

REIMAGINING TOURISM CITIES IN THE AI AGE: VIRTUAL INFLUENCERS AS SUSTAINABLE CITY AMBASSADORS

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Received: 31 March 2026; Revised: 28 April 2026; Accepted: 7 May 2026

ABSTRACT

This study reconceptualizes virtual influencers (VIs) as communicative governance agents within smart tourism ecosystems, extending their role beyond commercial branding into sustainable urban tourism management. While prior research has primarily examined VIs in marketing contexts, the paper proposes a moderated sequential mediation framework in which VIs influence tourist engagement, which in turn enhances destination trust and subsequently drives responsible visitation intention. The model further introduces ethical transparency as a critical moderating factor that strengthens the relationship between engagement and trust by enhancing perceived legitimacy and reducing concerns related to algorithmic opacity. The framework positions engagement as the primary activation mechanism, trust as the central psychological mediator, and responsible visitation intention as the key behavioral outcome. This study is primarily grounded in Parasocial Interaction Theory and Service-Dominant Logic, which highlights the potential of AI-mediated communication to replace carbon-intensive promotional activities. This research reframes VIs as institutional communicative agents embedded within governance systems rather than external marketing tools; second, it integrates engagement–trust mechanisms into smart tourism governance, providing a behavioral pathway linking AI-mediated communication to sustainable tourism outcomes; and third, it extends sustainability discourse by incorporating the communicative dimension of tourism promotion through digital substitution. The study offers a theoretical foundation for future empirical research examining the role of AI communication in shaping sustainable tourism behaviors within smart cities.

Keywords: Virtual influencers, smart tourism, tourist engagement, destination trust, ethical transparency, sustainable tourism.

1. INTRODUCTION

Global tourist towns are increasingly facing a significant governance dilemma: how to maintain economic vitality through tourism expansion while concurrently addressing environmental degradation, social inequity, and diminishing urban liveability [1,2]. Accelerated urbanization, escalating climate change, biodiversity decline, and the surge of overtourism have revealed systemic weaknesses in cities reliant on tourism [3,4]. Simultaneously, digital disruption and platform have revolutionized the organization of tourism markets, altering mobility patterns, consumer behaviors, and urban governance structures [5]. These converging pressures highlight the need for cohesive governance frameworks that align technological advancement with environmental goals and long-term urban resilience. In addition, smart tourism city concept has emerged as a dominant approach to addressing these challenges. It integrates information and communication technologies (ICT), big data analytics, and multi-stakeholder collaboration to enhance destination

competitiveness, adaptive management, and resilience [6,7]. This framework enables real-time tracking of visitor movements, predictive analysis of congestion trends, and improved delivery of public services through interconnected digital infrastructures [8,9]. Smart tourism ecosystems conceptualize destinations as dynamic networks linking governments, tourism firms, communities, and visitors in continuous processes of data-driven value co-creation [10]. While technological infrastructures are well developed, the communicative dimension of smart tourism governance remains underexplored. Infrastructure enables coordination; yet behavioral influence and sustainability compliance depend on communication systems that shape perceptions, norms, and institutional trust.

Besides, AI is also transforming automation, predictive analytics, and mediated communication [11,12]. This technological advancement has accelerated the emergence of virtual influencers (VIs), defined as digitally created, algorithmically managed entities that function as cultural intermediaries across digital platforms [13,14]. Unlike human influencers, VIs are non-corporeal, programmable, and scalable, enabling consistent alignment with organizational objectives while adapting dynamically to customer behaviour. Existing research examines VIs within commercial marketing contexts, focusing on authenticity, congruence, and engagement outcomes [15,16]. However, their strategic role in advancing sustainable tourism governance remains insufficiently explored. This gap is particularly evident in tourism cities where communication performs both regulatory and normative functions. Tourism governance extends beyond infrastructure management to include influencing tourist behaviors, promoting responsible consumption, and strengthening institutional legitimacy [1,2]. Sustainable tourism development emphasizes environmental protection, cultural preservation, and social equity [3]. However, traditional destination marketing often relies on carbon-intensive promotional practices, including international roadshows and high-mobility campaigns, which may undermine sustainability objectives [17]. This tension highlights the need for alternative communication mechanisms capable of aligning competitiveness with ecological responsibility.

