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Smart Tourism Technologies and Tourist Experience: The Role of Digital Safety and Convenience in Shaping Satisfaction and Behavioral Intentions

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Abstract

This study examines the role of smart digital systems in shaping the tourist experience, with a particular focus on perceived safety, comfort, and convenience, and their relationship with satisfaction and future intention to use digital services. The research was conducted on a sample of 104 respondents using a structured questionnaire and a quantitative research design. Data were analyzed using Spearman's rank correlation coefficient and the Mann–Whitney U test. The results show that perceived comfort and convenience had the strongest positive association with satisfaction with the tourist experience, whereas perceived safety showed a weaker positive association. Satisfaction, perceived effectiveness of smart technologies in larger destinations, and comfort were positively associated with the intention to use smart digital services. The findings also indicate that perceived digital competence positively affects perceived safety and comfort, while gender differences were not statistically significant. The study contributes to the smart tourism literature by proposing and empirically examining an integrated conceptual framework that simultaneously considers perceived safety, comfort and convenience, satisfaction, and behavioral intention in the context of smart tourism technologies. The results highlight the importance of developing simple, intuitive, and user-oriented digital solutions in tourism.

Keywords: smart tourism; digital technologies; safety; comfort and convenience; tourist satisfaction; behavioral intention; tourist experience



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1. Introduction

Smart tourism is increasingly changing the way tourists plan, experience, and remember their trips. The development of mobile applications, artificial intelligence, the Internet of Things, and digital platforms has enabled tourists to access information more easily, make decisions more quickly, and move more efficiently within destinations. These technologies are no longer just an addition to the tourism offer but are becoming an important part of the overall tourist experience (Zhang et al., 2022; Ionescu & Sârbu, 2024).

Previous research shows that smart technologies can increase tourist satisfaction, encourage revisit intentions, and influence recommendations to other users (Torabi et al., 2023; Gopinath & Jyotsna, 2025). However, most of these studies focus on the usefulness and functionality of technology, while less attention is given to how tourists perceive safety

and comfort when using digital systems within destinations. Safety and convenience are becoming just as important as the availability of technology itself. Tourists use digital systems for navigation, real-time information tracking, communication, and activity planning, which can increase their sense of control but also raise concerns related to privacy and data security (Tiwari et al., 2024; Omar et al., 2025). At the same time, the comfort and ease of use of technology can significantly influence overall satisfaction with the experience. This is why there is a need for research that simultaneously examines perceived safety, comfort and convenience, satisfaction with the tourist experience, and the intention to use smart digital services. Existing studies rarely examine perceived safety, comfort and convenience together within a single integrated model, particularly in the context of smart tourism destinations. Most existing models are based on technology acceptance theories, but they rarely include these dimensions together in the context of tourism.

The aim of this study is to examine the role of smart digital systems in shaping tourists' perceptions of safety, comfort, and satisfaction, as well as their relationship with future intention to use such technologies. Special attention is given to understanding how perceived digital competence and gender influence perceptions of safety and comfort in smart tourism destinations. The study addresses the following research questions:

RQ1: How are perceived safety, comfort and convenience, satisfaction, and behavioral intention related within the context of smart tourism technologies?

RQ2: To what extent do perceived digital competence and gender influence tourists' perceptions of safety and comfort when using smart tourism technologies?

Existing models provide only a partial explanation of tourists' acceptance of smart technologies because they primarily emphasize functional evaluations while giving less attention to experiential and safety-related perceptions. As smart tourism technologies increasingly become an integral part of the overall travel experience, understanding tourists' behavioral intentions requires a framework that simultaneously considers functional, experiential, and security-related dimensions. The present study addresses this limitation by integrating these constructs into a single conceptual framework specifically tailored to smart tourism destinations.

2. Literature Review

Smart tourism has become one of the central research areas in contemporary tourism due to the rapid development of digital platforms, mobile applications, artificial intelligence, the Internet of Things, real-time information systems, contactless services, and intelligent destination infrastructure. Contemporary literature increasingly views smart tourism technologies not only as operational tools, but also as systems that shape the tourist experience, perceived value, satisfaction, safety, convenience, intention to use, and destination loyalty. Therefore, the literature review is structured into two thematic sections: smart tourism technologies and technology acceptance, and digital safety, comfort, and tourist experience in smart destinations.

Recent research on smart tourism technologies has gradually converged around several recurring conceptual themes rather than isolated technological applications. The first concerns the functional value of digital technologies, typically explained through perceived usefulness and ease of use. A second stream emphasizes experiential outcomes, including tourist satisfaction, memorable experiences, and destination loyalty. More recent studies introduce trust, privacy, perceived safety, and digital security as critical conditions influencing technology acceptance, while another emerging stream highlights the importance of personalization, artificial intelligence, and user experience. Although these perspectives have significantly expanded the understanding of smart tourism adoption, they have mostly evolved in parallel, with relatively limited integration into a single conceptual frame-

work. This fragmentation creates a need for studies that jointly examine the functional, experiential, and safety-related dimensions of smart tourism technologies.

2.1. Smart Tourism Technologies and Technology Acceptance

Smart tourism technologies can be understood as digital systems that enhance the interaction between tourists, service providers, destinations, and technological infrastructure. They support tourists in all phases of travel, including information searching, planning, navigation, on-site experience, decision-making, and post-visit behavior. Research shows that smart tourism technologies improve tourist experience and satisfaction through perceived value, where accessibility, informativeness, interactivity, and personalization are often highlighted as key technology attributes (Zhang et al., 2022; Torabi et al., 2022; Torabi et al., 2023; Yang & Zhang, 2022; S. Chang, 2022). Collectively, these studies consistently suggest that tourists rarely evaluate smart technologies solely because they are technologically advanced. Instead, tourists assess technologies according to the extent to which they simplify travel, facilitate decision-making, provide timely information, and improve the overall travel experience. In this respect, perceived usefulness and ease of use remain the dominant explanatory mechanisms, consistent with the technology acceptance model, although recent tourism research increasingly recognizes that experiential value represents an equally important outcome of technology adoption. Despite differences in research settings and technologies examined, the literature demonstrates remarkable consistency regarding the central role of perceived usefulness. Whether investigating mobile applications, AI systems, metaverse platforms, or destination technologies, perceived usefulness repeatedly emerges as one of the strongest predictors of technology acceptance. However, considerably less agreement exists regarding the relative importance of contextual factors such as trust, safety, emotional responses, and previous digital experience. These inconsistencies suggest that technology acceptance in tourism cannot be fully explained through functional evaluations alone.

