

The impacts of natural hazards on Taiwan's tourism industry

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Abstract Typhoon Morakot hit Taiwan in 2009, severely damaging the Alishan National Forest Recreation Area, a famous tourist resort in Taiwan. The only highway to this area was under repair for 10 months after the typhoon. Consequently, Alishan's tourism industry suffered losses estimated at NT\$1 billion. This work investigates the impacts of natural hazards on Taiwan's tourism industry. First, government, university, and industry experts were invited to a focus-group interview to update criteria for tourism development in Taiwan. Next, the Analytic Hierarchy Process (AHP) was applied to rank the proposed criteria. Last, two tourist attractions, one urban and one rural, are discussed in detail. This work proposes three novel dimensions for Taiwan's tourism development—destination attraction, destination arrangement, and contingency planning for natural hazards—which comprise nine criteria. Analytical results will provide Taiwan's tourism industry with references for future policy-making and sustainable development.

Keywords Typhoon Morakot · Tourism development · Sustainable development · Climate change

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1 Introduction

Travel and tourism have become one of the world's largest industries, supporting more than 258 million jobs worldwide and generating some 9.1% of global (GDP) (WTTC 2011). As the need of tourism increases, competition grows increasingly intense. In many countries, tourism is the main source of foreign exchange earnings. The 2008 global financial crisis seriously harmed the global tourism industry. As economies are gradually recovering worldwide, travel intention has been increasing. Taiwan's government recently made efforts to promote tourism and has increased the number of inbound tourists (DGBAS 2011) (Fig. 1). Figure 2 shows a map covering four well-known tourist attractions in Taiwan and lists the number of visitors to these attractions over the last 2 years (Fig. 3).

However, in addition to the economy, natural disasters can adversely affect tourism. On August 8, 2008, Typhoon Morakot battered Taiwan with high winds and torrential rains, causing numerous mudslides and landslides in mountainous areas. Many roads and bridges were severely damaged islandwide. Several famous tourist resorts were damaged during the typhoon. For instance, the Alishan National Forest Recreation Area was forced to shut down for 10 months, as traffic could not reach the area, resulting in an estimated loss of [NT\$1 billion] to Taiwan's tourism industry (Taiwan Tourism Bureau 2009a).

In addition, Typhoon Maggie hit Northeast Taiwan during October 2010, bringing a huge amount of rainfall, and collapsing many roadbeds on the Suhua Highway. The typhoon cuts communications between Northern Taiwan and Eastern Taiwan, and around 300 tourists were unaccounted for after the typhoon, 30 of which were later found dead (TTB 2002). This calamity negatively influenced foreigner intention to sightsee in Taiwan, and also raised tourist awareness of natural hazards (Johnston et al. 2005).

Most typhoons hit Taiwan, an island country, during summer and autumn and cause severe flooding and damaging both land and property. Based on statistics from Taiwan's Water Resources Agency, Ministry of Economic Affairs, typhoons brought record high rainfall to Taiwan over the last decade; the estimated number victims and dollar value of losses have increased annually (Table 1). For example, Typhoon Morakot, the most severe disaster in Taiwan's history, injured or killed an estimated 4,000 people and generated an economic loss as high as NT\$20.37 billion. The Central Weather Bureau (CWB) now predicts that both the probability and intensity of typhoons hitting Taiwan will increase in 2011 (WRAMEA 2011; CWB 2011).

Overall, this will have tangible and intangible impacts on Taiwan's tourism industry. Tangible harm, such as damaged bridges and roads, can be physically reconstructed.

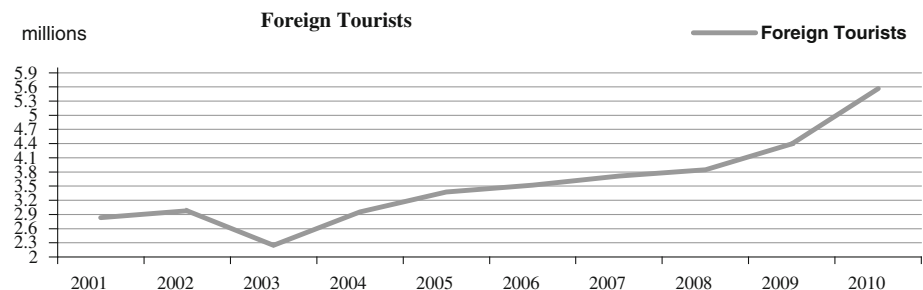


Fig. 1 Number of foreign tourists coming to Taiwan during 2001–2010 (DGBAS 2011)