Also, there is a significant knowledge vacuum regarding the methodical integration of VIs into smart tourist governance to impact sustainability performance and behavioral consequences. The function of VIs outside of marketing settings and their potential as governance tools inside urban tourist systems are ignored in previous study. In order to close this gap, this study rethinks VIs that can match communication with immediate sustainability goals and improve the body of current knowledge. Within this context, AI-driven VIs can be conceptualized as sustainable digital ambassadors embedded within smart tourism ecosystems. Through interactive communication, personalized messaging, and alignment with real-time sustainability metrics, these digital agents can enhance tourist engagement, strengthen destination trust, and influence visitation intentions. Trust is a critical determinant of behavioral intention in digital environments [18], suggesting that AI-mediated communication may play a significant role in promoting sustainable tourism outcomes. This study reconceptualizes AI-driven VIs as communicative governance agents within smart tourism systems, shifting their role from symbolic branding tools to programmable interfaces aligned with sustainability objectives. It introduces the concept of digital substitution sustainability, defined as the replacement of carbon-intensive promotional practices with scalable, low-impact digital communication. By integrating related literature and theories, the proposed framework positions VIs as enablers of behavioral alignment within sustainable urban tourism governance. Instead of testing predetermined correlations empirically, this study takes a theory-building strategy based on an integrative conceptual examination with the goal of creating a cohesive framework. The study combines concepts from the literature on smart tourism, AI-mediated communication, sustainable governance, and engagement and trust while integrating Parasocial Interaction Theory (PIT) to capture micro-level engagement and trust mechanisms and Service-Dominant Logic (SDL) to explain the outcome.

2. LITERATURE REVIEW

2.1. Intelligent Tourism Cities and Digital Ecosystems

The smart tourism city paradigm has emerged as a primary solution to the structural challenges facing modern urban destinations, particularly those stemming from digital transformation, overtourism pressures, and sustainability demands [6,7]. Smart tourism transcends mere technological implementation; it conceptualizes destinations as interlinked socio-technical systems where ICT infrastructure, big data analytics, and stakeholder collaboration dynamically interact to improve adaptive governance and competitive advantage [8,10]. In this context, tourism cities are perceived not just as physical locations but as digitally enhanced ecosystems where information flows shape experience value and policy responsiveness. Big data analytics and real-time monitoring technologies have emerged as key components of smart tourism governance. Predictive modelling enables authorities to forecast congestion patterns, redistribute tourist flows, and reduce environmental stress [5]. Sensor networks, Internet of Things (IoT) systems, and geolocation technologies provide detailed insights into movement patterns and spatial density [9]. These capabilities improve operational efficiency, optimize resource allocation, and support evidence-based decision-making. However, while the technological dimension of smart tourism ecosystems is well theorized, the communicative dimension remains underexplored.

