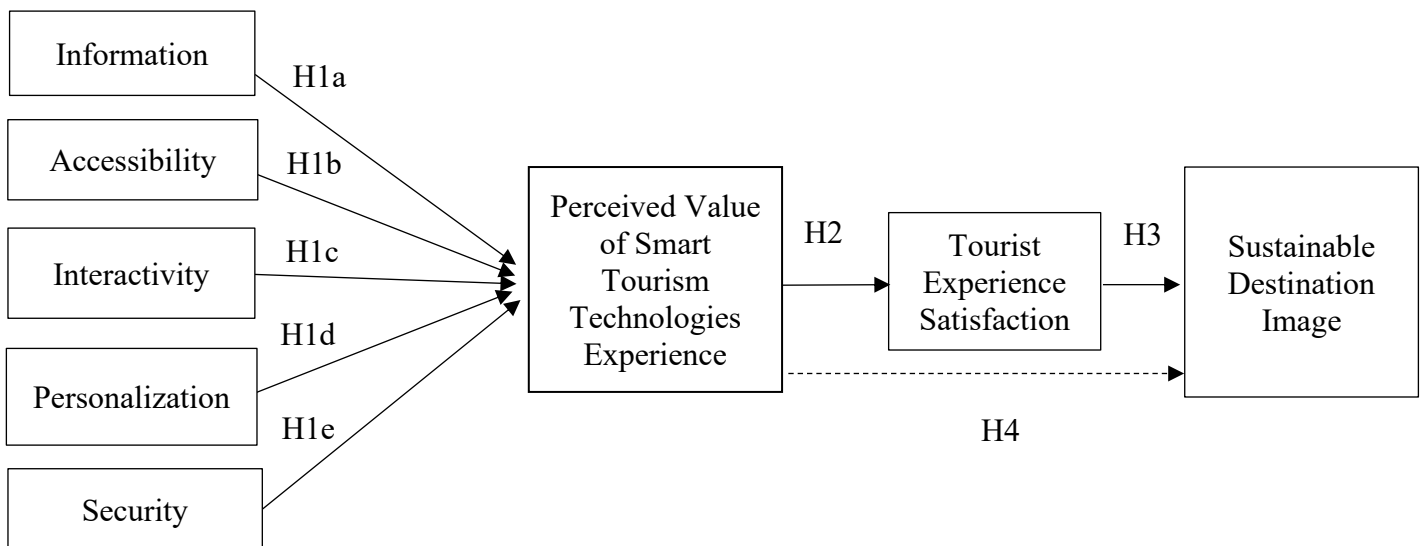
Figure 2. Proposed research model.

Detailed information about latent variables (factors) and apparent variables (subfactors) is presented in Table 1:

Table 1. Research constructs and measurement scale

Constructs	Indicators	Sources
Information	1. When traveling in Istanbul, smart tourism technologies provide me with useful destination and trip information. 2. When traveling in Istanbul, smart tourism technologies enable me to complete my travels with reliable and detailed information. 3. When traveling in Istanbul, smart tourism technologies help to minimize my travel concerns.	(Pai, et al., 2020) (Zhang, et al., 2022) (Jeong & Shin, 2020)
Accessibility	1. I can use smart tourism technologies anywhere and at any time during my travels in Istanbul. 2. Smart tourism technologies are easily accessible during my travels in Istanbul. 3. Smart tourism technologies are easily found without complicated processes when traveling in Istanbul.	(Pai, et al., 2020) (Zhang, et al., 2022) (Jeong & Shin, 2020)
Interactivity	1. Smart tourism technologies are interactive when I travel around Istanbul. 2. Smart tourism technologies are highly responsive to my travels in Istanbul. 3. It is easy to share information and content on smart tourism technologies during my travels in Istanbul.	(Pai, et al., 2020) (Zhang, et al., 2022) (Jeong & Shin, 2020)
Personalization	1. I receive personalized information on smart tourism technologies when traveling in Istanbul. 2. Smart tourism technologies provide me with easy-to-follow links and tips while traveling in Istanbul. 3. Travel information provided by smart tourism technologies meet my needs when traveling in Istanbul.	(Pai, et al., 2020) (Zhang, et al., 2022) (Jeong & Shin, 2020)
Security	1. Smart tourism technologies protect my personal and confidential information. 2. Smart tourism technologies respect my privacy and security of my transactions. 3. Smart tourism technologies are trustworthy and reliable.	(Pai, et al., 2020) (Zhang, et al., 2022) (Jeong & Shin, 2020)

