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Building a digital ecosystem to support the community-based tourism value chain: a case study of Moc Chau, Vietnam

Nguyen Thi Minh Thu[1]
[1] Hanoi High Technology College, Hanoi, Vietnam.

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Corresponding Author:
Nguyen Thi Minh Thu

Abstract:

This study evaluates the role of air transportation in generating primary tourist flows to Moc Chau, a community-based tourism destination without a directly connected airport. Through field surveys and the analysis of data obtained from the Vietnam National Authority of Tourism, the Civil Aviation Authority of Vietnam (CAAV), the International Air Transport Association (IATA), the Organisation for Economic Co-operation and Development (OECD), and the International Civil Aviation Organization (ICAO) during the 2020–2024 period, the interrelationship between transit air transportation and the ground transportation system was clarified. The findings indicate several operational bottlenecks within the community-based tourism value chain, including the lack of data connectivity among transportation subsystems, the fragmentation between homestay services and ground transportation providers, and institutional gaps in intersectoral coordination. Accordingly, the study proposes an integrated transport–tourism ecosystem model based on interregional open-data integration, comprising three core components: an open-data center, standardized interregional APIs, and a regional coordinating organization. The proposed model may contribute to a 20–25% increase in ground transportation efficiency, a 15–18% reduction in inbound operational costs, and an increase in homestay occupancy capacity to 75–80%.

Keywords: air transportation, tourism value chain, open data, intersectoral coordination, community-based tourism, Moc Chau

1. Introduction

Over recent decades, the aviation industry has undergone substantial expansion, becoming a key driver of socio-economic connectivity and tourism market development (Doganis, 2019; ICAO, 2022). Contemporary tourism systems are increasingly shaped by the integration of air transportation and ground transport networks, forming multimodal transport–tourism ecosystems with strong interregional connectivity (Graham & Dennis, 2010; Zhang & Zhang, 2016).

In Vietnam, the rapid development of major international airports such as Noi Bai, Tan Son Nhat, and Da Nang has significantly supported the growth of domestic and international tourism. However, many mountainous community-based tourism destinations, including Moc Chau (Son La Province), still lack direct airport infrastructure. Consequently, tourism development in these areas depends heavily on transit connectivity through domestic aviation networks combined with ground transportation systems from gateway hubs such as Hanoi, Thanh Hoa, and Dien Bien.

Despite the growing role of multimodal connectivity, operational integration among aviation, ground transportation, and community-based tourism services remains fragmented. This limitation reduces travel convenience, weakens service coordination, and constrains the competitiveness of mountainous destinations in attracting international and high-value tourist markets. Therefore, an important question emerges: how can a multimodal transport ecosystem, centered on air transportation, support and optimize the tourism value chain in mountainous community-based destinations such as Moc Chau?

This study aims to:

1) Analyze the role of air transportation in generating tourist flows to Moc Chau;
2) Evaluate the operational linkages between air transportation, ground transportation, and community-based tourism services; and
3) Propose an integrated digital transport–tourism ecosystem framework to optimize the community-based tourism value chain in the context of digital transformation..

2. Literature Review

2.1. The multimodal transport–tourism ecosystem

The development of business ecosystem theory has substantially broadened traditional perspectives on competition and cooperation within service economies. According to Moore (1996), a business ecosystem is formed through the interaction of diverse actors characterized by mutual interdependence and collective value creation based on symbiotic linkages. Within the context of transport and tourism services, transport service ecosystem theory (Harrison & Van Hoek, 2010) further incorporates the operational dimension of intermodality, requiring synchronized coordination among air transport providers, ground transportation operators, travel agencies, accommodation establishments, destinations, and tourists. Consequently, the concept of a multimodal transport–tourism ecosystem has emerged as a comprehensive analytical framework capable of explaining how service actors interact in order to optimize the overall travel experience of tourists.

