

Risk Management Strategies in the Tourism Industry: Developing an ANP Model for Risk Reduction and Resilience Enhancement Amid Crises

Marbawi¹, Yulius Dharma², Nur Faliza³, Harris Fakhrial⁴, Rina Malinda⁵

Abstract

This study investigates risk management strategies in the tourism industry by developing an Analytic Network Process (ANP) model that aims to increase resilience and reduce risks during crises. The tourism sector is inherently vulnerable to a variety of uncertainties, including natural disasters, economic fluctuations, and global health emergencies. Through a comprehensive analysis of key factors such as destination characteristics, stakeholder capacity, regulation, and market dynamics, the study identifies three key strategies: Integrated Public-Private Collaboration Model, Adaptive and Resilient-Based Model, and Smart Technology-Based Model. The results show that the Adaptive and Resilient-Based Model is a top priority for effective risk mitigation, emphasizing the importance of flexibility and adaptability. The results showed that the Adaptive and Resilient-Based Model is a top priority for effective risk mitigation, emphasizing the importance of flexibility and adaptability. Key elements supporting this model include robust infrastructure, advanced technology, skilled human resources, and strong collaboration between stakeholders. The findings provide practical guidance for policymakers and industry stakeholders, highlighting the importance of innovative and sustainable approaches to strengthen the tourism industry's resilience to dynamic risks and crises.

Keywords: Risk Management, Tourism Industry, Crisis Response Strategies, Increased Durability.

Introduction

The tourism industry is an important component of the global economy, making a significant contribution to employment and product domestic bruto (PDB) in many countries. However, the industry is also highly vulnerable to various crises, including natural disasters, economic downturns, and pandemics, which can disrupt operations and threaten sustainability. Pandemic COVID-19 has underscored vulnerabilities in the tourism sector, exposed the inadequacies of existing risk management frameworks, and emphasized the urgent need for stronger strategies to improve resilience and recovery (Nagaj & Žuromskaitė, 2021; Sharma et al., 2021). In this context, there is a need for a deeper exploration of risk management strategies tailored specifically for the tourism industry, especially through innovative frameworks such as the Analytic Network Process (ANP).

Although the literature on resilience in tourism is growing, there is still a significant gap in understanding how specific risk management strategies can be effectively integrated into operational frameworks. For example, while studies have examined the general concept of resilience, there is a lack of empirical research focusing on the application of structured methodologies such as ANP in developing a comprehensive risk management strategy (Huang et al., 2022; Adekuajo, 2023). Additionally, the existing literature often overlooks the subtle differences between the various tourism sectors and their unique resilience capacities, which can lead to generalized conclusions that may not apply across all sectors (Prodi et al., 2023; Gaki & Koufodontis, 2022). This gap demonstrates the need for a more tailored approach that takes into account the specifics of different tourism segments and their response to the crisis.

The uniqueness of this research lies in its proposal to develop an ANP model designed specifically for the tourism industry, which aims to improve risk reduction and resilience during a crisis. By using ANP, This study seeks to provide a systematic approach to evaluating and prioritizing risk management strategies based

¹ Department of Management, Universitas Malikussaleh, Aceh, Indonesia, Email: marbawi@unimal.ac.id

² Department of Management, Universitas Malikussaleh, Aceh, Indonesia, Email: yulius.dharma@unimal.ac.id

³ Department of Management, Universitas Malikussaleh, Aceh, Indonesia, Email: nurfaliza@unimal.ac.id

⁴ Department of Management, Universitas Malikussaleh, Aceh, Indonesia.

⁵ Department of Management, Universitas Malikussaleh, Aceh, Indonesia

on dependencies and feedback between factors that affect tourism resilience (Huang et al., 2022; Wen & Dai, 2021). This model not only addresses the immediate challenges posed by the crisis but also contributes to long-term sustainability by fostering adaptive capacity within the tourism sector. In addition, this model is in line with recent calls to integrate disaster management principles into tourism planning, thus promoting a proactive rather than reactive approach to crisis management (Peng, 2023; Wen & Dai, 2021).

