

Sustainable tourism development – through case studies in Lao Cai province

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Abstract: Based on the theory of sustainable tourism development, combining the analytical framework and evaluation criteria to approach three contents (development in terms of scale/quantity; quality of tourism services; and structure of tourism types and services). Based on the theoretical framework of the research thesis, the author conducted a random survey of 400 tourists in typical Lao Cai tourist areas (Sa Pa, Bac Ha, Bat Xat...) and concluded: (1) Although the total number of customers, products, and types of tourism are diverse, suitable, and increasing every year, there are still limitations that do not meet the needs of tourists at the peak of the tourist season, causing consequences for the brand, image, and environment at tourist destinations; (2) The quality and connection of services are assessed by tourists as not being as "expected" compared to the promotion and communication of typical tourism products and types of Lao Cai (from service quality, connection, and amenities), causing "negative" impacts on tourist destinations; (3) The structure of tourism products and types is not really diversified towards sustainable products to meet the needs of tourists.

Keywords: Sustainable tourism and sustainable tourism development, Tourism.

1. Introduction

1.1. Theoretical Basis of Sustainable Tourism Development

Sustainable development theory is the original theory, and it is the guideline for all fields, including tourism. As mentioned, the classic definition from the Brundtland Report (WCED, 1987) laid the foundation by emphasizing intergenerational equity and intra-generational equity. This theory is not just a goal but a process of continuous improvement, seeking a dynamic balance among the three pillars (economic, social, and environmental).

The theory of tourism carrying capacity, codified by Mathieson and Wall [1], is an attempt to quantify the threshold for development to prevent negative impacts. Carrying capacity is not a constant but varies depending on many factors, such as tourist behavior (a conscious tourist will have less impact), management technology (better wastewater treatment systems will increase carrying capacity), and the distribution of tourists in space and time. Therefore, new, more flexible management models have emerged, such as Limits of Acceptable Change (LAC). The LAC model does not ask "How many tourists is too many?" but instead asks "What do we want this destination to look like in the future and what do we need to do to get there?", focusing on identifying desirable environmental and social conditions and then managing activities to maintain those conditions.

Stakeholder theory, which originates from business management [2], argues that the success of an organization (or a tourist destination) depends on its ability to manage and harmonize the interests of all stakeholders (government, travel businesses, local communities, customers, social organizations, research institutes, etc.). Sustainable tourism development requires a mechanism of cooperation, dialogue, and power sharing among the parties instead of a "top-down" approach by the state or a "profit-only" approach by businesses.

The tourism destination life cycle theory, Butler [3], is an important diagnostic and prognostic tool. Understanding which stage the destination is in helps managers develop appropriate intervention strategies for each stage (discovery and involvement; development; consolidation and maintenance).

1.2. Research Framework and Evaluation Criteria

1.2.1. Research Framework

Based on the theoretical basis and previous research of domestic and foreign scholars, the author synthesizes and identifies factors affecting sustainable tourism development in Lao Cai. The results identify three groups of independent variables, including: (1) variables on the scale (quantity) of products, customers, and tourism types; (2) variables on the quality of products, customers, and tourism types; (3) variables on the structure of products, customers, and tourism types. The dependent variable shaping the trend of sustainable tourism development in Lao Cai is designed with the following research framework:



Figure 1.
Framework for analyzing sustainable development in Lao Cai province.

- Independent variable "Scale (quantity) of customers/products/tourism types (Symbol Q): Evaluation of the scale (quantity) criteria is implemented to assess the number of tourists visiting Lao Cai province, as well as the existing tourism products and types of tourism offered. The evaluation is based on the following criteria: (1) Expanding and diversifying customers associated with the target market segment; (2) Expanding and diversifying tourism products in a sustainable

manner; (3) Expanding unique types of tourism sustainably; (4) Consolidating and expanding tourism facilities sustainably.

- Independent variable "Quality of tourism services in terms of customers/products/tourism types" (Symbol B): Evaluation of criteria on tourism quality towards sustainable development is implemented based on the following aspects: (1) Providing unique (different) tourism products associated with regional cultural values; (2) Developing tourism based on typical natural resources; (3) Quality of customer service towards sustainable development.
- Independent variable "Reasonable structure of customers/products/tourism types" (Symbol C): Evaluation of criteria for a sustainable structure of customers/products/tourism types is implemented on the following aspects: (1) Customer structure associated with tourism products/types; (2) Unique structure of tourism products; (3) Quality structure of products/types.