Perceived Smart Tourism Technologies	1. Considering the time and effort spent on them, it is worth using smart tourism technologies. 2. I have a very good impression of my experience with smart tourism technologies. 3. Using smart technologies while traveling is enjoyable and entertaining.	(Zhang, et al., 2022) (Jeong & Shin, 2020)
Experience Satisfaction	1. Overall, I am satisfied with the smart tourism technologies available in Istanbul. 2. The smart technology available in Istanbul exceeded my expectations. 3. I am satisfied with the quality of services provided using smart tourism technologies in Istanbul.	(Zhang, et al., 2022) (Santos-Roldán, et al., 2020) (Jeong & Shin, 2020)
Sustainable Destination Image	1. Istanbul can be regarded as an attractive tourist destination. 2. Istanbul can be regarded as a quite suitable destination for all-year-round holiday. 3. Istanbul has a plenty of delicious foods spots including cafes and restaurants. 4. Istanbul has many reasonable accommodation options. 5. The environment in Istanbul is orderly, clean and hygiene. 6. Istanbul offers historical and cultural attractiveness.	(Mohaidin, et al., 2017) (Králiková, et al., 2020)

Source: Own development.

II. ANALYSIS

4 ANALYSIS

4.1 Data and Research Methodology

4.1.1 Data collection

This study applied a quantitative study using an online survey technique to analyze and evaluate the potential impact of smart tourism technologies might have on tourist experience satisfaction and sustainable destination image. The data was collected between the months of March and April 2022 from tourists who have visited Istanbul. The questionnaire was created on Google Forms to avoid the accumulation of incorrect data that could otherwise influence the results of the analysis. A live survey URL was distributed via social networks such as Facebook and LinkedIn briefly mentioning the survey procedure and offering an invitation for travelers to take part in the survey. Respondents were selected by non-random sampling, namely the snowball sampling method where respondents also refer to and include their acquaintances to participate in the study. It is assumed that tourists have already had experience with smart tourism technologies so their perceptual thinking regarding the satisfaction with the service of these devices or applications can be explored. It aims to find out how well Istanbul fits the concept of smart tourism.

This method was appropriate and convenient for the study due to meeting specific criteria such as ease of accessibility, willingness to participate, proximity, availability of participants at a given time period, and cost-effectiveness (Etikan, et al., 2016). In total, 142 questionnaires were collected from tourists visiting Istanbul. The sample size is believed to be appropriate in the sense that it ensures reliability and validity.

4.1.2 Measurements

Our measurement model is a questionnaire divided into two parts: demographic characteristics and measure of the constructs. The first part consists of 6 questions about personal information. The second part contains 27 questions that ask tourists about tourists perspectives on smart tourism technologies, travel experience satisfaction and sustainable tourism image in Istanbul. Respondents could choose answers measured on a five-point Likert scale from 1 - totally disagree to 5 - totally agree. 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.

Table 2 below provides a summary of the demographic characteristics of the respondents included in the analysis of this study. The demographic profile includes characteristics such as gender, age, level of education, occupation, marital status and category of respondents.

Table 2. Demographic characteristics of respondents (n=142)

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 %

5 EMPIRICAL RESULTS

5.1 Data Analysis

Empirical results of partial least square structural equation modeling (PLS-SEM) were obtained using the computer software Smart PLS 3.3.9. Researchers have used PLS-SEM extensively in the social sciences in the past decade. It has the potential to estimate complex models with many constructs and indicator variables, as well as excellent predictive capabilities (Hair, et al., 2019).

Therefore, the choice of this method is due to the hypothesized nature of the proposed relationships in this study. The PLS-SEM analysis consists of two steps: validation of the measurement model and evaluation of the structural model. The measurement model represents relationships between observed data and latent variables and the structural model represents the relationship between latent variables.