In conclusion, this study aims to fill a critical gap in the existing literature by proposing a structured ANP model, which addresses the unique challenges facing the tourism industry in managing risk and improving resilience. In doing so, the study hopes to provide valuable insights that can assist policymakers and industry stakeholders in developing more effective risk management strategies, tailored to the complexity of the tourism landscape.

Literature Review

Risk Management In Tourism Theory

The tourism industry is inherently vulnerable to a variety of crises, including natural disasters, economic fluctuations, and health emergencies, as evidenced by the recent COVID-19 pandemic. This situation has highlighted the critical need for effective risk management strategies that enhance resilience and facilitate recovery in tourism destinations (Yang & Kim, 2023; Gaki & Koufodontis, 2022). The literature shows that while many frameworks exist for crisis management in tourism, there is an urgent need for models that specifically address the unique challenges facing the sector, especially through structured methodologies such as the Analytic Network Process (ANP) (Casal-Ribeiro et al., 2023).

Community Resilience and Tourism Theory

Community resilience plays a critical role in the tourism sector's ability to survive and recover from crises. Yang dan Kim (2023) emphasizes that community readiness, responsiveness, and recovery greatly affect the quality of life of residents and the sustainability of tourism development. This relationship suggests that increasing community resilience can lead to better tourism outcomes, necessitating the integration of community-focused strategies into risk management frameworks. Moreover, Gaki and Koufodontis (2022) argue that regions with diverse economic structures and adaptive capacities tend to recover more effectively from shocks, suggesting that a deep understanding of local contexts is essential for developing effective risk management strategies.

Crisis Management Framework Theory

A systematic review of the crisis management framework in tourism reveals a range of approaches that have been proposed to guide stakeholders through the crisis phase (Casal-Ribeiro et al., 2023). These frameworks typically include pre-crisis preparedness, crisis response, and post-crisis recovery, emphasizing the importance of a holistic approach to crisis management. However, many existing frameworks lack empirical validation and fail to accommodate the complexity of inter-organizational relationships and community dynamics (Braje et al., 2022). This gap provides an opportunity for the development of an ANP model that can systematically evaluate and prioritize risk management strategies based on these dependencies.

Tourism Resilience of UKM

Small and medium-sized business resilience (UKM) In tourism is very important, as these businesses are often the backbone of the local economy (Badoc-Gonzales et al., 2022). Badoc-Gonzales et al. (2022) highlight that increased network collaboration among tourism SMEs can promote community development and resilience. However, Aydogan et al. (2023) show that there is a dichotomy in the literature regarding the resilience of small versus large organizations, suggesting that these two types of entities have unique vulnerabilities and strengths in crises. This complexity requires a tailored risk management approach, which takes into account the specific characteristics of organizations of different sizes.

Methodology

In this study, the model Analytic Network Process (ANP) is used to design risk management strategies in the tourism industry by analyzing the complex relationships between key factors and sub-factors, such as destination characteristics, stakeholder capacity, regulations and policies, and tourism market dynamics. ANP facilitates the mapping of relationships between these elements through paired comparisons and supermatrices to determine effective strategy priorities. This study evaluates three alternative strategies: the Integrated Public-Private Collaboration Model, the Adaptive and Resilient-Based Model, and the Smart Technology-Based Model. These strategies were chosen for their ability to manage risk collaboratively, adapt quickly to change, and utilize technology to predict and mitigate risks in the tourism sector.

This model is built with four main factors which are: **first**, characteristics of tourist destinations, which include aspects of geography, infrastructure, cultural heritage, and the types of tourist attractions offered (Newsome et al., 2013); **second**, stakeholder capacity, which consists of human resource knowledge, financial resources, technology, and cooperation networks (Buhalis & Law, 2008); **third**, Regulations and policies, which are legal and regulatory frameworks that govern safety, security, environment, operational standards, and consumer protection in the tourism industry to ensure the sustainability and quality of the tourism experience (Rajendran, 2023); and **fourth** tourism market dynamics, which include trends in tourist demand and behavior, seasonal travel patterns, competition between tourist destinations, as well as technological developments that affect tourism experience and destination management (Cohen et al., 2014; Pearce, 2011; Buhalis & Law, 2008). These four factors are interrelated and influence each other in building an effective risk management model.

