

ERIA Discussion Paper Series**Tourism Supply Chains and Natural Disasters:
The Vulnerability Challenge and Business
Continuity Models for ASEAN Countries**

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Abstract: *The global development of tourism has been tremendous over the last decades. The increasing importance of tourism in the global economy is likely to continue. The value chain of tourism will be altered in the Association of Southeast Asian Nations (ASEAN). Improving the tourism supply chains and the related supply chain networks will widely contribute to efficiency. On the other hand, tourism is challenged by natural disasters that, during 1994 and 2013, cost 1.35 million lives worldwide. Disaster management can be widely improved, and current international and regional efforts on strategies for disaster risk reduction can be accelerated. The Austrian experience provides insights on how tourism can develop and grow despite the presence of natural hazards.*

Keywords: tourism, supply chains, natural disasters, risk, risk management, sustainable tourism development, climate change adaptation,

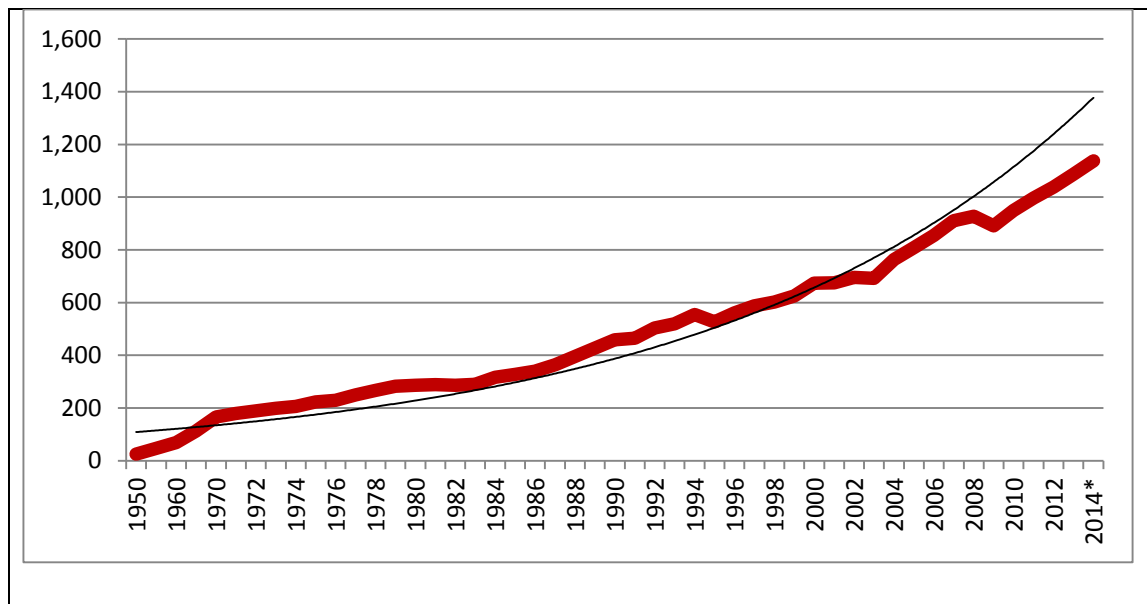
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1. Introduction

Tourism is a relatively young and dynamic economic sector. Since 1950, global tourism has grown steadily. While this growth was initially observed in Europe and in North America, its future growth is expected primarily in Asia and in countries that have the largest economic growth rates and higher disposable incomes. The contribution of tourism to the global economy in 2014 is US\$7 trillion or an estimated 9 percent of global gross domestic product (GDP) (2014) thereof, US\$1.5 trillion in foreign earnings or 6 percent of all global, and 30 percent of all global service exports. Some 500 million jobs are due to tourism (UNWTO 2015).

Figure 1: Global International Tourism Arrivals, 1950–2014 (in millions)



Source: World Tourism Organization UNWTO 2015, 2015a, Available at: http://stats.areppim.com/stats/stats_ita.htm

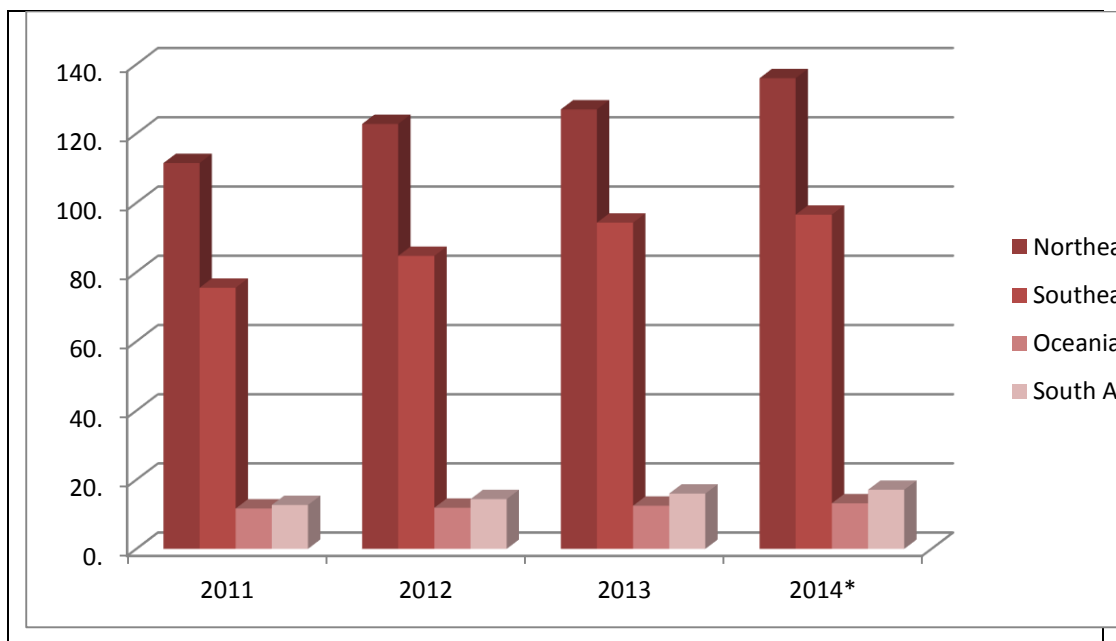
While the number of people on earth almost tripled since 1950, the number of international tourists increased to more than 40 times from 25 to 1138 million in 2014 (Figure 1). This is more than one order of magnitude higher than population growth. Every tourist arriving from abroad stays for six days on average and generates some US\$180 daily income or more than US\$1,000 per trip. There are large variations of prices and lengths of stay between different destinations. Besides international tourists, there are considerably more national tourists. China alone is reported to have more

than 2 billion national tourists or 18 times more than its international tourists. For other large countries like the United States of America (USA), India, Russia, Brazil, and Japan, domestic tourism is similarly important. In other countries, the ratio is considerably less. Usually, the smaller the country, the higher is the share of international tourists. Small island destination states usually have several hundred times more international tourists than local tourists.