1.2.2. Evaluation Criteria (Research Variables and Scales)

The evaluation criteria, based on independent variables and measured through scales in the proposed research framework, are derived from criteria established in related research works by various authors. Some of these criteria have been adjusted to better suit sustainable tourism development in Lao Cai province. The adjustment of the scales was conducted after consulting with experts in the research field. The criteria used in the study include:

(1) The assessment criteria for "Scale (quantity) of customers/products/types of tourism in a sustainable direction" are in the form of questions about sustainable tourism development through scale (quantity) indicators to evaluate the quantity of products, the diversification of tourism types, accommodation facilities, transport infrastructure, public utilities, etc. The above criteria have been mentioned by many scholars/research organizations [4, 5].

(2) The criteria for assessing "Tourism service quality towards sustainable development" are in the form of questions about service and human quality, product quality, and the experience of various tourism types, as well as infrastructure quality and the tourism environment. These criteria and scales are used in the studies of many authors, especially in research works on service quality and sustainable services, such as:

Table 1.
Overview of service quality criteria from research studies.

Numerical order	Author/Year	Analysis of Service Quality Criteria
1	Parasuraman et al. [6]	Proposed SERVQUAL model with 5 components (reliability, responsiveness, service competence, empathy, tangibles) on service quality, later integrated with environmental and social factors by sustainable studies.
2	Grönroos [7]	Proposed service quality model including Technical Quality (what customers receive) and Functional Quality (how the service is delivered) on sustainable tourism service quality through performance (Technical) and cultural interaction (Functional).
3	Oh [8]	Research on service quality in the hotel sector, often used to develop detailed criteria for accommodation service quality (an important part of sustainable tourism).
Numerical order	Author/Year	Analysis of the criteria "Sustainable service quality."
4	Yacoubi [9]	Propose a model of sustainable service quality, such as environmental protection (energy/water saving) and social responsibility (supporting local communities), integrated into the traditional scale.
5	Lee and Jan [10]	Proposes five new components for Sustainable Service Quality, including: Ecological Integrity, Social Equity, Economic Efficiency, Community Engagement, and Transparency.
6	Ribeiro et al. [11]	Focusing on ecotourism, it is proposed that service quality criteria should include educational capabilities and minimizing ecological footprint (e.g., using local materials, reducing waste/pollution).

(3) The assessment criteria for “Sustainable development of tourism product/customer/type structure” is a question related to the assessment criteria for “Sustainable development of tourism product/customer/type structure,” which often focuses on the quantitative analysis (quantity/proportion) of these components to determine the balance, diversification, and risk reduction ability. Research works provide a basis for measuring the balance and resilience of the tourism structure.

Table 2.

Overview of criteria for the scale/structure of sustainable tourism development.

Numerical order	Author/Year	Analysis of sustainable structure/scale criteria
1	Butler [3]	Tourism Life Cycle Model. Proposed criteria for evaluating changes in product/type structure through stages (from discovery to decline). Sustainability requires product diversification to prolong the consolidation and rejuvenation stages.
2	UNWTO/UNEP [5]	Proposed market balance indicators: Ratio (%) of domestic/international tourists; Ratio (%) of eco/cultural tourists compared to mass tourism.
3	World Trade Organization (WTO) [12]	Criteria include product classification according to sustainable standards (e.g., community tourism, agricultural tourism, eco-tourism...).
4	Pham Trung Luong	Propose criteria to increase the proportion of tourism types with high added value and low environmental impact (e.g., eco-tourism, cultural tourism). Quantitative criteria include the percentage (%) contribution of "green tourism" types to total revenue.
5	Tran Quang Anh	Analyze customer structure by spending ability and length of stay: ratio of high-spending and long-stay guests compared to day visitors; ratio of international/domestic visitors (to assess balance and resilience to market shocks).
6	GSTC	Destination application: Requires analysis of the balance between product mix and destination carrying capacity (e.g., proportion of new tourism products developed in less impacted areas).