Particularly for mountainous destinations such as Moc Chau, where direct airport infrastructure remains absent, air transportation continues to play an essential role in generating both international and domestic tourist flows through transit aviation hubs such as Noi Bai (Hanoi), Tho Xuan (Thanh Hoa), and Dien Bien airports (Lohmann & Pearce, 2012). From these hubs, ground transportation systems subsequently assume responsibility for distributing tourists to community-based tourism destinations. Such an ecosystem structure requires flexible coordination in scheduling operations, transport capacity allocation, ticketing system synchronization, and data sharing across transport modes in order to ensure seamless connectivity, minimize travel bottlenecks, and optimize the utilization efficiency of existing infrastructure capacity (Graham & Dennis, 2010).

In addition, Graham et al. (2010) emphasized that, under conditions in which regional airports cannot be simultaneously developed due to investment constraints, the development strategy of a hub-and-spoke air transportation network integrated with optimized ground transportation systems constitutes a practical solution for expanding the market coverage of community-based tourism. Particularly for short-stay international tourists, high-end tourists, MICE travelers, and wellness tourism segments, rapid connectivity between central airports and community-based tourism destinations through high-quality ground transportation services becomes a decisive factor shaping destination attractiveness (Zhang & Zhang, 2016).

2.2. The community-based tourism value chain in mountainous areas

The theory of the community-based tourism value chain has been developed through the extension of the traditional value chain framework (Porter, 1985) into the field of sustainable tourism (Giampiccoli & Saayman, 2018; UNWTO, 2019). This model emphasizes the central role of local communities in directly participating in the development and distribution of tourism service products while simultaneously maintaining control over indigenous cultural and ecological resources.

For destinations such as Moc Chau, the community-based tourism value chain comprises several key components:

(i) the sustainable exploitation of ecological resources, including pine forests, tea hills, and waterfalls;

(ii) the organization of ethnic cultural experiences associated with the Hmong and Thai communities;

(iii) the development of family-operated homestay and farmstay systems;

(iv) the production and commercialization of high-tech agricultural products and local specialties such as Oolong tea, Moc Chau milk, and plum products; and

(v) local tour guide services and the demonstration of traditional handicrafts.

However, the study conducted by Pham et al. (2023) indicated that the community-based tourism value chain in Moc Chau remains heavily dependent on domestic tourist flows originating from the Hanoi region, while opportunities for

international market expansion remain relatively limited. One of the principal reasons lies in the lack of effective connectivity between central aviation transport channels and the mountainous ground transportation networks responsible for tourist distribution. This limitation not only constrains market accessibility but also reduces the capacity to generate superior economic value from high-spending tourist segments and international visitors seeking authentic experiences associated with the Vietnamese highlands.

2.3. Open data governance within the transport–tourism ecosystem

Beyond transport infrastructure itself, the capacity for open data governance has increasingly been regarded as a fundamental foundation for the effective operation of transport–tourism ecosystems in the digital era (Gretzel et al., 2021; OECD, 2020). In this regard, data derived from airline booking systems, ground transportation services, accommodation reservations, travel management systems, customer reviews, and local event schedules, when interconnected, synchronized, and analyzed in real time, can facilitate the optimization of the entire tourism service value chain.