Aramberri (2006) classified the 160-member countries of the World Travel and Tourism Council (WTTC) according to national and international tourism based on 2001 data. The top 15 countries for tourism earned together 80 percent of all tourism revenues. In another attempt, 171 countries were analysed using World Tourism Organization UNWTO 1998/1999 data. On average, the direct and indirect earnings from tourism were 11.5 percent, but there are large variations in this figure. Out of all countries, 22 earned more than double or 23 percent of their national income from tourism. This group included mainly small islands like Maldives that depends with 61 percent of its GDP on tourism. Another 48 countries earned between 11.5 and 23 percent of their national income from tourism. A majority of 101 countries earned less than average (Aramberri 2006). Tourism and the development of tourism widely varied between countries. Almost all ASEAN countries belonged to the last group, and this country analysis would need to be repeated with updated data to include the progress of touristic development. Based on World Tourism Organization UNWTO 2015 data, the conditions in Asian countries, in particular Southeast Asia, are changing fast and the relative importance of tourism is much higher than a decade ago (Figure 2).

An ever-increasing number of destinations worldwide are open for tourism. In his opening speech at the World Tourism Day on 27 September 2014, Taleb Rifai, Secretary General of World Tourism Organization (UNWTO), stated that tourism has become one of the leading social, economic, and cultural phenomena and that in spite of persistent global economic and geopolitical challenges, its progress is showing no sign of slowing down (Rifai 2014). Asian tourism is expected to grow faster and the share of Asian destinations in world tourism will increase over the next years, whereas tourism in Europe or North America, the earlier centres of tourism development, is generally considered saturated.

Figure 2: Share of Tourism in Asia Based on International Arrivals



Source: World Tourism Organization UNWTO, 2015; World Tourism Barometer, January 2015.

For most countries, tourism is still a major driving force for the development of businesses and infrastructure, and a source of improvement of the economic situation of its people. In the same speech, Rifai warned that ‘there can be no real tourism development if it damages the values and cultures of host communities, or the socio-economic benefits generated by tourism do not trickle down to the community level’. He simultaneously expressed three major concerns that were observed in many places where tourism was developed and that should be avoided in future ventures of touristic development: the degradation of environment, the loss of cultural identity by selling out local traditions as a tourist commodity, and the non-involvement of local people. Often, touristic developments were not matched by a prospering local society. While the role of tourism in structural economic progress and sustainable development is not a new topic on the international agenda, how to make tourism more sustainable and contribute to developing countries’ sustainable development objectives is still a challenge that requires urgent attention (UNCTAD 2013).

In the following section, we will consider (i) the challenges of tourism development as exemplified by the value and supply chains from local to global; (ii) the simultaneous increase of disaster risks, in particular natural disasters, that are most

pronounced in Asia; and (iii) the combat against natural disaster risk through global regional and national frameworks, and the local measures that allow tourism businesses to minimise negative impact and recover immediately from disaster shocks.

2. The Tourism Value Chain and Supply Chain

The value chain is related to tourism activities of tourism. It aims to include innovation in this economic sector as new products continuously contribute to the added value of tourism. The tourism supply chain focuses on particular services or service networks within the value chain, with the aim of optimisation. The supply chain directly relates to businesses earning money in tourism and building up the value in tourism. Additionally, the targeted companies help other companies to earn money. The optimisation of the supply chain in return contributes to the value chain.

2.1. Types of Tourism in the Value Chain

Tourism has become specialised and diversified through the years. The tourism offer spans from backpackers and budget travellers to exclusive resorts for performing sports like diving or golf, visiting famous sites and cultural heritage, specialist holidays with safaris, climbing mountain peaks, and snow-based winter tourism, to even polar tourism (Lamers 2008). The costs per trip can increase by more than a hundred times and tend to elevate the premium tourist from the budget ones. Even space tourism has become a tourist product and costs more than US\$1million per trip.

A specific value chain is generated according to the type of tourism activity. The value chain stretches over various geographical scales—from local, regional, continental, and global. Generally, the more scales are covered, the more value is generated. Tourists who are ready to pay the extra cost for the travel or flight can, in general, also pay more for local goods and services than the locals. If a restaurant that is better than others in the village opens, people from other parts of the village will also frequent it. It might even attain regional fame and, with more guests, the restaurant can increase in size. The profit is even higher if local food is used in the restaurant and extra value is generated. This was, and perhaps still is, the reason for the start of a

successful tourism. The type and level of service of accommodation, the availability of sights, sports facilities, and tourism products will all contribute to the value chain. The value is thus distributed between different service sectors from outside and inside the destination. Outside the destination, we find companies such as tour operators and travel agents, and transportation service providers like aviation, railways, bus, and cruise companies. Inside the destination, we find companies dealing with local destination management, accommodation, restaurants, shopping facilities, rental shops for sports equipment, and other related tourism products and services. Experienced product providers design tours based on the local resources of the destination or on the skills of the local population such as mountain trekking, diving courses, health and wellness treatments, and themed or religious travels. All these generate value, which can translate to wealth for the people involved.

2.2. Leveraging Value from Touristic and Non-touristic Businesses

Local businesses such as restaurants, bars, entertainment facilities, shopping malls, shops, and local transportation companies can increase their business activities by many times through tourism. They can also increase the prices of their services as tourists can often pay more than locals. Even communal facility providers such as water supply companies, electricity companies, and waste and garbage removal companies perform better due to tourism. Another group in the value chain are hospitals and helicopter services in mountain areas that specialise in tourism-related accidents such as ski or mountain climbing accidents. The role of local and regional products, e.g. food, handicraft, artwork, is another important asset of tourism. Thus, the tourism supply and value chain is highly complex and interwoven with the traditionally grown economy and tourism-triggered growth, particularly in affluent tourist destinations. The benefits derived by the local economy from tourism can also vary depending on the rate of local and regional production and services. Consequently, the prices and benefits vary between regions, countries, and destinations. The higher the share of nearby products and services, the higher is the benefit from the local tourism value chain. A good example of the rapid extension of tourism and the related value chain is Southeast Asia. Southeast Asia has registered the highest growth in international tourism during the last two decades (Figure 2). Some of the reasons for

this are its prospering economy, more disposable income, more leisure time, longer holiday periods, higher education of the tourists, and less expensive travel costs for tourists visiting the region.

