HUE UNIVERSITY

SCHOOL OF HOSPITALITY AND TOURISM

DUONG THANH TUNG

MPACT OF SMART TOURISM APPLICATIONS ON TOURISM DESTINATION IMAGE OF HCMC

Major: Tourism
Code: 9810101

SUMMARY OF TOURISM DOCTORAL DISSERTATION

HUE - 2025

The research was completed at:

School of Tourism, Hue Univeristy

Supervisor 1: **Assoc. Prof. Dr. Nguyen Quyet Thang**

Supervisor 2: **Dr. Do Thi Thao**

Reviewer 1: .....

.....

Reviewer 2: .....

.....

Reviewer 3: .....

.....

Thesis defended at the Hue University Thesis Examining Council meeting .....

.....

Hours … on … day … month … ……

Thesis can be researched at the library: .....

PART I: INTRODUCTION

1. Rationale for the dissertation

In the digital era, the convergence of technology and tourism has engendered profound transformations, with smart tourism technology emerging as a force that redefines not only the tourist experience but also their cognitive and affective structures regarding a destination. Tourism Destination Image (TDI), a central theoretical construct in tourism research, is widely acknowledged for its pivotal role in tourists' decision-making processes, satisfaction, and loyalty. However, this construct is currently confronting new challenges and opportunities under the impact of Smart Tourism Technologies (STTs) (Filho et al., 2022; Tavitiyaman et al., 2021a, 2021b; Tavitiyaman et al., 2023).

Although prior studies have preliminarily documented a positive correlation between the adoption of Smart Tourism Applications (STAs) and TDI improvement, the current theoretical landscape retains substantial gaps necessitating further exploration and elucidation, thereby establishing the urgency of this dissertation (Gajdošík, 2019; Gretzel & Koo, 2021; Gretzel et al., 2015; Suanpang & Jamjuntr, 2024; Suanpang & Pothipassa, 2024).

Firstly, the detailed psychological mechanism through which specific STAs (such as information systems, sightseeing, e-commerce, transportation, and smart forecasting) relate to TDI, specifically Theory of Mind - ToM (Cognitive - CI and Affective - AI) has not been fully explicated within integrated theoretical models (Tavitiyaman et al., 2021a; Tavitiyaman et al., 2021b). Clarifying the independent and sequential mediating roles of CI and AI in the STA-to-TDI relationship is an urgent theoretical imperative to better comprehend the tourist's psychological "black box" within a smart tourism environment.

Secondly, this study addresses the need to integrate foundational theoretical frameworks such as TAM, TDI, ToM into the comprehensive model. This integration not only circumvents the limitations of examining theories in isolation but also engenders a multi-dimensional analytical framework to more comprehensively explain the complex phenomenon of STAs' influence on TDI.

Third, conducting this research in Ho Chi Minh City (HCMC) possesses theoretical value in validating, adjusting, and extending the

applicability of global theories to a specific context, contributing to the enrichment of scientific knowledge regarding smart tourism and destination image within the context of emerging economies.

Ultimately, the dissertation's findings will provide recommendations for stakeholders in HCMC tourism industry (state management agencies, enterprises, and tourists) to strategically navigate the complexities of smart tourism development.

2. Research objectives

2.1. General objective

The general objective of this research is to identify and measure the impact relationship between smart tourism applications and destination image. Based on the findings, the thesis proposes managerial implications aimed at enhancing the tourism destination image of HCMC.

2.2. Specific objectives

The thesis focuses on four specific objectives:

To systematize the theoretical framework regarding the relationship between smart tourism applications and destination image.

To identify the factors of smart tourism applications influencing the destination image of HCMC and to construct a conceptual research model.

To measure and validate the impact of smart tourism applications on the destination image of HCMC.

To propose theoretical and practical managerial implications aimed at enhancing the tourism destination image of HCMC.

3. Research Questions

The dissertation seeks to answer the following four research questions:

What are the foundational theories that explain the relationship between smart tourism applications and destination image?

Through which factors are smart tourism applications and tourism destination image measured, and do these measurements achieve reliability and validity?

How do smart tourism applications influence the tourism destination image of HCMC?

Based on the research findings, what theoretical and practical managerial implications should be proposed to enhance the tourism destination image of HCMC?

4. Object and scope of research

Research Object: The object of this thesis is the relationship between STAs and TDI. Specifically, the thesis focuses on the influence mechanism between the experience of using STAs and the process of destination image formation and transformation, mediated by the ToM mechanism, moderated by the level of technology usage, and aimed at proposing directions to enhance the destination image.