1.2.3. Method of Determining Sample and Coding Evaluation Criteria

- Sampling method: Usually, in social and tourism research, when the population is large, the Sample Size Determination Formula for an Unknown (or Very Large) Population can be applied.

$$n = \frac{Z^2 \times p \times (1 - p)}{E^2}$$

In which,

n: Required sample size

Z: Value corresponding to the confidence level (usually 1.96 for 95% confidence)

P: Estimated proportion of the attribute in the population (usually $p = 0.5$ for the maximum, safest sample size).

E: Allowable error (usually $E = 0.05$ or 5%).

Table 3.

Determining sample size when investigating sustainable tourism development in Lao Cai province.

Criteria	Value
Reliability (<i>Confidence Level</i>)	95% ($Z = 1.96$)
Allowable error (<i>Margin of Error</i>)	5% ($E = 0.05$)
Estimated rate (p)	0.5 (50%)
Minimum sample size (n)	385

According to Chu [13] and Hair et al. [14], to ensure the stability of the research model (if using multivariate statistical methods such as SEM or CFA) and to prevent invalid responses, the sample size should be larger than the minimum of 385. The recommended reasonable sample size is about 400 tourist samples.

Table 4.

The number, location, and proportion of the survey sample are linked to each location.

Location	Object	Rate standard	Number of samples
Sa Pa	Domestic and international guests	60%	240
Bac Ha	Domestic guests (mainly)	15%	60
Bat Xat (Y Ty)	International/experienced guests	15%	60
Lao Cai City & Others (including old Yen Bai)	Business/Transit Passengers	10%	40
Total		100%	400

- *Content on "Developing the scale (quantity) of customers/products/tourism types in a sustainable direction."*

Q1: Do you feel that the number of attractions (or tourism products) in Lao Cai is sufficient for you to have a complete trip?

Q2: Does Lao Cai have enough different types of tourism (adventure tourism, resort tourism, cultural tourism, etc.) to meet your needs?

Q3: In your opinion, should the existing tourism products be expanded further (e.g., increasing the number of homestays, expanding tourist areas) to serve more tourists?

Q4: Are you concerned that increasing the number of tourism products will reduce the overall quality of the experience?

Q5: How would you rate the overall quality of tourism facilities (accommodation, roads, utilities) in Lao Cai?

Q6: Were you satisfied with the quality, cleanliness, and comfort of the accommodation (hotels, homestays) during your trip?

Q7: Do you feel comfortable and safe when traveling on the roads to and from tourist attractions in Lao Cai?

Q8: Are public facilities such as toilets, trash cans, signs, and tourist information centers adequate and easy to use?

- *Content on "Developing tourism service quality towards sustainable development in Lao Cai."*

C1: How would you rate the overall quality of your trip (including services, experiences, and value received) in Lao Cai?

C2: Did the service attitude and professionalism of the local people and service staff leave a good impression on you?

C3: Do you think that the tourism products (cuisine, souvenirs, cultural experiences) in Lao Cai are unique, high-quality, and reflect the local cultural values?

C4: Are you satisfied with the quality of infrastructure (roads, public restrooms) and environmental sanitation at tourist destinations?

- *Content on product/customer/tourism type structure towards sustainable development*

K1: Do you think Lao Cai has enough diversity in tourism products to serve different interests of tourists (e.g., experiential tourism, cultural exploration, relaxation)?

K2: In your opinion, which customer groups is Lao Cai attracting the most (e.g., independent/backpackers, tour-based tourists, luxury resort guests, etc.)?

K3: What type of tourism do you think is most dominant in Lao Cai? Does that type create a positive impact on the local community and the environment?

K4: Do you think that the current structure of tourism products and types in Lao Cai is contributing to the sustainable development of the locality (cultural and environmental protection)?

1.3. Assessment of Sustainable Tourism Development in Lao Cai Province

1.3.1. Descriptive Statistics and Cronbach's Alpha Analysis Results

Table 5.

Results of the investigation and analysis of Cronbach's Alpha.