2.3. The Development of the Global Tourism Value Chain

The extent of the value chain very much depends on the geographical scales involved—the larger the scale, the larger is the value of tourism. In an ideal scenario, the value chain covers all scales from local to global to maximise the value for all involved parties. The first level of tourism is often the rural and urban exchange within a region. Urban dwellers need some recreational facilities and try to temporarily escape the city for a short time. This can develop into a national tourism destination when the fame of the place goes beyond the region. Some particular destinations become international tourist destinations in the continent or even the whole world.

Along with the scales, tourism becomes more sophisticated and multifaceted. Hence, more and better services are needed, and the value chain increases widely. How often and how long a tourist destination is visited will depend on the tourists, their time, and budget. Urban destinations are easy to access and are higher priced, while rural areas with a more difficult access are usually lower priced. There are special tourist attractions unique in the world, such as Venice or the golden shrine—Kinkakuji—in Kyoto; there are also general tourist attractions such as coastal and mountain areas. The first ones cannot be substituted, but the latter ones can be exchanged as many countries offer similar services. The means of transport also differ: for intercontinental visits, an airplane is usually necessary as the mode of transport. In local and regional trips, the car, train, and boat are options. Another important factor is time and how long before tourism could develop. The most requested tourist resorts could develop over decades and go from local to regional to international attractions. Trial and error usually lead to improvements of touristic products and resorts, and those resorts turn out to be very robust.

2.4. Equality between Tourists and Hosts as a Value Factor

In Austria, a country with outstanding tourism activity, tourism developed from agriculture. Mountain farmers usually had many children as they could not afford other

labourers and relied on family members. Usually, only the eldest or elder children could stay on the farm as the land did not give enough food for a larger population. Urban development was responsible for a richer middle class that could afford tourism. Many children that should otherwise leave the mountains found new occupations as hotel owners and they became richer than their brothers, overtaking the farm. Similar to the two harvest seasons in agriculture that is found in most places in Asia, the Austrian mountain tourism gives two harvests also—one in summer and another in winter. Winter tourism developed after summer tourism and snow-based winter tourism has higher value than summer tourism. The tourism activities were requested by rich European countries that did not have this kind of landscapes (such as Germany or the Netherlands). In many cases, tourism was sold directly by the owners of hotels and guest houses, assisted by a local tourist association, without any intermediate travel agent. Tourism was booming, but while summer tourism was somehow on retreat, winter tourism took the lead in generating wealth. Because of tourism, rural Austria is rich; the value chain has extended to a maximum, whereas this touristic development did not happen in other countries like Japan that has similar conditions mainly due to the availability of other economic occupations (Breiling, 2006). In Japan, the rural population has a lower status than in Austria. This is partly due to the economic disparities between the urban and rural population. In many Asian countries, tourism resorts developed very fast but the value chain does not include the available local resources. The supply comes from the regional or even global scale. The initiative takers of the touristic development often do not come from the area and the possible local benefits of tourism are partly missed. In some extreme cases, tourism widely disregards the local needs for development, e.g. when tourists cruise in luxury liners without using local facilities or visit exclusive resorts that are closed to local inhabitants. The respect between visitors and visited people is undermined. In small island states like Maldives or Fiji, the use of local resources is very small and the growth of tourism almost entirely depends on imports. As such, much of the value gained is spent again. These countries depend completely on the economic prosperity of the tourist countries.

2.5. Wise Resource Management and the Tourism Value Chain

Budget tourism usually uses the locally available resources with a minimum of additional investments. Tourists stay in guest houses and sometimes with families and local residents. Farm holidays and some types of ecotourism belong to this kind of tourism. The value chain is modest and the interaction with the visited culture is high. This kind of tourism is often the impulse of more intensive tourism development. In this instance, tourism gets more resource intensive. Taking the tourism opportunity in a fast way generally increases the danger that the resource base of a destination gets overused. There are demands for additional resources and luxury items imported from outside the region. A problem can arise when scarce resources such as water are needed disproportionately, e.g. to water lawns for golf tourism in dry countries or artificial snow making for winter tourism. This was the case with the recent extension of the Les Arcs ski resort in the French Alps where rainfall was limited and the water base of the valley was not sufficient for snow making (de Jong 2015). The water supply of the neighbouring four valleys had to be used to fill a large water reservoir. High-end four- or five-star hotels or designated resorts also use the highest amount of water and energy. In rich countries, these resources are more easily available and the benefits of tourism are more equally distributed. However, in poor countries, the resource demands of high-end hotels and resorts compete with the basic needs of the local population, which is very likely not sufficiently involved in the benefits of tourism. The better the locally available resources are managed and conflicting uses minimised within a given destination, the higher will the contribution to the tourism value chain be.

2.6. Growth of the Tourism Value Chain due to Agglomeration of Destinations

The agglomeration of tourism destinations like in the Alps gives more value than the stand-alone destinations. The tourism products are more sophisticated, and the competition and cooperation on a local and regional scale generally increase the generated value in the chain. For example, Austria developed an extraordinary value from snow-based winter tourism. Over 300 major tourist destinations in a 50,000km² area offer a lot of choices and an unmatched skiing offer. However, without the increased support from the public, the ski lift operators responsible for the construction and maintenance of ski tracks, lifts, and snow-making facilities would not run

profitably. It was only due to the combination of the regional economy and the clustering of hotels, restaurants, and snow-based winter tourism service facilities that it has become profitable. There are less developed and newly developed winter tourism destinations outside the Alps in Bulgaria, Romania, Slovakia, or Russia that offer more modest services at a higher price. The development of a stand-alone destination is often more costly as the mountain road network is not developed or there is no airport in the neighbourhood. The Austrian destinations have a comparative advantage as the road network for regional tourism is highly developed and the destinations can be easily reached by international tourists. Due to the scale of the business, cheap charter flights are available and Austrian snow-based winter tourism has become increasingly a target for long-distance travellers.