A growing number of studies confirm that smart tourism technologies contribute to the creation of memorable tourist experiences, which subsequently influence satisfaction, revisit intention, recommendations, and willingness to pay a higher price for enhanced services (Zhang et al., 2022; Torabi et al., 2022, 2023; Yang & Zhang, 2022; Shin et al., 2023). Similarly, Elshaer and Marzouk (2024) showed that smart tourism technologies contribute to memorable experiences through hotel innovations, while S. Chang (2022) emphasized that smart technologies and perceived value positively influence memorable experience and destination image. Goo et al. (2022) further showed that smart tourism technologies can simultaneously stimulate a sense of novelty and reduce tourist anxiety, thereby increasing travel satisfaction. Also, social influence and perceived ease of use significantly enhance the perceived usefulness of gamification, which in turn shapes tourists' attitudes and strongly drives their intention to use gamified technologies, while hedonic behavior primarily contributes indirectly through improving ease of use (Uludag et al., 2026).

Smart tourism is increasingly conceptualized in the recent literature as a digital ecosystem. Bibliometric and systematic reviews emphasize that smart destinations connect tourists, infrastructure, service providers, and information and communication technologies in order to improve experience, competitiveness, and sustainable destination management (Ercan, 2023; Alsharif et al., 2024; J. Liu et al., 2024; Law et al., 2022). Garanti (2023) further emphasized the importance of value co-creation in smart destinations, while Chuang (2023) showed that smart tourism platforms integrate various digital services and enable an active role of tourists in shaping their own experience. Díaz-Parra et al. (2023), Ionescu and Sârbu (2024), and Shafiee et al. (2023) highlighted that the integration of smart

technologies with infrastructure, services, and attractions can improve the destination management, service quality, and strategic planning of tourism development.

Artificial intelligence, chatbots, the metaverse, mobile applications, and location-based services play a particularly important role in recent research. [Orden-Mejía and Huertas \(2022\)](#) showed that the informativeness, empathy, and interactivity of destination chatbots significantly increase tourist satisfaction. [Koo et al. \(2025\)](#) emphasized that ethical AI practices and personalization stimulate the adoption of smart tourism technologies, where trust plays a key mediating role. [Florido-Benítez and del Alcázar Martínez \(2024\)](#) highlighted that artificial intelligence enhances tourism marketing and experience through personalization and process optimization, but at the same time raises issues related to data security, privacy, and reduced human contact. [H. Liu and Park \(2024\)](#) showed that metaverse experiences, through the sense of presence, perceived usefulness, and ease of use, can stimulate the intention of actual destination visits, while [Xiong and Zhang \(2024\)](#) emphasized the importance of digital literacy, ease of use, and perceived autonomy in shaping tourist engagement and loyalty when using location-based applications. [Solomovich and Abraham \(2026\)](#) further confirmed that trust in ChatGPT chatbots and the perception of their usefulness and ease of use increase the intention to use them for travel planning.

In the context of technology acceptance, research most often relies on models such as the technology acceptance model and the unified theory of acceptance and use of technology but increasingly complements them with constructs such as trust, experience, emotions, social influence, hedonic motivation, and technological readiness. [Sujood et al. \(2024\)](#) showed that the intention to use smart technologies in tourism and hospitality is best explained by a combination of perceived usefulness, ease of use, attitudes, social influence, and trust. [Khoshroo and Soltani \(2025\)](#) confirmed that the acceptance of digital technologies in tourism in the context of Industry 5.0 depends on the expected benefits, ease of use, social influence, facilitating conditions, hedonic motivation, price value, and habits. Similarly, [Dyussekeyeva et al. \(2025\)](#), [Hidayat and Faturohman \(2024\)](#), [Ahmad and Rasheed \(2025\)](#), and [Li et al. \(2024\)](#) emphasized that perceived usefulness and ease of use are among the most important predictors of the intention to adopt and use tourism digital technologies. On the other hand, [Šostar et al. \(2026\)](#) indicate that word-of-mouth is the most influential form of tourism promotion, having the highest priority and a significantly stronger impact on tourists' decision-making compared to digital and traditional communication channels.

A lot of research increasingly points to the importance of attitudes, emotional factors, and user characteristics. [Zheng et al. \(2024\)](#) showed that the use of smart technologies increased tourist satisfaction, and satisfaction then directly affected revisit intention. [Nafees and Sujood \(2025\)](#) emphasized that the intention to use interactive technologies arises from a combination of technological and emotional factors, while [Sharma et al. \(2025\)](#) showed that even attitudes toward digital-free tourism can be explained by expected benefits, perceived effort, social influence, and cultural dimensions. The results of [Šostar et al. \(2025\)](#) showed that the Internet has a stronger influence on consumer purchasing decisions in product categories such as travel, technology, and clothing, where higher levels of trust in online information and greater information search are required, while younger users demonstrate significantly higher engagement and reliance on digital content in the decision-making process.

[Tuomi et al. \(2023\)](#) further showed that older adults adopt digital cultural tourism services to a limited extent, where technical difficulties, lack of interaction, and insufficient awareness act as barriers. [Campayo-Sánchez et al. \(2025\)](#) also highlighted that hedonic motives encourage the use of smart tourism technologies, while concerns about security and privacy, as well as higher age, can reduce their usage. [Novianti et al. \(2022\)](#) further confirmed that smart tourism technologies influence tourist behavior both directly and

indirectly by shaping attitudes, social influences, and perceived control. Despite these advances, existing studies often focus on isolated technological or behavioral factors, while fewer studies have adopted an integrated perspective that simultaneously considers experiential and contextual dimensions. Taken together, these findings indicate that technology acceptance in tourism is increasingly understood as a multidimensional phenomenon in which functional evaluations, trust-related perceptions, and experiential outcomes jointly influence tourists' behavioral responses.