Smart tourism ecosystems are inherently relational and co-creative. According to SDL, value is co-created through interactions among governments, firms, residents, and tourists [19]. Consumer engagement research further conceptualizes interaction as a multidimensional process involving cognitive, emotional, and behavioral elements that influence loyalty and behavioral intention [20,21]. In digitally mediated contexts, engagement functions as a critical mechanism linking infrastructural capabilities to behavioral outcomes [22]. Nevertheless, current research emphasizes technological affordances rather than the communicative agents that activate these affordances within governance systems. From a governance perspective, communication is not merely informational but also performative, shaping perceptions of legitimacy, behavioral norms, and trust between institutions and visitors [2,1]. Destination branding literature has traditionally focused on symbolic identity construction and image projection [23,24]. However, sustainability transitions require communication to function as behavioral governance, encouraging responsible consumption and environmental compliance [3,25]. This shift necessitates programmable communication tools capable of aligning messaging with real-time sustainability metrics. AI-driven systems enable adaptive communication through content personalization, behavioral analysis, and real-time narrative adjustment [11,12]. Within this context, communication becomes algorithmically responsive rather than static. The emergence of AI-mediated communicative agents signals a transformation in how destinations manage engagement and trust within smart ecosystems [13,14]. Despite these developments, existing smart tourism research pays limited attention to the structural role of communicative agents in governance. Communication therefore plays a central role in shaping sustainable behaviors [25]. Also, digital platforms are treated as passive channels rather than active governance mechanisms [6]. The behavioral dimension remains fragmented across marketing, information systems, and tourism literature [26,16]. The increasing focus on resilience and adaptive governance highlights the need to reposition communication within smart tourism ecosystems. Urban tourism resilience depends not only on infrastructure but also on behavioral adaptability and stakeholder alignment [2,4]. Communication integrated with sustainability dashboards can function as a regulatory tool guiding visitor behavior toward low-impact activities and off-peak visitation. In this context, digital communicative agents act as intermediaries linking predictive analytics systems with human decision-making.

2.2. Governance and Resilience in Sustainable Urban Tourism

Sustainable tourism governance requires balancing economic viability, environmental protection, cultural preservation, and social equity across multiple stakeholders [1]. Governance extends beyond regulatory structures to include participatory decision-making, policy learning, and adaptive coordination [2]. Tourism cities are vulnerable to ecological stress due to concentrated visitor flows and carbon-intensive mobility patterns [3]. The combined pressures of climate change, biodiversity loss, and overtourism have intensified the need for resilience-oriented governance approaches [4]. Resilience in tourism cities is increasingly understood as a socio-ecological capacity rather than purely an infrastructural feature. Adaptive governance emphasizes iterative policy adjustment, stakeholder engagement, and behavioral alignment [2]. While technological systems support congestion management and predictive analytics [5], long-term sustainability ultimately depends on behavioral compliance and normative acceptance among tourists.

However, traditional destination branding approaches have focused primarily on symbolic identity and image positioning [23,24]. Such approaches are insufficient for addressing sustainability challenges that require behavioral change. The increasing complexity of tourism systems necessitates a shift toward communication as behavioral governance, where messaging actively influences norms and aligns visitor behaviors with policy objectives. Digital transformation provides new opportunities to integrate communication with governance metrics. AI-enabled systems can incorporate sustainability indicators, visitor data, and behavioral nudges into unified smart tourism platforms [10,12]. This integration enhances transparency, strengthens institutional legitimacy, and supports resilience-oriented governance [27].

2.3. VIs and AI-Enhanced Interaction

VIs combine AI, digital modelling, and narrative design to simulate human-like interaction [13,14]. Their adaptability enables real-time content adjustment based on behavioral data, ensuring alignment with organizational and governance objectives. Existing research has primarily examined VIs within commercial marketing contexts, focusing on authenticity, congruence, and engagement outcomes [16,26]. However, their integration into governance systems remains underexplored. Unlike human influencers, whose credibility depends on personal identity, VIs can be embedded within institutional frameworks and aligned with sustainability metrics and policy goals. AI-mediated communication enhances engagement by enabling personalized, data-driven interactions [11]. Through machine learning and predictive analytics, VIs can tailor sustainability narratives to different audience segments, encouraging responsible tourism behaviors. At the same time, ethical concerns related to transparency and accountability remain critical [27]. The scalability of VIs also supports digital substitution sustainability by reducing reliance on carbon-intensive promotional activities. By replacing physical campaigns with digital engagement, tourism destinations can lower environmental impact while maintaining global visibility. Thus, VIs can enhance tourist engagement through personalized and adaptive communication.