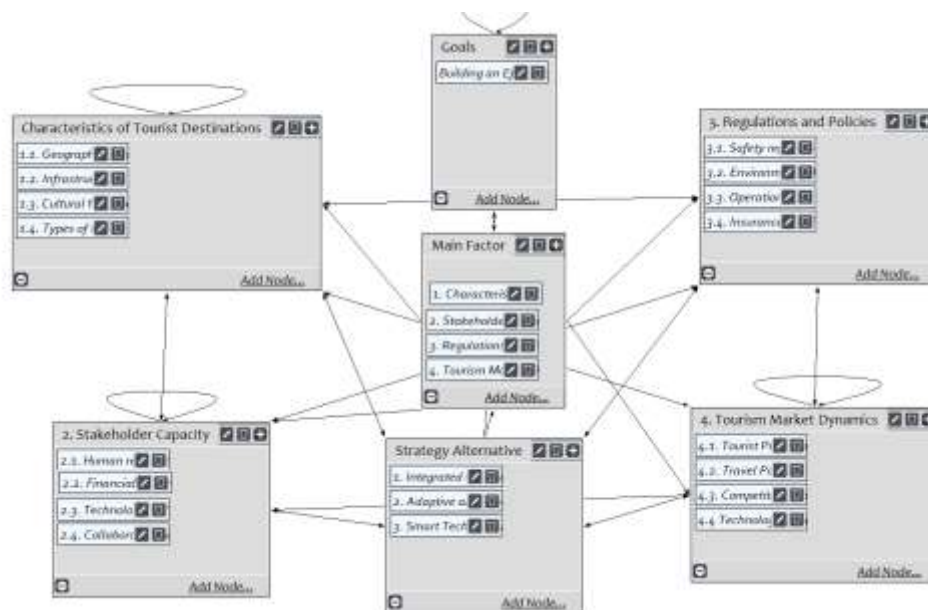


Figure 1. Research Conceptual Framework

Result

The government-private sector collaboration model and the smart technology-based model are also considered important but are not prioritized as much as the adaptive model. Key elements that should be prioritized to support this model include the infrastructure and facilities available (0.41574), Information Technology and Systems (0.43426), Knowledge and skills of human resources (0.40725), Collaboration between stakeholders (0.43199), Regulations and policies (0.10377), and financial resources (0.40125). This priority aims to strengthen tourism resilience in the face of various risks and crises.

Table 1. Priority Matrix

Name	Normalized Cluster	By	Limiting
1.1 Geography and natural environment	0.35306		0.066271
1.2 Available infrastructure and facilities	0.41574		0.078036
1.3 Cultural and historical heritage	0.05564		0.010443
1.4 Types of tourism attractions offered	0.17557		0.032955
1.5 Knowledge and skills of human resources	0.40725		0.063703
1.6 Financial resources	0.08965		0.014024
2.3 Technology and information systems	0.43426		0.067928
2.4 Cooperation and coordination among stakeholders	0.68853		0.10767
3.1 Safety and security regulations	0.43199		0.058533
3.2 Tourism industry management policies	0.13846		0.014497
3.3 Standard operating procedures in the tourism industry	0.34998		0.046753
3.4 Consumer insurance and protection policies	0.07337		0.009801
4.1 Tourist preferences and expectations	0.23288		0.053927
4.2 Travel patterns and trends	0.28682		0.047904
4.3 Competition among tourist destinations	0.17781		0.029697
4.4 Development of technology in the tourism industry	0.21250		0.035491
1 Integrated Government-Private Sector Collaboration Model for Sustainable Tourism Risk Management	0.21250		0.050591
2 Adaptive and Flexible Resilience-Based Model for Mitigating Dynamic Risks in the Tourism Industry	0.50101		0.102298
3 Smart Technology-Based Model for Optimizing Digital Tourism Risk Management	0.25122		0.051294
4.1 Destination characteristics	0.21408		0.032343
4.2 Stakeholder capacity	0.12978		0.019608
4.3 Regulations and policies	0.10377		0.011716
4.4 Tourism market dynamics	0.05237		0.007912

Adaptive and Flexible Resilience-Based Models were identified as top priorities in addressing dynamic risks in the tourism industry, with the value of "Normalized by Cluster" the highest amount of 0,50101. The ability of this model to effectively address and manage evolving risks makes it essential in improving the resilience of the sector. Meanwhile, the Government-Private Sector Integrated Collaboration Model (Normalized by Cluster: 0,21250) and Intelligent Technology-Based Model to Optimize Digital Tourism Risk Management (Normalized by Cluster: 0,25122) is also significant, but its level of importance is still below the model that prioritizes adaptability and flexibility.