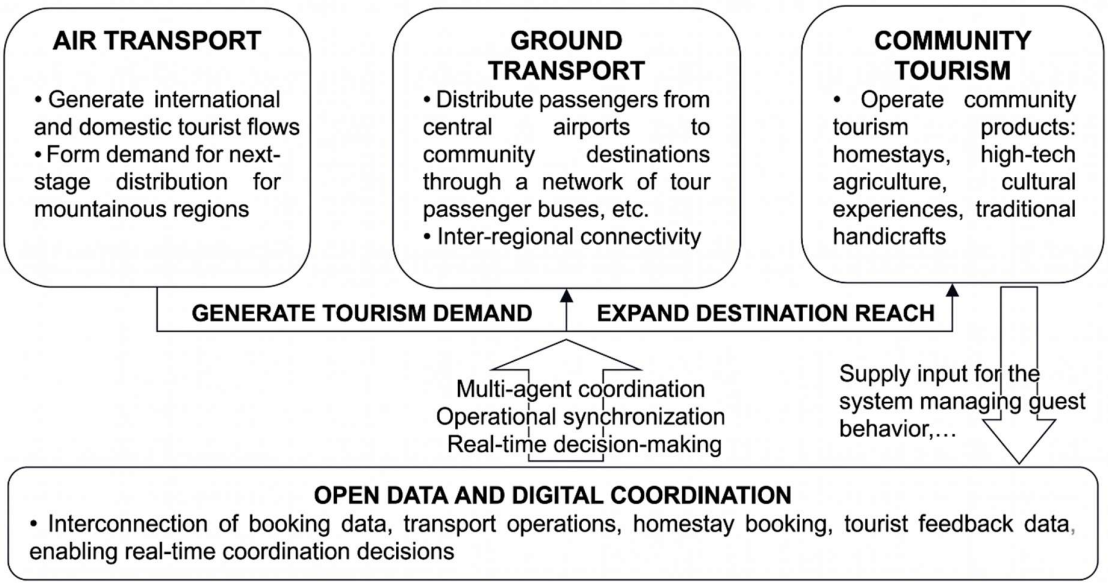
The open data governance model for community-based tourism in mountainous areas not only supports efficient tourist flow coordination but also enables local communities to better understand consumption behavior, optimize service capacity, and improve service quality in accordance with international standards (Sigala, 2020). At the macro level, interregional open-data systems also support governmental authorities in monitoring tourist flows, coordinating support resources, and formulating flexible destination management scenarios in response to market fluctuations.

Nevertheless, empirical studies conducted in Vietnam (Nguyen Thi Thanh Huong, 2022) have demonstrated that the transport–tourism data governance infrastructure remains fragmented, lacking interregional data-sharing standards, while API interfaces have not yet been fully standardized. Consequently, data exchange among airlines, ground transportation operators, and community-based tourism destinations has yet to achieve optimal efficiency. This situation not only increases operational costs but also creates bottlenecks within the overall tourist travel experience.

2.4. Research Framework

Based on the theoretical foundations discussed above, this study develops an integrated analytical framework aimed at modeling the linkage structure between air transportation, ground transportation, and the community-based tourism value chain within the context of digitalization. The proposed framework emphasizes the role of interregional coordination among air transportation, ground transportation, community-based tourism service distribution systems, and open data governance platforms (Figure 1).

Figure 1. Research Framework



Source: Author, 2025

The proposed framework reflects a cyclical linkage system among the components of the mountainous transport–tourism ecosystem under the influence of digital transformation, with open-data platforms serving as the central element. This system synchronizes operational coordination between transport modes and tourism service value chains, thereby expanding market accessibility, enhancing tourist experiences, and optimizing economic efficiency. In particular, air transportation performs the role of a strategic transit mechanism by generating international and domestic tourist flows through central airports and connecting them to community-based destinations via specialized ground transportation systems. This integrated structure provides a practical foundation for a multi-stakeholder linkage model aimed at promoting sustainable tourism development in mountainous regions such as Moc Chau.

3. Case and Methodology

Moc Chau (Son La Province, Vietnam) was selected as the case study due to its rapid growth as a mountainous community-based tourism destination despite the absence of direct airport infrastructure. The destination represents a typical model of tourism development highly dependent on multimodal connectivity between aviation transit hubs and regional ground transportation systems. This study employed a qualitative research approach to examine the operational structure of the transport–tourism ecosystem in Moc Chau. Primary data were collected through in-depth interviews and focus group discussions in order to obtain multidimensional perspectives from stakeholders involved in the tourism value chain.

A total of 24 in-depth interviews were conducted with representatives of airlines, ground transportation enterprises, travel agencies, local authorities, homestay operators, and international tourists who had previously visited Moc Chau. In addition, two focus group discussions were organized with community-based tourism stakeholders to identify operational bottlenecks and coordination gaps within the multimodal transport–tourism system.