2.4. Trust and Engagement

Trust is a fundamental determinant of behavioral intention in digital environments and plays a critical role in tourism decision-making [18,28]. In smart tourism contexts, trust influences perceptions of safety, sustainability credibility, and institutional reliability. Engagement conceptualizes engagement as a multidimensional construct involving cognitive, emotional, and behavioral participation [21,20]. In digitally mediated environments, engagement precedes trust formation and influences behavioral outcomes. SDL further emphasizes that value is co-created through interactions among stakeholders [19]. The interactive marketing literature highlights the importance of digitally mediated relational dynamics in shaping institutional trust and behavioral intention [22,29]. AI-driven

communicative agents that consistently provide transparent and reliable sustainability information can strengthen perceptions of legitimacy and trust. Therefore, tourist engagement enhances destination trust, which in turn drives responsible visitation intention.

2.5. Parasocial Interaction Theory (PIT) and Service-Dominant Logic (SDL)

According to PIT, individuals are capable of forming one-sided yet meaningful social relationships with mediated personas, which foster emotional attachment and relational trust [30]. These parasocial interactions reduce psychological distance and enhance customers perceived social presence, thereby increasing their cognitive and emotional engagement with mediated agents. Prior studies have shown that perceived social presence and interaction with digital agents can significantly enhance user engagement and relational responses in AI-mediated environments [11,13]. In particular, when users perceive a sense of familiarity and intimacy with mediated figures, they are more likely to develop favorable attitudes and sustained interaction behaviors [26]. In the context, users may perceive these agents as relatively and socially present despite their artificial and algorithmic nature [13,14]. This perceived social presence compensates for the absence of real human interaction, allowing VIs to simulate authentic relational experiences.

In parallel, SDL conceptualizes value as co-created through ongoing interactions among multiple stakeholders rather than embedded in outputs [31]. Within smart tourism ecosystems, destinations, travelers, and digital agents collaboratively integrate resources through interactive, technology-enabled, and data-driven processes. This perspective emphasizes that value emerges dynamically through participation and experiential engagement rather than being passively delivered. Prior research highlights that such interactive mechanisms enhance user participation, involvement, and engagement in value co-creation activities, particularly in digital and AI-mediated environments [21,22]. In this regard, VIs function as operant resources that facilitate real-time, personalized, and contextually relevant communication, enabling tourists to actively engage with destination content. By transforming real-time data into meaningful and customized interactions, VIs not only strengthen user engagement but also support the co-creation of immersive and personalized tourism experiences.

2.6. Theoretical Advancement

Even while research on AI-mediated communication and smart tourism is expanding, these fields are studied separately. While AI communication and VI study are typically located within marketing and branding contexts, smart tourism studies mostly concentrate on technical infrastructures, data analytics, and ecosystem coordination. As a result, nothing is known about VI function in urban tourist governance systems. In order to close this gap, this study rethinks communication as a governance mechanism of a symbolic function. They are integrated into smart tourist infrastructures and synchronized with real-time urban data. Furthermore, by proposing the idea of digital substitution sustainability, the study extends the literature by explicitly connecting communication tactics to environmental consequences. The framework also offers a multi-level explanation of how micro-level relational interactions lead to macro-level value co-creation and behavioral alignment by combining PIT and SDL. This theoretical integration makes it possible to comprehend how AI-mediated communication supports sustainable urban tourist governance and resilience by fostering participation, trust, and responsible behaviors.

3. CONCEPTUAL FRAMEWORK

Through interactive and tailored communication, VIs function as institutional communicative agents that start visitor interaction. The intention of visitors to visit responsibly is influenced by this involvement. Figure 1 introduces ethical transparency as a critical

moderating factor that strengthens the relationship between engagement and trust by enhancing perceived legitimacy and reducing concerns related to algorithmic opacity. It positions engagement as the primary activation mechanism, trust as the central psychological mediator, and responsible visitation intention as the key behavioral outcome.