To ensure the success of the Adaptive and Flexible Model, Some key elements need to be prioritized. This includes Infrastructure and Facilities (Normalized by Cluster: 0,41574), Technology and Information Systems (0,43426), and Knowledge and Skills of Human Resources (0,40725). Moreover, Cooperation and Coordination Between Stakeholders (0,43199), Regulations and Policies (0,10377), and Financial Resources (0,40125) It is also crucial to create a strong foundation in implementing this model. By focusing on these factors, the tourism industry can strengthen its resilience to dynamic risks and be better able to deal with crises.

Discussion

The tourism industry is a dynamic sector of the global economy, but it is highly vulnerable to various risks and uncertainties, such as natural disasters, climate change, and economic fluctuations. This uncertainty can disrupt the growth and reduce the attractiveness of a tourist destination. Therefore, the implementation of adaptive and flexible risk management strategies is essential for the sector to survive and thrive in the face of various challenges. The literature shows that effective risk management is essential to maintain tourism

competitiveness, especially amid disasters and crises (Liu et al., 2019; Sharma et al., 2021). Liu et al. (2019) emphasized that a robust risk management framework can improve tourism competitiveness by protecting critical infrastructure from potential threats. In addition, the COVID-19 pandemic has underscored the need for adaptive strategies that can respond to rapidly changing conditions, thus reinforcing the importance of resilience in tourism (Sharma et al., 2021).

Adaptive and Flexible Resilience-Based Models

The Adaptive and Flexible Resilience-Based Model offers an approach that allows tourism organizations to adapt their strategies and operations to unexpected changes. This model utilizes advanced technology to monitor risks in real time and is supported by the development of competent human resources. The integration of critical elements such as infrastructure, technology, policy, and collaboration between stakeholders is essential for effective risk mitigation in the tourism industry. Research shows that the incorporation of technology and information systems significantly improves the ability to monitor environmental risks and make informed decisions (Kashem et al., 2022; Panyadee et al., 2023). Additionally, the model's focus on stakeholder collaboration is crucial, as effective partnerships can lead to a more coordinated response to crises (Novelli et al., 2018; Tulungen et al., 2021). The application of this model is expected to build long-term resilience, minimize negative impacts, and ensure the sustainability of the tourism sector during complex challenges (Sharma et al., 2021).

Key Elements to Support the Model

The key elements that need to be prioritized to support this Adaptive and Flexible Model include several aspects. First, resilient infrastructure and facilities enable rapid response to emergencies and accelerate post-crisis recovery. Research shows that investment in resilient infrastructure is critical to improving resilience in tourism ("Natural Hazards and Their Effects on the Tourism and Hospitality Sector in the Philippines", 2023; Butler, 2018). Second, Information technology and systems play a crucial role in effectively monitoring environmental risks and providing accurate data for informed decision-making. Intelligent technology integration can facilitate real-time risk assessment and improve operational efficiency (Panyadee et al., 2023). Third, the Knowledge and skills of human resources (HRM) adequate is essential to ensure readiness to face threats. Well-trained human resources can quickly identify risks and take effective mitigation actions, thereby strengthening the organization's ability to cope with crises (Era & Rosario, 2020; Dewi, 2024). The importance of human capital in crisis preparedness has been widely documented, as skilled personnel are essential for the implementation of effective risk management strategies (Sharma et al., 2021).