2.2. Digital Safety, Comfort, and Tourist Experience in Smart Destinations

In smart destinations, tourist safety and comfort are increasingly shaped by digital systems such as IoT technologies, artificial intelligence, mobile connectivity, real-time information, contactless services, wearable technologies, crowd monitoring systems, and intelligent surveillance. Such systems can increase the sense of control, reduce uncertainty, facilitate movement in space, and improve the quality of the tourist experience. At the same time, the literature warns that digital safety is not only a matter of technical protection, but also of trust, privacy, perceived risk, and technology acceptance.

Research on data security, privacy, and trust shows that these factors play a key role in the adoption of smart tourism technologies. [Tiwari et al. \(2024\)](#) showed that trust, shaped by the perception of security and privacy risks, mediates between perceived usefulness, ease of use, attitudes, and the intention to adopt IoT technologies in smart tourism destinations. [Omar et al. \(2025\)](#) confirmed that expected benefits, ease of use, and facilitating conditions encourage the intention to use smart technologies, while concerns about privacy and security weaken this effect. [Wang et al. \(2026\)](#) showed that the intention to support artificial intelligence in tourism is primarily driven by perceived benefits and positive emotions, while privacy concerns have a negative effect, with digital literacy mitigating this negative impact. [Law et al. \(2026\)](#) emphasized that tourists' privacy concerns are still fragmented in research, although they significantly influence technology adoption in tourism and hospitality. [Romani et al. \(2023\)](#) confirmed that perceived safety and trust strongly determine the propensity to use technologies in smart cities, while [Issakov et al. \(2025\)](#) showed that digital technologies shape the perception of safety and thereby contribute to destination sustainability through strengthening trust, positive image, and stable tourism development.

Digital safety is particularly important in the context of smart cities, tourism destinations, and intelligent monitoring systems. [Walczak et al. \(2025\)](#) showed that the adoption of IoT technologies in smart cities differs by gender: women express higher trust, stronger perception of safety, and greater support for ecological IoT applications, while men base adoption more strongly on perceived usefulness. [Fu \(2026\)](#) showed that intelligent systems combining IoT sensors, mobile data, and machine learning algorithms can improve hazard prediction, reduce false alarms, and accelerate response in risky tourism environments. [Couto et al. \(2026\)](#) emphasized that mobile connectivity, Internet, Wi-Fi, and safety networks are key factors of tourist experience in remote destinations, as the lack of safety infrastructure can influence tourists' decision to abandon activities. In the field of real-time information, [Akhla et al. \(2023\)](#) showed that such information positively affects the tourist experience by reducing waiting time, optimizing routes, and increasing the sense of control, while [J. H. Chang and Lee \(2023\)](#) showed that real-time crowding information influences tourist decisions and enables schedule adjustments for a more pleasant experience.

Contactless and wearable technologies further confirm the link between safety, comfort, and intention to use. [Burkett and Virto \(2025\)](#) showed that contactless tourism services increase perceived safety, usefulness, ease of use, user experience, and perceived value, which then shape a positive attitude and higher intention to use. [Burkett and Virto \(2025\)](#)

also confirmed that perceived safety in the adoption of contactless innovations in air transport and hospitality positively affects user experience and tourists' willingness to pay for additional safety services. Guebel et al. (2025) showed that safety and trust are key determinants of the intention to use wearable technologies in tourism, while usefulness, ease of use, and socio-symbolic elements primarily act through building trust. A similar broader logic was confirmed by Chowdhury (2023), who showed that perceived convenience and service quality significantly shape attitude and intention to use digital services, although perceived safety in that specific context did not have a significant effect.

Comfort and convenience of digital technologies emerge as important determinants of satisfaction and user behavior. Nur et al. (2025) showed that smart tourism infrastructure, quality communication, perception of safety and hygiene, and accessibility significantly increase tourist satisfaction, and satisfaction then encourages revisit intention. Lasisi et al. (2025) emphasized that perceived convenience plays an important role in tourist mobility decisions, while Zeqiri et al. (2023) showed that perceived convenience and value stimulate repurchase intention of online services through trust and recommendations. Gopinath and Jyotsna (2025), in a meta-analysis, showed that tourist satisfaction with smart technologies is primarily determined by expectation confirmation, usefulness, informativeness, and the quality of information and service. Lee and Jan (2022) developed and validated a smart tourism experience scale and showed that smart technologies enrich tourist experience through useful information, easier planning, and more diverse activities, leading to higher satisfaction and loyalty. Diaz et al. (2026) further confirmed that availability, enjoyment, safety, and interactivity of smart technologies positively shape satisfaction with technology and travel and encourage recommendations and future behavioral intentions.

Some studies also consider the perspective of employees, destinations, and broader service management. Cimbalević et al. (2024) showed that the technological readiness of employees in tourism positively influences their attitudes and intention to use technologies, partly through perceived ease of use and usefulness. Tavitiyaman et al. (2026) confirmed that personalized and functional smart technologies in hotels increase perceived usefulness among employees, which then leads to a better evaluation of service experience and improved business performance. Ma (2024) showed that artificial intelligence in tourism increases satisfaction through personalized recommendations, virtual assistants, resource optimization, and enhanced safety. Le Anh and Thanh (2026) showed, in the context of smart destinations, that perceived safety through smart technologies, innovation, destination attractiveness, digital interpretation, and involvement in the local context can increase the perception of the integration of smart tourism services and demand for tourism activities. Nieves-Pavón et al. (2025) further showed that tourist motivations, perceived value, and education stimulate smartphone use in destinations, which then increases online recommendations and willingness to pay for additional services.

The reviewed literature consistently demonstrates that smart tourism technologies influence tourists through several interconnected mechanisms. Functional characteristics such as usefulness and ease of use remain fundamental, while trust, safety, convenience, and experiential quality increasingly emerge as complementary drivers of technology acceptance. Nevertheless, most previous studies investigated these relationships separately, focusing either on technology adoption, perceived security, or tourist experience. Few studies integrated these dimensions into a single framework capable of explaining how digital safety, comfort and convenience, satisfaction, and perceived usefulness jointly shape behavioral intentions in smart tourism environments. Addressing this gap represents the primary theoretical motivation for the present study.