Survey Subjects: The survey subjects are domestic and international tourists who have experienced tourism in HCMC and have used or interacted with STAs.

Scope of Content: The research focuses on analyzing the chain of influence from STAs to the TDI of HCMC. Specifically, it examines the relationship between five components of STAs (Smart Information Support - SIS, Smart Service Support - SSS, Smart Technical Support - STS, Smart Economic Support - SECS, and Smart Functional Support - SFS) and tourists' psychological processing, mediated by ToM (Cognitive Interpretation - CI and Affective Interpretation - AI). ToM subsequently influences the TDI. Furthermore, the thesis examines the moderating role of TP within these relationships.

Spatial Scope: The research is conducted within the context of tourism in HCMC (pre-merger period).

Temporal and Data Scope:

Secondary Data: Academic works, scientific articles, industry reports, and statistics were collected and synthesized, primarily from 2000 to the present, to ensure the inheritance and currency of the theoretical framework.

Primary Data: Collected through a questionnaire survey method. The formal survey was conducted over four months, from August 2024 to the end of December 2024. This timeframe was selected to capture the diverse opinions of tourists across both low and peak tourism seasons in HCMC.

5. Academic and Practical Contributions of the Thesis

5.1. Theoretical Contributions

The primary contribution of this thesis lies in connecting and integrating theories that have traditionally been studied relatively independently, specifically: TDI, TAM, and ToM.

A notable novelty of the thesis is the extension of ToM application into the tourism domain, a theory traditionally rooted in cognitive psychology and neuroscience (Baron-Cohen, 1997; Premack & Woodruff, 1978; Tavitiyaman et al., 2021b; Wellman, 2014).

Furthermore, the research identifies tourists' TP as a robust moderating variable, significantly influencing the intensity and nature of the key relationships within the conceptual model. By incorporating TP as a multi-dimensional moderator, the thesis offers high applicability regarding boundary conditions for the effectiveness of STAs.

5.2. Practical Contributions

The research findings provide critical scientific arguments for constructing a sustainable smart tourism ecosystem in HCMC, with specific recommendations for three strategic stakeholder groups:

For State Management Agencies: There is a need to transition from fragmented management to the development of a comprehensive strategic framework for the STA ecosystem. The focus should be on establishing synchronized technical standards to ensure interoperability between the public and private sectors. Specifically, an urgent task is the establishment of a shared Tourism Data Hub to integrate multi-source data, supporting predictive analysis and data-driven management decision-making.

For Enterprises and Technology Developers: STAs must be repositioned from mere distribution channels to strategic touchpoints for shaping brand image. Enterprises need to invest proactively in experiential technologies (VR, AR, AI) and shift design mindsets from functional efficiency to emotional experience. Technically, the development of Adaptive User Interfaces is the optimal solution for personalizing interaction experiences, ensuring usability for all user segments regardless of technology proficiency. Digital content strategies must be designed to simultaneously impact both cognitive components (reliable information) and affective components (tourism inspiration).

For Public Policy and Market Strategy: Based on the moderating role of the TP variable, differentiated market segmentation and communication strategies must be implemented: emphasizing deep experiential features for high-TP segments, and convenience/support features for low-TP segments. Simultaneously, management agencies must deploy digital capacity-building programs for tourists (through visual instructions and technical support desks), treating this as a prerequisite for maximizing the utility value of the STA ecosystem and enhancing the effectiveness of destination communication.

PART II: CONTENT

CHAPTER 1: LITERATURE REVIEW

1.1. Evaluation of Related Domestic and International Studies

The literature review has systematized the theoretical foundations and related research concerning the relationships between STAs, ToM, TDI, and tourist behavior within the context of digital transformation. Based on leading theories TDI, TAM, and ToM, the review clarified the developmental trajectory of each concept, component structures, and impact mechanisms in international studies. Specifically, TDI is analyzed based on two core components: cognitive image and affective image. TAM explains the technology acceptance mechanism, while ToM is approached as a psychological-cognitive mediating layer that helps explain how tourists process technological information and form evaluations of the destination.

The review of previous studies indicates an increasing trend toward integrating digital technology with psychological theoretical frameworks. However, the majority of research still views the destination image as a direct reflection of technological factors without clearly decomposing the mediating mechanism at the cognitive-affective social level. This gap necessitates the development of an integrated model capable of deeper explanation of the transformation process from technological experience to destination image and behavioral intentions.