To enhance data reliability, primary findings were supplemented and cross-validated through secondary sources, including tourism reports, transport planning documents, policy papers, and statistical data obtained from Vietnamese and international organizations related to aviation, tourism, and digital governance. The collected data were analyzed thematically and comparatively to clarify the relationships among air transportation, ground transportation, tourism services, and open-data governance within the study area.

4. Results & Analysis

4.1. The Connective Role of Air Transportation in Generating Tourist Flows to Moc Chau

Within the context of socio-economic development in the mountainous regions of Northern Vietnam, air transportation has increasingly demonstrated a central role in expanding tourism markets. Although Moc Chau does not possess a direct airport, the Northern Vietnam aviation network, with Noi Bai International Airport (Hanoi) serving as its core hub, continues to perform a strategic function in generating both international and domestic tourist flows to the region.

Table 1. Statistics on Air Transportation Passenger Flows and Tourism Demand in the Mountainous Regions of Northern Vietnam during the 2020–2024 Period

Year	International Arrivals to Hanoi (million visitors)	Domestic Passengers via Noi Bai Airport (million passengers)	Proportion of Tourists Demanding Travel to Northern Mountainous Regions (% of domestic tourists)
2020	0.9	6.1	~12%
2021	0.1	5.4	~9%
2022	1.6	13.8	~17%
2023	3.6	16.2	~21%

2024 (estimated year-end)	4.3	17.4	~22%

Source: Vietnam National Authority of Tourism, Tourism Report 2024; Civil Aviation Authority of Vietnam (CAAV), Air Transport Statistics 2024; IATA Asia–Pacific Region, 2025.

Statistical data obtained from the Vietnam National Authority of Tourism and the Civil Aviation Authority of Vietnam (CAAV) indicate significant fluctuations during the 2020–2024 period. Throughout 2020–2021, the COVID-19 pandemic resulted in an almost complete suspension of international tourist arrivals, while domestic passenger traffic through Noi Bai Airport also experienced a substantial decline. However, following the reopening of Vietnam's borders in March 2022, the tourism market recovered rapidly. By 2023, international arrivals to Hanoi had reached 3.6 million visitors, equivalent to approximately 73% of the pre-pandemic level, while domestic passenger traffic through Noi Bai Airport reached 16.2 million passengers (CAAV, 2024).

In 2024, according to estimates provided by CAAV, IATA, and the Vietnam National Authority of Tourism, international arrivals to Hanoi are projected to reach 4.3 million visitors, corresponding to approximately 85–90% of the pre-pandemic peak level, whereas domestic passenger traffic is expected to increase to 17.4 million passengers (GSO, 2025; IATA, 2025). Notably, the proportion of domestic tourists expressing demand for travel to the mountainous regions of Northern Vietnam via Noi Bai Airport continued to rise, reaching 22% of total domestic passengers in 2024. This trend reflects a positive shift in post-COVID-19 intraregional travel behavior.

Primary survey data collected from 64 international tourists who had visited Moc Chau between March and May 2024 revealed that 87.5% selected transit itineraries through Hanoi by air. The transit duration from Noi Bai Airport to Moc Chau ranged from approximately 4 to 4.5 hours, depending on the transportation mode utilized, including limousine services, contracted vehicles, and organized package tours. Regarding domestic tourists, data from the Son La Department of Tourism (2024) indicated that 23% of visitors initiated their journeys by air through Hanoi before subsequently connecting to ground transportation services to reach Moc Chau.

The above analysis demonstrates that, despite the absence of direct airport infrastructure at the destination itself, air transportation continues to perform a core role in generating primary tourist flows to Moc Chau, thereby expanding access to both international and domestic tourism markets. This finding is consistent with the theory of the multimodal transport–tourism ecosystem, in which transit aviation functions as the generator of demand, while ground transportation systems undertake deeper tourist distribution through interregional networks (Graham & Dennis, 2010; Zhang & Zhang, 2016).

Furthermore, the integration of interdisciplinary estimated statistics, as conducted in this study, represents a common practice in international academic research, contributing to data reliability and enabling the timely reflection of rapidly changing market conditions (OECD, 2023; ICAO, 2024). Such an approach simultaneously enhances the persuasiveness of research findings within the context of Vietnam's increasingly deep international tourism integration.