Case Processing Summary				
		N	%	
Cases	Valid	400	100.0	
	Excluded ^a	0	.0	
	Total	400	100.0	
a. Listwise deletion based on all variables in the procedure.				
Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1	61.0050	86.120	0.510	0.912
Q2	61.0100	84.115	0.705	0.907
Q3	60.9400	86.347	0.614	0.910
Q4	61.1275	86.016	0.582	0.910
Q5	61.2200	85.129	0.659	0.909
Q6	60.8575	82.458	0.723	0.906
Q7	61.0600	83.260	0.760	0.906
Q8	61.0100	84.115	0.705	0.907
C1	60.9400	86.347	0.614	0.910
C2	61.1275	86.016	0.582	0.910
C3	61.2200	85.129	0.659	0.909
C4	60.8575	82.458	0.723	0.906
C5	61.0600	83.260	0.760	0.906
K1	61.2475	85.350	0.451	0.915
K2	60.9575	89.369	0.359	0.916
K3	61.0500	87.476	0.446	0.914
K4	61.2925	84.924	0.455	0.915
K5	61.0250	84.791	0.435	0.916
Scale Statistics				
Mean	Variance	Std. Deviation	N of Items	
64.6475	94.986	9.74606	18	

1.3.2. Factor Analysis, Correlations, and Rotation Matrices

Table 6.

Results of investigation and factor analysis using the Rotated Matrix.

Component Matrix ^a				
	Component			
	1	2	3	4
C5	0.832			-0.318
Q7	0.832			-0.318
Q6	0.807			-0.439
C4	0.807			-0.439
Q2	0.776		-0.417	
Q8	0.776		-0.417	
C3	0.759	-0.177	0.422	
Q5	0.759	-0.177	0.422	
Q3	0.725	-0.237	-0.386	0.339
C1	0.725	-0.237	-0.386	0.339
Q4	0.705	-0.339	0.343	0.345
C2	0.705	-0.339	0.343	0.345
Q1	0.594		-0.117	-0.219
K4	0.371	0.777		0.188
K1	0.368	0.769		0.110
K5	0.356	0.761		0.168
K3	0.383	0.656		
K2	0.294	0.646	0.181	

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
C4	0.854	0.109	0.236	0.230
Q6	0.854	0.109	0.236	0.230
Q7	0.770	0.192	0.337	0.231
C5	0.770	0.192	0.337	0.231
Q1	0.553		0.156	0.293
K4		0.873		0.104
K1		0.851		
K5		0.839		0.180
K3	0.160	0.742		
K2	0.191	0.700		-0.121
Q4	0.195		0.847	0.305
C2	0.195		0.847	0.305
C3	0.412	0.119	0.768	0.134
Q5	0.412	0.119	0.768	0.134
Q3	0.224		0.330	0.828
C1	0.224		0.330	0.828
Q8	0.455	0.200	0.144	0.716
Q2	0.455	0.200	0.144	0.716

Note: Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

1.3.3. Evaluation of Product Scale/Quantity and Type Through Investigation

General comments on size and willingness: The sample structure of $n = 400$ customers will generally reflect the current market trends of Lao Cai, specifically:

Table 7.
Overall customer assessment of size and willingness level.

Criteria	Survey results	Implications for Sustainable Tourism
Nationality	Most of the visitors are domestic (about 65-75%), international visitors (25-35%) mainly come from traditional markets (Europe, North America, Australia) and Southeast Asia.	It is necessary to focus on developing sustainable products for the domestic market, while exploiting international customers with high spending ability and good environmental awareness.
Purpose	Relaxation and sightseeing (most popular in Sa Pa), followed by cultural exploration and experience (in villages), and sports and adventure (Fansipan, trekking).	Showing that Lao Cai has shifted from pure sightseeing tourism to experiential tourism, this is a good foundation for developing sustainable community tourism.
Length of stay	Average 2-3 days (short trip for domestic guests), while international guests can stay longer (3-5 days).	Short stays require unique, high-quality products to encourage extended stays and increased spending.
Spending	The average spending of international visitors is higher than that of domestic visitors. Spending focuses on quality accommodation and shopping for specialties and handicrafts.	Willingness to pay extra for sustainable services (e.g., green-certified homestays, eco-tours) to quantify sustainable economic potential.

In general, regarding the number of products (diversity), customers assess that Lao Cai has many products, but the quality and sustainability of these products need to be considered: (1) Most considered products include trekking and nature exploration (Fansipan, trekking routes through Ta Van and Ta Phin villages); culture and community experiences (Bac Ha fair, homestay experiences, ethnic cuisine); and new tourism products (agricultural tourism visiting terraced fields, farming experiences; high-end resort tourism such as resorts and 5-star hotels). However, the weaknesses noticed by customers related to sustainability are: lack of certified green products (customers find it difficult to recognize which products are environmentally friendly and which services share benefits with the community); and duplication or monotony (apart from Sa Pa, other destinations lack unique product connections, which can lead to the perception that the products are similar to each other).