Accordingly, the thesis proposes an integrated STAs, ToM, TDI research model, wherein ToM acts as a mediator between technological experience and TDI. Furthermore, it considers TP as a control variable to enhance methodological rigor. The research hypotheses are developed based on theoretical arguments and empirical evidence from international studies, forming the foundation for model testing in subsequent chapters.

1.2. Literature Review Assessment Using Bibliometrics

The analysis results reveal a significant theoretical gap: previous studies have largely overlooked the asymmetry in tourists' technology reception capabilities (TP). By filling this gap, positioning ToM as the mediating psychological mechanism, and TP as a moderating boundary condition, the thesis proposes a more comprehensive analytical framework that accurately reflects the psychological and behavioral mechanisms of tourists within the practical context of a destination undergoing rapid digital transformation, such as HCMC.

1.3. Research Gaps

This thesis focuses on addressing the following gaps:

Most current studies have not developed an integrated theoretical model to test the strength and impact mechanism of STAs on the process of TDI formation.

Prior research often examines the impact of technology on ultimate outcomes such as satisfaction or revisit intention but leaves open the “black box” regarding the mediating psychological mechanism of ToM.

The moderating role of users' TP in the relationship between STAs and TDI is an almost unexplored aspect.

Regarding research context, the majority of studies on STAs and TDI have been conducted in developed countries or destinations with a solid smart tourism foundation, creating a knowledge gap in other contexts, particularly in developing countries like Vietnam and cities like HCMC.

1.4. Foundational Theories

1.4.1. Theoretical Framework of Tourism Destination Image (TDI)

The TDI theoretical framework provides a foundational basis for analyzing tourist perceptions and behaviors. Traditional theories

emphasize two core components: cognitive and affective (Agapito et al., 2013; C. H. Lin et al., 2007; Pramanik, 2023).

1.4.2. Technology Acceptance Model (TAM)

To understand how tourists adopt and utilize STAs, the research relies on the Technology Acceptance Model (TAM) (Davis, 1989).

1.4.3. Theory of Mind (ToM)

Theory of Mind (ToM) is a central concept in cognitive psychology and neuroscience, introduced by Premack & Woodruff (1978). It refers to the human capacity to infer and understand the mental states of others, including beliefs, intentions, desires, and emotions. This thesis does not "redefine" ToM but utilizes it as an explanatory reference framework. Through ToM, the research clarifies how tourists utilize social inference to process technological signals, thereby forming a more comprehensive TDI, encompassing both cognitive and affective aspects. This approach enhances the explanatory power of the research model while providing novel theoretical contributions regarding the application of socio-psychological theories to the context of smart tourism.

CHAPTER 2: THEORETICAL FRAMEWORK AND RESEARCH MODEL

2.1. Theoretical Framework

2.1.1. Smart Tourism and Theoretical Framework

Smart tourism represents the profound integration of advanced technologies aimed at enhancing the tourist experience, improving destination management, and promoting sustainability. The foundation of smart tourism lies in information and communication technologies (ICTs), which play a role in collecting, processing, and exchanging data, thereby optimizing the experience for tourists and the management efficiency of destinations (Akdu, 2020; Gajdošík, 2019; Pachoulas et al., 2024). Within this context, Smart Tourism Applications (STAs) play a central role, providing functionalities such as dynamic trip planning, geo-location-based services, and real-time information (Krishnamurthi et al., 2021; Pujakusumah et al., 2024; Sabou & Maiorescu, 2020).

2.1.2. Concepts of Smart Tourism Applications and Functional Groups

STAs represent the integration of advanced ICTs to address complex challenges and enhance operational efficiency across various fields. STAs,comprising smart information systems, smart tourism, smart e-commerce systems, smart transportation systems, and smart forecasting, have an impact on TDI.

The shaping of an STA revolves around core attributes, development challenges, and practical implications for stakeholders. First, location-tracking services are considered an essential foundation, enabling the provision of real-time, location-based services such as navigation and local suggestions. Concurrently, the capacity for personalization and real-time recommendations regarding activities, dining options, and accommodation based on user behavior and preferences is a crucial characteristic that significantly enhances interaction and satisfaction levels (İştin, 2022; Khan & Mehmood, 2024; Sia et al., 2023).

2.1.3. Concepts and Components of Technology Proficiency

In the context of STAs and TDI, this thesis defines TP as the capability of tourists and tourism industry stakeholders to effectively utilize advanced technologies to enhance the tourism experience and improve perceptions of destinations (Czyz & Javed, 2025; Femenia-Serra et al., 2019; M & P, 2024; Moradi et al., 2018; Praveen, 2025).

