

Article

Information Flows in Tourism Service Coordination: A Multi-Stakeholder Qualitative Study of Coastal Destinations in Vietnam's South Central Coast

Loan Thanh Thi Dang 

Faculty of Finance–Banking and Business Administration, Quy Nhon University, 170 An Duong Vuong,
Quy Nhon 55131, Gia Lai Province, Vietnam; dangthithanhloan@qnu.edu.vn; Tel.: +84-394-751-359

Highlights

What are the main findings?

- Digital tools support tourism service transactions; however, coordination beyond individual operations remains constrained when information is fragmented across stakeholders, platforms, procedures and local administrative spaces.
- Tourism logistics information creates coordination value only when it is updated, verified, shared and used to adjust service actions across the visitor journey.

What are the implications of the main findings?

- The study advances TLIS as a socio-technical and inter-organizational lens for analysing information-based service coordination in tourism destinations.
- The findings suggest that coastal destinations need shared information flows that connect service providers, digital platforms, tourism management authorities and tourism beyond isolated channels.

Abstract

Tourism destinations increasingly operate through digital platforms, real-time data, and online connectivity tools, yet service coordination among stakeholders remains constrained. This study analyses how tourism logistics information is created, updated, verified, shared, and used in service coordination at coastal destinations in Vietnam's South Central Coast subregion. The study adopts a multi-stakeholder qualitative case study design, in which qualitative data from 42 participants provide the main source of evidence, while a supplementary descriptive survey of 358 participants is used only to contextualise and clarify selected issues within the sample. The findings show that existing digital tools and information channels support information search, transaction confirmation, operational coordination, and service feedback. However, coordination at the destination and inter-provincial levels remains limited when information flows are fragmented across stakeholders, channels or platforms, data or procedures, and local or regional spaces. On this basis, the study conceptualises the Tourism Logistics Information System (TLIS) as a socio-technical, inter-organisational, and coordination-oriented structure in which the value of information depends on the extent to which data are updated, verified, shared, and translated into coordinated action among stakeholders. The paper contributes to research on smart destinations, destination governance, and tourism supply chains by clarifying information fragmentation (IF) as a mechanism that constrains service coordination in inter-provincial coastal destination contexts.



Academic Editor: Lewis Ting
On Cheung

Received: 20 May 2026

Revised: 16 June 2026

Accepted: 30 June 2026

Published: 6 July 2026

Copyright: © 2026 by the author.
Licensee MDPI, Basel, Switzerland.

This article is an open access article
distributed under the terms and
conditions of the [Creative Commons
Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Keywords: tourism logistics information system; information flows; service coordination; information fragmentation; smart tourism destinations; destination knowledge transfer; tourism supply chain; coastal destinations; Vietnam

1. Introduction

Information technology and digital platforms have changed how tourism information is created, distributed, and used throughout the travel journey, from information search and service booking to experience evaluation (Buhalis & Law, 2008; Navío-Marco et al., 2018). In the online environment, tourism information is not only provided by businesses or destination management agencies, but it is also searched, compared, interpreted, and disseminated through social networks, user reviews, and intermediary platforms (Xiang & Gretzel, 2010). Therefore, tourism information increasingly circulates within a multi-actor, multi-channel environment, shaped by multiple touchpoints across the tourist journey (Buhalis & Law, 2008; Navío-Marco et al., 2018; Xiang & Gretzel, 2010).

Research on smart tourism has expanded its focus from online transactions to data, connectivity, digital platforms, real-time interaction, and value co-creation within the tourism ecosystem (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Ye et al., 2020; Yan et al., 2025). Studies on smart tourism destinations emphasize that the “smartness” of a destination stems not only from technological infrastructure, but also from leadership, innovation, human capital, social capital, and how stakeholders interpret, organize, and utilize technology within the specific destination context (Boes et al., 2016; Gelter et al., 2022). Recent studies on digitalization in tourism supply networks also show the need to analyze technology along with stakeholder fragmentation, collaboration, and data-driven coordination capabilities, rather than simply viewing digitalization as an addition of digital tools (Sifolo, 2025). This approach clarifies the role of technology and data in tourism experiences, information access capabilities, and destination governance. These discussions suggest that technology, data, and digital connectivity are key enabling conditions of the information environment within destination contexts. However, they do not fully explain how information is verified, shared, and translated into coordinated actions among multiple stakeholders (Gretzel et al., 2015; Sifolo, 2025).

This issue becomes more evident in tourism destinations characterised by multi-actor structures and high interdependence among services. Destination governance research views destinations as a system of interdependent actors, including management agencies, businesses, service providers, local communities, and tourists (Baggio et al., 2010; Bramwell & Sharman, 1999; Volgger & Pechlaner, 2014). Coordination within this system is influenced by inter-organizational relationships, trust, interests, connectivity capabilities, and common coordination mechanisms (Beritelli, 2011; Fyall et al., 2012; Jamal & Getz, 1995; van der Zee & Vanneste, 2015). Studies on knowledge transfer in destinations also show that network structures influence how knowledge and information flow among stakeholders, thereby impacting the destination’s innovation and coordination capabilities (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015). Recent review and consensus studies continue to emphasize the role of multi-stakeholder participation, coordination mechanisms, and new research programs in sustainable destination governance (Laesser et al., 2025; Panagiotopoulou & Skoultzos, 2025). From this perspective, information is not only a technical input but also a relational resource that is mobilized through collaborative networks and multi-actor coordination mechanisms at the destination level.

In tourism logistics, the tourism product is created through the combination of multiple services within a single trip, including transportation, accommodation, tour operations,

attractions, food and beverage services, shopping and customer support (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009). The dispersed and interdependent nature of these services makes information a crucial condition for planning, coordination, control, and reducing uncertainty in service delivery (Christopher, 2022; Datta & Christopher, 2011). In the context of destination-based e-supply chain management, information and communication technology can support tourism supply chain coordination when transaction, operational, and feedback data are linked to operational decisions among stakeholders (Zhang & Tavitiyaman, 2022). Recent studies on digitalization in tourism supply networks also emphasize that real-time supply networks, stakeholder collaboration, and contextual deployment capabilities are crucial conditions for technology to support coordination (Sifolo, 2025). Tourism information flows can also support regional economic linkages when information is circulated and used among localities, businesses, and stakeholders (Ruan & Zhang, 2021). The reviewed literature highlights the interdependent nature of services within the tourism journey and the coordinating role of information in this context. It thus provides a theoretical basis for conceptualizing tourism logistics information flows as a mediating mechanism between system conditions and service coordination outcomes.

Research on smart tourism, destination governance and tourism supply chains consistently shows that information is a critical resource for the operation and performance of tourism systems (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Zhang et al., 2009; Zhang & Tavitiyaman, 2022). Nevertheless, these streams approach the role of information from different angles. Smart tourism studies primarily emphasize digital technologies, data, platforms and real-time connectivity as means to enhance visitor experience and destination competitiveness (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Ye et al., 2020; Yan et al., 2025). Destination governance and knowledge-transfer research, by contrast, focuses on multi-stakeholder relationships, inter-organizational networks, coordination mechanisms and the capacity of stakeholders to collaborate (Fyall et al., 2012; van der Zee & Vanneste, 2015; Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Laesser et al., 2025; Panagiotopoulou & Skoultos, 2025). Meanwhile, logistics and tourism supply chain studies tend to conceptualize information as an enabler of operational data sharing, uncertainty reduction and service coordination across interconnected tourism services (Datta & Christopher, 2011; Christopher, 2022; Zhang et al., 2009; Zhang & Tavitiyaman, 2022; Sifolo, 2025).

Although these strands of research all acknowledge the importance of information for the functioning of tourism systems, recent reviews and synthesis studies continue to report fragmented data, heterogeneous information standards and barriers to information sharing among organizations in tourism ecosystems, including research on smart tourism, destination governance, knowledge transfer and tourism supply chains (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Gretzel et al., 2015; OECD & European Union, 2025; Sifolo, 2025; Zhang & Tavitiyaman, 2022). However, these limitations are still largely examined within separate research streams and are often interpreted as issues of technology, governance or inter-organizational cooperation, rather than analysed as a mediating mechanism through which technical, organizational and inter-organizational conditions shape service coordination at the destination level (Gretzel et al., 2015; Laesser et al., 2025; OECD & European Union, 2025; Panagiotopoulou & Skoultos, 2025; Sifolo, 2025; Zhang & Tavitiyaman, 2022). In tourism service ecosystems, information fragmentation is therefore not only a data problem but also a reflection of limitations in network governance and ecosystem-level coordination. As a result, despite the extensive literature on digital technologies and data in tourism, the ways in which tourism logistics information flows are generated, validated, shared and mobilized to translate system conditions into coordinated action among multiple stakeholder groups within the same destination ecosystem remain

insufficiently explained. This gap is particularly salient in inter-provincial coastal destinations, where effective service coordination depends not only on information connectivity among organizations but also on the continuity of information flows across administrative and governance boundaries (Christopher, 2022; Datta & Christopher, 2011; Mrnjavac & Ivanovic, 2007; Ruan & Zhang, 2021; Zhang et al., 2009; Zhang & Tavitiyaman, 2022).

Existing studies have also documented multiple manifestations of IF in tourism ecosystems, including dispersed data, weak interoperability across systems, inconsistent data standards, and barriers to inter-organizational information sharing (OECD & European Union, 2025; Sifolo, 2025; Zhang & Tavitiyaman, 2022). Recent reviews and synthesis work show that these limitations appear in various contexts, from digitalised tourism supply networks to data-driven destination governance, yet they are still predominantly described within separate research streams (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Gretzel et al., 2015; OECD & European Union, 2025; Sifolo, 2025; Zhang & Tavitiyaman, 2022). However, although these studies acknowledge the existence and persistence of IF, empirical evidence on how different types of fragmentation affect tourism logistics information flows and service coordination across multiple stakeholder groups within the same destination remains relatively limited (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Sifolo, 2025). From an integrated perspective, the relationship between system conditions, tourism logistics information flows, and service coordination mechanisms at the destination level has not yet been thoroughly clarified in the existing literature, especially in multi-stakeholder and inter-regional destination settings such as coastal itineraries (Datta & Christopher, 2011; Christopher, 2022; Ruan & Zhang, 2021; Zhang & Tavitiyaman, 2022). Building on this gap, the article adopts the TLIS as an analytical framework to explain how technical, organizational, and inter-organizational conditions shape tourism logistics information flows and, in turn, influence service coordination mechanisms at the destination level (Trist, 1981; Datta & Christopher, 2011; Gretzel et al., 2015; Volgger & Pechlaner, 2014; Sifolo, 2025; Zhang & Tavitiyaman, 2022).

Building on this foundation, the study adopts the TLIS as an analytical framework to examine the relationships between system conditions, information flows, and service coordination processes at the destination level (Datta & Christopher, 2011; Christopher, 2022; Trist, 1981; Volgger & Pechlaner, 2014). The term TLIS is not used to propose a new technological system, but to emphasize the role of information in connecting and coordinating tourism service activities that are carried out by multiple actors with high levels of interdependence in creating tourist experiences (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009; Datta & Christopher, 2011; Zhang & Tavitiyaman, 2022). This approach builds on logistics, supply chain, and information systems research, where information is treated as a foundational resource for coordination, synchronization, and uncertainty reduction in interlinked activities (Datta & Christopher, 2011; Christopher, 2022). At the same time, it integrates insights from destination governance, tourism network, and knowledge-sharing research, which highlight the role of inter-organizational relationships and multi-actor interactions in shaping coordination capacity at the destination level (Jamal & Getz, 1995; Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Fyall et al., 2012; Volgger & Pechlaner, 2014). In this sense, TLIS is understood as the technical, organizational, and inter-organizational context within which information activities take place, rather than being equated with the information flows themselves or with the coordination practices that emerge among actors (Trist, 1981; Datta & Christopher, 2011; Volgger & Pechlaner, 2014). In this study, information flows are the direct object of analysis, while TLIS serves as the conceptual lens for explaining how system conditions (including technical, organizational, and inter-organizational conditions) shape the circulation of information and how these flows support or hinder service coordination (Datta & Christopher, 2011; Gretzel et al.,

2015; Sifolo, 2025; Zhang & Tavitiyaman, 2022). This approach is consistent with the view of destinations as systems of interdependent actors connected through relationships of information exchange, knowledge sharing, and inter-organizational collaboration (Jamal & Getz, 1995; Baggio et al., 2010; van der Zee & Vanneste, 2015).