Thus, the questionnaire was considered highly reliable. In addition, following the distribution of the preliminary test, the wording of some of the questions was adjusted to avoid vague sentences until the official release of the final questionnaire.

According to the descriptive analysis of demographic data in Table 2, 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%), following with local residents (43 or 30.3) and domestic tourists (23 or 16.2%). The following section discusses the analyses and results.

5.2 Multicollinearity

Multicollinearity represents a high degree of linear intercorrelation between independent variables in a multiple regression model and leads to incorrect regression analysis results (Kim, 2019). As diagnostic tools multicollinearity was tested using variance inflation factor (VIF) for each element. As a rule of thumb, VIF less than 5 indicates that multicollinearity is no longer a problem in the model (Hair, et al., 2017). VIF of 5 or 10 indicates that multicollinearity may be problematic. According to the study, variance inflation factor (VIF) values is ranged from 1.348 to 2.499 in table 3, which indicates that the data is free from multicollinearity.

The occurrence of a VIF above 3.3 is suggested as an indication of pathological collinearity, and also as an indication that a model may be contaminated by common method bias. Consequently, if all VIFs resulting from the full collinearity test are equal to or less than 3.3, the model can be considered free of common method bias (Kock, 2015; Hair, et al., 2017).

Table 3. Variance Inflation Factor (VIF)

Constructs	VIF
Acc1	1.893
Acc2	2.288
Acc3	1.951
Inf1	2.179
Inf2	2.419
Inf3	2.053
Int1	2.148
Int2	1.791
Int3	1.626
PV1	1.477
PV2	1.763
PV3	1.495
Per1	1.689
Per2	1.636
Per3	1.556
SDI1	1.618
SDI2	1.665
SDI3	1.889
SDI4	2.000
SDI5	1.348
SDI6	1.935
Sec1	2.499
Sec2	2.518
Sec3	1.795
TES1	2.646
TES2	2.099
TES3	2.242

Source: Authors' Estimations from Smart PLS 3.3.9.

5.3 Internal consistency reliability

The internal consistency reliability can be measured using the composite reliability (or sometimes called construct reliability) which is much like Cronbach's alpha. Researchers claimed to analyze and test the model for constructs reliability and internal consistency performed with Dijkstra-Henseler rho along with Cronbach's alpha coefficients, respectively (Hair, et al., 2017). In exploratory studies, it is recommended that the composite reliability and Cronbach's alpha values have to be higher than 0.70 (Hair, et al., 2017). As it is shown in Table 4, all Cronbach's α were greater than 0.7, indicating good reliability for all items. The analysis also met the requirements for composite reliability (CR) measured with Dijkstra-Henseler rho and Joreskog rho with threshold levels of 0.9 and 0.7, respectively.

The results show that all considered constructs show an acceptable value of composite reliability: 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), Tourist Experience Satisfaction (0.919). As a result, all items reveal a higher level of internal consistency.

Table 4. 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

Source: Authors' Estimations from Smart PLS 3.3.9.

5.4   Factors Loadings

As for the factor loadings of the latent construct, all items were loaded significantly above the threshold level. In the SEM approach, typically a factor loading of 0.7 or higher means that the factor extracts enough variance from that variable.

Table 5. *Factor Loadings*

	Accessibility	Information	Interactivity	PV	Personal	Security	SDI	TES
Acc1	0.865							
Acc2	0.893							
Acc3	0.857							
Inf1		0.862						
Inf2		0.897						
Inf3		0.892						
Int1			0.892					
Int2			0.854					
Int3			0.803					
PV1				0.777				
PV2				0.871				
PV3				0.813				
Per1					0.815			
Per2					0.846			
Per3					0.838			
SDI1							0.707	
SDI2							0.731	
SDI3							0.744	
SDI4							0.804	
SDI5							0.688	
SDI6							0.763	
Sec1						0.890		
Sec2						0.882		
Sec3						0.869		
TES1								0.917
TES2								0.873
TES3								0.877

Source: Authors' Estimations from Smart PLS 3.3.9.