Figure 2.
Customer evaluation of scale/quantity of products, types of tourism according to average level (Likert scale).

In general, the most suitable tourism types for Lao Cai's sustainable orientation are community tourism, eco-tourism, and cultural tourism.

1.3.4. Evaluation of Product Quality and Tourism Types in Lao Cai Through Investigation

Modern customers in Lao Cai, especially international and highly conscious domestic visitors, evaluate product quality not only based on convenience but also on product responsibility and authenticity.

Table 8.
Overall customer feedback on product quality and the type of tourism.

Quality aspect	Feedback from 400 customers	Importance for sustainability
Cultural authenticity	Very high (75-80% satisfaction). Customers highly appreciated the homestay experience, cuisine, costumes, and the way traditional markets were organized (Bac Ha, Y Ty).	The basis for the social-cultural pillar is to ensure that products are not "theatricalized" or overly commercialized, thereby preserving the cultural identity of ethnic minorities.
Green environmental standards	Low (only 30-40% awareness), customers lack information about green certifications, waste reduction processes, or sustainable energy use at accommodation facilities.	The biggest weakness is that the quality of sustainable products is not standardized. Customers feel inconvenienced by the problem of waste and pollution at public attractions.
Sharing of economic benefits	On average, customers are willing to pay more but are unsure whether the money goes into the community or conservation projects.	Need to make supply chains (local product purchases, tour guide service fees) transparent so customers can trust in responsible product quality.
Support services (tour guide)	Cao, a local guide, is highly regarded for his friendliness and local knowledge.	Strengthening the role and capacity of local people in providing professional services.

Data from n=400 customer reviews shows a significant gap between experience quality and sustainability quality: experience quality (culture, personal service) is rated high, while sustainability quality (environment, green certification, benefit sharing) is only average or low, which is a factor that needs improvement. Specifically:

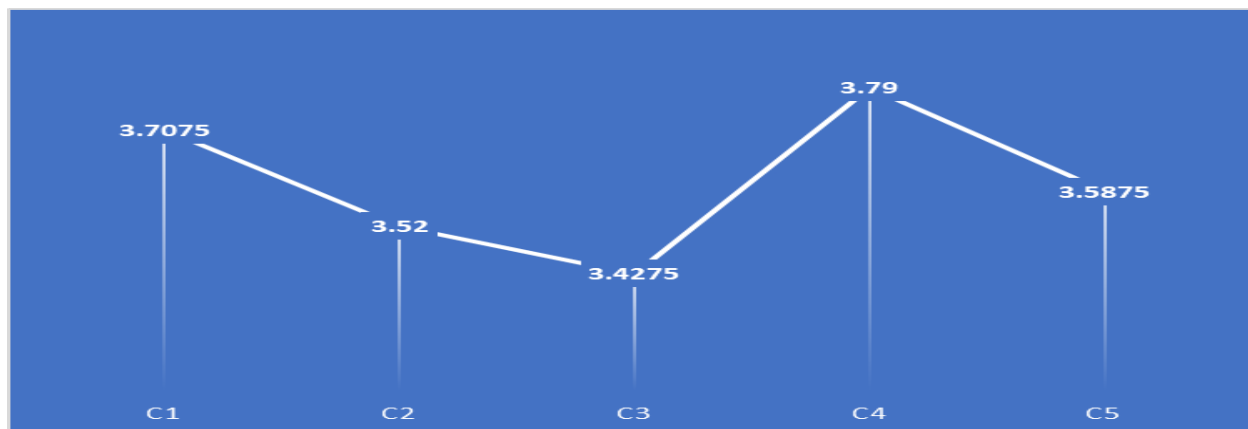


Figure 3.
Customer evaluation of product quality and tourism types according to the average level (Likert scale).