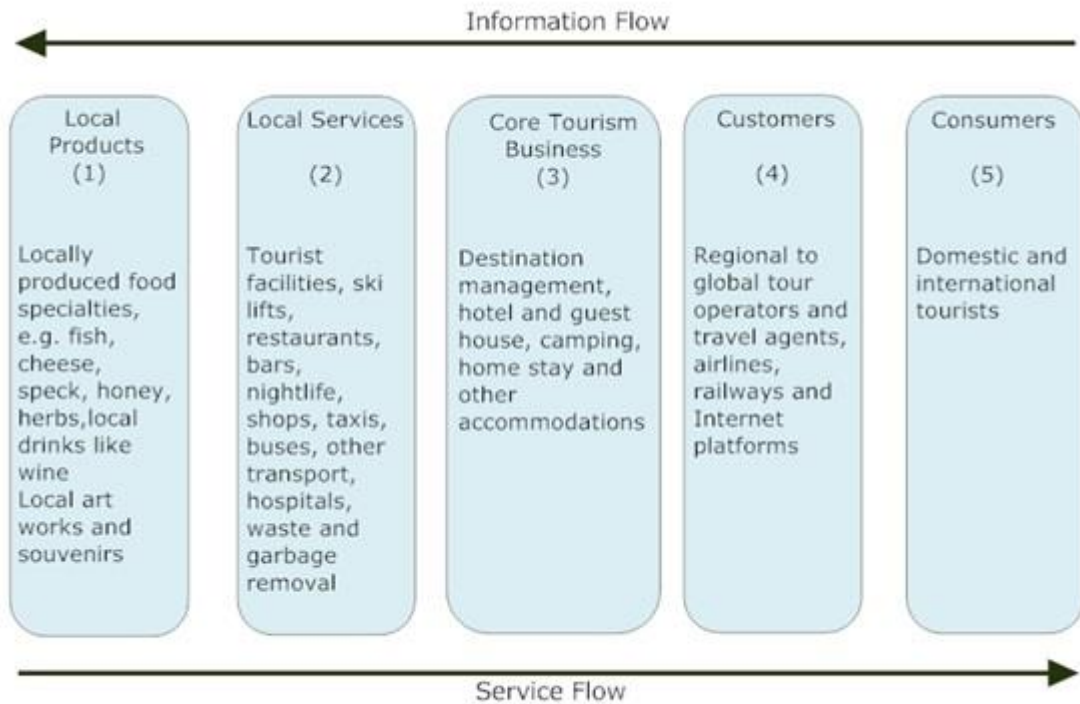
2.7. The Tourism Supply Chain

The tourism supply chain is closely related to the tourism value chain but, in the supply chain, the businesses are the focus. The supply chain is also more service and logistics oriented. Optimising the supply chain usually means altering the value chain also. Conner et al. (1997) described various models of supply chains that relate either to a management or to a business process re-engineering perspective. Several components like planning and control, work structure, organisation structure, product flow facility structure, information flow facility structure (IT), product structure, management methods, power and leadership structure, risk and reward structure, and culture and attitude can be identified in the supply chain. Every component is subject to improvement. So far, the number of studies referring to tourism or tourism industry chains has been limited. The role of disasters and natural disasters in particular has not been researched. Zhang et al. (2009) state that tourism products are often viewed by consumers as chains of different service components that form service networks. Therefore, identifying ways to manage these networks is vital, especially for large tourism firms that are keen to maintain an advantage over their competitors. Supply networks involve inter-firm relationships and product development. Zhang et al. refer to studies describing conflicts between hotels and tour operators or the elimination of tour operators as a sales agent by setting up a website to do the marketing via the internet. Darnall et al. (2006) point out that environmental management systems have

better environmental performance if green supply chain management is introduced at the same time. Budeanu (2009) explores the adoption of environmental supply chain management by eight large tour operators. Due to the absence of regulatory pressures and cost saving benefits, the adoption is only triggered by public pressures.

The complex interrelationships within the tourism sector are simplified in Figure 3. The tourist is the final consumer on the global or regional scale (5). The customers are also on the global or regional scale. These are usually the large tour operators, airlines, and international hotel chains that buy the touristic products from a destination (4). At the centre is the core tourism business, which comprises the destination managers, marketing organisations for the destinations, hotels or guest house managers (3). Overnight stay is considered as the core service of a destination. There are also other tourism service providers from restaurants, bars, nightlife, shops, taxis, ski lift operators, communal services and more (2). In the final block are the traditional service and product providers—farmers who produce food, wine or other beverages, local specialties, crafts, arts, souvenirs, and more (1). There is a service flow from 1 to 5 and an information flow from 5 to 1.

Figure 3: Supply Chains of Tourism



Source: Author.

3. The Tourism Sector and Natural Disasters

In the supply chain risk radar, natural disasters are the single most threat to tourism (World Economic Forum 2013). A new category of extreme weather, previously part of the category natural disasters, was introduced and considered as the second largest disrupter for the tourism industry and more important than political unrest and conflicts, terrorism, sudden demand shocks or export and import restrictions. Becken (2012) concludes that adapting to climate change is very closely linked to ‘future proofing,’ ‘risk management,’ and ‘disaster-risk reduction.’ All of these are highly relevant for tourism businesses, destinations, and the tourism sector at a global level. In an assessment of tourism mega trends, Buckley et al (2015) mention climate change and related hazards as the first challenge for tourism growth worldwide.

The impressive growth of tourism and the increasing value of tourism in national and regional economies of ASEAN and other countries can experience a rapid