The research context is coastal destinations within the South Central Coastal Sub-region of Vietnam. The geographical scope is defined by the administrative and tourism development context at the time of data collection in 2024, including Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan, and Binh Thuan. The Vietnam Tourism Development Strategy to 2030 identifies the direction for professional, high-quality, and sustainable tourism development (Prime Minister of Vietnam, 2020). The North Central and Central Coastal Region Planning for the period 2021–2030, with a vision to 2050, emphasizes the need for spatial linkages, infrastructure, and economic sectors within the region (Prime Minister of Vietnam, 2024).

This context also needs to be understood in light of Vietnam's provincial tourism governance structure. The Law on Tourism emphasizes tourism development based on each locality's potential and comparative advantages and the strengthening of regional linkages, while also assigning provincial People's Committees responsibility for state management of tourism and for implementing tourism strategies, master plans, plans, and policies in ways that are appropriate to local conditions (National Assembly of Vietnam, 2017). World Bank analysis further shows that subnational governments in Vietnam account for more than half of total government expenditure, while weaknesses in intergovernmental fiscal relations can undermine transparency, coordination, and coherence across provinces (World Bank, 2015). This institutional context helps explain why tourism information flows may remain organized along administrative boundaries even when tourist itineraries are inherently cross-provincial.

This context aligns with the research's analytical objectives. In coastal itineraries, tourists often travel through multiple localities. Tourism products are composed of many interdependent services. Operational information flows through management agencies, businesses, intermediary platforms, service providers, and tourists (Baggio et al., 2010; Christopher, 2022; Mrnjavac & Ivanovic, 2007; Ruan & Zhang, 2021; Zhang et al., 2009; Zhang & Tavitiyaman, 2022). When the travel space is interprovincial, but information is still organized by individual entities, platforms, processes, and localities, IF may impair the ability to coordinate services at the destination and regional levels. When inter-provincial itineraries span multiple provinces but information continues to be organised separately by actors, platforms, procedures and localities, informational fragmentation can undermine coordination capacity at both the destination and regional levels.

The study seeks to answer the following three questions:

RQ1. How do stakeholders perceive and utilize the flow of tourism logistics information in the organization, provision, and consumption of services?

RQ2. How is the flow of information used to support service coordination among stakeholders in the destination ecosystem?

RQ3. What types of information fragmentation limit the ability to coordinate services at the operational, destination, and regional levels?

From the research questions, IF is conceptualised as a structural mechanism that can impede service coordination within the TLIS. The study examines fragmentation along four dimensions: actors, platforms and communication channels, data and processes, and governance spaces, in order to clarify how information structures shape coordination flows among stakeholders. This perspective explains why expanding digital tools and communication channels does not automatically enhance coordination capacity at the destination level when information flows remain bounded by organisational and spatial constraints.

This study contributes to the literature in three ways. First, it uses TLIS as an analytical framework to clarify the relationship between system conditions, information flows, and service coordination at the destination level. This approach extends discussions in e-tourism and smart tourism, which often focus on technology, digital platforms, and user experience (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Yan et al., 2025). Second, the study identifies IF as an intermediate mechanism that can weaken the transformation of data into coordinated action among service actors (OECD & European Union, 2025; Sifolo, 2025; Zhang & Tavitiyaman, 2022). Third, it provides empirical evidence from intermunicipal coastal destinations in Vietnam, where information flows operate across a multi-stakeholder network and across governance spaces (Ruan & Zhang, 2021; Prime Minister of Vietnam, 2024).

2. Materials and Methods

2.1. Literature Review and Analytical Framework

2.1.1. Digital Technology in Tourism Information

Studies on e-tourism show that information technology and the internet have transformed the distribution, communication, and management of information in the tourism industry (Buhalis & Law, 2008; Navío-Marco et al., 2018). Online channels have also changed how tourists access information when planning trips, particularly through search engines, social networks, and user-generated content sources (Xiang & Gretzel, 2010; Navío-Marco et al., 2018). Furthermore, research on smart tourism emphasizes the role of ICT, data, connectivity, and interaction among components of the destination ecosystem (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Ye et al., 2020). These studies show that digital technology has expanded the space for the flow of tourism information, but at the same time highlight the need for timeliness, connectivity, and the use of information among stakeholders in the destination (Buhalis & Law, 2008; Xiang & Gretzel, 2010; Gretzel et al., 2015; Navío-Marco et al., 2018).

Research on smart tourism shows that digital technologies and data have transformed the tourism information environment through greater connectivity, real-time interaction and value co-creation within destination ecosystems (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Ye et al., 2020; Yan et al., 2025). From an ecosystem perspective, a smart tourism destination is viewed as a setting in which technological infrastructure, leadership capacity, innovation, human capital and social capital interact through networks of stakeholder relationships (Boes et al., 2016; Gelter et al., 2022). This research emphasises the role of data and digital platforms in collecting, processing and analysing information in real time, thereby supporting service personalisation and enhancing destination competitiveness (Gretzel et al., 2015; Ye et al., 2020). At the same time, research on digitalisation in tourism supply networks suggests that technology implementation is shaped by stakeholder fragmentation, collaboration mechanisms, data-driven practices and destination-specific conditions (Sifolo, 2025; Yan et al., 2025). From this perspective, smart tourism provides a useful analytical lens for understanding the technical and organisational conditions of destination information environments, but it offers limited insight into how information flows are organised, validated and used as mechanisms for service coordination among multiple stakeholder groups. In this study, insights from smart tourism research are used to characterise the technological and data environment of destinations, while analytical attention is directed towards tourism logistics information flows and their role in enabling or constraining service coordination among stakeholders.

2.1.2. Multi-Stakeholder Relationships in Destination Governance

At the destination level, the relationship between stakeholders is not only seen through the presence of multiple actors, but also through how these actors coordinate, exchange information, and form common action mechanisms within an environment of intertwined interests (Bramwell & Sharman, 1999; Baggio et al., 2010; Beritelli, 2011; Volgger & Pechlaner, 2014). Government agencies, businesses, service providers, local communities, and tourists all participate in creating, distributing, and consuming tourism value, but their roles, interests, and connectivity capabilities are not the same (Baggio et al., 2010; Bramwell & Sharman, 1999; Volgger & Pechlaner, 2014). Therefore, destination coordination is influenced by inter-organizational relationships, trust, interests, connectivity capacity, and mechanisms for joint organizational action (Beritelli, 2011; Fyall et al., 2012; Jamal & Getz, 1995; van der Zee & Vanneste, 2015).

Recent reviews on sustainable destination governance also emphasize that the involvement of multiple stakeholders only creates governance value when linked to mechanisms for coordination, information exchange, and adaptation to the specific destination context (Laesser et al., 2025; Panagiotopoulou & Skoultzos, 2025). From this perspective, information is not just a technical element. Information is also a relational resource, as the sharing and use of information depends on the roles, interests, beliefs, and responsibilities of each stakeholder in the destination network (Baggio et al., 2010; Beritelli, 2011; Fyall et al., 2012; Jamal & Getz, 1995; van der Zee & Vanneste, 2015). Studies on knowledge transfer in destinations show that network structures may facilitate or hinder the flow of knowledge between entities, thereby affecting innovation and coordination capacity of the destination (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015). Therefore, information flow needs to be analyzed as an inter-organizational process in which information is created, verified, and used for service coordination.

2.1.3. Information Flow in Tourism Logistics

In logistics and supply chain management, information plays a central role in planning, coordinating, controlling, and reducing uncertainty among supply chain links (Christopher, 2022; Datta & Christopher, 2011). In tourism, this role is linked to organizing the flow of movement, services, resources, and information at the destination, where multiple stakeholders participate in serving tourists (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009). From a tourism supply chain perspective, these services do not operate as isolated units but are interconnected within an interdependent service system, where changes in one stage may affect the quality and timeliness of other stages along the tourist journey (Zhang et al., 2009; Mrnjavac & Ivanovic, 2007). Information on itineraries, service bookings, service capacity, transportation conditions, prices, attractions, customer feedback, and management requirements helps parties confirm transactions, allocate resources, and handle changes arising during the service delivery process (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009; Zhang & Tavitiyaman, 2022). Accordingly, tourism logistics information flows do not only support isolated transactions. They may also enable coordination among interdependent services within the destination and across the broader tourism supply chain (Datta & Christopher, 2011; Zhang et al., 2009; Ruan & Zhang, 2021; Zhang & Tavitiyaman, 2022). In this study, tourism logistics information flows are defined as the processes through which information related to tourist movements, services and resources is created, updated, validated, shared and used among actors in the destination ecosystem to support planning, coordination and operational adjustment (Christopher, 2022; Datta & Christopher, 2011; Zhang et al., 2009; Zhang & Tavitiyaman, 2022).

Tourism logistics should not be understood as transportation or physical distribution. At the destination level, tourism logistics involves organizing the flow of movement,

services, resources, and information throughout the entire journey of a tourist (Mrnjavac & Ivanovic, 2007). Information regarding schedules, bookings, room availability, service capacity, transportation conditions, pricing, attractions, customer feedback, and management requirements may all influence service coordination (Christopher, 2022; Datta & Christopher, 2011; Mrnjavac & Ivanovic, 2007; Zhang et al., 2009).

Research on tourism information flows indicates that information may support regional economic linkages when it is circulated and used between localities, businesses, and relevant stakeholders (Ruan & Zhang, 2021). In Digital Supply Chain Management in Tourism Destinations, ICT plays an important role in linking transactions, resources, and operational decisions among participating service providers (Zhang & Tavitiyaman, 2022). In smart tourism destinations, this requirement is particularly important because coordination extends beyond interactions between tourism enterprises and tourists to include multiple organizations, digital platforms, and governance levels involved in tourism service delivery (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Zhang & Tavitiyaman, 2022).

Recent studies on digitalisation in tourism supply networks show that real-time data, collaboration among actors and context-sensitive implementation are critical conditions for technologies to effectively support coordination (Sifolo, 2025). From a perspective that is closer to competition in tourism supply chains in digital environments, Ku (2024) further emphasizes that digital capabilities, collaboration and virtual integration are important for enhancing the adaptability and competitiveness of tourism service networks. Therefore, the coordination value of information does not lie in the mere existence of data or isolated communication channels but depends on information quality, the timeliness of sharing, interoperability among actors and the extent to which information is used in operational decision-making (Christopher, 2022; Datta & Christopher, 2011; Zhang & Tavitiyaman, 2022; Sifolo, 2025; Ku, 2024). Consequently, the key issue is not simply whether digital tools are present, but how information flows are organized across actor, platform, process and governance boundaries to support coordinated action in tourism service networks (Sifolo, 2025; Gretzel et al., 2015; Zhang & Tavitiyaman, 2022; Ku, 2024).

Accordingly, this study conceptualizes tourism logistics information flows as a mediating mechanism linking the conditions of the TLIS to service coordination outcomes (Datta & Christopher, 2011; Gretzel et al., 2015; Sifolo, 2025; Zhang & Tavitiyaman, 2022). The value of information is created only when information is shared and used among actors in the provision of tourism services, rather than merely existing as isolated data or communication channels (Christopher, 2022; Datta & Christopher, 2011; Sifolo, 2025). Accordingly, in this study, information flows are approached as an intermediate process between system conditions and service coordination outcomes: information only becomes a meaningful information flow when it crosses organizational, platform and territorial boundaries and is used to adjust concrete actions in tourism service delivery (Ruan & Zhang, 2021; Zhang & Tavitiyaman, 2022).

2.1.4. Tourism Logistics Information System

A tourism logistics information system (TLIS) is approached as an analytical framework connecting three issues: tourism information, tourism logistics, and destination service coordination. According to this approach, TLIS is conceptualized as a socio-technical and inter-organizational information structure that encompasses the system conditions under which tourism logistics information flows emerge and are transformed into coordinated action. These conditions include data resources, stakeholder groups, governance arrangements, digital platforms and coordination procedures (Trist, 1981; Datta & Christopher, 2011; Volgger & Pechlaner, 2014). Within this structure, technologies, data and stakeholder relationships shape how tourism logistics information is generated, validated, shared and

mobilized. Accordingly, TLIS is not synonymous with a specific software application, database, information portal or technology platform. Rather, it constitutes the broader institutional and informational context that enables or constrains information flows and, in turn, influences service coordination among destination stakeholders (Datta & Christopher, 2011; Christopher, 2022). In this study, TLIS is used as a conceptual lens for analysing the information environment that supports service coordination, rather than as a fully developed technological entity in practice or as a label for the information flows operating among stakeholders (Trist, 1981; Datta & Christopher, 2011; Volgger & Pechlaner, 2014).