2.1.4. Concepts and Components of Destination Image

In the tourism field, TDI comprises the perceptions, impressions, and beliefs that tourists form about a destination, which significantly influence their decisions and experiences (Azeez, 2021; Kladou & Mavragani, 2015). The concept of TDI is closely related to the brand image of a destination. A strong and positive TDI contributes to overall branding and ensures the sustainability of the destination (Ban et al., 2021). TDI is a complex and multidimensional concept, encompassing cognitive, affective, and conative components. It is formed through the interaction between external and internal factors, profoundly impacting tourist behavior while playing a pivotal role in positioning and building sustainable branding for tourism destinations.

2.1.5. Sequential Mechanism of ToM

This thesis utilizes ToM as a reference framework to explain how tourists process and interpret information from STAs. ToM is a cognitive ability that allows an individual to attribute mental states,

such as beliefs, intentions, desires, emotions, and knowledge, to themselves and others, while understanding that others possess different beliefs, desires, and intentions. This ability plays a critical role in shaping tourist experiences and behaviors (Tavitiyaman et al., 2021b).

Consequently, within the context of this research, ToM is used to explain the cognitive-social mechanism that helps clarify the formation and transformation of Cognitive Image (CI) and Affective Image (AI) under the influence of STAs.

2.2. Research Model and Hypotheses

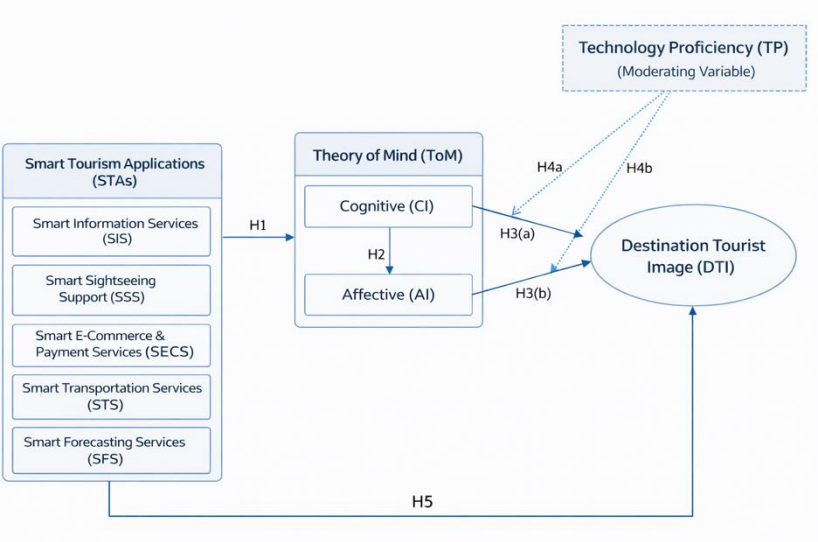

Figure 1: Proposed research model

(Source: Proposed by the author, 2025)

Table 1: Representation of Research Hypothesis Relationships

Hypothesis	Relationship
H1	Smart Tourism Applications (STAs) → Theory of Mind (ToM)
H2	ToM (Cognitive → Affective)
H3(a), (b)	ToM (Cognitive and Affective) → Tourism Destination Image (TDI)

H5	Smart Tourism Applications (STAs) → Tourism Destination Image (TDI)
H4(a), (b)	Technology Proficiency (TP) moderates the relationship: ToM (Cognitive and Affective) → Tourism Destination Image (TDI)

(Source: Proposed by the author, 2025)

CHAPTER 3: RESEARCH CONTEXT AND METHODOLOGY

3.1. Research Context

3.1.1. Overview of Tourism and Digital Transformation in HCMC

HCMC maintains its position as a vital economic, cultural, and tourism hub in Vietnam. However, HCMC faces significant growth opportunities alongside increasing competitive pressure from other regional and international destinations. Although impressive growth indices demonstrate the attractiveness and resilience of HCMC tourism, placing this within the context of intense international competition, particularly the lead in visitor numbers held by Thailand, indicates that this growth is insufficient to ensure a sustainable leading position. This emphasizes the urgency of identifying strategic differentiating factors, such as STTs, to maintain development momentum and increase market share.

3.2. Research Methodology

3.2.1. Qualitative Research Method

The qualitative research method aims to deeply explore experts' perspectives and assessments regarding the impact of each STA component on TDI.

3.2.2. Bibliometric Analysis Method

Bibliometric analysis is a robust tool for the quantitative assessment of scientific literature (Aleixandre-Benavent et al., 2017; Donthu et al., 2021; Moed, 2009; Zupic & Čater, 2015).