3.1. VIs and Tourist Engagement

Within smart tourism ecosystems, digital infrastructure enables real-time interaction between destinations and tourists. However, infrastructure alone does not guarantee meaningful behavioral alignment. VIs can be an effective communicative interface that translate data-driven insights into engaging and personalized interactions within destination platforms such as official websites, social media channels, and smart city dashboards. Previous research has shown that through tailored and engaging communication, AI-driven VIs greatly increase user engagement [13,15,26]. VIs dynamically adapt their content, tone, and messaging based on user behaviors and contextual data. From a theoretical perspective, this relationship is grounded in both theories. PIT explains that repeated and personalized interactions with mediated agents foster perceived social presence and emotional closeness, which are key drivers of user engagement [30]. As tourists interact with AI-driven VIs that simulate human-like communication, they are more likely to experience a sense of familiarity and relational connection, thereby increasing their level of engagement. Simultaneously, SDL conceptualizes engagement as a central mechanism in value co-creation processes, where interactive and responsive communication enables users to actively participate in the co-creation of tourism experiences [19,21]. VIs function as operant resources that facilitate interaction within smart tourism ecosystems.

P1: AI-driven VIs positively influence tourist engagement in smart tourism cities.

3.2. Tourist Engagement and Destination Trust

While engagement represents immediate interaction, trust reflects a deeper psychological mechanism that shapes decision-making and behavioral intentions in digital environments. Research shows that engagement contributes to relational outcomes, including trust, by reducing uncertainty and enhancing perceived credibility in digital environments [20,28]. In tourism contexts, destination trust encompasses perceptions of safety, reliability, credibility, and institutional legitimacy. Engagement plays a critical role in building such trust by fostering familiarity, emotional connection, and perceived responsiveness. Tourists may perceive the destination as competent, transparent, and dependable. This continuous interaction reduces uncertainty and enhances confidence in destination governance. Thus, engagement serves as a key antecedent of destination trust within AI-mediated communication environments. The relationship between tourist engagement and destination trust can be understood from a PIT perspective, continuous engagement with communicative agents fosters perceived intimacy, familiarity, and pseudo-social bonding, which are fundamental mechanisms underlying trust formation [30]. As tourists repeatedly interact with responsive and personalized content, uncertainty is reduced, and confidence in the system increases. From an SDL perspective, engagement reflects an ongoing process of interaction and resource integration, through which tourists evaluate the reliability, consistency, and credibility of destination communication [20,21]. This iterative interaction reinforces perceptions of institutional trustworthiness and strengthens the formation of destination trust.

P2: Tourist engagement positively influences destination trust.

3.3. The Moderating Role of Ethical Transparency

The effectiveness of engagement in building trust is contingent upon the perceived legitimacy of the communication process. In this context, ethical transparency becomes a critical moderating factor. Ethical transparency refers to the clear disclosure of AI identity,

data usage practices, and governance affiliation. When tourists are aware that interactions are AI-driven and are provided with transparent information regarding how data is used and how recommendations are generated, concerns related to manipulation and deception are reduced. This enhances the credibility of the communication process and strengthens the impact of engagement on trust. Conversely, a lack of transparency may weaken this relationship by introducing skepticism and perceived risk. Accordingly, ethical transparency amplifies the positive effect of engagement on destination trust. The moderating role of ethical transparency can also be theoretically grounded. Within PIT, the development of parasocial relationships depends on perceived authenticity and credibility of the mediated agent [30]. Ethical transparency enhances perceived authenticity and reduces psychological resistance, thereby strengthening the effect of engagement on trust [27,28]. From an SDL perspective, transparency contributes to institutional legitimacy and reinforces the integrity of value co-creation processes [31]. When tourists are more willing to engage and co-create value, it amplifies the positive impact of engagement on destination trust.

P3: Ethical transparency positively moderates the relationship between tourist engagement and destination trust.