5.5   Convergent validity

Validity analyses were performed for both convergent validity and discriminant validity to reflect the authenticity of the survey data.

Convergent validity refers to how closely the new scale relates to other variables and other measures of the same construct. The construct must not only correlate with related variables but also must not correlate with dissimilar, unrelated ones. The factor loading of each indicator and the average variance extracted (AVE) can be used to evaluate convergent validity (Hair, et al., 2017). Statistically, convergent validity is established when the factor

indicator loading is above 0.708 since that number squared (0.7082) equals 0.50 which means AVE is 50%. However, indicators that have a lower loading can only be considered if other indicators have an AVE of 0.50 or more. A satisfactory benchmark is 0.708. The results show that all indicators of these constructs showed higher loadings (i.e. above 0.70 and AVE above 0.50).

As shown in Table 4, 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), Tourist Experience Satisfaction (0.790) confirmed the convergent validity of the measurement model.

5.6 Discriminant Validity

5.6.1 Fornell-Larcker Criterion

Discriminant validity was also examined using the Fornell-Larcker test, which implies that a construct is empirically unique and represents a phenomenon of interest that other measures in the model do not capture (Henseler, et al., 2015). The results show that, according to the Fornell-Larcker test, both the basic and strict assumptions are met, and discriminant validity is established. It is worth noting that the diagonal values in Table 6 represent AVE and each construct measured must have an AVE value greater than 0.5. In addition, the coefficient value of each construct must be higher in both the column and row to establish discriminant validity (Henseler, et al., 2015).

Table 6. Discriminant Validity – Fornell-Larcker Criterion

	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

Source: Authors' Estimations from Smart PLS 3.3.9.

5.6.2 Heterotrait-Monotrait ratio

The Heterotrait-Monotrait ratio (HTMT) result shown in Table 7 was below the minimum threshold of 0.85, which is appropriate for this study.

Table 7. 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		
Sustainable Destination Image	0.439	0.491	0.438	0.404	0.482	0.444	0.746	
Tourist Experience Satisfaction	0.662	0.678	0.637	0.715	0.619	0.524	0.537	0.888

Sources: Authors' Estimations from Smart PLS 3.3.9.

5.7 Structural Model and Hypotheses Testing

The quality of the fit of the model can be continued with the path analysis of the structural model. This analysis is highly relevant for identifying and establishing causal relationships or construct relationships that underlie research assumptions and hypotheses.

5.7.1 Direct effect

The results provide insight into tourist experience satisfaction and the sustainable destination image of Istanbul. A bootstrapping technique with a sample size of 5000 and one-tailed significance was used to approximate the statistical significance of the parameter. This study has eight variables. Relationships with significant impacts and support for the corresponding hypothesis are presented as "Supported" in the "decision" column in the table below.

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 perceived value of smart tourism technologies experience. H1a, H1b and H1d hypothesis are supported, as shown in Table 8.

The results showed that perceived value of smart tourism technologies experience (H2, β = 0.691, t = 11.618, p = 0) was significantly positively related with tourist experience satisfaction. Tourist experience satisfaction (H4, β = 0.497, t = 5.066, p = 0) was significantly positively related with sustainable destination image.

Table 8. Path Coefficient direct and indirect relationship

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	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

Sources: Authors' Estimations from Smart PLS 3.3.9.

5.7.2 Indirect effect

This research examined potential mediation mechanism of tourism experience satisfaction. Mediation analysis was performed to test H4, H4a, H4b and H4d, which hypothesised 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 an insignificant mediation relationship between 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 9. Mediation Analysis (Indirect Effect)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	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

Sources: Authors' Estimations from Smart PLS 3.3.9.

5.7.3 Coefficient of determination

Additionally, to analyze the predictive power of the constructs, the coefficient of determination was evaluated. The value of the coefficient of determination (R^2) can be interpreted as the percentage of change in the dependent variable that was explained by the independent variable. The values of the coefficient of determination given in Table 10 explain the adequate variability.