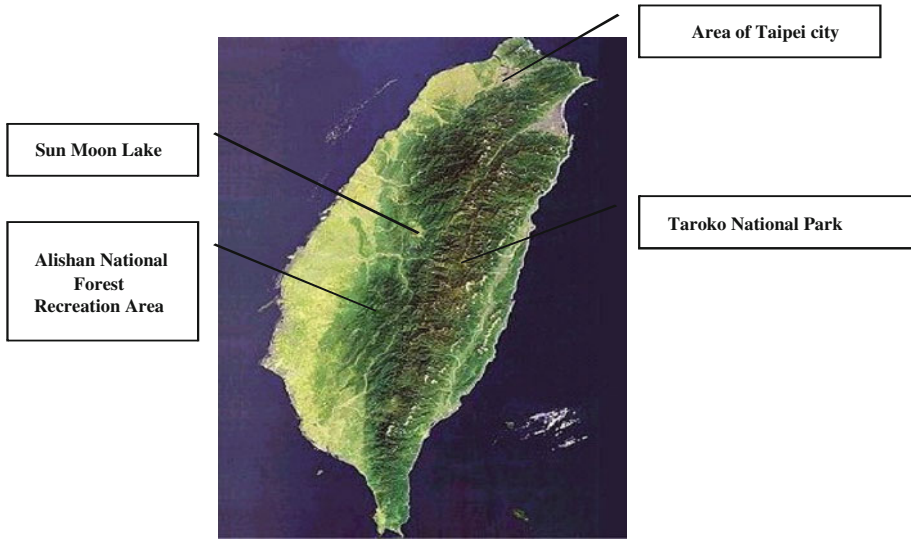


Fig. 2 A geographical map of Taiwan indentifying four famous tourist attractions (TTB 2011)

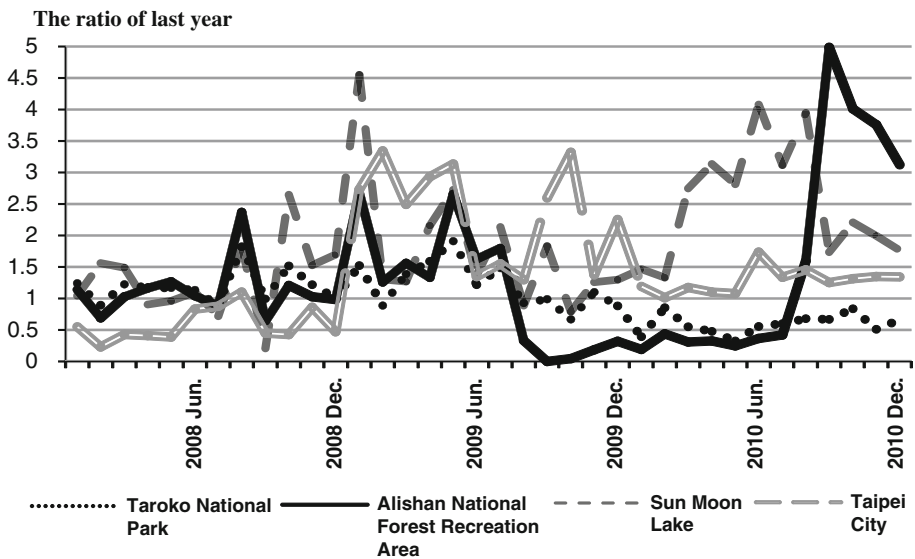


Fig. 3 Number of visitors to these four famous tourist attractions in Taiwan during 2008–2010 (TTB 2011; DGBAS 2011)

Conversely, a damaged image of Taiwan as a tourism destination is much more difficult to repair. In the past, tourism criteria were primarily based on the economy, convenience, and practicality, rather than natural disasters. This work aims to investigate the impact of natural disasters on Taiwan’s tourism industry. First, government, university, and industry experts were invited to a focus-group interview to update the criteria tourism development in Taiwan. Next, the Analytic Hierarchy Process (AHP) was applied to rank the proposed

