AN INTEGRATED RISK-BASED APPROACH TO SUSTAINABLE TOURISM DEVELOPMENT: EMPIRICAL EVIDENCE FROM HA LONG

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Abstract: ***This study examines the role of risk in sustainable tourism development through an integrated approach, in which risk is conceptualized as a mediating variable transmitting impacts on the economic, social, and environmental outcomes of the destination of Ha Long Bay. Data were collected from 398 valid survey questionnaires using a five-point Likert scale and analyzed with advanced quantitative techniques, including Cronbach's Alpha, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). The empirical results indicate that management, planning, and legal risks exert the strongest influence on aggregated risk, followed by environmental pressure and tourism overcrowding. In addition, natural disaster and climate change risks as well as socio-economic risks, although exhibiting relatively weaker effects, remain statistically significant, highlighting the multidimensional and interconnected nature of risk at the destination. These findings underscore the critical importance of integrated risk management in enhancing the long-term sustainability of tourism development, particularly in coastal and heritage destinations experiencing rapid tourism growth.***

• Keywords: *tourism, risk, sustainable, sustainable development, Ha Long, Vietnam.*

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1. Introduction

In the tourism sector, the World Tourism Organization emphasizes that sustainable tourism development requires a balance among three core pillars: economic growth, social equity, and environmental protection. Nevertheless, evidence from many destinations shows that rapid tourism expansion is frequently accompanied by the accumulation of structural risks. Hall and Amore (2018) argue that tourism risk should not be viewed solely as isolated crises, such as natural disasters or pandemics, but rather as long-term systemic pressures that gradually erode destination resilience and sustainability. From this perspective, risk can be conceptualized as an intermediary mechanism linking development pressures to sustainability outcomes.

Ha Long, the tourism center of Quang Ninh Province and home to the World Natural Heritage Site of Ha Long Bay, represents a typical case of these dynamics. Following the sharp decline during the COVID-19 pandemic (2020-2021), tourism in Quang Ninh has rebounded strongly, reaching over 21 million visitors in 2025 and generating substantial revenue. While this growth has reinforced tourism's role as a key economic driver, it has simultaneously exposed a range of emerging risks. Environmental pressures have intensified due to overcrowding, dense cruise activities, coastal urbanization, and increasing solid waste, placing significant stress on water quality, marine ecosystems, and the karst landscape. Rising tourist volumes are also associated with heightened risks of biodiversity loss and environmental degradation, threatening the long-term sustainability of tourism resources. In addition, governance-related risks have become increasingly prominent. The rapid expansion of infrastructure, resorts, and coastal real estate has raised concerns about the preservation of Ha Long Bay's Outstanding Universal Value. Without effective regulatory frameworks and coordinated stakeholder management, short-term economic objectives may conflict with long-term conservation goals. Socio-economic risks are also evident, as the growing dependence on tourism makes the local economy vulnerable to external shocks, as demonstrated during the pandemic. Furthermore, increasing living costs and socio-cultural changes may exacerbate inequality if tourism benefits are not equitably distributed among local communities.

Risks related to safety, service quality, and destination reputation are likewise critical. Tourism-related incidents can quickly spread through global media, undermining destination image and competitiveness. At the same time, natural hazards and climate change are emerging as significant factors shaping tourism sustainability. Northern coastal Vietnam is frequently affected by typhoons, heavy rainfall, and sea-level rise,

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which disrupt tourism activities and increase safety risks. In the long term, climate change is expected to intensify extreme weather events, accelerating coastal erosion, ecosystem degradation, and landscape deterioration key assets underpinning Ha Long's tourism value.

Despite growing academic attention, most studies on sustainable tourism in Vietnam focus on individual dimensions rather than adopting a comprehensive risk-based perspective. To address this gap, this study proposes an analytical framework in which risk is conceptualized as a mediating variable, capturing the cumulative effects of multiple pressures on sustainable tourism development outcomes.