Thus, R^2 of perceived value (0.610) indicates that 61% of the variance is due to independent constructs (accessibility, information, interactivity, personalization, and security). Table 10 shows that the R^2 of sustainable destination image is 0.288, which indicates that approximately 29% of the variance is due to the perceived value of smart tourism technologies and tourist experience satisfaction (independent construct). While the R^2 of the tourist experience satisfaction (0.477) shows that approximately 48% of the variance is explained by the perceived value of smart technologies (independent construct).

Table 10. 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

Sources: Authors' Estimations from Smart PLS 3.3.9.
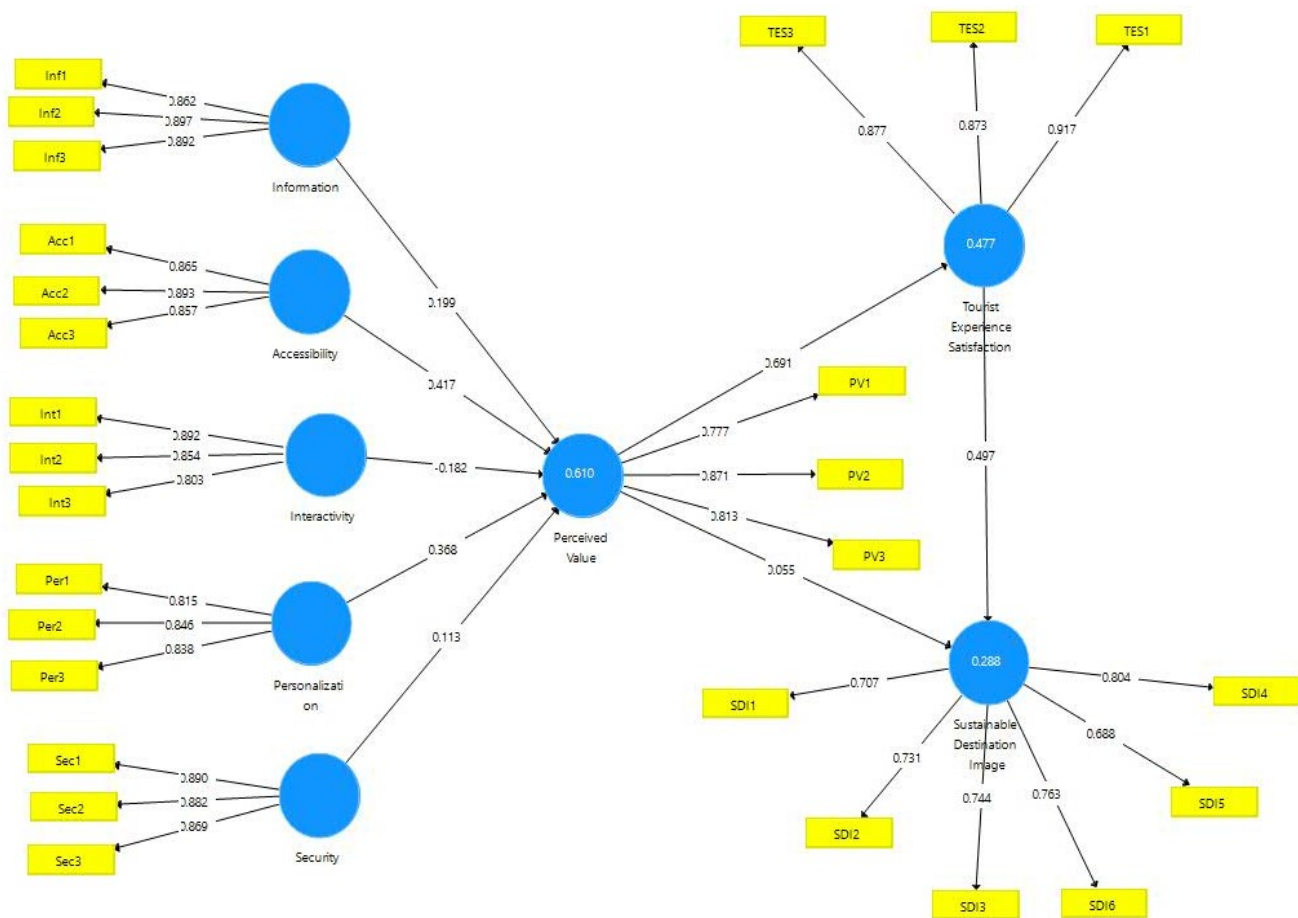
5.7.4 Structural model

Figure 3. Structural Equation Model extracted from Smart PLS 3.3.9.