TLIS needs to be distinguished from closely related concepts. Electronic tourism systems emphasize the application of information technology and the internet in the distribution, transaction, and retrieval of tourism information (Buhalis & Law, 2008; Navío-Marco et al., 2018). Smart tourism destination platforms emphasize data, connectivity, real-time interaction, and co-creation of value within the tourism ecosystem (Buhalis & Amaranggana, 2015; Gretzel et al., 2015). Logistics information systems are typically analyzed at the enterprise or supply chain level to support data collection, processing, and distribution for control, coordination, and decision-making (Christopher, 2022; Datta & Christopher, 2011).

In contrast to these adjacent concepts, TLIS emphasises the inter-organisational information structure of the destination. It also emphasises how that structure affects coordination among interdependent services within the tourist journey (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009; Volgger & Pechlaner, 2014). The focus of TLIS is not technology itself. The focus is on how information related to movements, services, resources, and feedback is created, updated, verified, shared, and used among actors in tourism service coordination (Datta & Christopher, 2011; Mrnjavac & Ivanovic, 2007; Zhang et al., 2009; Zhang & Tavitiyaman, 2022).

TLIS is positioned at the intersection of three research streams, including smart tourism destinations, knowledge transfer within destinations, and supply chain management/e-supply chain in tourism. Studies on smart tourism destinations emphasize the role of technology, data, stakeholder connectivity, and co-creation of value within the destination ecosystem (Boes et al., 2016; Gelter et al., 2022; Gretzel et al., 2015). Studies on knowledge transfer within destinations clarify how information and knowledge flow within destination networks (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015). Meanwhile, studies on tourism supply chains and electronic supply chains point to the role of ICT, information sharing, and operational coordination in connecting related services (Zhang et al., 2009; Zhang & Tavitiyaman, 2022; Sifolo, 2025). From this basis, TLIS is used to analyse how technical, organisational, and inter-organisational conditions shape the quality of information flows and, in turn, influence service coordination in digitalised destination environments (Trist, 1981; Gretzel et al., 2015; Sifolo, 2025; Volgger & Pechlaner, 2014). Based on this foundation, this paper does not propose or evaluate a specific technology system. Instead, TLIS is used as an analytical framework for examining how tourism logistics information is created, verified, shared, and used in service coordination, as well as how different forms of IF weaken coordination capacity at operational, destination, and regional levels (Datta & Christopher, 2011; Gretzel et al., 2015; Sifolo, 2025; Zhang & Tavitiyaman, 2022).

2.1.5. Socio-Technical Structure of Tourism Logistics Information Systems

This study approaches TLIS as a socio-technical structure. According to the socio-technical approach, the effectiveness of the system depends on the compatibility between the technical structure and the social organization (Trist, 1981). In TLIS, the technical structure includes technology, data, software, platforms, and communication channels. The social structure includes people, information usage capabilities, coordination processes,

trust, interests, and data update responsibilities. Therefore, TLIS needs to be evaluated based on its ability to support information as a coordination resource, not just on the number of digital tools used.

The socio-technical approach helps explain the connection between the system's operating conditions and the ability to coordinate information among stakeholders. For information systems, the value of technology depends not only on its technical characteristics but also on the specific organizational context and usage practices (Trist, 1981). In tourism, this requirement is even more evident because tourism products are often formed through the combination of multiple suppliers within the same service journey (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009). On this basis, information flow is considered an intermediary process linking the socio-technical conditions of TLIS with the results of service coordination.

2.1.6. Information Flow-Based Service Coordination Mechanism

Research on smart tourism destinations, destination governance, and tourism logistics and supply chains provides complementary insights into the technological, organisational, and informational conditions shaping service coordination in destinations (Christopher, 2022; Fyall et al., 2012; Gretzel et al., 2015; Koo et al., 2016; Laesser et al., 2025; Yan et al., 2025). Building on these perspectives, TLIS is conceptualised as a socio-technical and inter-organisational information framework through which service coordination depends on the circulation, integration, and use of information among destination actors (Trist, 1981; Datta & Christopher, 2011; Volgger & Pechlaner, 2014). Within this framework, technology, data, collaborative relationships, and coordination mechanisms function as interconnected elements that jointly shape how information is created, updated, validated, shared, and used across destination networks (Datta & Christopher, 2011; Gretzel et al., 2015; Volgger & Pechlaner, 2014; Zhang & Tavitiyaman, 2022).

From this perspective, coordination challenges in digitalised destinations arise not only from technological constraints but also from fragmented information flows across actors, platforms, processes, and governance levels (Gretzel et al., 2015; Sifolo, 2025; Zhang & Tavitiyaman, 2022). In this study, TLIS serves as a qualitative analytical framework for examining the relationships among system conditions, information flows, and service coordination rather than as a causal measurement model or a fully implemented technological system.

To avoid equating levels of information interaction, the study distinguishes three operational concepts. Information exchange is the transmission and reception of information between parties via direct or digital channels. Information sharing is the act of allowing other parties to access relevant data or information to facilitate transactions, management, or customer service (Christopher, 2022; Datta & Christopher, 2011). Service coordination is a higher level, where information is used to regulate actions, resources, schedules, capacity, or service responses among multiple entities (Christopher, 2022; Datta & Christopher, 2011; Mrnjavac & Ivanovic, 2007; Zhang et al., 2009). Therefore, the transmission or sharing of information is not sufficient to conclude that service coordination has occurred.

In this study, coordination mechanisms refer to the set of rules, procedures, practices and forms of interaction through which stakeholders use information to adjust activities, allocate resources, arrange schedules and align services, thereby translating information flows into coordinated service actions across the destination ecosystem (Datta & Christopher, 2011; Fyall et al., 2012). Accordingly, TLIS denotes the technical, organisational and inter-organisational context in which information activities take place (Trist, 1981; Baggio & Cooper, 2010; Volgger & Pechlaner, 2014), information flows denote the processes through which information is created, exchanged, integrated and used among actors (Ruan & Zhang,

2021; OECD & European Union, 2025), and coordination mechanisms denote the ways in which actors use information to adjust actions and manage interdependencies during service delivery (Datta & Christopher, 2011; Fyall et al., 2012). This distinction prevents the mere existence of information from being equated with the existence of coordination, and provides a basis for analysing more precisely the intermediary role of information flows in linking system conditions to coordination outcomes.

Analytically, this study distinguishes between TLIS, information flows and coordination mechanisms. TLIS is understood as the socio-technical and inter-organizational context within which information-related activities take place. Information flows are the processes through which tourism logistics information is generated, updated, validated, shared and used among actors. Coordination mechanisms are the rules, procedures, practices and forms of interaction through which actors use information to adjust activities, allocate resources and align services, thereby translating information flows into coordinated service actions. This distinction clarifies the analytical role of TLIS as the broader context that shapes information flows and, through them, influences service coordination.

The analytical framework is built on five components, namely socio-technical conditions, stakeholder roles, tourism logistics information flows, the degree of information interoperability or fragmentation, and service coordination outcomes at operational, destination and regional levels. The framework is used as a qualitative analytical tool to guide coding and interpretation of the data. Its aim is to clarify how information supports or constrains service coordination, rather than to test causal relationships. Within this framework, TLIS is used to identify the system context. Information flows are used to analyse how information operates in practice. Coordination mechanisms are used to interpret how information is translated into coordinated action in real settings.

The four types of fragmentation are treated as the main analytical categories in this study. Fragmentation by stakeholder occurs when different groups create, hold and use information according to their own roles, interests and decision needs; this interpretation is consistent with research on destination networks, knowledge transfer and multi-stakeholder coordination (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015). Fragmentation by channel or platform arises when information is dispersed across websites, social media, online travel agency platforms, applications, telephone, Zalo or internal systems; this form of fragmentation reflects a multi-channel tourism information environment in which data can be created, searched and exchanged through multiple contact points (Buhalis & Law, 2008; Xiang & Gretzel, 2010). Fragmentation by data or process occurs when data are not standardised, not synchronised or lack clear mechanisms for updating and verification; this issue relates directly to the role of information sharing in tourism logistics and tourism supply chains (Zhang et al., 2009; Zhang & Tavitiyaman, 2022). Fragmentation by regional space arises when information is organised at the level of individual provinces or localities, while tourist itineraries extend across multiple provinces or regions; this interpretation is aligned with studies on tourism logistics and information flows in regional economic linkages (Mrnjavac & Ivanovic, 2007; Ruan & Zhang, 2021).

Figure 1 summarizes this analytical logic. TLIS is conceptualized as a socio-technical and inter-organizational construct where the degree of interconnectedness or fragmentation of information flows affects service coordination at the operational, destination, and regional levels.

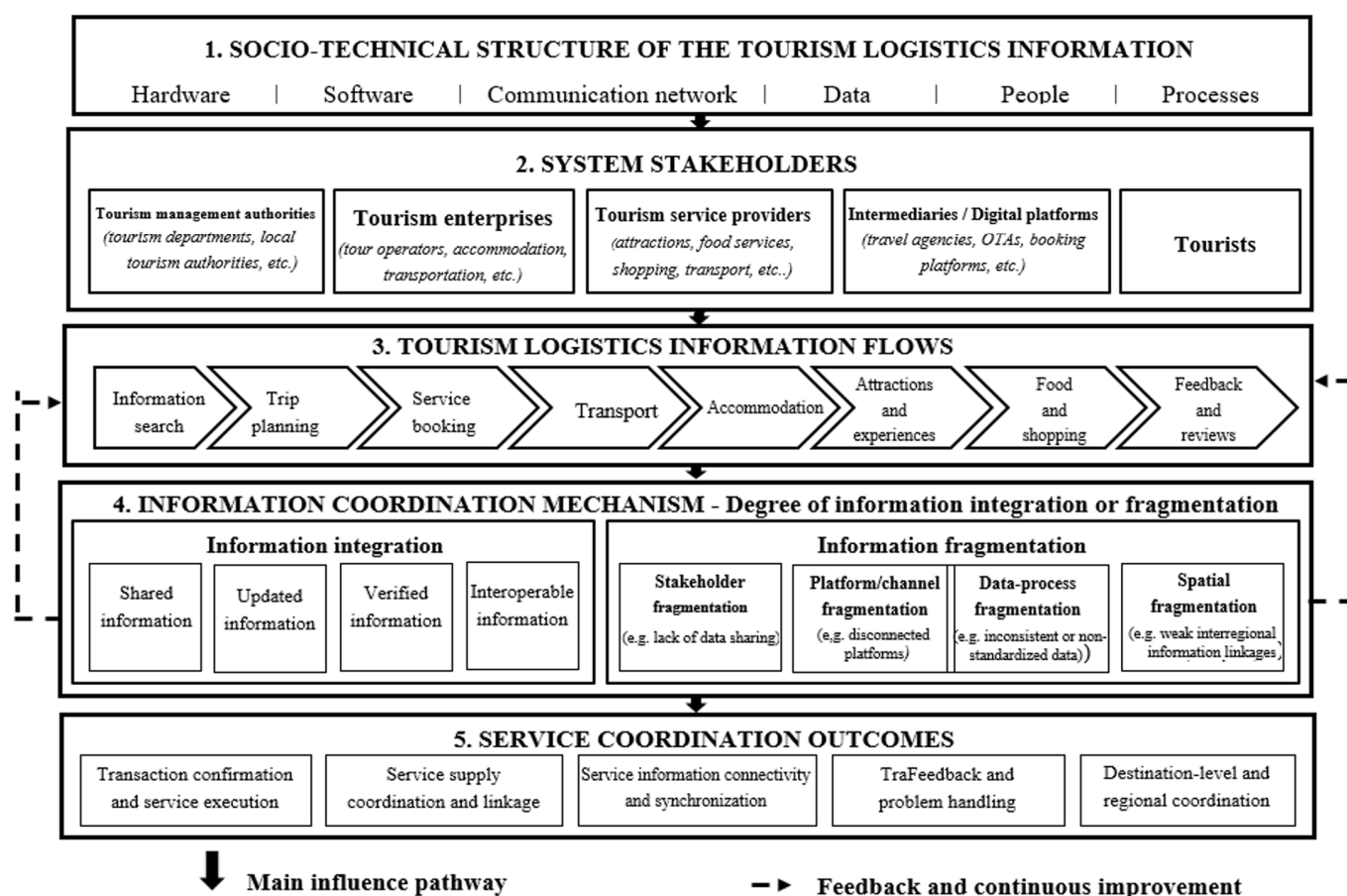


Figure 1. Information-flow-based service coordination mechanism in the TLIS.