4.2. Current operational conditions of the air–ground transport–community tourism linkage system

Although air transportation plays a central role in generating primary tourist flows to the mountainous regions of Northern Vietnam, as discussed above, the operation of the transport–tourism ecosystem in Moc Chau currently continues to face numerous structural bottlenecks, particularly within the coordination mechanisms linking interregional transport modes and the community-based tourism service system.

Field survey results collected between March and May 2024 from 18 homestay establishments and 6 ground transportation enterprises in Moc Chau indicate that formal operational cooperation mechanisms between homestays and central airlines or multimodal tourism agencies are almost entirely absent. Among the 18 surveyed homestays, only 3 establishments (16.7%) maintained stable cooperative arrangements with ground transportation operators serving the Hanoi–Moc Chau route, while the remaining 15 establishments (83.3%) operated entirely through fragmented booking mechanisms and were heavily dependent on small-scale local tourism intermediaries.

Further analysis revealed that, among the 15 homestays lacking fixed cooperation agreements with ground transportation providers, 12 establishments (80%) relied on fragmented transport brokerage services, with

intermediary commission fees ranging from 8% to 15% of the total tour transaction value. Consequently, 58% of transportation transactions associated with these homestays involved tourists independently arranging separate transportation services. This situation increased instability in transit operations and created significant difficulties in forecasting accommodation capacity. The standard deviation of weekly transportation schedules fluctuated between 2 and 2.5 days compared with the original operational plans.

Conversely, ground transportation enterprises operating on the Hanoi–Moc Chau route also encountered serious constraints in forecasting market demand due to the absence of access to real-time airline booking data. Surveys conducted among six major route operators demonstrated that none possessed access rights to airline booking information for either international tourists or domestic passengers traveling from Ho Chi Minh City, Da Nang, and other major urban centers to Hanoi. As a result, operational capacity fluctuations became highly unstable: during peak seasons (April, May, October, and November), operational demand increased by up to 140% relative to the annual average, whereas during low-demand periods (July and August), average seating capacity utilization declined to approximately 51%. The average idle time of transport vehicles during the low season reached 2.3 days per week, thereby substantially increasing operational costs.

Particularly severe constraints were identified within the international inbound tourism segment. Travel agencies specializing in inbound tours emphasized that the most significant operational barrier stemmed from the absence of integrated multimodal service platforms. The development of seamless itineraries linking airline tickets, transit transportation, and homestay reservations continued to require manual coordination across multiple independent service providers. Survey data from five major travel agencies indicated that tour management costs increased by approximately 14%–18.5% due to the lack of API integration among airlines, ground transportation systems, and homestay accommodation providers. In comparison, competing ASEAN destinations reported tour management cost ratios approximately 10%–12% lower as a result of more effective operational integration mechanisms (UNWTO, 2024).

Primary survey findings from 64 international tourists who had visited Moc Chau further reflected these operational bottlenecks. Specifically, 91.7% of respondents confirmed that they encountered difficulties because information regarding ground transportation services was unavailable at the time of booking flights to Hanoi. Moreover, 75% indicated that, if integrated multimodal connectivity services had been available from the international ticket-booking stage onward, they would have been willing to pay an additional 12%–18% of total travel costs in exchange for seamless interregional transport convenience.

From an institutional perspective, the absence of an intersectoral regional coordination organization connecting aviation, ground transportation, and community-based tourism has further intensified the fragmentation of the service ecosystem. These sectors continue to operate independently, characterized by insufficient data standardization and the absence of open API technical interfaces, resulting in localized decision-making processes that fail to synchronize the overall supply chain (Nguyen Thi Thanh Huong, 2022; Gretzel et al., 2021).