2. Litterature Review

The concept of sustainable development underpins the triple bottom line framework, which emphasizes balancing economic growth, social equity, and environmental protection. UNWTO (2008) highlights that sustainable development should generate long-term economic benefits, preserve socio-cultural values, and minimize environmental impacts. However, maintaining this balance has become increasingly difficult in the context of rapid tourism expansion and globalization. Sharpley (2020) describes this as a "growth paradox," where the pursuit of higher visitor numbers and revenues often conflicts with resource conservation and social integrity, leading to structural imbalances favoring short-term gains. Within this context, the concept of tourism risk has gained prominence. Hall and Amore (2017) argue that risk extends beyond sudden shocks, such as disasters or pandemics, to include cumulative and systemic pressures like environmental degradation, governance failures, social conflicts, and economic dependence. These interconnected risks can undermine destination resilience if not effectively managed. Gössling et al. (2020) further demonstrate how global crises and climate change expose the vulnerability of tourism-dependent destinations.

From a governance perspective, OECD (2020) emphasize the need for integrated risk management to identify vulnerabilities and mitigate long-term impacts, particularly in heritage destinations with irreplaceable values. Theoretically, risk can be conceptualized as a mediating variable linking structural pressures to sustainability outcomes. Rather than exerting direct effects, environmental, socio-economic, and governance factors increase systemic risk, which in turn reduces the ability to maintain sustainability balance.

This perspective aligns with social-ecological systems theory (Folke et al., 2016), which views sustainability as dependent on the capacity to manage feedback loops. Uncontrolled risks may push systems toward critical thresholds, leading to irreversible changes. Overall, integrating sustainability with risk and resilience frameworks provides a more comprehensive approach, emphasizing the role of risk accumulation in shaping long-term tourism development trajectories.

2.1. Risk Groups in Sustainable Tourism Development

The rapid growth in tourist arrivals has intensified concerns over overtourism, defined by UNWTO (2018) as a situation where visitor numbers exceed a destination's carrying capacity, leading to negative environmental, social, and experiential impacts. In environmentally sensitive areas such as coastal and heritage destinations, these pressures manifest through water pollution, coastal erosion, waste accumulation, biodiversity loss, and ecosystem imbalance (Gössling et al., 2020). Empirical evidence further indicates that rising tourism flows can significantly increase biodiversity risks in the absence of effective management (Xu et al., 2025).

From a social-ecological systems perspective, environmental pressure not only causes direct degradation but also weakens the adaptive capacity of destinations (Folke et al., 2016). When ecological thresholds are exceeded, systems may approach tipping points with potentially irreversible consequences. Therefore, environmental pressure and overtourism are key drivers of systemic risk in sustainable tourism development.

H1: Environmental pressure and overtourism have a positive effect on risks in sustainable tourism development.

2.2. Management, Planning, and Legal Risks (MAN)

Tourism destinations often face governance-related risks such as fragmented planning, inconsistent policy implementation, vested interests, and short-term development priorities (Dredge & Jamal, 2015). The OECD (2020) highlights that weak or poorly integrated governance systems increase vulnerability to economic and environmental shocks. In heritage contexts, such shortcomings may threaten resource integrity and Outstanding Universal Value. Moreover, governance risks are considered foundational, as they influence the capacity to manage environmental, social, and market-related risks (Hall et al., 2017). Consequently, management, planning, and legal risks play a central role in amplifying overall risk in sustainable tourism development.

H2: Governance, planning, and legal risks have a positive effect on risks in sustainable tourism development.

2.3. Socio-economic Risks (SOC)

While tourism is a key driver of economic growth, excessive dependence on it increases structural vulnerability. Gössling et al. (2020) show that the COVID-19 pandemic exposed the risks faced by destinations reliant on international tourism. Rapid tourism expansion may also lead to rising living costs, unequal benefit distribution, and socio-cultural changes (Sharpley, 2020). From the perspective of Social Exchange Theory, residents' attitudes depend on the perceived balance between benefits and costs. When costs outweigh benefits, social tensions may emerge, threatening system stability. Therefore, socio-economic risks not only directly affect local communities but also contribute to broader systemic risk in sustainable tourism development.