3.2.3. Quantitative Research Method

The quantitative research utilizes qualitative techniques to develop and refine the measurement instruments.

3.2.4. Data Collection Methods

Semi-structured interviews.

3.2.5. Data Analysis Methods

Content analysis and Thematic analysis.

3.2.6. Sampling Method and Procedure

The quantitative research will be conducted through a survey involving a sample of 450 tourists. The collected data will be cleaned, coded, and analyzed using specialized software for Partial Least Squares Structural Equation Modeling (PLS-SEM).

CHAPTER 4: RESEARCH FINDINGS

4.1. Analysis of influencing factors

4.1.1. Characteristics of the survey sample

This study was conducted on a sample of 450 respondents.

Table 2: Summary of survey sample characteristics

Characteristic	Category	Frequency	Percentage
Gender	Male	229	50.9%
	Female	221	49.1%
Age Group	18-24	71	15.8%
	25-34	92	20.4%
	35-44	101	22.4%
	45-54	110	24.4%
	55+	76	16.9%
Education Level	High School or equivalent	106	23.6%
	Vocational/College Diploma	114	25.3%
	University Degree	122	27.1%
	Postgraduate Degree	108	24.0%
Region/Continent	Asia	125	27.8%
	Europe	92	20.4%
	The Americas	84	18.7%
	Africa	70	15.6%

	Oceania	79	17.6%
Occupation	Office worker, Civil servant	156	34.7%
	Entrepreneur	81	18.0%
	Business, Commerce	93	20.7%
	Other	120	26.7%
Experience	Low	74	16.4%
	Medium	139	30.9%
	High	237	52.7%

(Source: Processed from survey data, 2025)

4.2. Analysis of Influencing Factors

The study utilizes the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with SmartPLS 4 software, comprising two main stages: assessment of the measurement model and assessment of the structural model.

4.2.1. Data Cleaning and Common Method Bias (CMB) Testing

Cleaning Procedure: The dataset contained no missing values. Standard Deviation (SD) testing (SD >= 0.25) indicated serious responding. No univariate (Z-score < 3.29) or multivariate outliers were detected.

CMB Testing: Harman's Single Factor test: The first factor explained only 32.45% of the variance (<50%), indicating that CMB is not a serious concern.

Full Collinearity VIFs: Internal VIF coefficients ranged from 1.442 to 2.341, below the strict threshold of 3.3.

4.2.2. Assessment of the Measurement Model (PLS-SEM)

The assessment procedure followed two stages:

First-order Variables

Internal Consistency Reliability: Cronbach's Alpha (> 0.7) and Composite Reliability (CR > 0.7) met the requirements, with TDI (0.936) and SIS (0.934) achieving very high reliability.

Convergent Validity: Outer loadings (> 0.708) and Average Variance Extracted (AVE > 0.5) met the standards, confirming good measurement scale quality.

Discriminant Validity: Satisfied both the Fornell-Larcker criterion (square root of AVE is greater than the correlation between variables) and the Heterotrait-Monotrait ratio (HTMT < 0.85).

Second-order Constructs

STAs: Composed of five components (SIS, SSS, SECS, STS, SFS) with outer weights all statistically significant ($p < 0.001$). SECS made the highest contribution (beta = 0.312).

ToM: Composed of CI and AI. The model met requirements with AVE = 0.725 and CR = 0.935.

4.2.3. Assessment of the Structural Model and Hypotheses Testing

The structural model was assessed based on model fit, path coefficients, p-values, and predictive power (R2, f2). The analysis results show that all model fit indices met the requirements: SRMR = 0.052 (< 0.08) and NFI = 0.885, confirming the high reliability of the model.

The results of testing the specific research hypotheses are as follows:

Direct Impacts:

H1 (STAs → ToM): STAs have a significant positive impact on the ToM (beta = 0.520, $p < 0.001$).

H2 (CI → AI): CI regarding technology positively impacts AI towards technology (beta = 0.485, $p < 0.001$).

H3a (CI → TDI) and H3b (AI → TDI): Both Cognitive and Affective interpretations positively impact the TDI, with the impact of AI (beta = 0.355) being stronger than that of CI (beta = 0.280) ($p < 0.001$).

H5 (STAs → TDI): STAs have a direct impact on the Tourism Destination Image (beta = 0.352, $p < 0.001$).