In Figure 1, the arrows represent the analytical sequence from the socio-technical conditions of TLIS to the process of creating, updating, verifying, and using the information flow. This is followed by the degree of information interconnection or fragmentation and the resulting service coordination (Baggio & Cooper, 2010; Boes et al., 2016; Christopher, 2022; Datta & Christopher, 2011; Del Chiappa & Baggio, 2015; Mrnjavac & Ivanovic, 2007; Trist, 1981; Zhang et al., 2009). IF is positioned as an intermediate mechanism hindering coordination. When information becomes fragmented across stakeholder groups, communication channels and platforms, data and procedural arrangements, and regional spaces, digital tools may support individual transactions but they struggle to create a unified collaborative capability at the operational, destination, and regional levels (Mrnjavac & Ivanovic, 2007; Ruan & Zhang, 2021; Zhang et al., 2009; Zhang & Tavitiyaman, 2022). Therefore, Figure 1 is used to guide coding, present results, and discuss. This is not a causality testing model.

The analytical framework orients Section 3 towards three aspects: how stakeholder groups perceive and use information flows, how information flows support service coordination, and how fragmentation patterns limit coordination at the operational, destination, and regional levels. As a result, Section 3 focuses on the relationship between information and service coordination, rather than describing individual system components separately.

2.2. Methods

2.2.1. Research Design and Context

The study employs a single-case study design with a multi-stakeholder approach, in which the qualitative component constitutes the core of the research. The study also incorporated survey data as supplementary descriptive indicators to characterize the information channels, digital tools and coordination practices reported within the survey

sample, thereby contextualizing and triangulating the qualitative findings. A case study design is considered appropriate when the phenomenon needs to be analysed in its real-life context and when the boundaries between the phenomenon and its context are not clearly separated (Yin, 2018). A qualitative approach is suitable for studies that focus on explaining stakeholders' perceptions, practices, and information coordination mechanisms rather than testing a predefined quantitative model (Patton, 2015).

Within typologies of mixed methods designs, using survey data in a descriptive, auxiliary role and embedding it within a study in which the qualitative component is central shares key features with embedded designs or qualitatively driven designs (Creswell & Plano Clark, 2018). However, the present study is still guided by an exploratory aim that seeks to conceptualise and explain the operating mechanisms of TLIS in a real-world context. Survey data are used only to describe the context and to support the interpretation of qualitative findings, rather than to test causal relationships. Consequently, the study does not employ inferential statistical techniques but instead focuses on integrating multiple sources of evidence to develop an in-depth explanation of the phenomenon under investigation (Yin, 2018; Patton, 2015).

The case study focuses on the tourism logistics information environment in coastal destinations in Vietnam's South Central Coast subregion. The geographical scope is defined according to the administrative context at the time of data collection in 2024, as described in Section 1. The primary unit of analysis is the inter-organizational information flows that support the coordination of tourism services within a coastal space spanning multiple destinations. The case is defined as the tourism logistics information environment of the subregion as a whole rather than of individual provinces, because information flows and coordination activities typically cross administrative boundaries in the formation and delivery of tourism experiences. Accordingly, the study does not compare each locality as an independent case but treats them as components of a single research context.

The selection of this case is driven by the need to analyse information-based coordination in a tourism space that is inter-provincial, inter-service and inter-organizational. In Vietnam's South Central Coast subregion, a single travel itinerary or service delivery process may simultaneously involve government authorities, tour operators, accommodation providers, transport operators, attractions, digital platforms and tourists. This context creates mutual interdependencies among multiple groups of actors, making service provision rely heavily on information exchange and inter-organizational coordination, in line with the view of the destination as a multi-stakeholder system (Fyall et al., 2012; Jamal & Getz, 1995; Volgger & Pechlaner, 2014). At the same time, the interdependence among service components along the travel itinerary makes information a critical condition for supporting operational coordination and reducing uncertainty in service delivery (Christopher, 2022; Datta & Christopher, 2011; Zhang et al., 2009). Therefore, this case is particularly suitable for analysing how tourism logistics information is created, updated, validated, shared and used in a destination environment characterised by multiple overlapping organizational and administrative boundaries, as well as how these information flows support or hinder service coordination among stakeholders.

2.2.2. Participants and Data Sources

Participants were selected using a purposive sampling method. Selection criteria were not based on statistical representativeness, but on the degree of relevance of participants to the creation, management, exchange, verification, or use of tourism information (Patton, 2015). This sampling method is suitable for the objective of analyzing mechanisms and comparing how different stakeholder groups perceive, control, and utilize information flows in service coordination.

The main data source is the first-wave qualitative sample, which comprises 42 participants. The expert group was selected at the national level on the basis of their experience in research, management, consulting or practical implementation, as well as their recognised expertise in areas related to logistics information systems, tourism logistics, smart tourism, digital transformation in tourism, destination management or tourism supply chains. The remaining three groups are associated with destinations in Vietnam's South Central Coast Sub-region. Management officers need to be involved in managing, promoting, statistically analyzing, planning, coordinating, or governing tourism activities at the local/destination level. Business representatives are owners, managers, or operational personnel of travel agencies, accommodation providers, transportation companies, attractions, or related service providers, and must participate in information exchange with customers, partners, or regulatory agencies. Tourists are directly accessed at certain destinations in the region, are 18 years of age or older, and have experience searching for, verifying, booking services, or providing feedback on tourism information. Participant recruitment continued until new data no longer made a substantial contribution to extending or refining the established analytical themes. Accordingly, sample adequacy was assessed based on thematic sufficiency rather than statistical representativeness (Patton, 2015).

The study used two data sources in an asymmetrical manner. Combining data from multiple participant groups and diverse sources of evidence enhanced opportunities for cross-checking, assessing consistency and enriching the interpretations developed from the data. Qualitative data from Round 1, collected from 42 participants, served as the core body of evidence for identifying themes, building interpretations and developing the analytic framework. The survey data from Round 2, collected from 358 participants, were used as supplementary descriptive evidence to corroborate the context, examine the recurrence of selected issues within the survey sample and support the interpretation of qualitative findings. These data were not used for statistical generalisation or hypothesis testing but only as a supplement to the core qualitative data (Creswell & Plano Clark, 2018; Patton, 2015). Accordingly, the proportions, trends and open-ended responses from Round 2 were used only when they helped clarify or triangulate themes already identified from the primary qualitative data. The participant structure and the role of each data source are presented in Table 1.

Participants in the primary qualitative data are anonymized using group codes and sequential numbers: EX1–EX8 for experts, MO1–MO8 for managing officers, TE1–TE8 for tourism enterprises, and TO1–TO18 for tourists. Supplementary survey data are presented only in aggregated form and interpreted cautiously as descriptive evidence, not representative evidence for the entire market or the entire destination system.

Table 1. Participant structure and data-source roles.

Participant Group (Code)	Qualitative Round		Supplementary Descriptive Survey	
	Number of Respondents	Role as Main Qualitative Evidence	Number of Respondents	Role as Supplementary Descriptive Evidence
Experts (EX)	8	Clarifying TLIS concepts, structure and influencing factors	8	Supplementary descriptive comparison of system assessment and solutions
Management officers (MO)	8	Policy, management, infrastructure and data perspectives	8	Supplementary descriptive comparison of management and implementation conditions
Tourism enterprises (TE)	8	Tools, operations, coordination and data needs	44	Supplementary descriptive comparison of operations and information sharing

Table 1. Cont.

Participant Group (Code)	Qualitative Round		Supplementary Descriptive Survey	
	Number of Respondents	Role as Main Qualitative Evidence	Number of Respondents	Role as Supplementary Descriptive Evidence
Tourists (TO)	18	information needs, search channels, booking and experience	298	Supplementary descriptive comparison of information access and use
Total	42	Main qualitative data source	358	Supplementary descriptive evidence only; no statistical generalization

Source: Author’ design.

2.2.3. Data Collection

The primary qualitative data was collected between mid-August and mid-September 2024 through semi-structured interviews and short, semi-structured field exchanges. The majority of data was collected directly during the field survey, while some unclear points were clarified via telephone or Zalo. Interviews with experts, managers, and business representatives typically lasted 40 to 60 min, while field exchanges with tourists lasted 20 to 30 min. Additional communications lasted only about 5–10 min and were used to verify or clarify specific information.

The interview guides were tailored to each participant group but all focused on core topics such as tourism information sources and flows, actors involved in information exchange, tools and platforms used, forms of service coordination, conditions that support or hinder coordination, information bottlenecks and suggestions for improvement. The semi-structured approach ensured that the main topics were covered while still allowing additional dimensions to emerge from the data (Patton, 2015).

Interviews were not audio-recorded due to fieldwork conditions, the need to ensure participants’ comfort, and the sensitive nature of some discussions related to governance, business operations and inter-organizational coordination. Consequently, the analysis was based on structured field notes and expanded notes completed immediately after each interview. During each interview, the interviewer focused on guiding the discussion, while a research assistant recorded key points, statements receiving particular emphasis and relevant contextual details. Immediately after each interview, the two team members compared their notes, reconciled interpretations, supplemented missing details from near-contemporaneous recall and identified issues requiring further verification. This process enhanced the credibility and consistency of the data used in the analysis. When ambiguities or inconsistencies arose, the research team re-contacted participants by telephone or Zalo to clarify specific points at a summary level, rather than conducting formal member checking of the full analysis.

The study did not perform discourse analysis or micro-level conversational analysis. The focus of the analysis is on recurring meanings, coordinated practices, and differing patterns among target groups, identified through field notes, post-interview reviews, in-group comparisons, and further clarification via telephone or Zalo when needed.

Data from Round 2 was collected from late September to early December 2024 and supplemented in early 2025. The survey tool combined level-based and open-ended questions about the current state of TLIS, stakeholder responsibilities, system components, influencing factors, and development solutions. In this paper, Round 2 data was only processed at the frequency statistics level and descriptive summaries of open-ended responses were used. These results are used for contextualization and comparison with qualitative topics, not for causality testing or statistical generalization.

2.2.4. Data Analysis

The data was analyzed using the thematic analysis method (Braun & Clarke, 2006). The analysis process combined inferential coding from the analysis framework and inductive coding from the data. Initial orientation codes were constructed from five groups in the analysis framework: socio-technical conditions, stakeholder, tourism logistics information flow, information interconnection/fragmentation, and service coordination results.

The author and a collaborator independently coded the qualitative data using a manual coding matrix. Two readers recorded, assigned codes, compared inconsistent code segments, and returned to the original data to adjust the code definitions. Differences were discussed until a final coding assignment was agreed upon. When content remained ambiguous, the research team clarified it with participants via phone or Zalo if needed. The use of a manual matrix was appropriate for the data scale and the research's goal of interpreting the mechanism. The use of manually constructed matrices was appropriate given the size of the dataset, the study's focus on understanding coordination mechanisms, and established criteria for transparency in thematic analysis (Braun & Clarke, 2006; Nowell et al., 2017).

The analysis process was carried out in four steps. First, the author and a collaborator reviewed all in-depth interview records from Round 1 to understand the main content of each respondent group. Second, Round 1 data was coded according to the orientation code groups of the analytical framework. Third, additional codes were added when the data showed signs such as scattered data, lack of coherence, lack of up-to-date standardization, or dependence on informal exchange channels. Fourth, related codes were grouped into topics and compared among subject groups.

Data from Round 2 were analyzed using a descriptive approach, focusing on frequencies, proportions, and the distribution of responses, together with a synthesis of open-ended answers. The results were used to examine the consistency of emerging themes by comparing response patterns with the established coding structure. This procedure supports interpretive-level validation through systematic alignment between empirical patterns and thematic categories, thereby enhancing the transparency and credibility of the analytical process (Lincoln & Guba, 1985; Nowell et al., 2017). The initial coding groups, illustrative codes, links to the analytical framework and indicative data sources are summarized in Table 2.

Table 2. Initial coding groups.

Initial Coding Group	Illustrative Codes	Link to the Analytical Framework	Indicative Data Source
Socio-technical conditions	Technology; data; software; platforms; people; procedures; trust; coordination capacity	Conditions supporting or constraining information-flow operations	Round 1 field notes; Round 2 component ratings
Stakeholders	Tourism management authorities; tourism enterprises; travel agencies; service providers; tourists	Actors creating, sharing, verifying and using information	Round 1 field notes by stakeholder group; Round 2 responsibility ratings
Tourism logistics information flows	Search; booking; transport; accommodation; attractions; food and beverage; shopping; feedback	How information is organized and circulated across linked services	Round 1 field notes on search, booking, transport, accommodation and feedback; Round 2 tourist and enterprise responses

Table 2. Cont.