H3: Socio-economic risks have a positive effect on risks in sustainable tourism development.

*2.4. Safety, Service Quality, and Destination Reputation Risks (*SAF)

Safety and service quality are fundamental to tourism competitiveness. The World Economic Forum (2019) identifies safety and security as core pillars influencing destination performance. In the digital era, negative incidents can spread rapidly, heightening reputational risk. Moreover, inconsistent service quality and inadequate safety standards reduce tourist satisfaction and revisit intentions, thereby weakening long-term economic performance. Thus, safety, service quality, and reputation risks significantly contribute to overall risk in sustainable tourism development.

H4: Safety and service-related risks have a positive effect on risks in sustainable tourism development.

2.5. Natural Disaster and Climate Change Risks (NAT)

Climate change and natural disasters are major challenges to sustainable development. Global warming has intensified the frequency and severity of extreme weather events such as storms, floods, and heatwaves disrupting ecosystems and tourism activities (Scott et al., 2024). In tourism, climate vulnerability is considered a structural risk, particularly for coastal and nature-based destinations (Scott et al., 2019).

Natural disasters act as external shocks that can sharply reduce tourist arrivals, affecting employment and local livelihoods (UNWTO, 2018). Additionally, climate change exacerbates socio-economic risks by increasing living costs and inequality (Dogru et al., 2020). As long-term and systemic pressures, these risks simultaneously impact environmental, economic, and social dimensions (Hall et al., 2021). Without effective adaptation, they may degrade tourism resources and amplify overall risk in sustainable tourism

H5: Natural disaster and climate change risks have a positive effect on risks in sustainable tourism development.

2.6. The Mediating Role of Risk in Sustainable Tourism Development (SUS)

In the tourism context, UNWTO (2008) emphasizes that sustainable tourism requires a balance among economic viability, social equity, and environmental protection. However, destinations often face multiple, interrelated risks, including environmental, governance, market, and safety-related risks. Hall, Prayag, and Amore (2017) argue that these risks should be viewed not as isolated events but as long-term structural pressures that gradually erode destination sustainability. Rather than exerting direct effects, risks accumulate systemically, reducing a destination's capacity to maintain balance across the three sustainability pillars.

From a resilience perspective, tourism destinations are social-ecological systems with adaptive capacities (Folke et al., 2016). High levels of accumulated risk are associated with declining economic performance, weakened social cohesion, and environmental degradation (Scott et al., 2019). Therefore, conceptualizing risk as a mediating variable is both theoretically and empirically justified, as it captures how structural pressures translate into sustainability outcomes. This approach provides a clearer understanding of how environmental, governance, socio-economic, and safety-related factors influence sustainable tourism development.

H6: Risk in sustainable tourism development has a negative effect on sustainable tourism development.

3. Research Methodology

This study employs a quantitative approach using a structured questionnaire administered to tourists in Ha Long. Data were collected through convenience sampling and on-site surveys at major tourist attractions, tourism areas, and accommodation facilities. Respondents were individuals with direct tourism experience in Ha Long. Prior to the survey, participants were informed of the research purpose and assured of anonymity and voluntary participation to reduce bias. A total of 400 questionnaires were distributed, yielding 398 valid responses after excluding incomplete or invalid ones. The data were screened, coded, and cleaned to ensure accuracy and consistency. Variables were measured using a five-point Likert scale, adapted from previous studies and adjusted to fit the Ha Long context. Data analysis was conducted using SPSS to perform descriptive statistics and assess reliability via Cronbach's Alpha, with items below 0.3

removed. Exploratory Factor Analysis (EFA) was then applied (KMO ≥ 0.5; Bartlett's test Sig. < 0.05). Finally, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were performed using AMOS, with model fit evaluated through indices such as Chi-square/df, CFI, TLI, and RMSEA. Hypotheses were tested based on standardized coefficients and statistical significance.