Moderating Impacts:

H4a (TP x CI →TDI) and H4b (TP x AI → TDI): TP plays a positive moderating role, strengthening the relationship between CI/AI and TDI ($p < 0.05$).

Explanatory and Predictive Power:

The model explains 66% of the variance in the dependent variable, TDI (R2 = 0.660).

The f2 indicators show a large impact of ToM on TDI (f2 = 0.250), and a medium impact of STAs on TDI (f2 = 0.185).

4.2.4. Multi-Group Analysis (MGA)

Gender: Males depend more on personal technology proficiency (TP → STAs) to use the applications. Females are more sensitive to affective experiences derived from the applications (STAs → AI).

Education: The high-education group (University level and above) is more strongly impacted by technological beliefs (ToM → TDI).

Culture (Domestic and International): International tourists are more strongly impacted affectively by technology (STAs → AI), while domestic tourists place higher value on technological beliefs (ToM → TDI).

CHAPTER 5: DISCUSSION OF RESEARCH FINDINGS AND MANAGERIAL IMPLICATIONS

5.1. Discussion of Research Findings

5.1.1. Synthesis and Integration of Foundational Theories

The research results indicate that the TDI formation process within the smart tourism environment is effectively explained through an integrated model of three theoretical foundations: TAM, TDI, and ToM.

First, Extension of the TAM: Perceptions regarding the usefulness and ease of use of STAs do not merely influence usage intention; they also serve as cognitive information sources that help tourists evaluate the modernity, convenience, and management capability of the destination.

Second, Reinforcement of the Cognitive-Affective Structure of TDI: Cognitive image positively influences affective image, wherein the affective component plays a dominant role in forming the overall image. In the digitized environment, seamless and personalized technological experiences generate stronger positive emotions compared to traditional tourism contexts.

Third, Establishment of the Mediating Role of ToM: Tourists do not just process technological information functionally; they also

infer the intentions, care, and service capabilities of the destination through the way the technology system is designed and operated. ToM acts as the mechanism that converts technological experiences into psychological evaluations and destination images.

Fourth, Smart Technology as a Socio-Cognitive Agent: Unlike traditional studies emphasizing promotional information or direct experience, the results show that smart technology acts as a socio-cognitive mediator, indirectly but profoundly influencing TDI through beliefs and perceptions regarding the destination's care.

Fifth, Clear Distinction Between ToM and TDI: TDI reflects the outcome of evaluating destination attributes, whereas ToM represents the process of socio-cognitive inference regarding the destination's intentions and goodwill, thereby enhancing conceptual discriminant validity within the model.

Sixth, The Moderating Role of TP: TP is a critical boundary condition: the positive impact of STAs on ToM and TDI reaches optimal effectiveness when tourists possess a sufficiently high level of technological proficiency to reduce cognitive workload during interaction.

5.1.2. Cognitive-Affective Mechanism in the Smart Tourism Environment

STAs operate as a digital interaction environment that shapes tourists' cognition and emotions. When applications help reduce uncertainty, increase control, and save time, tourists feel more comfortable, secure, and satisfied. Conversely, systems that are difficult to use or unstable can induce cognitive stress and negative emotions.

5.1.3. Mediating Role of ToM in Smart Tourism Experiences

ToM helps explain how tourists “personify” the technological system and interpret experiences in either a positive or negative direction. When the system is perceived as understanding and supportive, positive emotions and destination evaluations are reinforced.

5.1.4. Moderating Influence of Personal Technology Proficiency

Tourists with high technological proficiency find it easier to utilize application features, reducing cognitive workload and

activating positive social inferences. Conversely, low proficiency can diminish the positive impact of technology.

5.1.5. Interpretation within the Destination Context

Within the context of a tourist city undergoing digital transformation, such as HCMC and Southeast Asia:

Coexistence of Smart and Traditional Tourism: Smart tourism exists alongside traditional experiences. Asian tourists emphasize care and understanding over purely technical functionality.

Role of ToM in Trust Building: Uneven levels of technological proficiency highlight the critical role of ToM in building trust.

User-Centric Design: Technology design that embodies "user empathy" is a key factor in enhancing the experience.

5.2. Implications for smart tourism development in HCMC

5.2.1. Theoretical implications

First, this thesis integrates and extends existing theories (TAM, TDI, ToM) to construct a comprehensive model capable of explaining tourism experience behavior within the digital technology context.

Rather than merely reinforcing existing theories, the research extends the application scope of ToM from psychology to tourism, demonstrating that tourists do not merely receive technological information but also interpret and attribute intentions to the destination through digital experiences. This adds a new perspective to tourist behavior, where cognition and emotion are formed not only through physical contact but also through technological interaction.