The conceptual model proposed in this study builds primarily on the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) while extending both frameworks with constructs that are particularly relevant in smart tourism environments. TAM argues that technology adoption is primarily explained through perceived usefulness and perceived ease of use, whereas UTAUT further incorporates experience, facilitating conditions, and individual characteristics influencing technology acceptance.

In the context of smart tourism, however, technology is evaluated not only as an information system, but also as an integral component of the overall travel experience. Consequently, experiential constructs such as tourist satisfaction, perceived comfort and convenience, and digital safety become theoretically relevant because they capture aspects of technology use that extend beyond purely functional performance.

In the proposed model, the SIZE construct is conceptually informed by the usefulness dimension of TAM, but operationalizes respondents' perceptions of the relative effectiveness of smart technologies in larger destinations. Perceived digital competence (EXP) reflects the role of prior experience emphasized within UTAUT, whereas behavioral intention (BI) remains the principal outcome variable common to both models. Satisfaction with the tourist experience (SAT) is introduced as an experiential outcome linking technology evaluation with behavioral responses, while perceived safety (SEC) represents a tourism-specific extension reflecting growing concerns regarding privacy, digital trust, and secure interaction within smart destinations. Unlike the original TAM construct, which measures the usefulness of a technology for an individual user, the SIZE construct captures respondents' perceptions that smart technologies generate relatively greater benefits in larger tourism destinations. Therefore, it should be interpreted as a context-specific operationalization inspired by perceived usefulness rather than as its direct equivalent.

Rather than proposing a new technology acceptance theory, this study builds on TAM and UTAUT by integrating experiential and safety-related constructs into a conceptual framework tailored to the smart tourism context. The proposed framework should therefore be viewed as an exploratory application of established theories rather than as a replacement or formal extension of existing technology acceptance models. Within this framework, perceived safety and perceived comfort and convenience are conceptualized as antecedents of tourist satisfaction, while satisfaction and perceived usefulness are expected to strengthen behavioral intention to use smart tourism technologies. Perceived digital competence is expected to reinforce tourists' perceptions of safety and comfort. In addition, based on previous empirical findings rather than on TAM or UTAUT, gender is examined as a contextual grouping variable because previous studies have reported inconsistent evidence regarding gender differences in perceived safety and technology adoption in smart tourism environments (e.g., [Walczak et al., 2025](#)). The proposed hypotheses examine how functional technology evaluations (perceived usefulness and comfort), experiential outcomes (satisfaction), and context-specific factors (perceived safety, prior digital experience, and gender) jointly explain tourists' behavioral intentions in smart tourism environments. The theoretical arguments developed in this section provide the conceptual foundation for hypotheses H1–H7, which are formally presented in Section 3.3 and empirically tested using the proposed research design. The proposed conceptual model presented in Figure 1 directly reflects the theoretical relationships identified in the reviewed literature and provides the basis for the empirical testing of the research hypotheses.

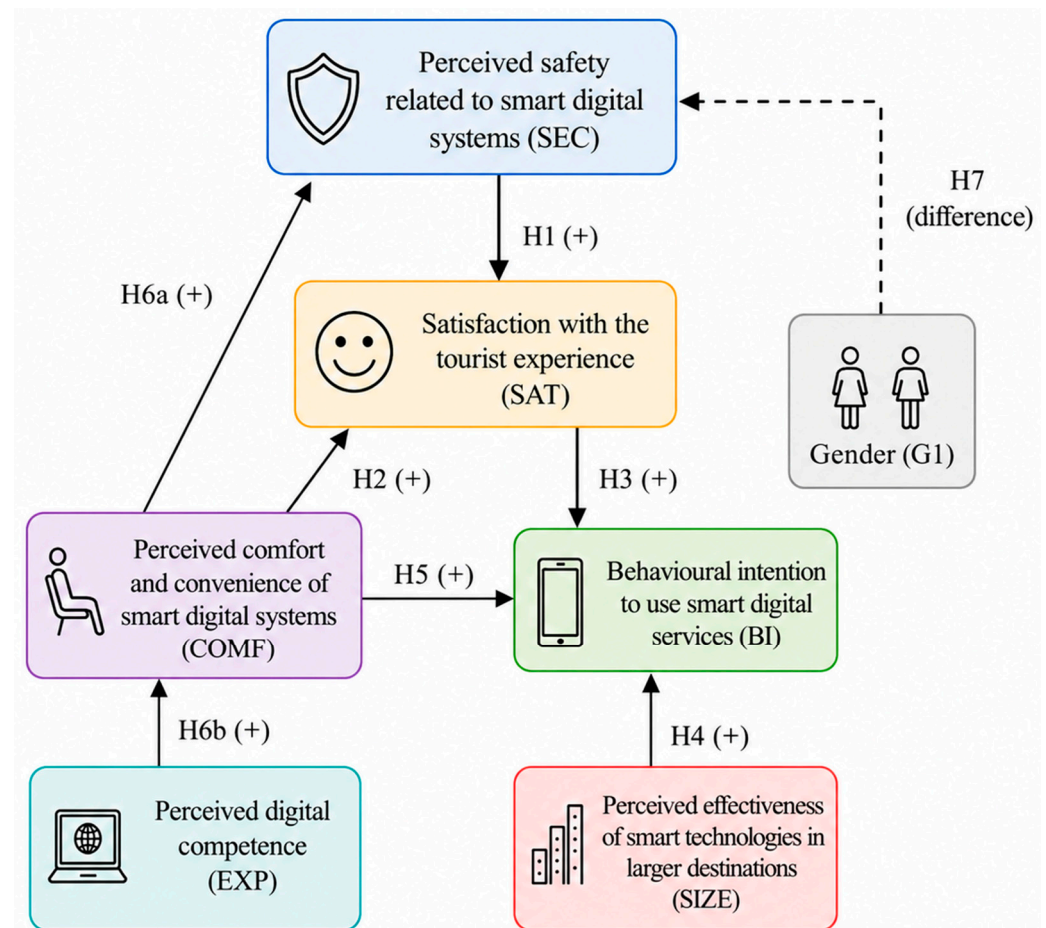


Figure 1. Conceptual research model with hypothesized relationships. Note: Figure 1 presents the conceptual research framework proposed prior to the empirical analysis and should not be interpreted as a statistically estimated structural model. Solid arrows represent the hypothesized associations (H1–H6), whereas the dashed line represents the exploratory gender comparison (H7) examined using the Mann–Whitney U test.