6   DISCUSSION AND CONCLUSION

Nowadays it is so important for businesses to implement smart technologies in existing business processes. This not only results in time savings and optimization of overall organizational performance but also ensures that the business stays ahead of the competition in the long run. To enable successful digital transformation, technology in an organization must be perfectly aligned with the values, mission, culture, and current processes of the business.

Smart tourism technologies have brought significant changes to the tourism industry, revolutionizing tourism businesses, products, and experiences, business ecosystems, and destinations. Information and communication technologies are one of the key factors for the development of smart tourism as well as sustainable tourism. Therefore, many tourist destinations and attractions have adopted smart tourism technologies to provide tourists with a convenient, friendly and personalized travel experience to enhance their satisfaction (Zhang, et al., 2022). Smart technologies help destinations improve the management of tourism resources, promote the maximum use and sustainable development of tourism resources, and improve the quality of life for residents and tourists.

When analyzing technological trends in tourism, one cannot ignore augmented reality tools that allow customers to visit the object of interest to them before leaving. The technology is already available; however, its adoption is still at a low level, and one of the limiting factors may be the lack of attractive content, which should change soon. Chatbots and voice assistants are other tools that promise to increase customer satisfaction while lowering customer service costs. They may not be smart enough to replace a human today, and they probably won't replace travel agent communication soon, but we believe that over time, most communication related to getting basic information about a product or organizing a vacation can be automated.

The main purpose of this master thesis was to understand the attributes of the perceived experience of smart tourism technologies and explore the relationship between the perceived value of smart tourism technologies experiences by tourists, tourist experience satisfaction, and sustainable destination image. First, attributes of smart tourism technologies have been measured by the perceived value of smart tourism technologies experience. The degree of significance in descending order is accessibility, personalization, information, security, and interactivity. In particular, when comparing the results of the analysis on the perceived value

of smart tourism technologies attributes, tourists have the highest degree of recognition of accessibility when using smart tourism technologies. The reasons may be that tourists can easily use it at any time as it is highly accessible when traveling in Istanbul. Tourists use available smart technologies to make decisions such as making travel plans on their mobile phones, interacting with other tourists and sharing experiences while traveling. Thanks to the easy access to smart tourism technologies, travelers spend less time and effort learning how to use these technologies, allowing them to enjoy a technology-based travel experience at their destination (Pai, et al., 2020). Personalization was another major factor influencing the perceived smart tourism experience. Because smart tourism technologies provide insight and better knowledge of consumer preferences by providing tourists with relevant and suitable offers, saving their time, while increasing travel satisfaction in the destinations.

Moreover, contrary to expectations, this master's thesis does not endorse the significance of the attributes of interactivity and security. Whilst, the accessibility, personalization, information, and play an important role in improving the travel experience based on smart technologies.

According to this study, if the smart city and smart tourism applications are used in all areas of governance, it will make Istanbul the center of attention in the world and lead to global competitive leadership. Smart technologies are being rolled out to make life easier for citizens as well as for tourists. Therefore, the Istanbul Metropolitan Municipality should constantly optimize 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. Finally, software developers should pay more attention to individual service performance and plan for more diverse experiences when developing related platforms, applications, websites, etc.

6.1   Theoretical Contributions

Theoretically, this master thesis has important contributions. The identified constructs and proposed research model for the exploration of certain links/relationships add to the growing body of knowledge. There are several research studies, exploring the impact of technologies, and sustainable destination image on tourist experience satisfaction. However, reverse exploration is rare, hence the exploration of the relationships of smart tourism technologies,

and tourist experience satisfaction toward sustainable destination image is the contribution of this thesis.