Initial Coding Group	Illustrative Codes	Link to the Analytical Framework	Indicative Data Source
Interoperability/fragmentation	Fragmentation by stakeholder, channel/platform, data/procedure and regional space	Mechanisms through which information supports or constrains coordination	Round 1 field notes on fragmentation; Round 2 descriptive comparison of system components and solutions
Service coordination outcomes	Transaction confirmation; supply coordination; service linkage; feedback and adjustment; destination/regional coordination	Coordination outcomes at operational, destination and regional levels	Round 1 cross-stakeholder themes; Round 2 descriptive ratings and open responses

Source: Author' design.

2.2.5. Data Reliability and Research Ethics

Data reliability is strengthened by cross-referencing data sources, comparisons between subject groups, double-entry recording, independent coding, code matching, verification of unclear content with participants, and data anonymization. Subject matter completeness is monitored during the analysis process. Data is considered sufficient for the research objective when subsequent interviews and field discussions primarily add detail to established subject groups, rather than creating significantly new topics related to information flow, IF, and service coordination. These procedures are consistent with the criteria of credibility, transferability, dependability, and confirmability in qualitative research (Lincoln & Guba, 1985). These procedures are consistent with the criteria of credibility, transferability, dependability, and confirmability in qualitative research.

Research ethics principles are adhered to during data collection and processing. Participants were informed about the research objective, voluntariness, confidentiality principles, and the intended use of the data. Consent was confirmed before interviews, field exchanges, or survey completion. Information that could identify individuals or organizations was removed from the analysis file. Qualitative data was coded by subject group and sequential number. Supplementary survey data was reported only in aggregated form.

3. Results

The results are organized according to the operational logic of information flows in service coordination. The focus of the analysis is on how information is created, transmitted, updated, verified, and used among stakeholders, as well as how a lack of communication affects coordination at the transaction, destination, and region levels. The main themes are drawn from the qualitative data of Round 1. The survey data from Round 2 is used only as supplementary descriptive evidence to compare, contextualize, and clarify these themes, not for statistical generalization or model testing.

Participant statements are placed in quotation marks and italics. They are standardized field notes, not verbatim transcripts from audio recordings. To avoid repetition, the following excerpts only include the participant's code in parentheses. In this section, TLIS is used as an interpretive framework for the observed information environment, not as evidence that a unified system was fully operational in the sub-region.

3.1. Stakeholder Perceptions of the Tourism Logistics Information System

Qualitative data shows that all stakeholder groups view the tourism logistics information flow as necessary, but their descriptions and usage of the information do not reflect

a fully operational, unified system. Instead, the observed information environment can be analyzed as a developing and fragmented TLIS. Differences are evident in their understanding of the system, the type of information needed, the information generated, the scope of sharing, and coordination bottlenecks.

The expert group views the tourism logistics information structure from the perspective of the overall system and coordination capacity. Their focus is on the conditions under which information can be updated, verified, interconnected, and used in service management or coordination. Some opinions emphasize that the current information environment is still “lacking in synchronization” (EX1) and tends towards “everyone for themselves” (EX6). These comments indicate that the problem is not only a lack of digital tools, but also relates to a lack of interconnectedness among data, update responsibilities, and coordination processes.

The management group approaches the tourism logistics information issue from the perspective of management officers, public data, and tourism activity coordination. MO3 argues that the system needs to help management agencies, businesses, and tourists “access and exchange information as quickly, specifically, and in detail as possible”. The bottlenecks this group is concerned about are not only the lack of information channels, but also the lack of updated data, sharing standards, and coordination processes among stakeholders.

The business and supplier group approaches the tourism logistics information environment from an operational perspective. Information mainly serves promotion, service booking, itinerary confirmation, partner coordination, customer care, and feedback handling. TE7 describes the use of “tour management software (itoursys), fanpage, Zalo”, whereas TE8 refers to the channels “directly, via Booking, Traveloka, Agoda”. These statements indicate that businesses have used multiple information channels, but these channels mainly serve the specific operational goals of each unit.

The group of tourists evaluates the tourism information environment based on the ability to search, compare, verify, and use information during their trip. They need clear information about prices, itineraries, accommodation, transportation, attractions, booking/cancellation policies, previous customer reviews, and support when problems arise. TO18 emphasizes the need for information that is “as clear and detailed as possible”.

Table 3 shows that each stakeholder group participates in information flows, but their information needs and control logics differ. Management officers require data for monitoring and coordination. Enterprises prioritize information for transactions and service operations. Tourists use information to reduce uncertainty before and during the trip. This divergence helps explain why information can be available within each group, but it is still difficult to transform information into shared data for coordinated service action.

Table 3. Information needs, roles and coordination bottlenecks by stakeholder group.

Group	Needs	Generated	Shared/Retained	Bottleneck
Experts	TLIS structure; components; operating conditions	Concepts; criteria; expert assessments; recommendations	Expert knowledge and recommendations; no transaction data	Difficulty transforming system knowledge into coordination procedures
Management officers	Reporting; statistics; monitoring; planning; enterprise and service data	Policies; notices; reporting requirements; management data	Administrative/public channels; limited real-time data	Lack of standardized data, timely updates and inter-local sharing

Table 3. Cont.

Group	Needs	Generated	Shared/Retained	Bottleneck
Tourism enterprises	Marketing; booking; service confirmation; partner coordination; customer care	Service information; prices; booking records; schedules; customer feedback	Internal systems, social media, direct channels and OTAs	Data are mainly used for firm-level operations rather than shared coordination
Tourists	Search; comparison; verification; booking; travel support; complaint/feedback	Reviews; ratings; travel questions; social media content; service feedback	Platform-based reviews and direct communication with providers	Information is dispersed across channels and difficult to verify across the whole journey

Source: Author's synthesis from Round 1 and Round 2.

3.2. Information Flow in Tourism Service Stages

The data from Round 1, compared with descriptive evidence from Round 2, shows that the flow of travel logistics information is present in many service groups of the itinerary. The content of the information varies by service group, but all revolve around two main functions: helping travelers reduce uncertainty when choosing and using services, and supporting businesses in preparing and adjusting their supply operations.

For transportation services, the information is used by customers to estimate time, cost, safety levels, and contingency plans. TO8 emphasizes the need for “departure times, pick-up points, drop-off points, and stopover times”, along with information on vehicle type, fares, online booking, baggage, and travel insurance. TO12 focuses on information about transportation services, related costs, status tracking, customer support, insurance policies, and emergency assistance. TO17 approaches transportation information from the perspective of itinerary organization, including “departure and arrival locations, modes of transport, travel time, and transportation costs”. These responses show that transportation information not only supports the selection of means of transport but also shapes the customer's ability to control their itinerary.

For accommodation services, information is used to assess the quality of the accommodation and its connectivity with other activities along the itinerary. TO8 requires information on “room size, bed type, amenities, view, actual photos”, room rates, promotional policies, previous guest reviews, capacity, facilities, and check-in/check-out regulations. TO10 focuses on “room availability, price, amenities, and location”. TO11 emphasizes the requirement for information to be “accurate, up-to-date, and synchronized across all accommodation establishments in the area”. Descriptive data from Round 2 also shows that travelers are generally interested in accommodation prices, property information, room images, distance to attractions or shopping areas, and reviews from previous guests. This data group indicates that accommodation information not only serves booking decisions but also assists travelers in organizing transportation, meals, shopping, and sightseeing.

For travel services and tour programs, the information flow is more integrated because a single decision often involves multiple services. TO12 requires information on “tour packages, included service costs, transportation, accommodation, policies and conditions, guides and languages, time and schedule, destinations and activities”. TO17 focuses on “the reputation of the travel agency”, the variety of tour programs, cancellation and refund policies, and registration terms. TO18 is interested in price, refund policies for canceled trips, and insurance. In Round 2, the most frequently chosen factors for travel agencies and tour companies included price, tour type, itinerary, attractions, accommodation, meal quality, transportation, and the reputation of the service provider. This indicates that

tour information helps customers assess costs, benefits, risks, and reliability before using the service.

For food and shopping services, customers use this information to choose services at their destination and control spending during their trip. TO8 refers to the restaurant name, address, opening hours, menu, price, ingredients, culinary style, ambiance, payment methods, and previous customer reviews. TO12 focuses on “type of cuisine and dishes, price, opening hours, location, and directions,” while also noting the source of ingredients and health and safety policies. TO14 emphasized “food quality, service quality of the provider” and whether the location is convenient for travel. These opinions show that information on dining and shopping is not only related to price, but also to safety, quality, local identity, and convenience of travel.

From the perspective of tourism service providers, the information flow is used to organize operational activities. TE7 indicated that information on tour bookings, transportation, room rates, and ticket prices is processed in business and marketing activities. TE8 addressed information on prices, food and beverage services, entertainment, and spa services. A response from the business group in Round 2 clearly showed the operational function of information: “Having this information helps restaurants proactively order ingredients, allocate staff, prepare space, and improve service quality.” This response also indicates that logistics information supports businesses in “connecting and exchanging information with travel partners to develop appropriate pricing and incentive policies.” Thus, operational information not only serves communication with customers but is also used to prepare resources and adjust supply according to actual needs.

The evidence suggests that information in the travel itinerary does not operate as a unified whole, but is linked to the specific requirements of each service group. For tourists, information supports service selection, cost estimation, and itinerary adjustments. For businesses, information is used to prepare resources and meet service demands. For enterprises, information is used to allocate resources, organize staffing, update service offerings, and coordinate with partners.

3.3. Information Flow and Service Coordination

Information flows create synergistic value when translated into specific decisions or actions in tourism service and management. EX7 emphasizes that tourism is an industry “with an interdisciplinary and interregional nature requiring close collaboration from government agencies, businesses, local communities, and tourists”. This assessment aligns with data from the survey participants, where information is used to confirm services, prepare resources, monitor activities, and adjust services.

From the business perspective, information is primarily used to receive requests and maintain relationships with customers. TE3 indicates that businesses process “customer requests and feedback” through sales, marketing, and customer service departments. TE7 describes the information processing chain as including “advertising, receiving customer information, responding to customer feedback, serving customers, and post-service care”. These statements indicate that information is used throughout the service process, from customer contact to post-service care, rather than just product introduction.

In a supply chain organization, information helps businesses connect customer requests with downstream service activities. TE5 states that businesses communicate with customers about “detailed tour itineraries, booking confirmations, updates, and customer feedback” and also communicate with other businesses about “tour and service booking information”. TE7 lists operational information such as tour bookings, transportation, room rates, and ticket prices. TE8 mentions prices and services related to food, entertainment, and spa treatments. This data shows that information not only facilitates communication

with customers but also supports businesses in preparing and adjusting related supply chain activities.

The operational role of information is more clearly demonstrated in the business responses in Round 2. The open feedback from the business group in Round 2 showed that logistics information helps restaurants prepare ingredients, allocate staff, arrange service space, and improve service quality. This information is also used when businesses communicate with travel partners about pricing policies and promotions. This response also indicated that logistics information supports businesses in connecting and exchanging information with travel partners to develop appropriate pricing and incentive policies. In this case, the information has collaborative value because it is used to make decisions about raw materials, staff, service space, pricing, and incentives.

From the perspective of tourism management officers, the flow of information is linked to monitoring activities, planning, and supporting destination coordination. MO5 addresses topics such as “management and planning of tourism transport”, “management of accommodation services and reservations”, “management and coordination of tours”, and “management of ancillary services”. MO7 emphasized the functions of “data collection and analysis”, “booking and service management”, “supply chain management”, “monitoring and evaluation,” and “reporting and analysis”. These opinions show that management officers view information as a basis for monitoring, analyzing, and organizing tourism activities, not just as a communication tool.

Some responses in Round 2 further clarified the role of information in destination management. Management officers reported that the system supports the collection and analysis of data on tourist flows, transportation demand, and service development trends at the provincial level. They also noted that such information was viewed as useful for planning activities and policy adjustments in response to emerging conditions. However, it still requires supplementary real-time data and advanced analytical tools. This indicates that information already plays a role in destination management, but the level of support depends on the quality of updates and data analysis capabilities.

From the traveler’s perspective, the quality of information directly impacts their decision-making ability during their trip. TO5 noted that the information system supports decision-making when the information is “clear and coherent”, helping travelers “estimate travel time” and “estimate incurred costs.” Conversely, TO10 observed that the information was “fragmented, unsynchronized, and outdated”. These two responses indicate that information can either support or hinder a traveler’s decision-making ability, depending on the clarity, timeliness, and consistency of the data.

The use of information for coordination remains uneven among stakeholders. Some businesses in Round 2 stated that logistics information systems “are not yet widely adopted” and “businesses mainly operate independently”. The management group also noted that the system “needs regular updates and integration with other platforms”, and “needs improvement in connectivity and information updates”. These responses indicate that information has supported some operational and managerial decisions, but has not been consistently used as a common coordinating resource among stakeholders.