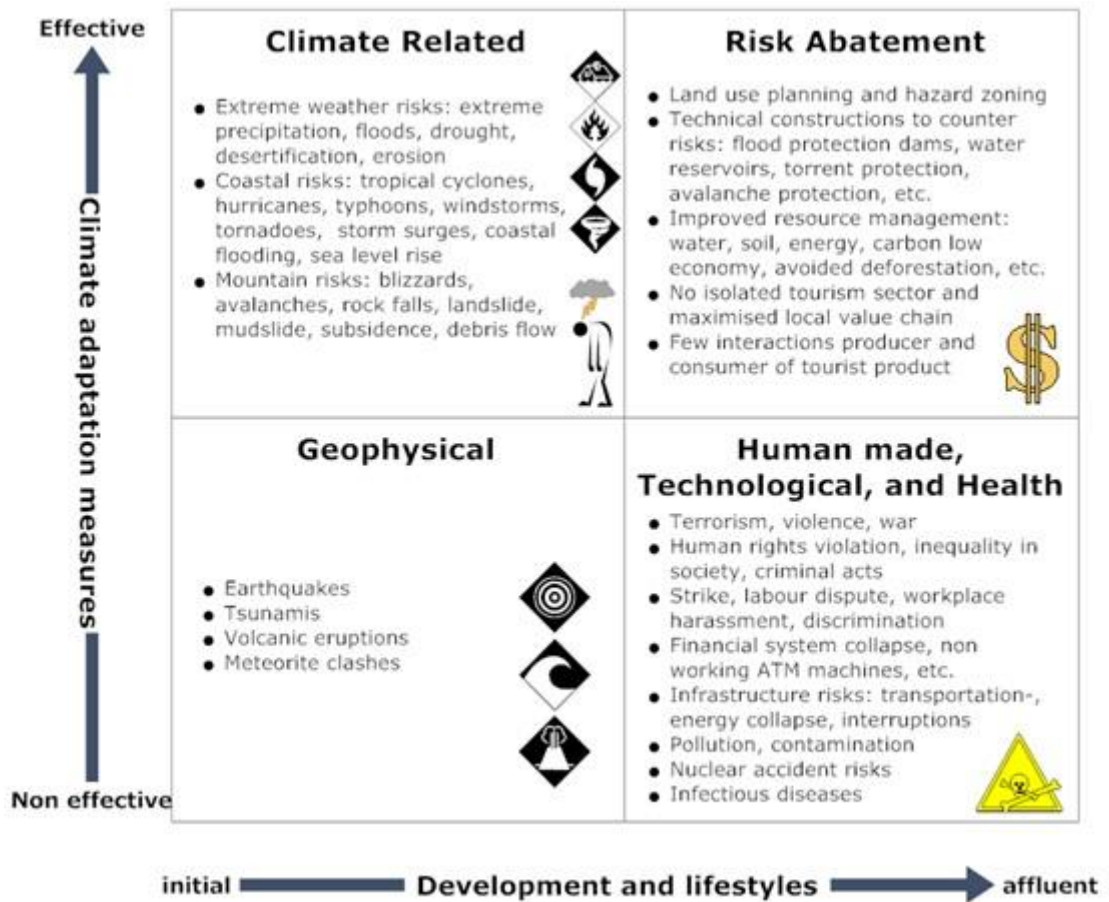
disruption if and when disaster occurs. On 26 December 2004, 12 countries in the Indian Ocean and Southeast Asia were hit by a tsunami that killed 230,000 people. That was the first of three mega disasters experienced within a decade. Two more major tragedies occurred after 2004 that contributed to the death of more than half a million people—Cyclone Nargis that hit Myanmar and killed 138,000 people on 2 May 2008, and the earthquake in Haiti that killed at least 220,000 people on 12 January 2010. These catastrophes disrupted touristic activities. The mega disaster of 2004 destroyed many coastal tourist destinations and killed several thousand tourists. The number of victims could have been drastically reduced if warnings were given out between the earthquake and the resulting tsunami within the time span of six hours. However, emergency plans were not in place at that time. After this tragedy, major international efforts were undertaken. The second world conference for disaster risk reduction (WCDRR) in 2005 in Kobe came up with the Hyogo Framework for Action (HFA). Ten years later, an updated Sendai Framework for Disaster Risk Reduction 2015–2030 was approved by the General Assembly of the United Nations as an outcome of the third WCDRR in March 2015 in Sendai. Both major conferences were held in Japan, a country that often experiences natural disasters and suffered from the triple or cascading disaster in Fukushima in 2011 where an initial earthquake, a resulting tsunami and a nuclear accident took 25,000 human lives and depopulated large territories. This tragedy would have been even bigger if emergency and business recovery plans were not in place. The disasters mentioned were extraordinary disasters compared to the 6,873 disasters registered in an emergency event database (EM-DAT) for the years 1994 to 2003 (CRED 2015). The Centre for Research on Epidemiology of Disasters (CRED) at the University of Leuven in Belgium has collected data on disasters since 1975 and today serves as a most comprehensive reference base worldwide. Over the years, the reporting improved considerably and general standards to classify disasters are now used such as: if 10 or more people are killed in an event, 100 or more people are reported affected, then a state of emergency is declared or a call for international assistance is made. On average, some 344 global disasters are registered annually. They affect more than 200 million or some 3 percent of the world population, and cost around 70,000 human lives a year. Living in a poor country increases the risk by three times. The Sendai Framework for Disaster Risk Reduction

2015–2030 targets building the resilience of nations and communities by evaluating the experiences during the HFA, identifying modalities of cooperation based on commitments, and determining modalities for the periodic review. The role of tourism in the value chain is likely to increase in many countries during the period 2015 and 2030. Therefore, natural disasters should not become a major hindrance but a challenge for business continuity and business improvement.

3.1. The Tourism Sector Hazard Matrix

The 2015 CRED report classifies natural hazards into two groups: climate related and geophysical hazards. A hazard is a situation of risk where a possible future disaster may develop. Decreasing the number of hazards means decreasing the vulnerability and increasing the resilience of tourist destinations, as well as continuing the intended tourist activities in the tourist destination. The tourism sector hazard matrix explains four categories relevant to any tourist destination: (i) extreme weather and climate-related hazards; (ii) geophysical hazards; (iii) risk abatement and environmental quality; and (iv) human-made, technological and health hazards. The left side of Figure 4, with geophysical and climate hazards, relates to possible natural disasters also described in CRED 2015. The right side of Figure 4 relates to non-natural disaster hazards that are not usually considered together with natural disasters.

Figure 4: Tourism Hazard Matrix



Source: Author, using information from UNEP 2008, OECD 2014, CRED 2015, and UNISDR 2015.

The impacts that relate to risks from the categories in the upper half of Figure 4 can be widely reduced by benign climate measures, while the lower half cannot, or can just indirectly, be influenced by those measures. All hazards contribute to the overall vulnerability and resilience of a destination. The level of development and lifestyle in a destination relates to the possible economic losses that a disaster can cause. The overall risk to a tourist destination is a combination of several factors and is site specific. The more hazards are present in a destination, the more vulnerable that destination is. The richer the area, the more money is generally available to protect it against hazards; and the poorer the destination, the more endangered their inhabitants are. Some risks are local, while others are regional or even global in their extent.

3.2. Climate-related Hazards

UN Secretary General Ban Ki-moon, in his opening remarks at the climate summit in Abu Dhabi in September 2014, stated that climate change threatens peace, prosperity and opportunities for billions of people. He added that the cost of climate change is getting unbearable (Ban Ki-moon 2014). While not all natural disasters, e.g. earthquakes, tsunamis, and volcano eruptions are related to climate change, the climate-induced share in natural disasters and extreme weather is likely to increase and is expected to cause enormous future damage. This may hinder the expected growth of global tourism.