In addition, as a world-famous tourist destination, using tourism technologies was making an ideal context to carry out such research. Hence, the exploration of the aforementioned relationships in the context of Istanbul, Turkey is also a contribution of this research thesis.

6.2 Practical Implications

This master thesis also has important practical implications. Firstly, the results indicate the significance of quality, reliability, and accuracy of the information for the perceived value of smart tourism technologies. Therefore, the administration and management of tourist destinations should value and include reliable and accurate information to be conveyed through smart tourism technologies, as well as all such information should be updated quite frequently.

Secondly, the accessibility and easy access to the information has also been valued significantly by the tourists. Hence, all the information providing sources through smart tourism technologies should be user-friendly and develop smart travel programs or websites that better meet the tourists' expectations with better personalization features.

Thirdly, the perceived value of smart tourism technologies experience showed the highest impact on tourism experience satisfaction (H2), and this means that perceived smart tourism technologies experience can lead tourists to higher satisfaction. Tourists receive the services they need through travel apps or websites that replace traditional manual services, which not only enhances the sense of tourist participation but also saves labour costs and reduces transportation costs (Pai, et al., 2021). Therefore, the promotion of local smart tourism websites, applications, and software can be increased. This could improve Istanbul's tourism experience satisfaction.

Fourthly, the results of the study depict that tourist experience satisfaction positively affects sustainable destination image (H4). Therefore, in order to entice sustain and entice more travelers, destination administration and management should seriously focus to enhance the tourist experience satisfaction by using tourism-related smart technologies to improve the destination's image and its competitiveness.

6.3 Limitations and Recommendation for Future Research

The first limitation is the online method of collecting data and conducting the survey through the snowball sampling method. Due to time constraints and accessibility, the sample size of respondents is relatively small and may not be representative of the entire population. In future studies, it is recommended to prepare surveys in multiple languages and enrich sample types from different countries to increase the diversity of the study sample. Moreover, data collection could be carried out from tourist attractions of reputed destinations.

Secondly, this study was conducted in Istanbul, which may have a unique tourist type and urban environment. There was no further analysis or comparison of different types of demographic characteristics. Respondents of different genders, ages, regions, and experiences with smart technologies and activities may have different attitudes toward the smart tourism technologies experience. The results of this research study may not be applicable to other areas, and the results obtained from it may be different based on their demographic and geographic characteristics.

Thirdly, this study examined the perceived value of the smart tourism experience, tourist experience satisfaction, and sustainable destination image. The applicability of these constructs is limited and yet to be explored. Future research should continue to investigate other factors that influence the smart tourism technologies experience to better understand current smart tourism technologies and should explore the phenomenon at a broader level. Moreover, there are many challenges for most tourist destinations as tourism recovers from the pandemic period, the question remains how DMOs will decide to build a sustainable destination image also requires holistic investigation based on the great potential of smart tourism technologies to tackle uncertain situations.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
AR	Augmented Reality
AVE	Average Variance Extracted
BRT	Bus Rapid Transit
CEVKO	Turkish Foundation for Environmental Protection and Packaging Waste Recycling
CR	Composite Reliability
DMO	Destination Marketing Organization
EBRD	European Bank for Reconstruction and Development Green Cities
GCAP	Green City Action Plan
HTMT	Heterotrait-Monotrait Ratio
ICT	Information and Communication Technology
IETT	Istanbul Electricity and Tramway and Tunnel General Directorate
IMM	Istanbul Metropolitan Municipality
IoT	Internet of Things
ISBAK	Smart City Technologies Inc.
ISKI	Istanbul Water and Sewerage Administration
NFC	Near Field Communication
PLS SEM	Partial Least Square Structural Equation Modeling
RFID	Radio-Frequency Identification
SUMP	Sustainable Urban Mobility Plan
UK FCDO	United Kingdom Foreign Commonwealth and Development Office
VIF	Variance Inflation Factor
VR	Virtual Reality
WTTC	World Travel and Tourism Council