Table 1 Typhoons and their damage to Taiwan during 2001–2010

| Year | Number of typhoons | Annual average participation (mm) | Total number of the injured and dead (estimated) | Amount of loss (NT\$ billion, estimated) |
|-------|--------------------|-----------------------------------|--|--|
| 2001 | 10 | 3,077 | 1,000 | 10.00 |
| 2002 | 3 | 1,572 | 10 | 0.50 |
| 2003 | 9 | 1,689 | 10 | 1.70 |
| 2004 | 9 | 2,572 | 100 | 13.20 |
| 2005 | 7 | 3,568 | 50 | 7.50 |
| 2006 | 7 | 2,844 | 10 | 1.00 |
| 2007 | 6 | 3,241 | 30 | 6.07 |
| 2008 | 6 | 3,025 | 300 | 8.00 |
| 2009* | 4 | 2,489 | 4,000 | 20.37 |
| 2010 | 5 | N/A | 1,000 | 15.00 |

* Including Typhoon Morakot (WRAMEA 2011; CWB 2011)

criteria. Last, two tourist attractions in Taiwan, one urban and one rural, are discussed in detail to evaluate the weighting of key criteria for tourism development in Taiwan. Moreover, these criteria associated with natural disasters can be considered when developing tourism-related policies.

2 Taiwan's tourism development

2.1 Literature review

Dwyer et al. (2004) proposed that tourism competitiveness can be improved by upgrading tourism resources and their management. They also suggested that the tourism competitiveness model, which differs from that of traditional business, can be evaluated through using relevant criteria. The tourism competitiveness model underscores the importance of a destination's resources (Go and Govers 2000; Heath and Wall 1992). Travel destinations are attractive locations and are considered essential input in tourism planning and marketing efforts (Kotler et al. 2005). When analyzing tourism destinations, the following six core attraction components are addressed: attractions (e.g., man-made landscapes, landmark buildings, natural and heritage resources, and festival activities); accessibility (e.g., transport system routes and terminals); amenities (e.g., accommodation facilities, retail business, and other tourist services); available tourism packages (e.g., tourism packages offered by travel agencies, tour operators, and other intermediaries); activities (e.g., activities held at destinations); and ancillary services (e.g., other tour services such as banking, telecommunication, postal service, newspapers, and hospitals) (Buhalis 2000).

After exploring the functions of tourist areas, Blank (1989) concluded that the five determinants of tourism competitive advantage are attraction, services, transportation, information, and promotion. Gunn (1997) further classified these determinants into two categories: attractions at tourist areas and tourist services at that area. Tourist services comprise the infrastructure, board, accommodation, shopping opportunities, recreational opportunities, information, and promotion. These five determinants can influence tourism competitive advantage directly or indirectly.

2.2 The government's program of doubling tourists arrival plans

According to the latest survey released by the World Economic Forum (WEF), Taiwan's global travel and tourism competitiveness rank moved up to 43rd in 2009 from 52nd in 2008.

To increase the aggregate competitiveness of Taiwan's tourism industry, the government's Doubling Tourists Arrival Plan (TTB 2002) has been the most important program in the last decade. Two main axes of this tourism policy, "construction of tourism characteristics linking multi-sustainability and social life" from the supply side, and "marketing high-quality package tours" from the demand side, were developed by the Taiwan Tourism Bureau as development directions in the Doubling Tourists Arrival Plan (TTB 2002). To drive Taiwan's international tourism market, the plan integrates the following five tourism resource environments in Taiwan—ecology, physical-chemistry, society, economy, and culture—which consists of organizing existing package tours, developing new tour packages and new destinations, and constructing a travel service network. Moreover, this plan includes the following eight tourism site types for Taiwan's tourism development: geographical and geological features; ecological environments; man-made landscapes and landmarks; historic locations and cultural remains; exploitation of terminals and transportation routes; package tours, development of accommodation facilities; and infrastructure construction and development. Plan execution connects separate tourist attractions and promotes scenic locales. The increasing number of foreign tourists (Fig. 1) demonstrates the plan's success.

The travel satisfaction of inbound tourists has increased markedly (Taiwan Tourism Bureau 2009b). During 2002–2008, the number of foreign visitors increased by 30%; most were from Korea, Hong Kong, Macau, Singapore, and Malaysia (TTB 2008). Since the policy allowing Chinese tourists to come to Taiwan was implemented in 2008, almost all tourist attractions around Taiwan have been inundated with sightseers. Up to December 2010, the number of Chinese travelers visiting has increased by 1.83 million (TTB 2010). This influx has altered the structure of Taiwan's tourism industry, resulting in investments in hotel construction and renovation.