The ultimate consequence of this lack of intersectoral operational data integration is not only the escalation of operational costs across the entire value chain, but also the creation of fragmented travel experiences. This issue particularly affects short-stay international tourists, who constitute one of the principal target segments that Moc Chau seeks to attract. Without the rapid establishment of an interregional digital data ecosystem, the destination's capacity to enhance its long-term competitive advantage will continue to deteriorate.

4.3. Discussion

(i) Air transportation functions as the generator of primary tourist flows but remains poorly integrated with ground transportation

Air transportation currently performs the role of generating primary tourism demand, particularly for international tourists and domestic visitors originating from areas distant from Northern Vietnam's tourism centers (Sigala, 2020; Zhang & Zhang, 2016). However, the principal bottleneck lies in the absence of integrated coordination between air transportation and ground transportation systems, resulting in fragmented travel experiences, prolonged transit durations, and reduced attractiveness of mountainous destinations. According to the proposed research framework (Figure 1), the two transport subsystems continue to operate in parallel, lacking a shared data platform capable of intermediary coordination.

Within the context of post-COVID-19 international tourism, where seamless travel experiences have become increasingly prioritized (Gretzel et al., 2021), disruptions in intermodal connectivity place Moc Chau at a competitive disadvantage compared with ASEAN destinations that have already implemented multimodal integration systems (UNWTO, 2024).

(ii) Fragmentation within the Community-Based Tourism Service Value Chain

The community-based tourism value chain model in Moc Chau currently remains largely spontaneous and fragmented in nature. Survey findings from 18 homestay establishments revealed that only 16.7% maintained formal cooperative relationships with specialized ground transportation operators, while the majority continued to rely on fragmented tour brokerage mechanisms. Brokerage fees ranging from 8% to 15% significantly increase service costs while simultaneously limiting the capacity of homestay operators to proactively regulate occupancy levels and improve competitive performance.

According to the proposed analytical framework, the community-based tourism service subsystem currently lacks any mechanism for two-way data feedback from air and ground transportation systems. Consequently, substantial difficulties arise in optimizing seasonal operations, tour structuring, and service capacity allocation.

(iii) The absence of an intersectoral open data platform constrains the entire ecosystem

As indicated within the research framework, open-data platforms constitute the fundamental element required for synchronizing operations among multiple intersectoral actors. Nevertheless, within the study area, no official integrated data system currently exists to connect the three principal stakeholder groups: airlines, ground transportation enterprises, and community-based homestay systems.

The resulting consequences are clearly observable:

- Ground transportation enterprises are compelled to operate based primarily on subjective demand forecasts, resulting in substantial operational fluctuations, with capacity variation ranging from 51% during low-demand seasons to 140% during peak periods.

- Homestay operators remain unable to proactively adjust service operation strategies in response to fluctuations in tourist flows originating from the aviation sector.

- Inbound travel agencies continue to process tour operations manually, thereby increasing operational costs by approximately 14%–18% compared with tours supported by integrated operational data systems.

These limitations not only increase internal operational costs but also reduce the quality of tourist travel experiences. Specifically, 91.7% of surveyed international tourists reported encountering inadequate synchronization in transportation connectivity beginning from the initial travel-planning stage.

(iv) Institutional coordination gaps across intersectoral governance structures

Beyond technological limitations, a deeper structural issue lies in the absence of effective intersectoral institutional coordination mechanisms. While developed tourism economies within ASEAN, such as Thailand and Singapore, have established intersectoral coordination committees integrating transportation, tourism, and data governance systems (ASEAN Smart Tourism Index, 2023), no equivalent interregional governance structure currently exists within the study area to coordinate tourism authorities, transport agencies, and the civil aviation sector.

This institutional fragmentation has created substantial barriers to the standardization of data-sharing procedures, the development of interoperable APIs, and the establishment of passenger information governance systems at the foundational legal and administrative levels. Consequently, the lack of institutional coordination mechanisms represents not merely a technological challenge but also a systemic governance issue affecting the overall functionality of the transport–tourism ecosystem.