Climate-related disasters are further divided into hydrological, meteorological and extreme events disasters. Overall, climate-related events account for the overwhelming majority (91 percent) of natural disasters that occurred worldwide. Floods are the most common kind of natural disasters. There were 2,937 or 43 percent flood-related disasters in 1994–2013 (CRED 2015). The flood in 2011 in Thailand was reported as the worst flood disaster ever. It affected 13.6 million people and the death toll reached 815 people. During the period 1994 to 2013, 2.5 billion people were affected in all flood disasters, with 160,000 people dead. Another 1,942 or 15 percent of all natural disasters are related to storms (CRED 2015). The total death toll from storms is 250,000, with 660 million affected people. In 2008, Myanmar was hit by Nargis the worst single storm event that left a death toll of 138,000. Typhoon Haiyan or Yolanda caused large damage in Southeast Asia in November 2013, with at least 7,000 fatalities in the Philippines. Another 381 disasters relate to extreme weather events, 369 relate to landslides, 322 to drought, and 255 to wildfires.

Changes in extreme weather and climate events have been observed since about 1950. It is very likely that the number of cold days and nights has decreased and the number of warm days and nights has increased on the global scale. It is likely that the frequency of heat waves has increased in large parts of Europe, Asia, and Australia. There are likely more land regions where the number of heavy precipitation events has increased than where it has decreased (IPCC 2013, Table SPM.1). The IPCC Special Report on Managing the Risks of Extreme Events and Disasters (SREX) to Advance Climate Change Adaptation (IPCC 2012) is an important basis for information on changing weather and climate extremes.

3.3. Geophysical Hazards

Geophysical hazards lead to most serious disasters. Tsunamis are entirely caused by geological and seismic processes, and have devastating effects in coastal areas. The tsunami of 2004 that hit 12 countries in one disaster was the world's largest recorded disaster in terms of fatalities. The Haiti earthquake of 2010 was the second largest disaster in this context. The most expensive disaster was the Tohoku triple disaster of 2011—earthquake, tsunami and nuclear accident, followed by the 2008 Sichuan earthquake and the Hanshin earthquake of 1995. The damage reached US\$300 billion, US\$150 billion and US\$100 billion respectively. During the period 1994 to 2013, 552 disasters or 8 percent related to the earthquake/tsunami category, with 3 percent of all disaster victims or 121 million people affected and 750,000 dead or 55 percent of all fatalities during the period 1994-2013. Tourism recovered after the 2004 tsunami and, in the following decade, emergency measures as proposed by the HFA were introduced. These measures widely improved the preparedness to minimise the impacts of disasters and today, a similar event would not have the same fatal consequences. Volcanic eruptions can also widely influence tourism. During the same period 1994 to 2013, there were 105 volcanic activities registered that led to disasters, with some 20,000 killed and large economic losses. During 10 and 23 April 2010, air traffic was partly stopped from and to Europe as Eyjafjallajökull Volcano emitted volcanic ash composites (Langmann et al. 2012). This event could have been much more damaging if the volcano erupted in August, the main tourist season in Europe. Instead, it happened in between touristic seasons and damages to tourism were modest.

3.4. Risk Abatement and Environmental Quality

According to the CRED report (2015), weather is less important than population growth and patterns of economic development. Today, not only are more people in harm's way than they were 50 years ago, but the development in earthquake zones, flood plains and other high-risk areas has increased the likelihood that an average hazard will become a disaster. In this context, risk abatement measures and issues of environmental quality receive increased importance. Urbanisation leads to land use change, deforestation, conversion of agricultural land for building purposes, soil erosion, air pollution, and water pollution. Resource management can be related to

risks in water management, soil fertility, energy shortage and more. As such, it is crucial to maintain a healthy state of environment as this can reduce risks considerably. In Austria and in some countries and regions, they have hazard zone maps on a municipality level that specify 'red areas' where it is strictly forbidden to build and 'yellow areas' where unusual disaster events are likely to affect (Kanonier 2006). Building on this municipal hazard map, the Austrian Ministry of Agriculture, Forestry and Environment further developed it into a countrywide vulnerability map to indicate the likelihood of the most frequent disasters and the likely damage on buildings (Fuchs 2009). Interventions into the landscape by building roads, rails, settlements, and infrastructure have to be balanced by stabilisation measures. So, along with the touristic development in Austria during 1955 to 1995, some 0.25 percent of the country's GDP was used annually to stabilise the sensitive environment of the Alpine regions by building safety protections along with the road developments in the mountains.

Cutter and Finch (2008) introduced a social vulnerability index using some 3,000 counties in the USA. Based on about 300 available statistical parameters, 40 indicators were used to define classes of social vulnerability in a dynamic way over four decades. Certain indicators like population, education, and income were found to be crucial to the ability to cope with risks. An increase in population can stress the resource base but educated people can also help to get more know-how and more income for risk mitigation. An extreme decrease in population—some counties lost up to 60 percent of their population between 1960 and 2000—can work exactly in the opposite direction. So, despite a considerable lower resource use, the ability to cope with risks has declined drastically. This is also the case in many Japanese villages that face serious outmigration of young people and an associated decline and ageing of the remaining population. Many villages of Tohoku region share such features and could be considered as highly socially vulnerable. In particular, mountain villages that otherwise would have less damage than coastal settlements were widely given up after the 2011 triple disaster as all resources were needed to cope with the major disaster that affected centres of the region.

3.5. Human-made, Technological and Health Hazards

Man-made hazards comprise a wide range of threats such as hazardous releases of chemicals and toxic waste, fire and explosion, transportation accidents, building and structure collapse, energy, power and utility failures, fuel shortages, air pollution, water pollution, contamination, financial issues system collapse, communication system interruptions, armed conflicts and wars, acts of terrorism with bombing, release of chemical and biological weapons, sabotage of infrastructure, and civil disturbance and riots. Another group of hazards relates to strike and labour dispute, workplace violence, harassment, and discrimination. An example on the effect of peace on tourism is Sri Lanka where tourism numbers multiplied after the end of the civil war in 2009. Human rights are often not considered when tourism is developed. One example is when the world association for soccer, the Fédération Internationale de Football Association, awarded the 2022 World Cup hosting rights to Qatar. For the construction of buildings and sport stadiums, Qatar needed migrant guest workers. The British newspaper, *The Guardian*, reported in 2013 that on 4 July and 8 August of the same year, with extreme summer temperatures, some 44 migrant workers from Nepal died (Amnesty International 2013). Often, tourists do not recognise human rights violations or they are hidden from tourists. Technological hazards also fall into another group of man-made hazards. The two nuclear disasters of Chernobyl in Ukraine in 1986 and Fukushima in 2011 widely demonstrate the technological risks associated with energy generation. In 2050, the annual energy consumption might be double the consumption in 2000 (Global Energy Outlook, 2012). As such, nuclear energy is again considered by some groups as a key strategy to counter climate change and global warming, as recently promoted in a so-called eco-modernist manifesto (Asafu-Adjaye et al. 2015). Other perhaps less drastic but substantial technological hazards are related to information technology system failure, the breakdown of telecommunication and internet services, and product defects or product contamination.