The competitive advantage of Taiwan's tourism industry is derived from the tourism resources at a destination, regardless of the external environment or internal conditions (Crouch and Ritchie 1999). Mihalic (2000) characterized tourism competitive advantage from an environmental perspective and argued that advantage is associated with natural environments and artificial factors. Natural tourism resources comprise natural landscapes, weather, forests, hot springs, and ecology, whereas [man-made?] tourism resources are historic sites, historical remains, history, social culture, and architecture. Johnston et al. (2005) concluded that climate change should be included in the natural tourism resources. As dramatic climates can cause disasters, tourism competitive advantage is inevitably adversely affected. Therefore, this work investigates the adaptations Taiwan's tourism industry may take in response to consideration.

3 Methods

A literature review and expert interviews, the main axes of this work, along with a quantitative approach, can help construct a comprehensive list of criteria for tourism development in Taiwan. The key criteria are updated via focus-group interviews with

government, university, and industry experts. Next, the weights and rank of the criteria are determined using the AHP.

3.1 Focus group interview

A focus-group interview, a structured group process utilized to obtain detailed information about a specific topic, is particularly useful for exploring attitudes and feelings and drawing out issues that may be unknown to the researcher. This work invited nine experts (three officials from the Taiwan Tourism Bureau, three senior tour guides from the top three travel agencies in Taiwan, and three professors from tourism departments at Taiwan's three national universities) to join the focus group. The selected experts have considerable practical experience and a significant influence on Taiwan's tourism policy.

The interview questions included the following. Facing climate change, how does the tourism industry reflect on future key criteria? Which part of the current development policy requires re-discussion? When natural disasters impact scenic locations, what is the best policy for government and industry? While threatened by climate change, do you have any suggestions for urban or rural tourist resorts?

3.2 AHP

The AHP, developed by Saaty in the 1970s, provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions (Saaty 1980). The AHP, which has been applied widely in numerous fields, consists of planning, generating a set of alternatives, choosing the best alternatives/policy, setting priorities, and determining requirements (Saaty 1990). At this stage, the updated criteria for tourism development after interviews will be transformed to an AHP hierarchy model. The nine experts filled out an AHP questionnaire to weight criteria. The priorities of those criteria ranked and analyzed.

4 Result

4.1 Updated key criteria of Taiwan's tourism development

During the focus-group interview, experts reviewed the eight criteria in the Doubling Tourists Arrival Plan and suggested that "man-made landscapes and landmarks" and "historic locations and cultural remains" be combined into "man-made landscapes and cultural heritage," and that "package tour planning" and "facilities development of accommodation" be combined into "tour itinerary, board, and accommodation." In terms of adaptation to nature hazards, all experts agreed that the concept of natural hazards should be included in Taiwan's tourism development plans. Hence, three criteria were identified: "destination safety," "local rescue mechanisms" (e.g., medical institutions, shelter, and police and firefighting resources), and "local emergency preparation" (e.g., water and food storage equipment, and emergency lighting). In sum, nine items are included in the proposed tourism development criteria (Table 2).

By adopting the concepts of tourism competitive by Buhalis (2000), Blank (1989), and Mihalic (2000), this work aggregates the nine criteria into the following three dimensions:

Table 2 Dimensions and criteria for Taiwan's tourism development

| Dimension (weight) | Criteria | Overall weights | Ranks |
|---|--|-----------------|-------|
| Destination attraction (0.2211) | Geographical and geological features | 0.0973 | 6 |
| | Ecological environments | 0.0686 | 8 |
| | Man-made landscapes and cultural heritages | 0.0575 | 9 |
| Destination arrangement (0.3189) | Exploitation of terminals and transport routes | 0.1244 | 3 |
| | Tour itinerary, board, and accommodation | 0.0797 | 7 |
| | Construction and development of infrastructure | 0.1148 | 5 |
| Contingency planning for natural hazards (0.4600) | Destination safety | 0.1932 | 1 |
| | Local rescue mechanism | 0.1518 | 2 |
| | Local emergency preparation | 0.1197 | 4 |

destination attraction (e.g., geographical and geological features, ecological environments, man-made landscapes, and cultural heritage); destination arrangements (e.g., terminals and transportation routes, tour itinerary, board, accommodation, and construction of infrastructure; and contingency planning for natural hazards (e.g., destination safety, local rescue mechanisms, and local emergency preparation) (Table 2).

4.2 AHP Weights and Ranks

After structuring all dimensions and their criteria into an AHP hierarchy model, experts were asked to make pair-wise comparisons between dimensions and criteria. The AHP method was utilized to weight and rank each criteria. In terms of rank, two of top three criteria are in the dimension of “contingency planning for natural hazards,” for instance, destination safety is ranked as No. 1 and local rescue mechanisms is ranked as No. 2.