Data synthesis reveals that information flow supporting service coordination is most evident in three activities: service confirmation, supply organization, and post-feedback adjustments. Within businesses, information is used to prepare resources, allocate personnel, update services, and work with partners. In destination management, information supports tracking, planning, monitoring, and analyzing tourism activities. However, these practices still largely depend on individual businesses, supply relationships, or management systems. Information-based coordination has emerged in operational and management activities; however, it has not become a stable, unified mechanism for destinations.

3.4. Information Fragmentation in Tourism Service Coordination

In the surveyed information environment, IF is not an absolute lack of information. It is a situation where information has been created and exchanged, but is not yet organized in a sufficiently interconnected manner to become a common collaborative resource. Data from Round 1 shows that this phenomenon does not appear as a single bottleneck, but it recurs in four main forms: fragmentation by subject, by channel/platform, by data/process, and by spatial region. The data reveal four main forms of fragmentation: stakeholder fragmentation, channel and platform fragmentation, data and procedural fragmentation, and regional-spatial fragmentation. These four forms constitute a mechanism that prevents tool-level digitalization from being fully translated into system-level coordination.

Firstly, subject-specific fragmentation occurs when each group creates, retains, and uses information according to its own objectives. Management officers need information for monitoring and coordination. Businesses prioritize information for sales and operations. Tourists need information to make choices, compare, and reduce uncertainty. MO3 emphasizes the need for all parties to “access and exchange information as quickly, specifically, and in detail as possible”. TO18 argues that information needs to be “as clear and detailed as possible”. Therefore, information remains valuable to each stakeholder group, but it is not easily transformed into shared data for service coordination.

Secondly, channel/platform fragmentation occurs when information is exchanged through multiple channels, but it lacks standardized updates and a single point of ultimate responsibility. From the tourist’s perspective, TO12 observes that platforms are increasingly diverse, but they still exhibit “information dispersion, lack of linkage between service providers, and limitations in transparency and consistency”. Therefore, multi-channel approaches increase access to information; however, they also increase the need for verification when prices, schedules, service availability, or cancellation policies differ across platforms.

Third, fragmentation by data/process exists when there is a lack of a common database, update standards, sharing processes, and unified verification mechanisms. For instance, EX1 states that the current information environment “lacks synchronization”; EX6 describes an “everyone for themselves” situation. Moreover, TO10 argues that information is still “fragmented, not synchronously linked, and lacking in updates”. These statements show that dispersed data only has collaborative value when placed within a common update, verification, and usage process.

Fourth, fragmentation by regional space happens when each locality or enterprise develops its own information channel, while tourism itineraries are inter-provincial and inter-service in nature. EX1 argues that localities are still “organizing development independently” and “have not demonstrated regional linkages”. TO11 also noted that tourism remains “fragmented, lacking synchronized development across localities” and that tourist destinations “lack connectivity”. Data from Round 2, serving as supplementary descriptive data, also shows the need to build a shared inter-provincial information portal or database. This mechanism limits the ability to coordinate between destinations and organize regional tourism products. This finding is best interpreted in light of the provincialized governance context of tourism, where data flows and operational decisions are typically organized around local administrative jurisdictions rather than tourists’ cross-provincial itineraries.

The four types of fragmentation mentioned above are not isolated manifestations. They collectively affect the ability to verify and adjust services at the operational level, connect stakeholders at the destination level, and integrate itineraries at the regional level. The data above shows that IF is not only about the number of information channels, but also about the responsibility for updating, the ability to verify, and the level of shared use

among stakeholders. Table 4 summarizes each form of information fragmentation and its coordination implications.

Table 4. Forms of information fragmentation and implications for service coordination.

Form of Fragmentation	Observed Pattern	Implication for Service Coordination
By stakeholder	Different stakeholder groups create and use information according to their own roles, incentives and decision needs	Shared data resources and update responsibilities remain difficult to organize
By channel/platform	Websites, social media, OTAs, Google, phone, email, Zalo and direct channels coexist	Information may be inconsistent, outdated or difficult to verify
By data/procedure	Common databases, update standards and sharing procedures are weak or uneven	Dispersed information is difficult to aggregate, verify and reuse for coordinated action
By regional space	Enterprise and local information channels remain only partly connected across provincial tourism spaces	Inter-destination coordination and regional tourism-product organization remain constrained

Source: Author's synthesis from the research data.

The findings indicate that tourism logistics information flows are present in the awareness and practices of various stakeholders, but the level of information utilization is uneven across different operational areas. For tourists, information supports service selection, cost estimation, and the management of travel needs. For businesses, information is used to confirm services, prepare resources, adjust service operations, and work with partners. For management agencies, information serves to monitor, plan, and manage destinations. However, these information flows primarily operate on a service-by-service, business-by-business, platform-by-platform, or local management basis. Therefore, while information has clear operational value, its potential for transformation into coordinated services at the destination and inter-local levels is limited by the level of data connectivity, processes, and shared responsibilities across stakeholders.

4. Discussion

This section compares the research findings with existing literature on smart tourism, destination governance, and tourism logistics. The focus is not on simply reproducing the findings presented in Section 3, but rather on clarifying the implications of these findings for understanding TLIS, IF, and inter-local service coordination at coastal destinations.

The main point of discussion in this study lies in the mechanism of transforming information into collaborative capabilities within a multi-stakeholder destination context. When information serves only individual transactions, businesses, or management spaces, its value is primarily operational. However, when linked to data, processes, and accountability among stakeholders, information can become a collaborative resource at the destination level. This interpretation positions TLIS as an analytical framework for the operational mechanisms of information, rather than as a set of technological tools.

4.1. Socio-Technical Conditions in the Tourism Logistics Information System

Studies on e-tourism and smart tourism have clarified the role of information technology, the internet, data, digital platforms, and real-time interaction in tourism development (Buhalis & Law, 2008; Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Navío-Marco et al., 2018; Ye et al., 2020; Yan et al., 2025). These studies show that technology can expand access to information, improve the tourist experience, and support destination governance.

However, research on smart destinations also emphasizes that the value of technology depends on the ecosystem, organizational capacity, human capital, social capital, and how stakeholders interpret the technology in a specific context (Boes et al., 2016; Gelter et al., 2022). This research finding aligns with that observation; however, it adds an important point: in this particular study, digital tools only create clearer synergistic value when linked to appropriate organizational conditions, data, and processes.

From a socio-technical perspective, the capabilities of TLIS cannot be assessed by the presence of individual digital tools. A tool may support transactions at the enterprise level, but it fails to create synergy without shared data, update processes, and inter-organizational accountability. Therefore, the focus of the analysis is on the alignment between digital infrastructure, data, people, and processes in transforming information into a collaborative resource.

This finding reinforces the socio-technical approach to information systems. According to this approach, the effectiveness of a system depends not only on technology, but also on the compatibility between technology and social organization (Trist, 1981). In the context of TLIS, the technical structure includes software, platforms, databases, and communication channels; the social structure includes the roles of actors, update responsibilities, information utilization capabilities, trust, and coordination processes. This understanding is also consistent with research on smart tourism destinations, where competitiveness and smartness are considered the result of technology, human capital, social capital, and organizational capacity (Boes et al., 2016; Gelter et al., 2022).

It is important to emphasize that TLIS should not be interpreted as a single technological object. The research results show that TLIS is more appropriately understood as an inter-organizational information structure, in which technology is a supporting condition, while the synergistic value depends on whether information is standardized, verified, and used in operational actions. This interpretation is based on case study data and is placed in relation to studies on information in the supply chain, e-supply chain management, and digitalization in tourism supply networks (Christopher, 2022; Datta & Christopher, 2011; Sifolo, 2025; Zhang & Tavitiyaman, 2022).

This interpretation complements research on smart tourism. Many studies on smart tourism emphasize technology, data, digital platforms, and co-creation of value in the destination ecosystem (Buhalis & Amaranggana, 2015; Gretzel et al., 2015; Ye et al., 2020; Yan et al., 2025). This study further clarifies the conditions under which technology and data become collaborative capabilities in the context of inter-local coastal destinations. Transaction digitization can improve access to information, but in this study, digitization does not automatically create destination collaboration without a standard for updating, verifying, and using common information among stakeholders.

The research results not only confirm the role of technology in tourism, as this issue has been widely discussed in studies on e-tourism, smart tourism, and e-supply chain management in tourism (Buhalis & Law, 2008; Gretzel et al., 2015; Zhang & Tavitiyaman, 2022). The data from this study indicate the importance to emphasize that the synergistic value of technology and data depends on socio-organizational conditions, including the role of stakeholders, update processes, verification mechanisms, sharing capacity, and the level of information utilization in collaborative action. While Ku (2024) highlights how digital transformation and virtual integration can strengthen the competitiveness and resilience of tourism supply chains, the present study shows that IF at the destination scale can still limit these benefits when data flows are organised along administrative and organisational silos. This interpretation aligns with recent studies on smart tourism, sustainable destination governance, and digitalization in tourism supply networks, where technology is considered in relation to the governance context, stakeholder participation, collaboration mechanisms,

and implementation conditions at each specific destination (Panagiotopoulou & Skoultos, 2025; Sifolo, 2025; Yan et al., 2025). Accordingly, TLIS is valuable as an analytical framework when understood as the relationship between technology, data, people, processes, and collaborative action, rather than simply a collection of tools or technical platforms.

4.2. Information Fragmentation as a Coordination Mechanism

Studies on logistics and supply chain management view information as a crucial condition for planning, coordination, control, and reducing uncertainty among supply chain links (Christopher, 2022; Datta & Christopher, 2011). In tourism, this role is more complex because tourism products are formed from many interconnected services, including transportation, accommodation, food and beverage, sightseeing, shopping, and customer support (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009). From an e-supply chain management perspective, ICT can improve tourism supply chain operations when transactional and operational information is linked to coordinated decision-making at the destination (Zhang & Tavitiyaman, 2022).

This study positions IF as an intermediary mechanism between system conditions and service coordination outcomes. The issue is not simply whether information exists, but whether it transcends the boundaries of subjects, processes, and management spaces to become a common basis for coordinated action. This interpretation shifts the focus from describing the level of digitization to analyzing the organizational capacity of information flow within the tourism supply network (Sifolo, 2025).

Theoretically, IF helps explain why multiple channels and data are insufficient to create coordination. When information is held within the private logics of subjects, platforms, processes, or localities, it is difficult to transform it into shared operational knowledge. This interpretation connects research on destination networks and knowledge transfer with the role of information in the tourism supply chain (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Zhang et al., 2009).

The significance of this finding is that IF is viewed as a barrier to service coordination. It reflects not merely a lack of data or information integration but a reduced capacity to transform information generated through individual exchanges into a shared resource across destination actors. This helps explain why digitalisation may advance at the transaction level while coordination at the destination level remains limited. This interpretation is also consistent with research on knowledge transfer in destination networks, which suggests that network structures can either facilitate or constrain knowledge flows among actors (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015).

The findings also help clarify the relationship between the tourism logistics literature and the destination governance literature in explaining service coordination. In the logistics and supply chain literature, information is viewed as a resource that supports planning, reduces uncertainty, and enhances coordination among actors (Christopher, 2022; Datta & Christopher, 2011). In contrast, destination governance research emphasises the role of collaborative relationships, networks, and coordination mechanisms in facilitating collective action (Baggio et al., 2010; Beritelli, 2011; Fyall et al., 2012; Jamal & Getz, 1995). The findings suggest that the effectiveness of these governance arrangements depends not only on the existence of collaborative relationships but also on the ability of stakeholders to exchange and use information effectively. When information flows remain fragmented across actors, existing collaborative relationships are less likely to be translated into substantive coordination at the destination level.

Therefore, IF should be treated as an inter-organisational governance issue rather than only a technical one. Technological solutions create coordinating value only when they are accompanied by data interoperability, updating responsibilities, and shared procedures

for using information. This argument also clarifies an important point in smart tourism destination research: the value of technology and data does not lie in the number of digital tools or communication channels, but in their ability to support the transformation of information into coordinated action among destination actors. This approach is consistent with research that places technology within data governance, organisational capacity, and tourism supply network contexts (Boes et al., 2016; Gretzel et al., 2015; OECD & European Union, 2025; Sifolo, 2025). From this perspective, a destination's coordination capacity should not be assessed by the mere presence of multiple standalone digital platforms. It should be assessed by the extent to which information is updated, verified, shared, and jointly used in coordinated service action.