Model Implementation in Practice

To implement this Adaptive and Flexible Model in practice, several strategies need to be implemented. First, competency-based training and development of Human Resources must be carried out regularly, including emergency response simulations to increase readiness to face crises. Continuous training is essential to improve the adaptive capacity of tourism organizations (Era & Rosario, 2020; Sharma et al., 2021). Second, investment in technology and information systems must be strengthened, especially through the development of real-time monitoring systems that can identify threats more quickly. The use of advanced technology is increasingly recognized as an important factor in increasing the resilience of the tourism sector (Kashem et al., 2022; Panyadee et al., 2023). Third, the development of resilient infrastructure needs to be carried out by building disaster-resistant facilities and strengthening supporting infrastructure such as transportation and health services. Research shows that strong infrastructure is essential for crisis management and effective recovery in tourism ("Natural Hazards and Their Effects on the Tourism and Hospitality Sector in the Philippines", 2023; Butler, 2018). Finally, cooperation between stakeholders must be strengthened through close partnerships between governments, the private sector, and communities to ensure an effective collective response to crises (Novelli et al., 2018; Tulungen et al., 2021).

Challenges in Implementation

In implementing this model, several challenges must be overcome. First, resistance to change among HR can be a barrier, especially if they don't understand the importance of implementing this model. Effective change management and clear communication are essential to overcome these barriers (Pradini, 2024; Sharma et al., 2021). Second, budget and resource constraints can also hinder progress, especially related to technology investment and infrastructure development. To overcome this, efforts must be made to seek financial support and allocate resources efficiently (Hoa & Huy, 2021; Eva, 2024). Third, the lack of collaboration between stakeholders is often a barrier, but this can be overcome by strengthening partnerships through regular meetings and joint training (Novelli et al., 2018; Tulungen et al., 2021). Finally, the lack of understanding and readiness regarding the importance of this adaptive model is another challenge that can be overcome through continuous education and extensive information campaigns (Era & Rosario, 2020; Sharma et al., 2021).

Conclusion

Adaptive and Flexible Resilience-Based Models for Dynamic Risk Mitigation in the Tourism Industry (Model 2) is a key strategy that emphasizes the importance of flexibility and adaptation in the face of uncertainty. This model is designed to improve the resilience of the tourism sector by prioritizing key elements such as infrastructure, technology, Human Resources knowledge, stakeholder collaboration, regulation, and financial resources. Collaboration between stakeholders and the application of technology are crucial aspects, while the integration of local wisdom can strengthen the risk management process.

Recommendations

Based on the findings, several recommendations to improve risk management in the tourism industry were proposed. First, building risk management capacity through strengthening infrastructure and training is essential. Second, the development of an early warning system for risks that arise through advanced technology must be pursued. Third, collaboration with stakeholders needs to be improved to create better synergies in handling risks.

References

- Adekuajo, I. (2023). Climate resilience in tourism: a synthesis of global strategies and implications for u.s. destinations. *Ecofeminism and Climate Change*, 4(2), 128-137. <https://doi.org/10.26480/efcc.02.2023.128.137>
- Aydogan, M., Curiel, J., Antonovica, A., & Çetin, G. (2023). Characteristics of crises resilient organizations in the hospitality and tourism industry. *International Journal of Contemporary Hospitality Management*, 36(4), 1432-1453. <https://doi.org/10.1108/ijchm-12-2022-1630>
- Badoc-Gonzales, B., Mandigma, M., & Tan, J. (2022). Sme resilience as a catalyst for tourism destinations: a literature review. *Journal of Global Entrepreneurship Research*, 12(1), 23-44. <https://doi.org/10.1007/s40497-022-00309-1>
- Braje, I., Dumančić, K., & Hruška, D. (2022). Building resilience in times of global crisis: the tourism sector in croatia. *European Political Science*, 22(3), 406-415. <https://doi.org/10.1057/s41304-022-00384-8>
- Butler, R. (2018). Sustainable tourism in sensitive environments: a wolf in sheep's clothing?. *Sustainability*, 10(6), 1789. <https://doi.org/10.3390/su10061789>
- Casal-Ribeiro, M., Boavida-Portugal, I., Peres, R., & Seabra, C. (2023). Review of crisis management frameworks in tourism and hospitality: a meta-analysis approach. *Sustainability*, 15(15), 12047. <https://doi.org/10.3390/su151512047>
- Dewi, I. (2024). The influence of internal audit and risk control on crisis management in the tourism industry in indonesia. *The Es Accounting and Finance*, 2(02), 138-149. <https://doi.org/10.58812/esaf.v2i02.221>
- Era, J. and Rosario, J. (2020). Examining tourism resilience practices as basis for a post-covid 19 recovery in the philippines. *Asean Journal on Hospitality and Tourism*, 18(1), 1-12. <https://doi.org/10.5614/ajht.2020.18.1.01>
- Eva, M. (2024). Covid-19 disruptions driving sustainable tourism: a case of the hawaiian tourism industry. *International Conference on Tourism Research*, 7(1), 67-73. <https://doi.org/10.34190/ictr.7.1.2000>
- Gaki, e. And koufodontis, N. (2022). Regional tourism resilience and recovery in times of crises. *Geojournal of Tourism and Geosites*, 40(1), 259-266. <https://doi.org/10.30892/gtg.40131-827>
- Hoa, N. and Huy, D. (2021). Vietnam tourism services development during and after covid 19 pandemic: situation and solutions. *Revista Gestão Inovação E Tecnologias*, 11(3), 23-34. <https://doi.org/10.47059/revistageintec.v11i3.1913>
- Huang, W., Chen, C., & Fu, Y. (2022). The sustainable island tourism evaluation model using the fdm-dematel-anp method. *Sustainability*, 14(12), 7244. <https://doi.org/10.3390/su14127244>

