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Tourism Resilience Through the Integration of Adaptation, Mitigation, and Transformation Towards Sustainable Tourism

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ABSTRACT

Tourism resilience is a key concept in maintaining the sustainability of destinations in the face of various crises such as pandemics, natural disasters, climate change, and socio-economic pressures. Global tourism faces increasingly complex dynamics of uncertainty, especially due to climate change, health crises, and socio-economic fluctuations. This condition requires tourism destinations to strengthen their resilience capacity through integrated adaptation, mitigation, and transformation strategies. This study aims to analyze the resilience process of destinations through three main pillars, namely adaptation, mitigation, and transformation that contribute to sustainable tourism development. Using a descriptive qualitative research method, data was collected through literature review. The results show that tourism resilience is formed through operational adaptation strategies, community-based risk mitigation, and transformation of tourism models towards long-term sustainability. Adaptation is carried out through diversification of tourism products, digitization of services, and strengthening community capacity. Mitigation is directed at reducing emissions, resource efficiency, and implementing green tourism standards. Meanwhile, transformation has emerged as a strategic phase that rearranges governance, business models, and destination development orientations to be more inclusive and resilient. These findings strengthen the understanding that resilience is not only the ability to recover from a crisis, but also the ability to grow and transform into a more resilient and innovative tourism system by identifying destination response patterns in managing risks and creating long-term stability so that it can realize sustainable tourism that is able to respond to crises while creating new value.

INTRODUCTION

The global tourism sector has experienced very rapid development in the last two decades and has become one of the main drivers of economic growth, job creation, and the strengthening of a region's cultural identity. However, behind this large economic contribution, tourism is also the sector that is most vulnerable to various types of disruptions (shocks), both short-term and long-term. Climate change, natural disasters, health crises, political instability, technological disruption, and changes in tourist behavior are external factors that can affect the stability and sustainability of a destination (Higgins, 2022). Tourism as a sector that is highly vulnerable to external shocks such as the COVID-19 pandemic has had a significant impact on a 74% decline in tourist visits globally (UNWTO, 2022). Similar impacts can also be seen in natural disasters such as flash floods in North Sumatra, West Sumatra, Aceh in 2025 and several impacts of earthquakes and mountain eruptions that cause disruptions to tourism activities ranging from the transportation industry, hotels, travel agencies, micro-tourism businesses, to local communities that depend on the tourism economy. This situation shows the urgency of strengthening the resilience of tourism destinations in order to be able to survive and recover from various crises.

The tourism sector is a very dynamic system and is vulnerable to various pressures, both caused by natural disasters, climate change, economic fluctuations, and global health crises. These disruptions raise the urgency to build a tourism system that is not only able to survive, but also recover and transform towards long-term sustainability (Hanna & Reilly, 2022). This impact emphasizes the importance of building resilient destinations, not only to be able to recover from crises, but also to be able to adapt and transform to be stronger and more sustainable. The concept of tourism resilience is becoming increasingly relevant. Resilience also includes the capacity to innovate and transform the tourism system to be able to face future challenges (Becken, 2020). Resilience is often understood through three main pillars: adaptation, i.e. adaptation to external changes; mitigation, which is preventive measures to reduce potential risks; and transformation, which is structural changes that create a more innovative, inclusive, and sustainable tourism system. These three aspects play an important role in encouraging destinations to be more resilient in the face of environmental, social, and technology-based threats (Gretzel, 2021).

Studies on adaptation, mitigation, and transformation are increasingly important because global developments show trends in green tourism, digitalization, strengthening community-based tourism, and attention to socio-cultural sustainability. Without strong resilience, tourism destinations have the potential to experience stagnation, decreased competitiveness, and long-term vulnerability. The concept of tourism resilience develops from the disciplines of ecology and disaster studies. Becken (2021) defines resilience as the ability of a system to absorb disruptions, adapt, and transform without losing its function. In the context of tourism, this study emphasizes that resilience involves multi-stakeholder collaboration, tourism product innovation, and planned risk management. Tourism resilience is becoming increasingly important as many destinations depend on tourism revenue. Therefore, an in-depth scientific study is needed to understand how destinations build resilience through adaptation, mitigation, and transformation strategies.