4.3. Information Flow in Destination Governance

At the destination level, the relationship between stakeholders is expressed through how they coordinate, exchange information, and organize joint actions under conditions of intertwined interests (Bramwell & Sharman, 1999; Baggio et al., 2010; Beritelli, 2011; Volgger & Pechlaner, 2014). This coordination is influenced by inter-organizational relationships, trust, interests, connectivity, knowledge transfer, and coordination mechanisms among the actors (Baggio & Cooper, 2010; Beritelli, 2011; Del Chiappa & Baggio, 2015; Fyall et al., 2012; Jamal & Getz, 1995; van der Zee & Vanneste, 2015). Recent studies on sustainable destination governance continue to emphasize stakeholder engagement, multi-stakeholder collaboration models, and adaptability to specific destination contexts (Panagiotopoulou & Skoultzos, 2025).

This research finding aligns with the literature above, and it also adds a layer of information analysis. Collaborative relationships and multi-stakeholder participation only create value when supported by a flow of information capable of practical application. Parties can coexist within a destination ecosystem, but this is not sufficient to create coordination. Coordination requires information to be shared, verified, and used to guide actions. This is the contribution of the research, built upon studies of destination governance, knowledge transfer, and tourism supply chain management (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Zhang et al., 2009).

The findings also help bridge three research streams that have often been examined separately in the literature. From a smart tourism destination perspective, the study suggests that the value of digital infrastructure and data lies not in technology alone, but in their capacity to support information flows that facilitate service coordination among actors within the destination ecosystem (Gretzel et al., 2015; Boes et al., 2016; Ye et al., 2020; Yan et al., 2025). From destination governance and tourism supply chain perspectives, the findings indicate that the role of information in enabling coordination extends beyond inter-firm relationships. This coordinating role extends across the broader destination ecosystem involving public authorities, tourism enterprises, and tourists (Fyall et al., 2012; Volgger & Pechlaner, 2014; Datta & Christopher, 2011; Zhang et al., 2009; Zhang & Tavitiyaman, 2022; Sifolo, 2025).

In the context of inter-local coastal tourism, destination governance needs to follow the logic of the tourist journey rather than just organizational or administrative boundaries. Research data shows that the same experience can span multiple service touchpoints and multiple localities. Therefore, governance capacity lies not only in having linkage mechanisms, but also in the ability to make information flow continuously along the service journey (Mrnjavac & Ivanovic, 2007; Zhang et al., 2009).

The research results show that information flow can connect three levels of coordination. At the operational level, information supports consultation, service booking, transaction confirmation, and specific request processing. At the destination level, informa-

tion supports demand monitoring, bottleneck identification, resource coordination, and service quality improvement. At the regional level, information supports route connectivity, product linkage, and coordination between localities. These three levels are derived from research data and interpreted in relation to the role of information in reducing uncertainty and coordinating supply chains (Christopher, 2022; Datta & Christopher, 2011). These three levels do not operate separately in practice. Disruptions at the operational level can accumulate into constraints at the destination level. Likewise, a lack of connectivity at the destination level can weaken coordination capacity at the regional level.

The research's contribution is clarifying the central role of information flow in destination governance. Information flow is not merely a means of communication. In this study, information flow is interpreted as a condition for transforming multilateral relationships into coordinated action. This approach helps clarify the gap between cooperation at the policy level and coordination at the service level. A locality may have a regional linkage orientation; however, without a common information flow, it is difficult to transform that linkage into a connected tourism experience. This interpretation complements studies on destination governance, destination knowledge transfer, and tourism supply networks (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015; Sifolo, 2025).

According to this interpretation, the flow of information can be seen as a soft governance infrastructure layer of the destination. This infrastructure layer is not just about the digital platform. It lies in the ability to connect data, responsibilities, processes, and actions among stakeholders. In the context of destinations increasingly using digital data, tourism data governance also needs to pay attention to mechanisms for sharing, integration, data quality, and accountability for updating among organizations (OECD & European Union, 2025). This interpretation helps explain why destination governance cannot rely solely on the presence of many stakeholders. Destination governance needs to be further analyzed through the ability of stakeholders to create and use shared information in service coordination. From this perspective, destination governance is not only a matter of designing collaborative arrangements. It is also a matter of organising the information environment so that actors can rely on a sufficiently trustworthy informational basis when adjusting service actions.

4.4. Information Sharing in Tourism Logistics

In tourism logistics, information sharing should be understood as the capacity to connect supply chain decisions rather than a single communication activity. This understanding aligns with studies that view information as a condition for reducing uncertainty, supporting coordination, and connecting activities within the tourism supply chain (Christopher, 2022; Datta & Christopher, 2011; Zhang & Tavitiyaman, 2022).

This research result is consistent with that broad understanding. Information regarding itineraries, guest numbers, transportation, room availability, attractions, food and beverage, payments, feedback, and changes all have logistical value within the context of this case study. This information helps stakeholders reduce uncertainty, prepare resources, and adjust actions. When information is shared at the right time and for the right purpose, individual services can operate as a relatively continuous experience. This interpretation aligns with the view on the role of information in logistics and tourism supply chain management (Christopher, 2022; Datta & Christopher, 2011; Zhang et al., 2009).

Information sharing in tourism logistics should not be simply understood as the transmission of information from one party to another. From a supply chain perspective, the synergistic value of information depends on data quality, timeliness, reliability, and the extent to which information is used in operational decisions (Christopher, 2022; Datta & Christopher, 2011). Research reinforces this point in the context of tourism: even if

information has been sent, if it is not updated, verified, or transformed into a basis for service adjustment, it will be difficult to support coordination among parties. Therefore, in tourism logistics, information sharing only has synergistic significance when linked to the ability to use the information in specific actions, rather than relying solely on the existence of an exchange channel.

Tourists should also be considered information creators, not just recipients. Through evaluations, feedback, comments, and sharing experiences, they generate data that can support service improvement and destination management. This understanding aligns with studies on the role of social networks in tourism information retrieval, as well as approaches to data, feedback, and co-creation of value in the smart tourism ecosystem (Gretzel et al., 2015; Xiang & Gretzel, 2010; Ye et al., 2020). However, the logistical value of feedback depends on whether that feedback is categorized, verified, and incorporated into the service adjustment process. When feedback is fragmented across platforms or within individual businesses, it is difficult to establish a common basis for service coordination at the destination level.

From a tourism logistics perspective, information sharing needs to be understood more broadly than the exchange relationship between businesses and suppliers. In the destination ecosystem, information is created and used by management agencies, businesses, suppliers, intermediary platforms, and tourists. Therefore, the logistical value of information lies not only in the transmission of information, but also in its ability to support coordination across boundaries of entities, platforms, processes, and locations. This understanding connects tourism logistics with destination governance and smart tourism destination research (Baggio et al., 2010; Boes et al., 2016; Mrnjavac & Ivanovic, 2007; Volgger & Pechlaner, 2014).

The key point to emphasize is the shift from information being transmitted to information being used collectively in coordinated action. In research data, the bottleneck lies not primarily in the lack of exchange channels, but in the ability to transform information into a basis for adjusting schedules, resources, service responsibilities, and service responses. This distinction develops from the theoretical foundation of information sharing and coordination mechanisms (Datta & Christopher, 2011).

Taken together, information sharing in tourism logistics should be viewed as an inter-organizational coordination capability. This capability includes data standards, trust, responsibility for updating, verification processes, and the ability to use information to adjust services in real-time or near real-time. In digitizing tourism supply networks, this capability depends on the ability to connect stakeholders, reduce fragmentation, and deploy data solutions tailored to the capabilities of each stakeholder group (OECD & European Union, 2025; Sifolo, 2025).

5. Conclusions

5.1. Main Conclusion

This study analyzes the flow of tourism logistics information at coastal destinations in the South Central Coastal Sub-region using TLIS as a socio-technical and inter-organizational analytical framework. In this approach, information is not merely data exchanged through individual channels. Information is viewed as an operational flow traversing multiple groups of stakeholders, platforms, processes, and local spaces.

The research results show that all stakeholders participate in the tourism logistics information flow with different roles and needs. Management agencies use information for monitoring, planning, and coordination. Businesses and suppliers rely on information to organize transactions, operate services, and provide customer care. Tourists use information to search, compare, verify, and make decisions during their journey. This difference demonstrates that service coordination does not solely depend on the presence of digital

tools. It also depends on how information is organized among groups of stakeholders with different goals, responsibilities, and data needs.

Research also indicates that existing digital tools and information channels have supported many operational-level activities, such as information retrieval, transaction confirmation, supply chain coordination, and feedback reception. However, coordination at the destination and inter-local levels remains limited when information is fragmented by subject, channel/platform, data/process, and regional space. Therefore, the coordination value of information does not lie primarily in the number of channels or tools used. That value depends on the ability to transform dispersed information into a stream of updated, verifiable, shared, and commonly used information.

Taken together, within the scope of the research data, the information flow acts as an intermediary between the socio-technical conditions of TLIS and the results of service coordination. When information is created and used within the scope of individual entities, platforms, or localities, coordination at the destination and regional levels is difficult to achieve effectively. Conversely, when information is organized as an operational flow that is interconnected, verifiable, and shared, it is able to support the connection of services throughout the entire travel journey and strengthen coordination among stakeholders.

5.2. Theoretical Implications

This research contributes to clarifying how TLIS can be used as an analytical framework for information flow in tourism service coordination. Instead of viewing technology, digital platforms, or databases as the central focus of analysis, this approach emphasizes the process by which information is organized, verified, shared, and used among stakeholders at the destination. This perspective engages with research on e-tourism and smart tourism, which has already highlighted the role of technology, data, platforms, and digital experiences in the tourism ecosystem (Boes et al., 2016; Buhalis & Law, 2008; Buhalis & Amaranggana, 2015; Gelter et al., 2022; Gretzel et al., 2015; Navío-Marco et al., 2018; Ye et al., 2020; Yan et al., 2025). Accordingly, TLIS is more appropriately understood as a socio-technical information structure where technology, data, people, processes, and collaborative relationships shape the value of information in coordinated action (Trist, 1981; Boes et al., 2016; Gelter et al., 2022). This interpretation is consistent with smart destination studies, where smartness is linked not only to technological infrastructure but also to human capital, social capital, organisational capacity, and the ways stakeholders use technology in a specific destination context (Boes et al., 2016; Gelter et al., 2022; Gretzel et al., 2015).

Another implication is that IF can be seen as a mechanism that degrades service coordination capabilities. Studies on logistics and supply chains have emphasized the role of information in planning, control, uncertainty reduction, and supply coordination (Christopher, 2022; Datta & Christopher, 2011; Zhang & Tavitiyaman, 2022). Research results show that in a multi-stakeholder destination environment, the mere presence of information is insufficient to create coordination. The value of coordination becomes clearer when information is updated, verified, shared, and used jointly among stakeholders. Accordingly, IF should not be interpreted merely as data scarcity or limited communication channels, but rather as a disruption in the transformation of information into a basis for coordinated action. The value of information sharing in tourism logistics does not lie in the volume of data or the number of communication channels, but in its capacity to translate information into coordinated actions in practice. The findings further confirm that information availability does not automatically lead to coordination; instead, coordination value is realized only when information is updated, verified, and jointly utilized within inter-organizational coordination mechanisms (Christopher, 2022; Datta & Christopher,

2011; Zhang & Tavitiyaman, 2022). In this sense, IF reflects not only data gaps but also disruptions in the information processing mechanisms that underpin coordination at the destination level. From this perspective, the theoretical contribution of the study does not lie in reiterating the importance of information in tourism, but in demonstrating that IF is a mediating mechanism that can weaken the capacity to translate information into coordinated action among multiple actors within the destination ecosystem.

The research also suggests a broader understanding of tourism logistics at the destination level. In the context of inter-local coastal destinations, tourism logistics is not only concerned with the transportation or distribution of physical goods. It also includes organizing the flow of information among multiple services, stakeholders, and management within the same travel itinerary (Mrnjavac & Ivanovic, 2007; Ruan & Zhang, 2021; Zhang et al., 2009; Zhang & Tavitiyaman, 2022). This approach helps connect tourism logistics research with destination governance, knowledge transfer within destination networks, and service coordination among stakeholders (Baggio & Cooper, 2010; Del Chiappa & Baggio, 2015).

From this perspective, information fragmentation is treated not only as a contextual condition but also as an intermediary mechanism within TLIS. This interpretation helps explain why information may be present in the system but still fail to be translated into coordinated action when it is fragmented by stakeholder, channel or platform, data or procedure, and regional space.