Furthermore, the confirmation of the moderating role of TP indicates that behavioral models within the smart tourism context must account for disparities in tourists' technological capabilities, rather than assuming homogeneity across groups. This result opens a new approach to "technology acceptance capability" in the study of modern tourism service consumer behavior.

5.2.2. Managerial implications

5.2.2.1. Policy implications for state management agencies

Research results indicate that enhancing tourists' CI and AI strongly depends on the effectiveness of STAs. Therefore, management agencies need to orient digital transformation strategies towards applications with significant impact on tourist cognition, such as smart digital maps, integrated tourism portals, itinerary

recommendation systems, and real-time service lookup tools. Beyond technological investment, it is necessary to establish inter-sectoral coordination mechanisms to ensure data quality, platform interoperability, and the standardization of operational processes. Concurrently, the government should develop a set of criteria for evaluating STA effectiveness, regarding this as a critical component in the strategy to enhance destination competitiveness.

5.2.2.2. Implications for tourism enterprises and the service sector

Enterprises need to regard STAs as strategic tools for enhancing customer experience rather than merely as technological utilities. Digital journey design must aim to optimize tourist cognition and emotion; for instance, by integrating transparent information, augmented reality experiences, and real-time service evaluations. Travel agencies, hotels, and attractions need to link data and integrate services into the city's common STAs to create a seamless, consistent, and reliable experience. The study also indicates that enterprises should exploit behavioral data from STAs to gain deeper insights into tourist needs, thereby refining products and marketing strategies in real-time.

5.2.2.3. Implications for technology developers and digital infrastructure providers

Given the criticality of CI and AI within the impact mechanism, STAs must be designed to enhance tourists' information processing capabilities and elicit positive emotions. Applications must prioritize intuitiveness, usability, and operational minimalism to mitigate cognitive load. The integration of emerging technologies, such as personalized AI, AR/VR, intelligent chatbots, and open data, will augment the capability for "destination storytelling," thereby fostering tourists' emotional engagement. Furthermore, research findings underscore the necessity of a stable, secure data infrastructure with cross-platform interoperability to ensure the long-term efficacy of the STA ecosystem.

5.2.2.4. Implications for enhancing tourists' technological proficiency

The moderating role of TP indicates that the effectiveness of STAs is significantly contingent upon the absorptive capacity of tourists. Consequently, smart tourism development strategies must

incorporate supportive solutions such as on-site technology usage guides, the creation of illustrative video content, the enhancement of visual iconography within applications, and the provision of multi-lingual versions. Additionally, communication campaigns should be implemented to heighten awareness regarding the benefits of STAs for the tourism experience. Bridging the technological competency gap among tourist cohorts will maximize the impact of STAs on cognition and emotion, thereby elevating the overall destination image.

5.3. Recommendations for enhancing smart tourism applications to improve the tourism destination image of HCMC

Analyzing strengths and critical gaps within the STA system.

Resolving discrepancies between tourist cognition and emotion.

Optimizing STAs to facilitate the development of destination image components.

Leveraging the role of TP to maximize the effectiveness of STAs and the CI/AI mechanism.

Formulating a comprehensive TDI communication strategy for HCMC.

5.4. Recommendations for developing specific smart tourism applications

Developing the "Saigon Hẻm Gems" application (Focusing on hidden alleyway attractions).

Developing the "HCMC Time Lens" application (Focusing on historical AR experiences).

Developing the "My Saigon Flow" application (Focusing on personalized seamless travel).

Developing the "Saigon Connect & Share" application (Focusing on social interaction and community).

Developing a comprehensive "Made for HCMC" STA suite.

PART III: CONCLUSION

1. Conclusion

First, the thesis has systematized and enriched the theoretical foundation of smart tourism and STAs in constructing and promoting Tourism Destination Image (TDI). The thesis demonstrates that

STAs are not merely technological tools but also critical constituent elements, exerting multidimensional impacts on both components of Theory of Mind (ToM): tourists' Cognitive Interpretation (CI) and Affective Interpretation (AI).

Second, the quantitative analysis of survey data and qualitative analysis of expert interviews have confirmed a positive correlation between the usage intensity and perceived quality of STAs and the improvement of HCMC's TDI. Tourists tend to form more positive evaluations and a deeper perception of the city's dynamism, modernity, convenience, and attractiveness upon experiencing these technologies. Specifically, the research identified specific factor groups within applications, such as ease of use, information usefulness, interactivity, and reliability, that play a pivotal role in shaping and enhancing the destination image.