The outbreak of infectious diseases is another risk that can be widely exaggerated. The magnitude of today's tourism turns epidemic events from local and regional incidents into global scale. For example in Asia, the 2002/2003 severe acute respiratory syndrome or SARS, with several hundred lethal victims, and the 2012/2013

Middle East Respiratory Syndrome or MERS received much attention from travellers. Other epidemic outbreaks like Ebola in West Africa caused over 11,000 deaths. The ongoing epidemic in Guinea and Sierra Leone widely limits the possibilities of any touristic activities in these countries (WHO 2015). Appropriate health and sanitary plans can widely reduce the number of victims.

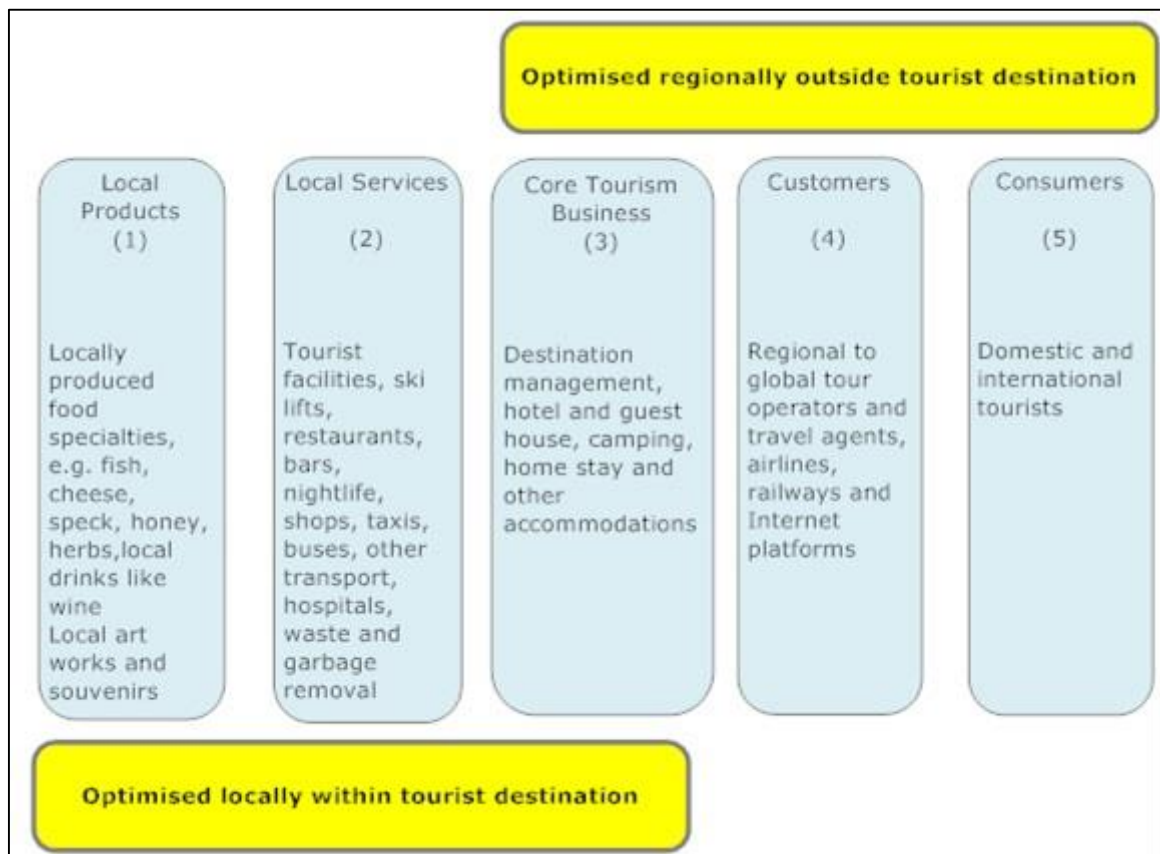
4. Natural Disaster Prevention and Non-disruption of the Tourism Industry: Austria as an Example

Austria is a landlocked country in central Europe with 8.6 million inhabitants. It has 90,000 tourism businesses with 614,000 employees which comprise 20 percent of the national labour force. Tourism directly and indirectly contributes 14.8 percent to GDP, or €46.5 billion or more than US\$50 billion in absolute numbers (Austrian Chamber of Commerce 2014). This is some 0.8 percent of global tourism spending and 2 percent of global international tourism spending. The combination of primarily mountains and a well-established infrastructure worked very well in Austria. Natural hazards and disasters are primarily limited to mountain risks and flooding. Business continuity failures in tourism after damages or even disasters are rare and hardly recognised by the Austrian public due to the established government agencies and the available instruments in place that collect all relevant risk information. The worst national disaster experienced in Austria happened in Kaprun in November 2000 when a technical failure caused a fire in an ascending train transporting skiers to the mountain top and claimed the lives of 155 people. In the 2014/15 tourist season, 25 people were killed due to avalanches and 28 people died in ski-related accidents not related to natural hazards (BMI, 2015). During summer, the death toll in the mountains is slightly higher (but less than 100) and most of the fatalities do not relate to natural hazards. The total number of fatalities in mountains is still less than a quarter of the number of people killed in car accidents. One major reason is that the established structures to counter natural disasters work well both ex ante and ex post. There were 4.894 incidents reported in 1972 and 2004 (Fuchs 2009), most of them were directly situated in tourist destinations.

4.1. Non-disruption of Tourism Supply Chains

In Austria, business interruption after natural disasters happens within a limited area. It does not take more than a few days to recover from an event and there are other tourist destinations nearby that can take the tourists from an affected area. Spheres of preventing natural disaster risks from inside and outside the tourist destinations are indicated in Figure 5.

Figure 5: Supply Chains of Tourism and Natural Disaster Mitigation Intervention Possibilities



Source: Author.