Experts believed the rank of “contingency planning for natural hazards” (weight, 0.46) should be higher than those of “destination attraction” (0.2211) and “destination arrangement” (0.3189) (Table 2). Taiwan's tourism areas are extremely vulnerable to extreme weather. Therefore, adopting contingency plans for natural hazards is very important. This can help travel agencies develop itineraries and mitigate the worries of tourists about natural risks.

Based on analytical results, the focus of criteria changes when climate change is considered. Most popular scenic locales in Taiwan are natural environments. These rural locations are likely more susceptible to climate change; consequently, the ability of a tourist resort to adapt to natural hazards is important. In response to natural threats, the experts proposed that rescue mechanisms and emergency preparation of tourist resorts are essential. Those considerations more or less affect itinerary planning. Additionally, the neighborhoods around a destination must focus on transportation development, accessibility of routes to a destination, and support by nearby emergency centers. This differs markedly is quite different from before.

Table 2 lists the weights and rank of important criteria by AHP. Findings indicate that the criteria in “contingency planning for natural hazards” are higher priority than those in the other two dimensions in the Doubling Tourists Arrival Plan, once again underscoring the importance of natural hazards.

4.3 Discussions of Taiwan's popular tourist attractions

One urban resort and one rural resort were selected as subjects for a case discussion. The National Palace Museum, home to one of the largest collections of Chinese cultural artifacts worldwide, is situated in an urban area, whereas Alishan Mountain, a prized natural landscape, is in rural area. To summarize the opinions of the experts, tourist resorts in urban areas and rural areas should adhere to different guidelines. The National Palace Museum should pay attention to anti-disaster planning and construction (e.g., earthquake-resistant structures and flood storage ponds) and rescue plans (e.g., evacuation of tourists) when dealing with potential natural hazards.

For Alishan Mountain, experts suggested that the erosion and sediment control be enhanced in this area (e.g., by reforestation). When hit by Typhoon Morakot, most of Alishan's landscape changed via landslides, floods, and mudslides. Additionally, hundreds of lives were taken by this typhoon. The most severe catastrophe in roughly 100 years adversely impacted the aboriginal villages in the area, seven of which were swept away. The only highway leading to Alishan was washed out, trapping nearly 4,000 residents. After a 10-month repair project, the highway was re-opened. Therefore, while arguing about developing key criteria for rural scenic spots, all experts emphasized the importance of installing emergency shelters, and strengthening search and rescue capabilities. Further, establishing highly efficient police and fire departments at rural scenic tourist locations that can provide timely help during an emergency is extremely important.

All experts noted that reevaluating the adequacy of rescue and evacuation systems should not be delayed. The government should allocate additional funds to construct a transportation network adapted to climate changes and that supports tourism and search and rescue activities. The government and tourism industry cannot ignore the adverse impacts of natural hazards, regardless of tourist site location.

5 Conclusions and suggestions

Through the focus-group interview, this work introduces three dimensions for Taiwan's tourism development—destination attraction, destination arrangement, and contingency planning for natural hazards. By applying the AHP to rank the priorities of all proposed criteria, this work establishes a new perspective for Taiwan's tourism development. Moreover, for scenic areas with specific geological structures, such as the Alishan National Forest Recreation Area, Taroko National Park, and Hehuan Mountain, their abilities to adapt to natural hazards need further improvement.

Findings in this work are similar intention to those obtained by Coiccio and Michael (2007), who suggested that hazard management, comprises a set of strategies that can be involved in normal tourism development planning, particularly when the probability of a natural hazard occurring within a specific period is high. Dramatic climate changes brought about by global warming have become a test for Taiwan's government and tourist industry. The tourism authority should refer to experience and develop a new plan for risk management, a real-time situation-aware disaster system, an anticipation mechanism associated with the economy and markets, and a standard operating procedure for crisis response.

Over the last few years, via the Doubling Tourists Arrival Plan, Taiwan's government has made considerable effort to develop tourism-related industries by, say, improving harbor facilities and their neighboring environments to facilitate the arrival of increased numbers of tourists. Due to the unpredictability of natural hazards, the government should

address factors associated natural hazards in a white paper for tourism policy and conduct sensitivity analyses for inbound and domestic tourism on a regional or national scale. Such analyses can prove useful when addressing future change scenarios from global climate models to provide information on the likely rate of future change, thereby facilitating planning and adaptation by the tourism industry (Yu et al. 2009). Furthermore, the tourism authority can also refer to the work of the European Union and take advantage of the DPSIR framework to trace the origins of natural hazards and solve potential problems before they occur (Tsai et al. 2009).

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