Third, despite the immense potential of STAs, their deployment and optimization in HCMC still face certain barriers related to technological infrastructure, data synchronization levels, accessibility for certain tourist segments, and competition from global applications. Although the TDI has improved, long-term efforts and strategies are still required for it to truly become superior and differentiated.

2. Recommendations

Based on the research findings and in-depth analysis, the thesis proposes several recommendations aimed at optimizing the positive impact of STAs on the TDI of HCMC.

First: State tourism management agencies in HCMC must take the lead in developing a comprehensive and synchronized strategy for the development and application of smart tourism.

Second: Tourism application developers and travel agencies must continuously innovate to enhance quality and user experience.

Third: Closer and more effective collaboration is needed between management agencies, enterprises, research institutes, and universities.

Fourth: To truly elevate HCMC's TDI through STAs, emphasis must be placed on creating high-quality digital content deeply imbued with the city's cultural and historical identity.

Fifth: Future research should be expanded to evaluate the effectiveness of different types of STAs or compare their impacts across more diverse tourist market segments.

3. Limitations and Future Research Directions

Despite achieving the stated research objectives, the thesis possesses several limitations that must be objectively acknowledged.

First, Cross-Sectional Design: The use of a cross-sectional research design with data collected at a single point in time means that the relationships between STAs, ToM, and TDI can only be interpreted as structural or predictive relationships, rather than confirming absolute causal relationships. The process of destination image formation under the impact of technology is inherently dynamic and varies over time; therefore, the current design does not fully reflect the psychological shifts of tourists.

Second, Common Method Variance (CMV): There is a risk of common method variance arising from data collected from the same self-reported source. Although technical tests were applied, the possibility of cognitive bias cannot be entirely excluded.

Third, Uncontrolled Extraneous Variables and Generalizability: The research model did not fully control for extraneous variables, such as actual on-site experiences or other personal characteristics, nor did it integrate the behavioral intention component into the overall attitude structure. Furthermore, while the representativeness of the sample in HCMC meets the requirements for PLS-SEM analysis, it still limits the generalizability of the findings to other contexts.

Based on these limitations, the thesis proposes directions for future research. Future studies should adopt longitudinal or experimental designs to more rigorously test the causality between technology and destination image. Expanding the model by incorporating variables such as behavioral intentions, destination attachment, or loyalty will help complete the attitude structure. Simultaneously, new moderating variables, such as personal innovativeness, technological anxiety, or cultural factors, should be considered to explain differences in tourist responses.

Mixed-methods research approaches, combining quantitative data with in-depth interviews or digital journey analysis, are also recommended to clarify complex emotional mechanisms.

Furthermore, within the context of rapid advancements in digital transformation and artificial intelligence, future research must address aspects of digital ethics, privacy, and sustainable tourism, thereby continuing to expand and update the theoretical framework of smart tourism.

LIST OF THE AUTHOR'S PUBLISHED WORKS RELATED TO THE DISSERTATION

1. Duong Thanh Tung, Nguyen Thi Bich Ngoc (2023), Research trends on the relationship between smart tourism applications and destination image from the perspective of bibliometric analysis, Journal of Economics & Forecasting, No. 33, 85-89.
2. Tung, D. T., Ngoc, N. T. B. (2024), Researching Trends on Smart Tourism Technology Using Bibliometric Analysis, Handbook of Industrial and Business Applications with Digital Twins; Routledge Taylor & Francis Group.
3. Tung, D. T., Thao,D. T., Ngoc, N. T. B. (2024), Smart Media Technology in No Poverty Reduction (Smart tourism village case study), Smart Technologies for Sustainable Development Goals; Routledge Taylor & Francis Group.
4. Tung, D. T., Thao,D. T., Thang, N. Q. (2024), Resource Readiness Level to Promote the Application of Information Technology in the Implementation of Smart Tourism: A Case Study in HCMC, Vietnam, Global Changes and Sustainable Development in Asian Emerging Market Economies; Springer Nature Link.
5. Tung, D. T., Ngoc, N. T. B., Nga, D. T. (2024), Investigating the evolution of smart tourism technology and tourism destination image: a bibliometric analysis, Hue University Journal of Science: Economics and Development; 25 – 42
6. Tung, D. T., Ngoc, N. T. B. (2024), Investigation on the evolution and trends in research on smart tourism, Proceedings International Conference on Business and Entrepreneurship Development Across Vietnam in a Globalized and Digitalized Era (AGBA).