Adaptation to the Tourism Destination Crisis

Empirical research during and post-COVID-19 has extensively documented adaptation practices in tourist villages that shift focus to domestic markets and community-based experience products, coastal destinations that implement visit quotas and ecosystem zoning, and regions that develop digital platforms for co-marketing (Gössling et al., 2020; regional study 2022–2024). Resilience to small businesses that are quick to adopt digital innovations tends to be more able to survive.

Adaptation is defined as a set of actions and processes that allow destinations to adjust their operations, governance, and products to reduce vulnerability and take advantage of new post-crisis opportunities. This concept is often framed in the broader perspective of resilience, which includes the ability to absorb, recover, and transform (Zhang et al., 2024). The framework generally includes adaptive capacity (adaptive capacity) such as resources, knowledge, social networks, and governance that enable adaptation, Vulnerability Assessment such as the identification of the exposure, sensitivity, and adaptive capacity of the destination, Adaptive Governance such as flexible and responsive multi-stakeholder policy and collaboration mechanisms.

The context of tourism crisis adaptation can be relevantly grouped for tourism destinations, namely Operational Adaptation (tactical), which is short-term adaptation and focuses on operational sustainability: health protocols, capacity restrictions, event rescheduling, digitization of reservation and payment services, and human resource training for emergency procedures (Sigala, 2020). Second, Structural Adaptation (infrastructure and environment) is a medium- to long-term step that includes the development of disaster-resistant infrastructure, coastal protection, water resource management, and the implementation of climate-friendly tourism designs (Scott et al., 2022; Gössling, 2023). Third, Socio-Economic

Adaptation (communities and local businesses) is an intervention that strengthens the economic resilience of the community, such as diversification of livelihoods, development of tourism products based on local wisdom, support programs for tourism SMEs, and social solidarity networks. Socio-economic adaptation is driven by the need to maintain the stability of the livelihoods of local communities. Global crises often hit small tourism sectors such as MSMEs and local guides. Therefore, diversifying livelihoods, creating cultural-based tourism products, and strengthening the domestic market are proven to be effective adaptation strategies (Dewi et al., 2024). Fourth, namely Technological Adaptation and Digitalization (Transformational) That is, when the crisis conditions trigger more fundamental changes in business and governance models: the transition to sustainable/low-carbon tourism, collaboration-based governance reforms, and destination reinventing (digital transformation, rebranding, product restructuring). Digitalization has become one of the most prominent forms of adaptation in the latest literature. The technology is used for marketing, transactions, traveler management, risk mitigation, and the creation of virtual experiences (Hidayat et al., 2025). Digital transformation strengthens economic resilience by opening up opportunities for small businesses to remain operational during mobility restrictions and this transformation is often seen as a step towards long-term resilience (Zhang et al., 2024). Fifth, namely Institutional Adaptation and Governance (Governance Adaptation) is a successful adaptation that relies heavily on Governance such as cross-sectoral coordination, evidence-based policy, community engagement, and public-private partnerships. Government (Governance) that are non-adaptive and too rigid tend to inhibit rapid responses, while the mechanisms that encourage Learning, flexibility, and distribution of authority will help accelerate adjustment to crisis adaptation (Zhang et al., 2024; Sigala, 2020). Mechanisms such as multi-stakeholder governance, community participation, disaster coordination forums, to Co-creation policies proven to strengthen adaptation responses (Brouder, 2020).