LIST OF TABLES AND FIGURES

APPENDICES

APPENDIX P I: QUESTIONNAIRE CONTENT

These are the details of the questionnaire used and the relationship between its questions and the variables used in the analysis. Respondents were informed that their personal data allowing to identify themselves and their legal entities were not disclosed. The following is a complete list of questions that make up the questionnaire:

Assessing the Impact of Smart Tourism Technologies on Sustainable Destination Image and Tourist Experience Satisfaction: Evidence from Istanbul

Tourism is a major component of economic growth for communities around the world and from the point of view of tourists, smart technologies have become more important when traveling. Smart technologies are used throughout the whole travel process, including tourism websites, tourism apps, social media, and virtual reality for tourists to arrange and enrich their trips. Most tourists use smart technologies such as location queries, local restaurant reviews or mobile payments through smart phones during their travel.

The main purpose of this study is to explore whether tourists are satisfied with their smart tourism technology experience in Istanbul (i.e., informativeness, accessibility, interactivity, personalization, and security) and also the impact of smart tourism technologies on sustainable destination image and tourists' experience satisfaction.

My name is Meryem Ari and I am a master's student of Business Administration at Tomas Bata University in Zlín. I would like to invite you to participate in this short survey as part of my master's studies. Your responses will be kept confidential.

Thank you for participation and taking the time to answer all questions.

Demographic information

1. Gender *

Female

Male

2. Age *

Below 20 years

21-35 years

36-45 years

46-60 years

Above 60 years

3. Education*

High school

Bachelor's degree

Master's degree or higher

Others

4. Occupation *

Student

Employed

Self-employed

Unemployed

Retired

Others

5. Marital Status *

Single

In a relationship

Married

Divorced

6. Category of Respondents *

Local resident

Domestic tourist

Foreign tourist

Part 1. Attributes of Smart Tourism Technologies (Information, Accessibility, Interactivity, Personalization, Security)

1a. Information

1.   When traveling in Istanbul, smart tourism technologies provide me with useful destination and trip information.

2.   When traveling in Istanbul, smart tourism technologies enable me to complete my travels with reliable and detailed information.

3.   When traveling in Istanbul, smart tourism technologies help to minimize my travel concerns.

1b. Accessibility

1.   I can use smart tourism technologies anywhere and at any time during my travels in Istanbul.

2.   Smart tourism technologies are easily accessible during my travels in Istanbul.

3.   Smart tourism technologies are easily found without complicated processes when traveling in Istanbul.

1c. Interactivity

1.   Smart tourism technologies are interactive when I travel around Istanbul.

2.   Smart tourism technologies are highly responsive to my travels in Istanbul.

3.   It is easy to share information and content on smart tourism technologies during my travels in Istanbul.

1d. Personalization

1.   I receive personalized information on smart tourism technologies when traveling in Istanbul.

2.   Smart tourism technologies provide me with easy-to-follow links and tips while traveling in Istanbul.

3.   Travel information provided by smart tourism technologies meet my needs when traveling in Istanbul.

1e. Security

1.   Smart tourism technologies protect my personal and confidential information.

2.   Smart tourism technologies respect my privacy and security of my transactions.

3.   Smart tourism technologies are trustworthy and reliable.

Part 2. Perceived Value of Smart Tourism Technology Experience

1.   Considering the time and effort spent on them, it is worth using smart tourism technologies.

2.   I have a very good impression of my experience with smart tourism technologies.

3.   Using smart technologies while traveling is enjoyable and entertaining.

Part 3. Tourist Experience Satisfaction

1.   Overall, I am satisfied with the smart tourism technologies available in Istanbul.

2.   The smart technology available in Istanbul exceeded my expectations.

3.   I am satisfied with the quality of services provided using smart tourism technologies in Istanbul.

Part 4. Sustainable Destination Image

1.   Istanbul can be regarded as an attractive tourist destination.

2.   Istanbul can be regarded as a quite suitable destination for all-year-round holiday.

3.   Istanbul has a plenty of delicious foods spots including cafes and restaurants.

4.   Istanbul has many reasonable accommodation options.

5.   The environment in Istanbul is orderly, clean and hygiene.

6.   Istanbul offers historical and cultural attractiveness.