The study is based on two fundamental equations as follows:

Equation 1 (Mediator):

$$RIS = \beta_1 ENV + \beta_2 MAN + \beta_3 SOC + \beta_4 CLI + \beta_5 SAF + \varepsilon_1$$

Equation 2 (Outcome):

$$SUS = \beta_6 ENV + \beta_7 MAN + \beta_8 SOC + \beta_9 CLI + \beta_{10} SAF + \beta_{11} RIS + \varepsilon_2$$

4. Research Results

The reliability analysis shows that all variable groups achieved high Cronbach's Alpha coefficients (0.861-0.906), exceeding the 0.7 threshold and indicating strong internal consistency. All observed variables have Corrected Item - Total Correlations above 0.6, confirming their strong contribution to the respective constructs, with no items requiring removal. Furthermore, the "Cronbach's Alpha if Item Deleted" values are lower than or approximately equal to the overall Alpha of each scale, suggesting that removing any item would not improve reliability. Therefore, all variables (SAF, MAN, NAT, ENV, SOC, RIS, and SUS) were retained for subsequent analyses, including EFA, CFA, and SEM.

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.902
Bartlett's Test of Sphericity	Approx. Chi-Square	7585.497
	df	406
	Sig.	.000

Source: SPSS Results

The KMO and Bartlett's test results confirm the suitability of the data for Exploratory Factor Analysis (EFA). The KMO value of 0.902 exceeds the minimum threshold of 0.5, indicating a high level of intercorrelation among variables and an adequate sample size. Bartlett's Test of Sphericity is statistically significant (Chi-square = 7,585.497; df = 406; Sig. = 0.000 < 0.05), demonstrating that the correlation matrix differs from an identity matrix. This confirms that the variables are sufficiently correlated to justify factor extraction.

The Total Variance Explained results indicate that seven factors with eigenvalues greater than 1 were extracted, consistent with Kaiser's criterion and the study's theoretical framework. The first factor has the highest eigenvalue (9.261), explaining 31.93% of the total variance, highlighting its dominant role. The cumulative variance explained by all factors reaches 74.87%, exceeding the recommended threshold of 50-60%, which confirms that the model captures most of the data variability. The remaining factors (Factors 2-7) contribute between 3.96% and 11.24%, indicating a balanced distribution of explanatory power.

Table 2: Rotated Component Matrixa

	Component						
	1	2	3	4	5	6	7
MAN2	.872						
MAN4	.856						
MAN3	.853						
MAN5	.821						
MAN1	.744						
ENV4		.879					
ENV2		.879					
ENV1		.858					
ENV3		.742					
SOC3			.899				
SOC4			.883				
SOC2			.882				
SOC1			.833				
NAT4				.946			
NAT3				.866			
NAT1				.852			
NAT2				.827			
SAF1					.919		
SAF2					.847		
SAF4					.845		
SAF3					.844		
SUS4						.956	
SUS2						.929	
SUS1						.717	
SUS3						.692	
RIS2							.914
RIS1							.872
RIS4							.784
RIS3							.764

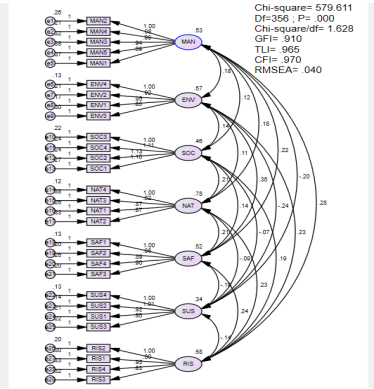
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

Source: SPSS Results

The results of the rotated factor matrix (Varimax) indicate a clear factor structure that is consistent with the proposed theoretical model. All observed variables exhibit high factor loadings, ranging from 0.692 to 0.956, exceeding the acceptable threshold of 0.5. This confirms strong convergent validity of the measurement scales.