3. Materials and Methods

3.1. Research Design and Sample

This study employed a quantitative research design based on a structured questionnaire. The aim of the research was to examine the role of smart digital systems in tourists' perceived safety, comfort, satisfaction, and future behavioral intention to use smart digital services. Prior to the main data collection, the questionnaire was pilot reviewed by five individuals with previous experience in using smart tourism technologies, who were asked to evaluate the clarity, comprehensibility, wording, and logical sequence of the questionnaire items. Based on their feedback, minor linguistic refinements were introduced to improve readability, while the content and conceptual structure of the instrument remained unchanged.

The survey was conducted on a sample of 104 respondents. A total of 109 questionnaires were returned. After screening for completeness and consistency, five incomplete responses were excluded. Consequently, the final dataset consisted of 104 valid questionnaires used for statistical analysis. All measurement items were assessed using a five-point Likert scale, where 1 indicated the lowest level of agreement and 5 indicated the highest level of agreement. Data were collected using an online survey distributed through the authors' personal and professional networks following a convenience sampling approach. The survey link was disseminated primarily via Facebook and email communication to

individuals with previous travel experience. Because the survey was distributed through private communication channels rather than a publicly accessible website, no public URL is available for verification. Data were collected from 16 May to 28 May 2026, over a period of 12 days. Participation in the study was voluntary and anonymous. Respondents were informed about the purpose of the research and provided informed consent before completing the questionnaire. Given the non-probability sampling method, the relatively small sample size, and the predominance of respondents aged 18–30, the findings should be interpreted with caution when generalizing to the broader tourist population. Younger respondents are generally more familiar with digital technologies than older age groups, which may have resulted in more favorable evaluations of perceived safety, comfort and convenience, and behavioral intention to use smart tourism technologies. Consequently, the findings should be interpreted as reflecting primarily the perceptions of digitally experienced users rather than the tourist population.

Ethical approval for this research was granted by the Ethics Committee of the Faculty of Tourism and Rural Development, University of J. J. Strossmayer in Osijek (KLASA: 602-06/25-01/44; UBROJ: 2177-1-20-01-11-26-12/2). The study was conducted in accordance with the ethical standards of the institution and the principles of voluntary participation, anonymity, and confidentiality. No personally identifiable data were collected from the respondents.

3.2. Measurement Instrument

The measurement instrument was developed by the authors for the purpose of this study. The questionnaire was not directly adopted from a single previously validated scale; rather, the constructs and items were conceptually informed by TAM, UTAUT, and recent smart tourism literature. The items were formulated to reflect the specific context of smart digital systems in tourism destinations, including digital safety, comfort and convenience, satisfaction, behavioral intention, destination-size-related technology benefits, and respondents' perceived digital competence. Because the instrument was developed for this study, the results should be interpreted as exploratory and the measurement model should be further validated in future research.

The questionnaire included six main constructs: perceived safety related to smart digital systems (SEC), perceived comfort and convenience (COMF), satisfaction with the tourist experience (SAT), perceived effectiveness of smart technologies in larger destinations (SIZE), behavioral intention to use smart digital services (BI), and perceived digital competence (EXP). Gender (G1) was included as a sociodemographic variable for testing group differences.

Perceived comfort and convenience (COMF) conceptually corresponds to ease-of-use-related dimensions in technology acceptance research, while behavioral intention (BI) reflects the outcome logic of TAM and UTAUT. Satisfaction with the tourist experience (SAT) captures the experiential outcome of using smart digital systems in tourism. Perceived safety (SEC) is included as a context-specific construct related to digital trust, security, and perceived protection in smart destinations. The SIZE construct was relabeled as perceived effectiveness of smart technologies in larger destinations because the items measure the respondents' perceptions that larger destinations benefit more from smart systems, rather than perceived usefulness in the strict TAM sense. Similarly, EXP was relabeled as perceived digital competence because the items measure the respondents' confidence and self-assessed ability to use digital technologies, rather than actual past experience.

All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The measurement items were developed by the authors and conceptually informed by previous technology acceptance and smart tourism research.

An overview of the constructs, their corresponding codes, number of items, and example statements is presented in Table 1.

Table 1. Constructs and measurement items.

Construct	Code	Items	Description	Example Item
Perceived safety related to smart digital systems	SEC	4	Measures the extent to which tourists perceive smart cameras, sensors, digital monitoring, and real-time information as contributing to safety in a destination.	"I feel safer in a destination when smart cameras, sensors, and digital monitoring systems are present."
Perceived comfort and convenience of smart systems	COMF	4	Measures the extent to which tourists perceive smart systems as facilitating movement, reducing waiting time, and making the stay more convenient.	"Digital services reduce waiting time and make tourist activities more convenient."
Satisfaction with the tourist experience supported by smart systems	SAT	5	Measures overall satisfaction with the tourist experience resulting from the use of smart digital technologies.	"Overall, smart technologies improve my experience of the tourist destination."
Perceived effectiveness of smart technologies in larger destinations	SIZE	4	Measures respondents' perception that smart technologies generate greater benefits and are more effective in larger tourist destinations than in smaller destinations.	"Large destinations benefit more from digital systems than small destinations."
Behavioral intention to use smart digital services	BI	4 (refined: 3)	Measures tourists' future willingness to use smart digital services during travel. One reverse-coded item was excluded due to lower internal consistency.	"In the future, I intend to use smart digital systems during travel."
Perceived digital competence	EXP	3	Measures respondents' perceived competence and confidence in using modern digital technologies in everyday life and travel contexts.	"I consider myself competent in using modern digital technologies."
Gender	G1	1	Sociodemographic variable used to test differences in perceived safety.	Male/Female

Conceptual basis of the constructs. The questionnaire was developed by the authors and was not directly adapted from a single validated instrument. Instead, each construct was conceptually informed by established theoretical and empirical literature. SEC draws on digital safety, privacy, and trust literature (Tiwari et al., 2024; Omar et al., 2025; Romani et al., 2023; Law et al., 2026). COMF is conceptually based on the perceived ease-of-use dimension of TAM and smart tourism experience research (Davis, 1989; Venkatesh et al., 2003; Lee & Jan, 2022). SAT is grounded in tourist satisfaction literature (Lee & Jan, 2022; Zhang et al., 2022; Gopinath & Jyotsna, 2025). SIZE is an authors' construct conceptually informed by TAM usefulness and smart destination research. BI is based on the behavioral intention

construct from TAM and UTAUT (Davis, 1989; Venkatesh et al., 2003), whereas EXP is conceptually informed by UTAUT together with digital competence and technological readiness literature (Cimbaljević et al., 2024; Xiong & Zhang, 2024).