5.3. Management Implications

The research findings indicate that the development of TLIS should not be understood simply as adding portals, digital applications, or operational software. The core governance issue is organizing the flow of information among stakeholders. This information flow must be updateable, verifiable, shared, and used in service coordination. Therefore, the focus of governance needs to shift from expanding the number of information channels to enhancing data interoperability, defining update responsibilities, and establishing verification processes. This process requires the participation of management authorities, businesses, associations, intermediary platforms, and service providers. This approach aligns with recommendations on tourism data governance, where data quality, integration capabilities, and coordination mechanisms among stakeholders are considered crucial conditions for data to serve management, service innovation, and decision-making (OECD & European Union, 2025).

A practical implication is to identify the minimum data groups needed for coordinating services at the destination. Priority data groups could include accommodation, transportation, tours, attractions, food and beverage, shopping, transaction conditions, safety, problem-solving support, and tourist feedback. For each data group, it is necessary to clarify the data update unit, update frequency, verification channel, and intended use. This approach is not intended to create an additional layer of administrative data. The goal is to reduce the situation where information exists in fragmentation within each business, platform, or locality, but it is not reliable enough to serve as a common basis for service coordination.

For inter-provincial coastal routes, inter-local information sharing should be implemented according to a feasible roadmap. This mechanism does not necessarily have to start with a large-scale technology system. A more suitable starting point might be a shared minimum dataset, a central point for updating, a verification process, and a coordination agreement between localities and relevant stakeholders. A step-by-step approach is appropriate for destinations with multiple stakeholders, platforms, and uneven digital capabilities. It is also compatible with the direction of tourism data governance based on

controlled sharing, on-demand integration, and clear update responsibilities (OECD & European Union, 2025; Sifolo, 2025).

Tourist feedback should be considered an operational data source in destination governance, rather than just post-experience evaluation information. Feedback on service quality, itineraries, transportation, accommodation, attractions, and on-site support can support service adjustments if collected, categorized, verified, and processed appropriately. When feedback is fragmented across platforms or within individual businesses, its value for service coordination is limited. Therefore, feedback reception and processing mechanisms need to be linked to service improvement and destination coordination, rather than solely serving individual communication or customer care needs.

5.4. Research Limitations and Directions for Further Research

The study's findings should be interpreted within the context of the qualitative case design, data sources, and survey context. First, the primary qualitative data were collected through semi-structured interviews and short, semi-structured field exchanges. Due to survey conditions, the study did not utilize transcripts or verbatim recordings. Therefore, the excerpts in this paper are presented as standardized field notes. They serve to illustrate the topics analyzed and are not intended for discourse analysis or micro-level conversational analysis.

Regarding the research design, this paper is conducted as a multi-stakeholder qualitative case study, utilizing supplementary descriptive survey evidence. Therefore, the results are not intended to be statistically representative of all Vietnamese coastal destinations or the entire tourism industry. Data from Round 2, with 358 participants, was used for comparison, context, and to supplement the themes drawn from the qualitative data of Round 1. This data source was not used for model testing, impact estimation, or statistical generalization.

Furthermore, the scope of the study was defined by the administrative and tourism development context at the time of the 2024 survey. Therefore, the results should be interpreted within the context of destination management, regional linkages, and digital transformation in tourism at the time of data collection. Changes in policies, administrative spatial organization, digital platforms, or coordination mechanisms after the survey period were not fully reflected in this study.

Given these limitations, further research could be developed in several directions. Firstly, quantitative studies could examine the relationship among data quality, information connectivity, service coordination capacity, and destination operational outcomes. Simultaneously, comparative studies can be extended to other coastal tourism regions or other types of destinations, such as heritage cities, mountain destinations, island destinations, and inter-regional tourism corridors. In addition, future longitudinal research could examine how tourism logistics information flows and inter-stakeholder service coordination evolve over time in response to digital transformation, destination-management policy adjustments, or administrative-territorial restructuring. Finally, design and intervention studies could develop and test models for inter-local information sharing, focusing on minimum data standards, update procedures, verification mechanisms, and data governance.

Funding: This research is funded by Vietnam Ministry of Education and Training (MOET) under grant number B2024-DQN-04.

Institutional Review Board Statement: Ethical review and approval were not required for this study, as it does not fall within the scope of biomedical research regulated by Circular 43/2024/TT-BYT issued by the Ministry of Health of Vietnam. The research involved no biomedical procedures, clinical interventions, experimental deception, vulnerable participants, or collection of sensitive personal data. All participants took part voluntarily, and informed consent was obtained from each respondent.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Participants were informed about the purpose of the research, the voluntary nature of participation, data confidentiality and the anonymized use of their responses for academic publication.

Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to confidentiality considerations related to interview, field-note and stakeholder survey materials.

Acknowledgments: The author would like to thank the experts, management officers, tourism enterprises and tourists who participated in the study. The author also acknowledges the technical assistance of research collaborators in field-note taking, data entry and descriptive data compilation, as well as the support received during fieldwork in the coastal destinations examined in this research. The author also acknowledges the support of the funding from the Ministry of Education and Training under Grant B2024-DQN-04.

Conflicts of Interest: The author declares no conflicts of interest. The funder had no role in the design of the study; in the collection, analysis or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

EX	Expert participant
IF	Information fragmentation
MO	Management officer participant
OECD	Organisation for Economic Co-operation and Development
OTA	Online travel agency
RQ	Research question
TE	Tourism enterprise participant
TLIS	Tourism logistics information system
TO	Tourist participant

References

- Baggio, R., & Cooper, C. (2010). Knowledge transfer in a tourism destination: The effects of a network structure. *The Service Industries Journal*, 30(10), 1757–1771. [\[CrossRef\]](#)
- Baggio, R., Scott, N., & Cooper, C. (2010). Network science: A review focused on tourism. *Annals of Tourism Research*, 37(3), 802–827. [\[CrossRef\]](#)
- Beritelli, P. (2011). Cooperation among prominent actors in a tourist destination. *Annals of Tourism Research*, 38(2), 607–629. [\[CrossRef\]](#)
- Boes, K., Buhalis, D., & Inversini, A. (2016). Smart tourism destinations: Ecosystems for tourism destination competitiveness. *International Journal of Tourism Cities*, 2(2), 108–124. [\[CrossRef\]](#)
- Bramwell, B., & Sharman, A. (1999). Collaboration in local tourism policymaking. *Annals of Tourism Research*, 26(2), 392–415. [\[CrossRef\]](#)
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. [\[CrossRef\]](#)
- Buhalis, D., & Amaranggana, A. (2015). Smart tourism destinations enhancing tourism experience through personalisation of services. In I. Tussyadiah, & A. Inversini (Eds.), *Information and communication technologies in tourism 2015* (pp. 377–389). Springer. [\[CrossRef\]](#)
- Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the internet—The state of eTourism research. *Tourism Management*, 29(4), 609–623. [\[CrossRef\]](#)
- Christopher, M. (2022). *Logistics and supply chain management* (6th ed.). Pearson.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE.
- Datta, P. P., & Christopher, M. G. (2011). Information sharing and coordination mechanisms for managing uncertainty in supply chains: A simulation study. *International Journal of Production Research*, 49(3), 765–803. [\[CrossRef\]](#)
- Del Chiappa, G., & Baggio, R. (2015). Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure. *Journal of Destination Marketing & Management*, 4(3), 145–150. [\[CrossRef\]](#)
- Fyall, A., Garrod, B., & Wang, Y. (2012). Destination collaboration: A critical review of theoretical approaches to a multi-dimensional phenomenon. *Journal of Destination Marketing & Management*, 11(2), 240–260. [\[CrossRef\]](#)

- Gelter, J., Fuchs, M., & Lexhagen, M. (2022). Making sense of smart tourism destinations: A qualitative text analysis from Sweden. *Journal of Destination Marketing & Management*, 23, 100690. [CrossRef]
- Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets*, 25(3), 179–188. [CrossRef]
- Jamal, T. B., & Getz, D. (1995). Collaboration theory and community tourism planning. *Annals of Tourism Research*, 22(1), 186–204. [CrossRef]
- Koo, C., Mendes Filho, L., & Buhalis, D. (2016). Smart tourism and competitive advantage for stakeholders. *Tourism Review*, 71(1), 120–135. [CrossRef]
- Ku, E. C. S. (2024). Tourism digital transformation and future supply chain competition: An integrated perspective on real options theory and digital competencies. *Journal of Tourism Futures*, 11(2), 240–256. [CrossRef]
- Laesser, C., Reinhold, S., & Beritelli, P. (2025). The 2024 consensus on advances in destination management. *Journal of Destination Marketing & Management*, 38, 101038. [CrossRef]
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.
- Mrnjavac, E., & Ivanovic, S. (2007). Logistics and logistics processes in a tourism destination. *Tourism and Hospitality Management*, 13(3), 531–546. [CrossRef]
- National Assembly of Vietnam. (2017). *Law No. 09/2017/QH14 on tourism*. Thu Vien Phap Luat. Available online: <https://thuvienphapluat.vn/van-ban/EN/Van-hoa-Xa-hoi/Law-09-2017-QH14-on-tourism/360188/tieng-anh.aspx> (accessed on 14 June 2026).
- Navío-Marco, J., Ruiz-Gómez, L. M., & Sevilla-Sevilla, C. (2018). Progress in information technology and tourism management: 30 years on and 20 years after the internet—Revisiting buhalis and law’s landmark study about eTourism. *Tourism Management*, 69, 460–470. [CrossRef]
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1–13. [CrossRef]
- OECD & European Union. (2025). *Workshop on tourism data sharing, governance and integration* (OECD Tourism Papers No. 2025/16). OECD Publishing. [CrossRef]
- Panagiotopoulou, P., & Skoultos, S. (2025). Stakeholders’ involvement in sustainable destination management: A systematic literature review of existing multi-stakeholder frameworks and approaches. *Tourism and Hospitality*, 6(5), 250. [CrossRef]
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). SAGE Publications.
- Prime Minister of Vietnam. (2020). *Decision No. 147/QĐ-TTg dated 22 January 2020 approving the strategy for Vietnam tourism development to 2030*. Government of Viet Nam. Available online: <https://vanban.chinhphu.vn/default.aspx?docid=198927&pageid=27160> (accessed on 19 May 2026).
- Prime Minister of Vietnam. (2024). *Decision No. 376/QĐ-TTg dated 4 May 2024 approving the master plan for the north central and central coastal region for 2021–2030, with a vision to 2050*. Government of Viet Nam. Available online: <https://vanban.chinhphu.vn/?docid=210182&pageid=27160> (accessed on 19 May 2026).
- Ruan, W.-Q., & Zhang, S.-N. (2021). Can tourism information flow enhance regional tourism economic linkages? *Journal of Hospitality and Tourism Management*, 49, 614–623. [CrossRef]
- Sifolo, P. P. S. (2025). Transformative transdisciplinary approaches to digitalisation in the tourism supply network: Enhancing resilience and collaboration in Gauteng and KwaZulu-Natal. *Tourism and Hospitality*, 6(2), 95. [CrossRef]
- Trist, E. L. (1981). *The evolution of socio-technical systems: A conceptual framework and an action research program*. Ontario Quality of Working Life Centre.
- van der Zee, E., & Vanneste, D. (2015). Tourism networks unravelled: A review of the literature on networks in tourism management studies. *Tourism Management Perspectives*, 15, 46–56. [CrossRef]
- Volgger, M., & Pechlaner, H. (2014). Requirements for destination management organizations in destination governance: Understanding DMO success. *Tourism Management*, 41, 64–75. [CrossRef]
- World Bank. (2015). *Vietnam 2035: Toward prosperity, creativity, equity, and democracy*. World Bank Group. Available online: <https://openknowledge.worldbank.org/entities/publication/e7cc51c3-d056-548e-98f4-055a5016e5c8> (accessed on 15 June 2026).
- Xiang, Z., & Gretzel, U. (2010). Role of social media in online travel information search. *Tourism Management*, 31(2), 179–188. [CrossRef]
- Yan, D., Marzuki, A. B., Yang, J., Zhou, J., & Tao, S. (2025). Bibliometric analysis of smart tourism destination: Knowledge structure and research evolution (2013–2025). *Tourism and Hospitality*, 6(4), 194. [CrossRef]
- Ye, B. H., Ye, H., & Law, R. (2020). Systematic review of smart tourism research. *Sustainability*, 12(8), 3401. [CrossRef]
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.

- Zhang, X., Song, H., & Huang, G. Q. (2009). Tourism supply chain management: A new research agenda. *Tourism Management*, 30(3), 345–358. [[CrossRef](#)]
- Zhang, X., & Tavitiyaman, P. (2022). e-Supply chain management in tourism destinations. In Z. Xiang, M. Fuchs, U. Gretzel, & W. Höpken (Eds.), *Handbook of e-tourism* (pp. 1289–1309). Springer. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.