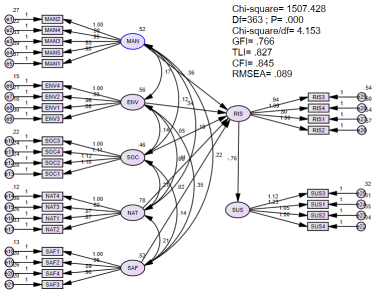
The Confirmatory Factor Analysis (CFA) results indicate a good fit between the measurement model and the data. All fit indices meet recommended thresholds: Chi-square/df = 1.628 (< 3), GFI = 0.910, TLI = 0.965, CFI = 0.970 (> 0.9), and RMSEA = 0.040 (< 0.05), confirming strong overall model fit. Convergent validity is supported, as all observed variables have high and statistically significant factor loadings (mostly above 0.7), adequately representing the latent constructs (MAN, ENV, SOC, NAT, SAF, RIS, SUS), with no items requiring removal. Discriminant validity is also achieved, as correlations among constructs are moderate and below 1, indicating no multicollinearity and confirming that the constructs are conceptually distinct.

Figure 1: Confirmatory Factor Analysis from Research Result



Source: Results from AMOS

Figure 2: Structural Equation Modeling from Research Result



Source: Results from AMOS

The Structural Equation Modeling (SEM) results indicate an acceptable overall model fit, satisfying conditions for interpreting causal relationships. The Chi-square/df value of 4.153 falls within an acceptable range for complex models, while RMSEA = 0.089 (< 0.10) suggests an adequate level of model fit.

Additionally, the goodness-of-fit indices (GFI = 0.766, TLI = 0.827, CFI = 0.845) all exceed the minimum threshold of 0.8, indicating a reasonably good fit and general support for the proposed theoretical framework. Although not optimal, the model demonstrates sufficient statistical adequacy and reliability for further analysis and discussion.

Table 3: Regression Weights

			Estimate	S.E.	C.R.	P	Label
RIS	<---	MAN	.360	.039	9.105	***	Accepted
RIS	<---	ENV	.344	.040	8.563	***	Accepted
RIS	<---	SOC	.051	.025	2.000	.045	Accepted
RIS	<---	NAT	.056	.020	2.814	.005	Accepted
RIS	<---	SAF	.017	.031	.549	.583	Rejected
SUS	<---	RIS	-.762	.093	-8.217	***	Accepted

Source: Results from AMOS

The SEM results show varying levels of significance across causal relationships, clarifying the roles of different risk groups. Management (MAN) and environmental risks (ENV) have strong, positive, and highly significant effects on overall risk (RIS) (p < 0.001). Socio-economic risks (SOC) also positively affect RIS, though at a lower significance level (p = 0.045). Natural and disaster-related risks (NAT) exhibit a significant positive impact (p = 0.005), highlighting their stable influence on overall risk. In contrast, safety and service risks (SAF) are not statistically significant (p = 0.583), suggesting a limited role in shaping RIS within this context.

Importantly, overall risk (RIS) has a strong and highly significant negative effect on sustainable tourism development (SUS) (p < 0.001). This confirms that increasing risk levels substantially undermine sustainability outcomes and reinforces the role of RIS as a key mediating variable linking component risks to sustainable development.

5. Discussion

The research findings provide empirical evidence that management, planning, and legal risks constitute the most influential group affecting risks in sustainable tourism development in Ha Long, with the highest regression coefficient (β = 0.360). This finding is consistent with theoretical approaches to destination governance, which emphasize that the effectiveness of public management, the coherence of planning, and the adequacy of legal frameworks play a foundational role in controlling risks arising from rapid and complex tourism development. In the context of Ha Long as a World Heritage destination, shortcomings in institutional coordination, overlapping plans, or weak law enforcement can exacerbate conflicts between short-term economic growth objectives and long-term conservation requirements, thereby increasing overall risk. This result also aligns with warnings issued by UNESCO regarding the potential degradation of Outstanding Universal Value at World Heritage Sites in the absence of effective and integrated governance mechanisms.