3.3. Research Hypotheses

Based on the proposed hypotheses, a conceptual research model was developed to illustrate the relationships among the examined constructs (Figure 1).

The model shows the proposed associations among perceived safety (SEC), perceived comfort and convenience (COMF), satisfaction with the tourist experience (SAT), perceived effectiveness of smart technologies in larger destinations (SIZE), behavioral intention to use smart digital services (BI), perceived digital competence (EXP), and gender (G1).

Table 2 shows that hypotheses H1–H6 are derived from the theoretical assumptions of the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT), together with empirical evidence from recent smart tourism research. In line with these theoretical perspectives, functional evaluations of smart technologies were expected to be positively associated with tourist satisfaction and behavioral intention, while contextual factors such as perceived safety, comfort and convenience, and perceived digital competence were assumed to strengthen technology acceptance in smart tourism environments. Hypothesis H7 differs conceptually from the preceding hypotheses because it does not examine relationships among latent constructs. Instead, it explores potential gender differences in perceived safety based on previous empirical findings reported in the smart tourism and technology adoption research.

Table 2. Research hypotheses.

Hypothesis	Relationship	Hypothesis Statement	Expected Direction
H1	SEC → SAT	Higher perceived safety related to smart digital systems is positively associated with satisfaction with the tourist experience.	Positive
H2	COMF → SAT	Higher perceived comfort and convenience of smart systems is positively associated with satisfaction with the tourist experience.	Positive
H3	SAT → BI	Higher satisfaction with the tourist experience supported by smart systems is positively associated with the intention to use smart digital services in the future.	Positive
H4	SIZE → BI	Higher perceived effectiveness of smart technologies in larger destinations is positively associated with the intention to use smart digital services.	Positive
H5	COMF → BI	Higher perceived comfort and convenience of smart systems is positively associated with the intention to use smart digital services.	Positive
H6a	EXP → SEC	Higher perceived digital competence is positively associated with perceived safety related to smart digital systems.	Positive
H6b	EXP → COMF	Greater perceived digital competence is positively associated with perceived comfort and convenience of smart digital systems.	Positive
H7	G1 → SEC	Based on previous empirical findings, perceived safety related to smart digital systems differs between male and female respondents.	Group difference

3.4. Conceptual Model

Figure 1 illustrates the conceptual research framework developed to represent the hypothesized associations among the examined constructs. The figure represents the theoretical framework underlying the study and serves as the basis for hypothesis development rather than as an empirically estimated statistical model. The model integrates the principal constructs examined in this study, including perceived safety related to smart digital systems (SEC), perceived comfort and convenience of smart systems (COMF), satisfaction with the tourist experience (SAT), behavioral intention to use smart digital services (BI), perceived effectiveness of smart technologies in larger destinations (SIZE), perceived digital competence (EXP), and gender (G1). Perceived safety (SEC) and perceived comfort and convenience (COMF) are conceptualized as primary antecedents of satisfaction with the tourist experience (SAT). Satisfaction is further expected to influence behavioral intention to use smart digital services (BI). Additionally, perceived effectiveness of smart technologies in larger destinations (SIZE) and perceived comfort and convenience are hypothesized to directly affect behavioral intention. Perceived digital competence (EXP) is assumed to positively influence both perceived safety and perceived comfort and convenience. Finally, gender (G1) is included as a grouping variable to examine potential differences in perceived safety.

3.5. Data Analysis

The data were analyzed using descriptive and inferential statistical methods. Frequencies and percentages were used to describe the sample structure. Descriptive statistics for the constructs were presented using minimum values, first quartile, median, third quartile, and maximum values.

The internal consistency of the measurement scales was assessed using Cronbach's alpha coefficient. Normality was tested using the Kolmogorov–Smirnov test. Since all constructs significantly deviated from normal distribution, Spearman's rank correlation coefficient was used to test the relationships between constructs. Gender differences in perceived safety were tested using the Mann–Whitney U test. All statistical analyses were conducted using IBM SPSS Statistics (version 25). The significance level was set at $p < 0.05$. Given the exploratory nature of the study and the relatively small sample size, correlation analysis was considered an appropriate method for examining the relationships between constructs. The statistical analyses were intended to examine the strength and direction of associations among constructs rather than to establish causal relationships or validate the full structural model.

4. Results

4.1. Sample Characteristics

The final sample consisted of 104 respondents. Women accounted for 67.31% of the sample, while men accounted for 32.69%. The sample was predominantly young, with 85.58% of respondents belonging to the 18–30 age group. Regarding travel frequency, the largest share of respondents travelled two to three times per year (Table 3).

Table 3. Sociodemographic characteristics of respondents.

Characteristic	Category	N	%
Gender	Male	34	32.69
Gender	Female	70	67.31
Age	18–30	89	85.58

Table 3. *Cont.*

Characteristic	Category	N	%
Age	31–45	6	5.77
Age	46–60	4	3.85
Age	60+	5	4.81
Travel frequency	Up to once per year	38	36.54
Travel frequency	2–3 times per year	51	49.04
Travel frequency	4–6 times per year	11	10.58
Travel frequency	More than 6 times per year	4	3.85

4.2. Descriptive Statistics and Reliability Analysis

Descriptive statistics indicate that the respondents generally evaluated smart digital systems in tourism positively. Median values ranged from 3.50 to 4.50, suggesting moderate to high levels of agreement with the measured statements.

The reliability analysis (Table 4) showed high internal consistency for most constructs. Cronbach's alpha values were 0.887 for SEC, 0.940 for COMF, 0.944 for SAT, 0.868 for SIZE, and 0.938 for EXP. The initial reliability of the BI scale was lower, with a Cronbach's alpha of 0.661. After excluding the reverse-coded item BI2, the reliability of the BI scale increased to 0.891. Therefore, the purified BI scale was used in further interpretation.