- Kashem, M., Shamsuddoha, M., Nasir, T., & Chowdhury, A. (2022). The role of artificial intelligence and blockchain technologies in sustainable tourism in the middle east. *Worldwide Hospitality and Tourism Themes*, 15(2), 178-191. <https://doi.org/10.1108/whatt-10-2022-0116>
- Liu, Y., Cheng, P., & Ouyang, Z. (2019). Disaster risk, risk management, and tourism competitiveness: a cross-nation analysis. *International Journal of Tourism Research*, 21(6), 855-867. <https://doi.org/10.1002/jtr.2310>
- Nagaj, R. and Žuromskaitė, B. (2021). Tourism in the era of covid-19 and its impact on the environment. *Energies*, 14(7), 2000. <https://doi.org/10.3390/en14072000>
- Novelli, M., Burgess, L., Jones, A., & Ritchie, B. (2018). 'no ebola...still doomed' – the ebola-induced tourism crisis. *Annals of Tourism Research*, 70, 76-87. <https://doi.org/10.1016/j.annals.2018.03.006>
- Panyadee, C., Krajangchom, S., Sangkakorn, K., & Intawong, K. (2023). Smart wellness technology for tourism destination based-on evolving tourist expectation model. *Tem Journal*, 1218-1226. <https://doi.org/10.18421/tem122-68>
- Peng, J. (2023). Tourism organizational resilience to the covid-19 crisis: evidence from sichuan province, china. *E3s Web of Conferences*, 409, 06004. <https://doi.org/10.1051/e3sconf/202340906004>
- Pradini, G. (2024). The influence of government policy on tourism public relations. *IJEMBIS*, 4(1), 368-374. <https://doi.org/10.59889/ijembis.v4i1.365>
- Prodi, E., Fasone, V., & Tommaso, M. (2023). Does industry resilience matter for postshock industrial policy? a focus on tourism-related industries. *Tourism Economics*, 30(2), 389-416. <https://doi.org/10.1177/13548166231154314>
- Sharma, G., Thomas, A., & Paul, J. (2021). Reviving tourism industry post-covid-19: a resilience-based framework. *Tourism Management Perspectives*, 37, 100786. <https://doi.org/10.1016/j.tmp.2020.100786>
- Tulungen, F., Batmetan, J., Komansilan, T., & Kumajas, S. (2021). Competitive intelligence approach for developing an e-tourism strategy post covid-19. *Journal of Intelligence Studies in Business*, 1(1). <https://doi.org/10.37380/jisib.v1i1.694>
- Wen, B. and Dai, T. (2021). Addressing capacity building of disaster prevention and mitigation in tourism resilience.. <https://doi.org/10.2991/assehr.k.211215.048>
- Yang, E. and Kim, J. (2023). Sustainable tourism development in a host community: the mediating role of community resilience in response to disasters and crises. *International Journal of Tourism Research*, 25(5), 527-541. <https://doi.org/10.1002/jtr.2592>