In order to systematize these operational bottlenecks, the study compares empirical findings with the proposed research framework, as summarized below:

Table 2. Operational gaps within the mountainous community-based transport–tourism ecosystem

Ecosystem Component	Current Operational Conditions	Scientific/Operational Gaps
Air transportation	Core generator of primary tourist flows	Lack of integration with ground transportation data systems
Ground transportation	Fragmented operations with limited forecasting capacity	Absence of airline booking forecast data
Community-based homestays	Dependence on fragmented bookings and brokerage mechanisms	Lack of seasonal occupancy feedback systems
Inbound travel agencies	Manual coordination with high operational costs	Absence of integrated booking systems
Open data governance	Not yet established	Lack of interregional standardization and shared API systems

Source: Author, 2025

Table 2 demonstrates that the entire ecosystem in Moc Chau simultaneously lacks horizontal integration among service stakeholders and vertical institutional coordination mechanisms. At the aviation level, although Noi Bai Airport functions as the generator of primary tourist flows, airline booking data are not shared with ground transportation providers or homestay operators, thereby creating significant difficulties in forecasting travel demand. Ground transportation enterprises consequently operate without access to source-market data, resulting in substantial seasonal fluctuations in operational capacity and limiting their ability to adjust transport allocation in real time.

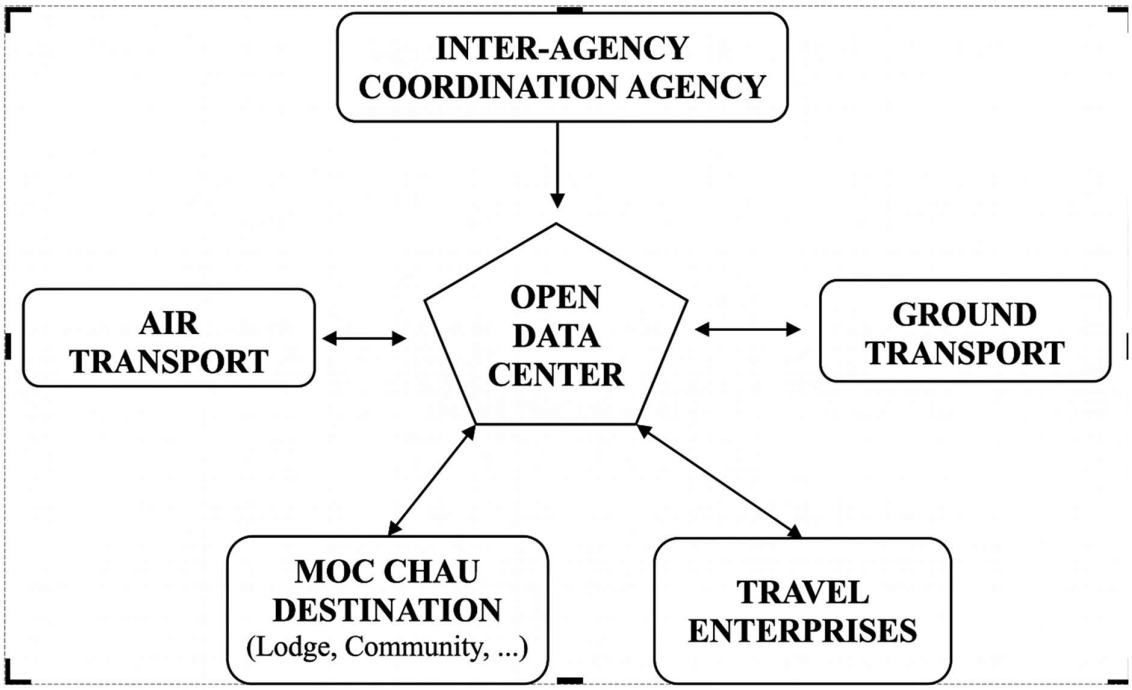
Similarly, homestay establishments remain highly dependent on fragmented bookings and intermediary brokers, lacking the capacity to balance seasonal service demand efficiently. Within the inbound tourism sector, tour planning processes continue to be conducted manually, thereby increasing operational costs, prolonging transaction procedures, and reducing the competitiveness of international tour packages compared with ASEAN destinations that have already implemented advanced multimodal booking systems (UNWTO, 2024).