Table 4. Descriptive statistics and reliability of constructs.

Construct	Min	Q1	Median	Q3	Max	Cronbach's α	Reliability Assessment
SEC	1.00	3.00	4.00	4.56	5.00	0.887	High
COMF	1.00	3.69	4.50	5.00	5.00	0.940	Very high
SAT	1.00	3.40	4.00	4.80	5.00	0.944	Very high
SIZE	1.00	2.69	3.50	4.31	5.00	0.868	High
BI	1.75	3.25	4.00	4.69	5.00	0.661	Questionable
BI (refined)	1.00	3.33	4.17	5.00	5.00	0.891	High
EXP	1.00	3.33	4.33	5.00	5.00	0.938	Very high

4.3. Normality Testing

The Kolmogorov–Smirnov test (Table 5) was used to examine the normality of the construct distributions. The results showed statistically significant deviations from the normal distribution for all constructs. Consequently, non-parametric statistical procedures were used in the hypothesis testing.

Table 5. Kolmogorov–Smirnov test of normality.

Construct	Statistic	df	<i>p</i> -Value
SEC	0.133	104	<0.001
COMF	0.217	104	<0.001
SAT	0.152	104	<0.001
SIZE	0.090	104	0.037
BI	0.201	104	<0.001
EXP	0.213	104	<0.001

4.4. Correlation Analysis

Since the assumption of normality was not met, Spearman's rank correlation coefficient (Table 6) was used to examine the relationships between the constructs. The results indicate that all of the constructs examined were positively and statistically significantly correlated.

Table 6. Spearman correlation matrix.

Construct	SEC	COMF	SAT	SIZE	BI	EXP
SEC	1.000					
COMF	0.712 **	1.000				
SAT	0.574 **	0.756 **	1.000			
SIZE	0.436 **	0.460 **	0.627 **	1.000		
BI	0.687 **	0.685 **	0.677 **	0.696 **	1.000	
EXP	0.597 **	0.717 **	0.684 **	0.510 **	0.708 **	1.000

Note: Spearman's rank correlation coefficients (ρ); ** $p < 0.01$.

The strongest correlation was found between perceived comfort and convenience and satisfaction with the tourist experience (COMF–SAT, $\rho = 0.756$, $p < 0.001$). Strong positive associations were also found between perceived digital competence and perceived comfort and convenience (EXP–COMF, $\rho = 0.717$, $p < 0.001$), as well as between perceived effectiveness of smart technologies in larger destinations and behavioral intention (SIZE–BI, $\rho = 0.696$, $p < 0.001$). The strength of the correlations was interpreted according to commonly accepted thresholds (weak, moderate, strong relationships).

All observed correlations were positive and statistically significant, indicating a consistent pattern of relationships among the constructs.

4.5. Hypothesis Testing

The results support all correlation-based hypotheses from H1 to H6 (Table 7). Perceived safety was positively associated with satisfaction, supporting H1. Perceived comfort and convenience showed the strongest relationship with satisfaction, supporting H2. Satisfaction, perceived effectiveness of smart technologies in larger destinations, and perceived comfort and convenience were all positively associated with behavioral intention, supporting H3, H4, and H5. Finally, perceived digital competence was positively associated with both perceived safety and perceived comfort and convenience, supporting H6a and H6b.

Table 7. Results of hypothesis testing for H1–H6 (Spearman's rank correlation).

Hypothesis	Relationship	Coefficient	p -Value	Decision
H1	SEC $\rightarrow$ SAT	0.574	<0.001	Supported
H2	COMF $\rightarrow$ SAT	0.756	<0.001	Supported
H3	SAT $\rightarrow$ BI	0.677	<0.001	Supported
H4	SIZE $\rightarrow$ BI	0.696	<0.001	Supported
H5	COMF $\rightarrow$ BI	0.685	<0.001	Supported
H6a	EXP $\rightarrow$ SEC	0.597	<0.001	Supported
H6b	EXP $\rightarrow$ COMF	0.717	<0.001	Supported

The Mann–Whitney U test (Tables 8 and 9) was used to examine whether perceived safety related to smart digital systems differed according to gender. Although women had a slightly higher mean rank than men, the difference was not statistically significant. Therefore, H7 was not supported. Given the unequal group sizes (34 male and 70 female

respondents), these findings should be interpreted with caution and require confirmation using larger and more balanced samples.

Table 8. Mann–Whitney U test for gender differences in perceived safety.

Variable	Gender	N	Mean Rank	Sum of Ranks	U	Z	p-Value
SEC	Male	34	50.82	1728.00	1133.00	0.399	0.690
SEC	Female	70	53.31	3732.00			

Table 9. Results of hypothesis testing for H7 (statistical test Mann–Whitney U).

Hypothesis	Relationship	Statistic	p-Value	Decision
H7	Gender differences in SEC	Z = 0.399	0.690	Not supported

The results presented in Table 8 showed no statistically significant difference in perceived safety between male and female respondents ($U = 1133.00$; $Z = 0.399$; $p = 0.690$). Accordingly, H7 is not supported.

These results provide empirical support for the hypothesized associations among the examined constructs. All proposed associations were statistically significant except the hypothesized gender difference in perceived safety. Because the proposed conceptual framework was examined using correlation-based statistical techniques rather than structural equation modeling, no empirical structural model was estimated. Consequently, Figure 1 should be interpreted as the conceptual research framework guiding the hypothesis testing rather than as a statistically estimated path model. The empirical findings are presented through correlation coefficients and hypothesis-testing results rather than through an estimated structural model.

5. Discussion

The results of this study confirm that smart digital systems play an important role in shaping the tourist experience and user behavior, and the obtained relationships also indicate certain deviations from dominant theoretical assumptions. The strongest observed association was found between perceived comfort and convenience and satisfaction with the tourist experience. This result suggests that tourists primarily evaluate the value of smart technologies through their functionality, ease of use, and ability to reduce effort during travel. Such a finding is consistent with studies that highlight the importance of convenience and ease of use as key determinants of satisfaction (Torabi et al., 2023; Gopinath & Jyotsna, 2025), but at the same time points to a broader shift toward an experience-oriented evaluation of technology, where users do not evaluate the technology itself, but rather its contribution to the overall experience. Given the correlation-based analytical approach adopted in this study, these findings indicate statistically significant associations rather than causal relationships. Consequently, the observed relationships should be interpreted as evidence of concurrent patterns among the examined constructs rather than direct causal effects.