In addition, environmental pressure and overtourism are identified as the second most influential risk group affecting risks in sustainable tourism development in Ha Long (β = 0.344). This finding reinforces arguments in international studies on overtourism, which suggest that rapid growth in visitor numbers, high tourism intensity, and resource exploitation beyond environmental carrying capacity can lead to ecosystem degradation, diminished visitor experience, and erosion of the long-term development base of destinations (UNWTO, 2018; Gössling et al., 2020). For Ha Long, where marine ecosystems and unique karst landscapes are central to tourism attractiveness, the results indicate that insufficient control of carrying capacity, waste management, and environmental protection may become serious barriers to achieving long-term sustainable tourism goals.

Beyond these dominant risk groups, natural disaster and climate change risks are also confirmed to have a positive effect on risks in sustainable tourism development in Ha Long (β = 0.056). Although the magnitude of this effect is relatively modest, the finding highlights the growing importance of natural and climatic factors in shaping overall risk levels at coastal destinations. Recent studies indicate that climate change increases the frequency and intensity of extreme weather events, thereby affecting tourism safety, infrastructure, and business stability (Scott et al., 2019). Accordingly, the results emphasize the need to integrate climate adaptation and risk mitigation measures into Ha Long's sustainable tourism development strategies, rather than relying solely on traditional management solutions.

At the same time, socioeconomic risks are found to exert a positive and statistically significant effect on risks in sustainable tourism development (β = 0.051). This reflects the vulnerability of destinations that are highly dependent on tourism, where community livelihoods are closely tied to fluctuations in tourism markets. Shocks such as the COVID-19 pandemic have clearly demonstrated the risks of mono-sector dependence, leading to unemployment, income loss, and increased social inequality (OECD, 2020). In the context of Ha Long, issues such as rising living costs, housing pressure, and changes in local cultural values may weaken community support for tourism, thereby indirectly increasing overall risk. This implies that sustainable tourism development is not only an environmental or managerial issue but is also closely linked to social equity and sustainable local livelihoods.

Finally, the results confirm that risks in sustainable tourism development have a very strong negative effect on sustainable development outcomes, with a regression coefficient of β = -0.762. This finding indicates that as risks accumulate and intensify, the economic, social, and environmental outcomes of sustainable development deteriorate significantly. It reinforces the perspective that risk functions as a central mediating variable, reflecting the simultaneous accumulation of multiple risk groups and transmitting their negative effects to sustainable development outcomes. From an academic perspective, this result contributes to extending sustainable tourism research through an integrated systemic risk approach. From a practical standpoint, the study underscores that proactive identification, governance, and mitigation of risks are not merely supportive measures but essential prerequisites for ensuring and promoting the long-term sustainable tourism development of Ha Long.

6. Conclusion

This study examines sustainable tourism development from an integrated risk perspective, conceptualizing risk as a mediating variable that captures the cumulative effects of multiple risk groups on development outcomes. Using advanced quantitative techniques, including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM), the study develops and empirically validates a risk-based analytical model for Ha Long.

The results indicate that management, planning, and legal risks have the strongest impact on overall risk, followed by environmental pressure and overtourism. This underscores the critical role of governance, planning consistency, and regulatory effectiveness in managing risks associated with rapid tourism growth. Additionally, climate change, natural disaster, and socio-economic risks, although exhibiting smaller effect sizes, remain statistically significant, highlighting the multidimensional and interconnected nature of risks in coastal and heritage destinations. Notably, overall risk exerts a strong negative effect on sustainable tourism development, confirming that increasing risk levels substantially diminish economic, social, and environmental benefits. This finding demonstrates that risk is not merely a by-product but a key determinant of long-term sustainability outcomes.

From a theoretical perspective, the study contributes by advancing a systemic risk-based framework and emphasizing the mediating role of risk in tourism development. Practically, the findings suggest a shift from reactive to proactive risk governance, including strengthening institutional capacity, improving planning, managing carrying capacity, protecting ecosystems, enhancing climate adaptation, and supporting local livelihoods. Despite limitations in scope and data, the study provides valuable empirical evidence for policy and future research. Further studies may adopt comparative, longitudinal, or mixed-method approaches to deepen understanding of risk in sustainable tourism development.

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