3.4. Destination Trust and Responsible Visitation Intention

Trust is a well-established predictor of behavioral intention across digital and service contexts. It is a major predictor of behavioral intention in both digital and touristic contexts [18]. In tourism, destination trust plays a crucial role in shaping responsible visitation behaviors. When tourists perceive a destination as trustworthy and aligned with sustainability values, they are more likely to adopt responsible travel practices. These may include choosing environmentally friendly transportation, visiting off-peak attractions, complying with local regulations, and supporting conservation initiatives. Such behaviors are particularly important in smart tourism cities, where managing visitor flows and minimizing environmental impact are key governance priorities. By strengthening trust through AI-mediated engagement, destinations can indirectly influence tourists' behavioral intentions and promote more sustainable patterns of visitation. From a PIT perspective, tourists develop trust through sustained interaction with communicative agents, they can internalize the values and messages conveyed, including sustainability-oriented behaviors [30]. The perceived relational bond increases compliance and willingness to act in alignment with recommended practices. From an SDL perspective, trust reflects a successful outcome of value co-creation processes as tourists perceive the destination as aligned with their expectations [19,31]. This perceived alignment encourages tourists to adopt behaviors that support collective value, such as responsible and sustainable visitation [1,25].

P4: Destination trust positively influences tourists' responsible visitation intention.

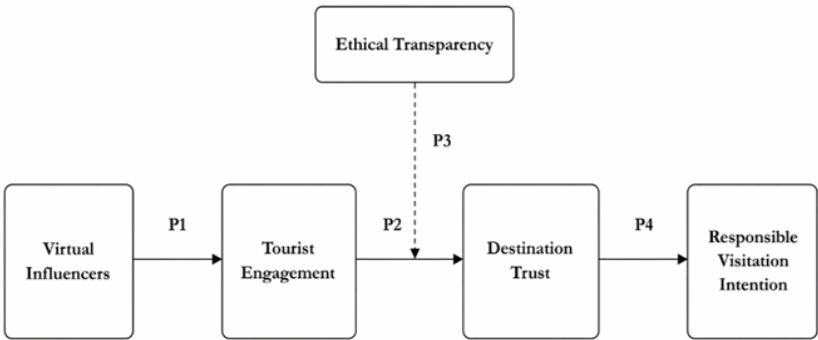


Figure 1. Proposed Framework. Source: Author's Creation

4. EXTENDED THEORETICAL ELABORATION

The framework introduces the notion of algorithmic communicative governance, redefining destination branding as programmable governance rather than purely symbolic promotion. Traditional branding emphasizes image construction and identity signaling [23]. In contrast, algorithmic communicative governance integrates digital communication with real-time sustainability data, predictive analytics, and policy dashboards [6,10]. Within this framework, VIs operate as formal communicative agents embedded in governance systems. Communication is linked to carbon indicators, tourist density metrics, congestion forecasts, and cultural preservation measures. The alignment of messaging with quantifiable indicators strengthens institutional trust and enhances behavioral compliance. The concept of digital substitution sustainability further extends the sustainability discourse. While existing literature emphasizes reducing tourist carbon footprints [3], limited attention has been given to the carbon intensity of promotional activities. Replacing international roadshows and high-mobility influencer campaigns with immersive digital communication reduces emissions while maintaining global reach. This perspective expands sustainability discussions to include communication practices within tourism governance. Integrating VIs into smart dashboards transforms digital ambassadors into structural governance components. Rather than functioning as supplementary marketing tools, VIs become adaptive interfaces linking data systems with human decision-making. They facilitate value co-creation through interactive processes [19,22], promote participatory sustainability practices, and support resilience-oriented governance. Overall, the framework positions AI-driven VIs as strategic assets in sustainable urban tourism management, linking engagement, trust, behavioral intention, and resilience within smart tourism ecosystems.