It is also important to conclude that perceived safety, although statistically significant, showed a weaker association on satisfaction compared to comfort and convenience. This is partly contrary to part of the literature that positions safety and trust as key determinants of technology acceptance (Tiwari et al., 2024; Omar et al., 2025). This result can be explained by the fact that tourists increasingly perceive safety as a basic standard rather than a differentiating factor. In other words, safety is necessary, but not sufficient on its own to create a positive experience. A similar argument is found in Buhalis and Leung (2018),

who emphasize that in smart destinations, basic technological functions become “hygiene factors”, while competitive advantage is created by elements that enhance the experience.

The results also show that satisfaction, perceived effectiveness of smart technologies in larger destinations, and perceived comfort and convenience are positively associated with the intention to use smart digital services. These findings are consistent with the fundamental assumptions of technology acceptance models, according to which perceived effectiveness of smart technologies in larger destinations and positive experience shape behavioral intentions (Li et al., 2024; Sujood et al., 2024). These findings suggest that experiential and context-specific factors may complement the traditional constructs of TAM and UTAUT when examining smart tourism technologies. The strong role of comfort and convenience indicates that user experience may be equally or even more important than purely functional perceptions such as usefulness. The observed associations indicate that comfort and convenience may represent useful complementary constructs when applying TAM and UTAUT in smart tourism settings. The findings provide preliminary empirical support for considering functional, experiential, and safety-related dimensions simultaneously when examining tourists’ acceptance of smart technologies, which is also confirmed by previous research (Ukpabi & Karjaluoto, 2017) and highlights the importance of context and user experience in digital tourism. Also, the results confirm that perceived digital competence is positively associated with the perception of safety and comfort. Respondents reporting higher perceived digital competence also reported higher perceived safety and comfort and more easily accept digital systems, which is consistent with research on digital literacy and technological readiness (Cimbaljević et al., 2024; Xiong & Zhang, 2024). This finding may also indicate potential digital inequality among tourists, where less experienced users may encounter difficulties in using smart systems, which can negatively affect their experience. Similar conclusions were made by Neuhofer et al. (2015), who emphasized that technology can simultaneously enhance and limit the experience, depending on the level of user competencies. In contrast to previous research, the results of this study do not confirm statistically significant differences in perceived safety between men and women. Although women showed slightly higher levels of perceived safety, the difference was not significant. This finding deviates from studies that indicate more pronounced gender differences in the perception of technology and risk, particularly in earlier stages of digital transformation. One possible explanation is that digital technologies in tourism have become widely accepted and standardized, thereby reducing differences among users. The homogeneity of the sample and the level of digital literacy of the respondents may further contribute to the absence of differences.

6. Conclusions

The results of the study suggest that smart digital systems play a significant role in shaping the tourist experience and user behavior. The strong impact of perceived comfort and convenience on satisfaction stands out, suggesting that tourists perceive the greatest value of technology in its functionality, ease of use, and ability to facilitate their stay in a destination. Satisfaction, together with perceived effectiveness of smart technologies in larger destinations and comfort, was positively associated with behavioral intention of the intention to use smart digital services, thereby confirming the fundamental assumptions of technology acceptance models.

While perceived safety was statistically significant, its impact was weaker compared to comfort and convenience, suggesting that tourists increasingly perceive safety as a standard rather than a key differentiating factor. Also, perceived digital competence was positively associated with the perception of safety and comfort, while gender differences were not statistically significant. From a practical perspective, the results indicate the

need for destination managers and service providers to focus the development of smart solutions on simplicity, intuitiveness, and real usefulness for tourists. Technologies that reduce waiting time, facilitate movement, and provide relevant real-time information have the greatest potential to increase satisfaction and encourage future use. It is important to maintain a high level of security and transparency in data management to preserve user trust. From a theoretical perspective, this study contributes to the smart tourism literature by applying established technology acceptance theories within a broader conceptual framework that introduces perceived safety and perceived comfort and convenience as tourism-specific contextual factors. Rather than proposing a new theoretical model, the findings provide exploratory evidence that these context-specific constructs may complement existing technology acceptance frameworks when examining tourists' adoption of smart technologies.

Despite the significant findings, this study has several limitations. The sample was relatively small and obtained through convenience sampling, which limits the generalizability of the findings. In addition, the sample was strongly dominated by respondents aged 18–30, who are generally more familiar with digital technologies than the wider tourist population. This demographic profile may have influenced the relatively positive perceptions of digital safety, comfort and convenience, and behavioral intention observed in this study. Consequently, the findings should be interpreted with caution and should not be generalized to all tourist segments without further empirical validation. An additional limitation concerns the measurement instrument, which was developed for this study and should therefore be further validated in future research, particularly regarding the SIZE and EXP constructs, which were relabeled to better reflect the content of the items. The use of correlation-based statistical techniques allows for the identification of significant associations among constructs but does not permit causal inference or testing of the complete explanatory structure of the proposed conceptual model. Because the study was designed as an exploratory investigation based on a relatively small convenience sample, exploratory and confirmatory factor analyses were not performed, and composite reliability (CR), average variance extracted (AVE), and convergent and discriminant validity were not formally assessed. Another limitation concerns the use of a single self-report questionnaire administered at one point in time. Because all variables were measured using the same instrument, some of the observed associations may be partly attributable to common method bias rather than exclusively reflecting substantive relationships among the examined constructs. Future studies should combine multiple data sources, longitudinal designs, or procedural and statistical remedies to reduce the potential influence of common method variance. Future research should include larger and more diverse samples and apply more advanced analytical approaches to further validate and extend the findings. Future studies employing structural equation modeling and larger, more representative samples are needed to determine whether the proposed framework provides incremental explanatory value beyond established technology acceptance models such as TAM and UTAUT. The analysis of gender differences was based on unequal group sizes, with female respondents substantially outnumbering male respondents, which may have reduced the statistical power for detecting potential differences between the two groups.

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