The underlying issue across the entire ecosystem lies in the absence of an interregional open-data platform, which constitutes the decisive factor enabling real-time operational coordination among service actors within the ecosystem.

v. Proposed model for a mountainous transport–community tourism ecosystem

Based on the systematic analysis of current operational conditions, the identification of research gaps, and the analytical framework established in this study, a model is proposed for improving the mountainous transport–community tourism ecosystem through integrated operations supported by an interregional open digital data platform.

Figure 2. Proposed model of the mountainous transport–community tourism ecosystem



Source: Author, 2025

The proposed model consists of three core components:

- Open Data Center: Serves as the central platform for collecting, synchronizing, and distributing real-time data across airlines, ground transportation, homestays, and travel enterprises.

- Interregional API System: Enables standardized data sharing on flight schedules, passenger flows, transport capacity, accommodation availability, and tour operations.

- Intersectoral Coordination Mechanism: Integrates tourism, transportation, aviation authorities, travel enterprises, and technology providers to ensure governance, data security, and operational standardization.

Through integrated data governance, the model supports synchronized multimodal operations, improves demand forecasting, reduces operational fragmentation, and enhances tourist travel experiences. International practices such as the Swiss Travel System (STC, 2023), the Japan Integrated Transport Data Platform (JTB, 2023), and New Zealand's South Island tourism data-sharing model (NZ Tourism, 2024) demonstrate the effectiveness of interregional open-data coordination in mountainous tourism development.

Based on field survey findings and international extrapolation models, the proposed ecosystem could potentially achieve the following outcomes within 3–5 years of implementation: 15%–18% reduction in inbound tour operational costs; 20%–25% improvement in ground transportation efficiency; Increase in homestay occupancy rates from 58% to 75%–80%; 30%–40% expansion in international tourist accessibility through multimodal booking systems; and Significant improvement in overall travel experience quality.

5. Conclusion

This study addressed the practical issue of operating the community-based tourism value chain in Vietnam's mountainous regions, with the objective of analyzing the role of air transportation in generating primary tourist flows, evaluating multimodal transport linkages, and proposing a digital ecosystem framework aimed at optimizing the overall tourism service chain. The empirical findings indicate that the study successfully achieved its proposed objectives while clarifying the mechanisms influencing service integration efficiency in mountainous regions lacking direct airport infrastructure.

Based on the theoretical foundations of the multimodal transport–tourism ecosystem and open-data governance models, the study contributes to the existing scientific literature by addressing research gaps related to interregional data integration and multi-stakeholder operational coordination in contexts characterized by limited direct transportation infrastructure. This represents a significant scientific and practical contribution compared with previous studies, which have primarily focused on intraregional tourism value chains or destination marketing perspectives.

The proposed interregional open-data ecosystem model consists of three principal components: an Open Data Center for transport–tourism coordination; standardized interregional API interfaces; and an intersectoral regional coordination organization. This model enables operational synchronization among stakeholders, enhances real-time coordination capacity, and optimizes the economic efficiency of the entire community-based tourism supply chain.

Drawing upon comparable international models such as the Swiss Travel System (STC, 2023), the Japan Integrated Transport Data Platform (JTB, 2023), and the New Zealand South Island Platform (NZ Tourism, 2024), extrapolated findings suggest that, after 3–5 years of implementation, the proposed model could reduce inbound tour operating costs by 15%–18%, improve ground transportation efficiency by 20%–25%, increase homestay occupancy rates from 58% to approximately 75%–80% during peak seasons, expand international tourist accessibility by 30%–40%, and improve travel experience indices by approximately 15 points.

Although challenges related to financial resources, institutional coordination, and technical standardization remain significant, the study affirms that an interregional open-data ecosystem constitutes an essential foundation for the professionalization of community-based tourism operations in mountainous regions, thereby facilitating integration into international operational standards within the context of deep digital transformation.

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The authors declare that they have no known financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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