5. IMPLICATIONS

The proposed framework offers important implications for urban planners, destination management organizations, and smart city stakeholders. First, VIs should be embedded within smart tourism dashboards rather than treated as external marketing tools. Integrating digital ambassadors into institutional systems enables direct alignment between communication outputs and real-time urban indicators such as congestion levels, carbon emissions, and heritage preservation metrics [6,10]. This transformation shifts communication from symbolic promotion to operational governance. Second, predictive analytics can support targeted sustainability communication. By analyzing visitor mobility patterns, seasonal demand fluctuations, and environmental stress indicators [5], VIs can encourage off-peak visitation, promote alternative destinations, and redistribute tourist flows. Such adaptive communication reduces pressure on fragile urban environments and supports more balanced visitation patterns [4]. Through personalized interaction, VIs can promote low-carbon transport options, participation in local cultural activities, and responsible consumption behaviors aligned with sustainability goals [25]. The concept of digital substitution sustainability provides a strategic approach to reducing the carbon footprint of destination promotion. Traditional marketing often relies on travel-intensive campaigns and influencer mobility, generating substantial emissions. Replacing selected physical promotional activities with AI-mediated digital engagement allows destinations to maintain global visibility while reducing environmental impact [3]. Policymakers should therefore evaluate promotional sustainability not only in terms of tourism outcomes but also communication practices. Effective implementation requires strong ethical governance. Transparency, accountability, and clear disclosure of AI identity are essential to prevent manipulation and maintain institutional trust [27]. Governance bodies should establish regulatory frameworks ensuring that AI-driven communicative agents operate within clearly defined sustainability guidelines. Public-private partnerships can

facilitate the co-development of digital ambassadors, combining technological capabilities with policy alignment [1]. Finally, AI-driven communication can enhance participatory governance. Through interactive engagement, VIs can support co-creation processes aligned with SDL [19,22]. This strengthens institutional responsiveness and contributes to long-term urban resilience.

6. LIMITATIONS AND FUTURE RESEARCH

Although conceptual, the proposed framework provides a foundation for empirical validation based on theories and related literature. To enhance methodological rigor, future research may employ structural equation modelling (PLS-SEM) to test relationships among virtual interaction, engagement, destination trust, responsible visitation intention, and perceived resilience. Measurement scales from engagement literature and trust research can be adapted for smart tourism contexts. Experimental designs may compare VIs with human influencers to examine differences in trust formation and perceived authenticity. Such studies could assess whether institutional-algorithmic trust differs fundamentally from celebrity-based credibility. Longitudinal research may explore whether sustained exposure to AI-mediated sustainability communication leads to measurable behavioral change over time. Cross-cultural studies are also essential, as perceptions of AI, trust, and digital interaction vary across contexts. Cultural attitudes toward automation, privacy, and authority may influence engagement–trust relationships. Comparative analysis across different tourism destinations may identify contextual factors affecting adoption and effectiveness. Future work may explore interactions between AI-driven communicative agents and other smart city technologies, such as mobility systems, climate dashboards, and cultural heritage platforms. Extending the framework to creative industries and digital cultural production may also deepen understanding of how they operate as cultural intermediaries within sustainable urban ecosystems.

7. CONCLUSION

This study reconceptualizes AI-driven VIs as communicative governance agents within smart tourism ecosystems, extending their role beyond commercial marketing into sustainable urban tourism management. By integrating the theories, the framework explains how VIs influence tourist behaviors through a sequential process in which engagement enhances destination trust and subsequently drives responsible visitation intention. This study makes three key contributions to the literature. First, the study advances smart tourism research by positioning VIs as institutional communication tools embedded within governance systems rather than external promotional actors. Second, it provides a theoretical mechanism linking AI-driven communication to behavioral outcomes by integrating engagement and trust into a unified governance-oriented framework. Third, it introduces the concept of digital substitution sustainability, highlighting how AI communication can reduce reliance on carbon-intensive promotional practices while maintaining destination visibility. By leveraging AI-driven communicative agents, tourism cities can move beyond passive information dissemination toward adaptive, data-driven behavioral influence. This shift enables destinations to better align tourist behaviors with sustainability objectives and supports long-term urban resilience. By integrating PIT and SDL, this study provides a dual theoretical lens that explains both the psychological mechanisms and the systemic processes through which AI-mediated communication influences responsible visitation behaviors.

Acknowledgement: The authors would like to thank colleagues and reviewers for their valuable feedback and support in the development of this study.

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