Identify the above determinants of adaptation success that determine the success of destinations including the strength of social capital and community networks (Prihadi et al., 2024), digital innovation in business and marketing processes, strong and sustainable inter-stakeholder collaboration, financial capacity and government support, institutional readiness in responding to crisis dynamics, data-driven policy development and empirical evidence (Kusuma Dewi, 2024). Destinations that integrate these factors show faster and more stable recovery rates than destinations whose adaptation is fragmentary. Adaptation is a crucial process, many destinations face obstacles, including limited funds for adaptive infrastructure investment, digital inequality between large and small destinations, weak coordination between actors, and resistance to changes in government institutions. high dependence on mass tourism, low technical capacity of human resources (Rahmat et al., 2025) and these obstacles cause adaptation to run unevenly, even causing new inequalities between regions. Adaptation of tourism destination crises is not only a technical step, but is a systemic process that requires integration between social, economic, technological, environmental, and governance aspects. Thus, adaptation becomes the main foundation that connects mitigation and transformation towards sustainable tourism.

METHOD

This study used a descriptive qualitative approach with the literature review method. This approach aims to systematically describe concepts, practices, and empirical findings related to tourism resilience through the integration of adaptation, mitigation, and transformation that support destination sustainability. The data sources consist of articles from international and national journals that discuss tourism resilience, destination adaptation, tourism risk mitigation, sustainability transformation and sustainable tourism development

models and official documents from UNWTO, the Ministry of Tourism and Creative Economy and academic books. Data collection techniques by identifying and selecting literature and article selection based on the keyword's tourism resilience, adaptation in tourism, tourism mitigation, tourism transformation and sustainable tourism development with criteria relevant to the theme of tourism resilience.

RESULT AND DISCUSSION

Mitigation of Tourism Destinations

Crisis mitigation in tourism is a series of strategies to reduce risks, minimize negative impacts, and improve destination preparedness in facing various forms of crises, both environmental, health, political, and socio-economic. In the era of climate change, global pandemics, and economic instability, mitigation needs are an integral part of sustainable destination management. Mitigation is not only responsive, but also preventive that can prevent ecosystem damage, improve tourist safety, and strengthen risk governance. In recent years, research has emphasized the importance of ecosystem-based mitigation, technology, and *community-based governance* as the foundation of tourism resilience (Becken, 2021; Prayag, 2022). The concept of mitigation in the context of tourism includes systematic efforts to reduce the vulnerability of destinations through planning, risk reduction, protection of tourism assets, and capacity building of actors. Becken (2020) explained that mitigation includes efforts to reduce carbon emissions, protect natural resources, and resilient infrastructure. Mitigation is also related to *early warning systems*, evacuation SOPs, visitor management, and more adaptive destination design. In addition, mitigation includes *social risk mitigation* approaches such as labor protection and strengthening the capacity of local communities that are often the most affected parties in crises (UNWTO, 2023).

Socio-economic mitigation is related to income stability of local communities, business diversification, labor protection, and capacity building of the creative economy. Tourism crises often have a capital-intensive and labor-intensive impact, so worker protection is critical. The Prayag study (2022) confirms that community economic diversification is a key factor in reducing the impact of the crisis.

Technology plays a strategic role in mitigating the tourism crisis through disaster monitoring systems, big data analytics, early warning applications, disaster sensors, and visitor management dashboards. IoT *(internet of think)* is also used to monitor the ecological pressure and carrying capacity of destinations (Ioannides, 2021). Effective mitigation implementation requires multi-level governance, involving governments, business actors, communities, academics, and NGOs. Hall (2022) argues that successful mitigation is built through the integration of environmental policies, spatial regulations, and community participation. *Collaborative governance* plays an important role because mitigation is cross-sectoral and requires intensive coordination. Mitigation is an important pillar in building tourism resilience. Comprehensive mitigation strategies include environmental, disaster, socio-economic, and technology-based mitigation. By strengthening mitigation, destinations can reduce risk vulnerability and prepare for a more stable, safe, and sustainable tourism system in the long term. Effective mitigation implementation requires multi-level governance, involving governments, business actors, communities, academics, and NGOs. Hall (2022) argues that successful mitigation is built through the integration of environmental policies, spatial

regulations, and community participation. *Collaborative governance* plays an important role because mitigation is cross-sectoral and requires intensive coordination.