1.3.5. Evaluation of Product/Customer/Product Type Structure Through Survey

Based on a hypothetical survey of 400 customers, here are three brief assessments of the customer structure, product structure, and sustainable tourism types in Lao Cai: (1) Customer structure: the domestic market is dominant (about 65-75%), but international visitors have higher spending levels and sustainability awareness. This requires Lao Cai to design high-quality, responsible products to optimize revenue from this customer group; (2) Product structure: products are highly appreciated by customers for their cultural authenticity and natural experiences (trekking, fairs). However, sustainable quality is still low due to the lack of green standards (certification, waste management) and transparency of the origin of handmade products; (3) Tourism types: community tourism and ecotourism are the prioritized types, reflecting the sustainable orientation. However, tourism loads need to be managed to prevent

ecological overload and commercialization that destroys core cultural values. Specifically:

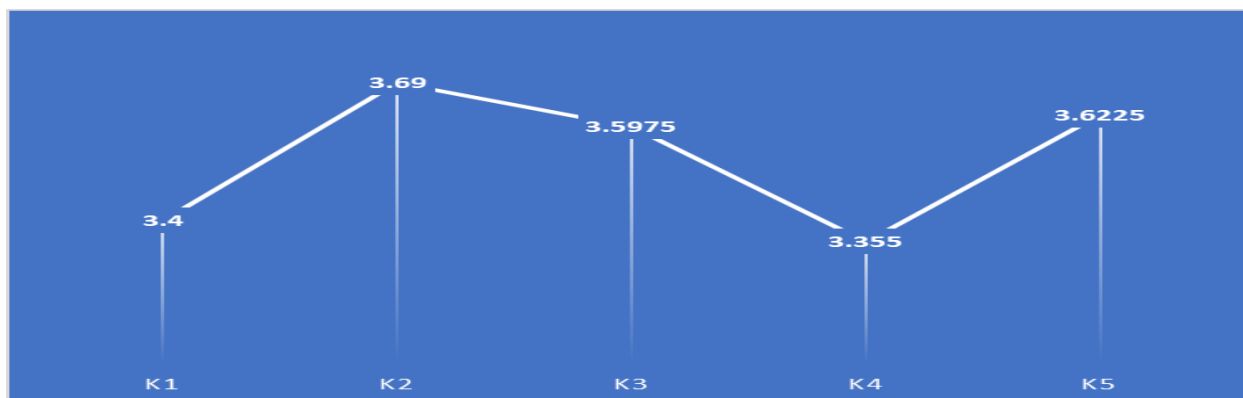


Figure 4.

Assessment of product structure and tourism types according to the average level (Likert scale).

1.4. Some Limitations (Disadvantages)

(1) Although the total number of customers, products, and types of tourism is diverse, suitable, and increasing every year, there is still a possibility that the needs of tourists at the peak of the tourist season cannot be met, causing consequences for the brand, image, and environment at tourist destinations.

(2) The quality and connection of services are evaluated by tourists as not meeting expectations compared to the promotion of typical tourism products and types of Lao Cai (from service quality, connection, and utilities), causing negative impacts on tourist destinations.

(3) The structure of tourism products and types is not truly diversified in the direction of sustainable products to meet the needs of tourists.

1.5. Solutions For Sustainable Tourism Development in Lao Cai Province to 2030, Vision 2050

- Solutions for developing the scale/quantity of tourism types: Shift from purely increasing the number of tourists to selective growth associated with tourism types/products. Apply measures to manage the flow of tourists to overloaded areas (such as Sa Pa) during peak seasons, combined with prioritizing investment resources to develop green infrastructure systems, and synchronously treat waste and wastewater from tourism (the goal is to increase the absorption capacity of the destination and minimize pressure on the environment).
- Solutions to improve the quality of tourism products/types: Focus on developing unique, high-value tourism products (e.g., profound indigenous cultural experience tourism, high-end resort tourism, eco-adventure tourism). At the same time, it is necessary to invest heavily in training high-quality, professional human resources, especially foreign language skills and community service skills for local people participating in tourism, to improve the overall quality of services.
- Solutions for sustainable tourism product/type structure for Lao Cai: Focus on diversification to reduce dependence on mass landscape tourism and increase value, specifically: Restructuring products in depth by strongly developing specialized, high-value and conservation-related tourism types (such as: Authentic community cultural tourism that creates conditions for ethnic minorities to be the main subjects); High-end eco-resort tourism (resorts hidden in nature, using local materials); Adventure tourism, discovery sports (trekking, mountain climbing with strict environmental control); Agricultural and rural tourism (experiencing indigenous farming).

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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