The types of mitigation in tourism destinations include (1) Environmental Mitigation, which is environmentally based mitigation is very important considering that many destinations are vulnerable to natural disasters such as floods, coastal erosion, landslides, and extreme weather. Commonly applied approaches include ecosystem restoration, conservation of sensitive areas, use of renewable energy, and reduction of carbon emissions (Hall et al., 2022). *Green infrastructure* such as mangrove forests, coastal vegetation, and watershed revitalization has been proven to reduce the impact of disasters while supporting ecotourism. (2) Disaster and Emergency Mitigation, namely disaster mitigation including the preparation of contingency plans, evacuation routes, safety information boards, routine simulations, and tour guide training. High-risk destinations such as volcanoes, coasts, and small islands are required to have disaster preparedness protocols. The COVID-19 pandemic has reinforced the importance of health protocols, operational SOPs, and data-driven crowd management (Sigala, 2020; Higgins-Desbiolles, 2022). (3) Socio-Economic Mitigation related to income stability of local communities, business diversification, labor protection, and capacity building of the creative economy. Tourism crises often have a capital-intensive and labor-intensive impact, so worker protection is critical. The Prayag study (2022) confirms that community economic diversification is a key factor in reducing the impact of the crisis. (4) Technology-Based Mitigation, namely technology plays a strategic role in mitigating tourism crises through disaster monitoring systems, *big data analytics*, early warning applications, disaster sensors, and visitor management dashboards. Mitigation is an important pillar in building tourism resilience. Comprehensive mitigation strategies include environmental, disaster, socio-economic, and technology-based mitigation. By strengthening mitigation, destinations can reduce risk vulnerability and prepare for a more stable, safe, and sustainable tourism system in the long term.

Tourism Destination Transformation

Destination transformation is a long-term structural and strategic change that allows destinations to become more sustainable, innovative, resilient, and adaptive to global changes. Transformation includes not only recovery from the crisis, but also a paradigm shift towards *green tourism, digital tourism, circular economy*, and *community-centered tourism*. According to Brouder (2020), the global crisis opens up space to reorganize tourism models and drive systemic transformation.

Tourism transformation increasingly emphasizes *community empowerment*, community participation, and fairer benefit *sharing*. Tourism transformation includes (1) Governance Transformation, namely greater involvement in the community and transparency in managing destinations. (2) Business Model Transformation, which is carried out a business model based on digitalization, diversification and innovation, (3) Sustainability Transformation, which is applying environmental, social and economic principles to destinations, (4) Destination Space Transformation, namely rearrangement of carrying capacity and *carrying capacity*. Transformation is often driven by crises so as to accelerate the digitalization of tourism, *hybrid tourism services*, and the use of *contactless technology* (Gretzel, 2021). The following is the mindset on the concept of Tourism Resilience Through

Adaptation, Mitigation and Transformation Towards Sustainable Tourism can be described as follows:

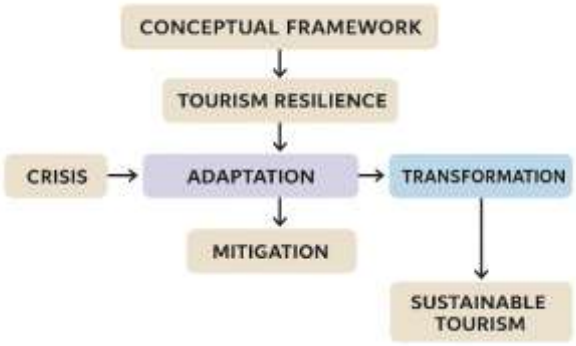

Figure 1. Tourism Resilience Concept Framework

The role of adaptation, mitigation, and transformation in comprehensively shaping the tourism resilience framework does not arise instantly, but is an accumulation of gradual processes involving three key elements: adaptation, mitigation, and transformation (Nascimento, et al., 2023). These three elements form a system that supports each other and creates the ability of destinations to survive, recover, and thrive in the midst of various crises. The following is an overview of the role and impact of adaptation, mitigation and transformation (AMT) in forming a comprehensive tourism resilience framework below:

PERAN ADAPTASI, MITIGASI, DAN TRANSFORMASI DALAM MEMBENTUK KERANGKA RESILIENSI PARIWISATA SECARA KOMPREHENSIF

ELEMEN	PERAN	DAMPAK
Adaptasi	Mekanisme respons cepat dan pemulihan awal	Menstabilkan sistem saat krisis terjadi
Mitigasi	Penguatan sistemik untuk pengurangan risiko	Krisis berikutnya memiliki dampak lebih kecil
Transformasi	Reposisi sistem pariwisata menuju keberlanjutan	Destinasi tidak hanya pulih, tetapi tumbuh lebih kuat

Figure 2. The Role and Impact of AMT

A comprehensive analysis of how Adaptation–Mitigation–Transformation (AMT) can build tourism resilience so that destination capacity can survive, adapt, and rise stronger after experiencing shocks (health crises, natural disasters, economic instability, and climate change). This resilience framework is formed through three key elements of AMT simultaneously.

The integration of adaptation, mitigation, and transformation results in holistic tourism resilience capacity. The integration of the three pillars of AMT forms a continuous strengthening cycle. Adaptation addresses immediate impacts, mitigation reduces long-term risks, while transformation ensures structural renewal and destination innovation. AMT alignment can be formed a holistic resilience capacity that includes ecological, social, economic, cultural, technological, and institutional dimensions (Becken & Whittlesea, 2020;

Cheer, 2022). This integration also allows destinations not only to " *bounce back"* but to " *bounce forward"* towards sustainable tourism. Adaptation provides a rapid response that prevents the collapse of tourism activities. Mitigation strengthens systems through risk reduction and vulnerability control. The transformation then ensures that the destination does not just recover, but builds a new tourism system that is more innovative, sustainable, and aligned with the needs of the future.

These three elements work in *a co-evolutionary* relationship, i.e. they influence and develop on the basis of previous crisis experiences. Thus, destinations can build a pattern of resilience that is repeated and increased, generating *adaptive capacity, absorptive capacity,* and transformative capacity that are at the core of sustainable tourism.

Destination resilience formed through adaptation, mitigation, and transformation (AMT) contributes to the achievement of the final goal, namely sustainable tourism characterized by *environmental sustainability*, local economic *sustainability,* social *sustainability,* and collaborative governance. Thus, sustainable tourism is not only the result of long-term planning, but also the result of a process of resilience built from the experience of facing crises.

CONCLUSION

The results of the study show that tourism resilience is formed through the integration of three main strategies, namely adaptation, mitigation, and transformation that run dynamically as a response to the destination to the crisis. This study concludes that tourism resilience is formed through strategic integration between operational adaptation, community-based risk mitigation, and transformation of tourism development models. These three elements work in a complementary manner in strengthening the ability of destinations to respond, absorb, and transform due to crisis pressures. First, adaptation plays a role as an initial response that maintains the sustainability of tourism functions through product diversification, digitization of services, and capacity building of local communities. Adaptation allows destinations to maintain operational stability in critical phases. Second, risk mitigation provides a preventive foundation through reducing emissions, optimizing resource efficiency, and implementing green tourism standards that strengthen the ecological security of destinations and reduce long-term vulnerabilities. Third, transformation becomes a strategic phase that changes governance, business models, and tourism development orientations towards a more inclusive, resilient, and sustainable system. This transformation makes resilience not just a recovery process, but the formation of a new tourism model that is more adaptive to change. Thus, this study confirms that resilience is not only the ability of destinations to recover from crises, but also the ability to develop, reorganize, and strengthen the foundations of long-term tourism through adaptive, mitigating, and transformative change.

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