Figure 5 illustrates disaster risk reduction from outside via global and regional efforts. They are valid for all businesses and resorts, and non-specific. There are supporting UN documents like the HFA and the Sendai framework (UNISDR 2005, 2015) or the promotion of regional disaster and climate risk resilience through risk financing mechanisms (UNISDR 2014). In addition, international sector associations developed supporting documents to counter natural hazards and critical risks (OECD 2014, 2014a, PREP 2014). The European Union (EU) provides regulatory frameworks to prevent adverse consequences from natural disasters such as the flood directive (EU 2007). The lower box in Figure 5 describes ex ante and ex post measures undertaken within a tourist destination. Within Austria, the provincial government, the state government or the chambers of trade and commerce allocates funds to support small- and medium-sized enterprises in a non-bureaucratic way (Ultraworld 2010/6). The following sections describe some instruments currently available for tourism businesses.

4.2. Public Disaster Prevention in Austrian Tourist Destinations

Austria has a long tradition of coping with risks. Its first mountain risk agency was established in 1884. Almost all potential natural disasters are related to climate and climate change. But the climate parameters work differently for individual hazards or seasons of the year, and can be aggravated due to particular local factors. Floods can appear both in summer and winter. During summer, floods are connected to extreme precipitation while, during winter, even non-extreme precipitation can cause flooding when soils are frozen. Avalanches are influenced by wide daily amplitude of temperatures and the generation of distinct snow layers. Debris flow, landslides, and mudslides occur during summer after heavy precipitation loads. A new risk is rockfall, when the Alpine permafrost thaws with rising temperatures. Since 1975, the mountain risk agency is also responsible for risk assessment. On the local level of tourist resorts and municipalities, we find hazard zone planning as non-structural institutional measures, and safety protection constructions as structural measures. The areas of 30 years recurring risk events, mainly flood and torrent activities, and the areas of 100 to 150 years recurring risk events are depicted as yellow and red areas; and any building activity is strictly forbidden and other uses can be restricted. Along with any road

construction, an environmental impact assessment will determine where such safety measures will be required. Critical parts will be considered as targets for improvement and expensive safety constructions result. Most potential damages are avoided by such measures. Since 2007, an online tool for flood risk assessment that covers some 25,000 kilometres of rivers allows enterprises and individuals to assess the actual flood risk (<http://www.hora.gv.at>). This allows the taking of preventive measures in due time.

4.3. Assessment of Vulnerability and Introduction of a Nationwide Vulnerability Map

Fuchs (2009) differentiates between four kinds of vulnerability—structural, institutional, economic and social. All of these are founded on different concepts. Structural vulnerability is the vulnerability of a location that is usually addressed by engineers and relates to technical measures and natural sciences. Flood risk maps are related to structural vulnerability and they may propose safety constructions at particularly vulnerable spots. Closely linked to this is institutional vulnerability. This puts into account the political system and its stability, as well as the provision of particular agencies and institutions to counter the risks and impacts of disasters. But other national government agencies also support risk awareness and risk abatement. For instance, the postal service issues stamps after disasters where people could show support by paying a small donation to disaster victims. Economic vulnerability relates to the disaster damage or the likely damage. It relates to two-thirds buildings and to one-third infrastructure. Ex post disaster measures and support are provided through the national disaster fund, the only chance to compensate or partly compensate the victims of disasters economically when the insurance system does not work, e.g. when the premium or the risk is too high to insure the business. The last category, social vulnerability, relates to risks that can arise due to the prevailing socio-economic conditions. In general, Austrian mountain societies are wealthy. The village as a place for good living is also a major asset for mountain tourism. Therefore, the overall vulnerability of Austrian mountain resorts relates mainly to a mix of the first three categories of vulnerability. Based on this, Austria introduced a nationwide vulnerability map (Fuchs and Zischg, 2014) where about 2,300 municipalities with an average size of 30 km² are included. Only the major risk categories are mentioned,

covering flood risks, mountain risks with mass movements such as torrents, landslides, debris flow, and avalanche snow risks in winter.

4.4. European Toolkit for Sustainable Tourism Indicators as a Way to Optimise Supply Chains within a Destination

Recently, the EU's European Commission Directorate General (DG) Enterprises and Industry published the European Tourism Indicator System for Sustainable Destinations (2013). The EU has introduced a number of tools to facilitate sound environmental management for businesses such as the EU Ecolabel or the Community eco-management and audit scheme (EMAS). The tourism sector's competitiveness is closely linked to its sustainability, as the quality of tourist destinations is strongly influenced by its natural and cultural environment and its integration into a local community. A sustainable tourism development further ensures the long-term competitiveness of the industry in an effort to regain lost market shares in tourism by so-called sustainability indicators. These relate to four groups: destination management, economic value, social and cultural impacts, and environment impact indicators. The basic principle of the Indicator System is that destination responsibility, ownership, and decision-making are shared. Engaging a group of stakeholders to come and work together to collect and report information is a powerful way to undertake effective destination management. There are 27 core and 40 optional indicators. One of the core indicators D1 is directed to climate change—the percentage of tourism enterprises involved in climate change mitigation schemes such as CO₂ offset, low energy systems, and adaptation responses. Particularly in tourism, where many businesses are located in areas vulnerable to flooding, drought and other impacts, this criterion highlights the importance of integrating climate change awareness and tourism planning as a means to identify risks and take early measures in countering the risks. In a second step, it is not unlikely that the reporting destinations will get privileged access to limited EU funds.

5. Recommendation for Natural Disaster Prevention and Non-disruption of Tourism Supply Chains in ASEAN Countries

Tourism is a relatively young economic activity in ASEAN countries and it will continue to grow. The value and supply chains of tourism in ASEAN countries give considerable options for improvement to achieve the economic benefits in local scales. A serious threat is natural disasters, considered as the most important danger in tourism supply chains. If people become prepared for natural disasters, the death toll of disasters can be reduced to a small portion, as was the case in the tsunami event of 2004. In terms of value, disasters will cause more harm to the tourism sector as the economies of ASEAN countries will grow and more properties will be affected. On the other hand, economic growth offers possibilities to build appropriate support structures. Examples from Europe and Austria show that a proactive attitude in disaster risk mitigation can be rewarded with additional success in tourism. A lot of experiences were collected during the last decade. Incentives to cooperate in disaster mitigation came in particular from recent international efforts from the UN, with the HFA and the Sendai Framework. International business associations are now better aware that natural disasters can be a major hindrance to developing enterprises. In conclusion, we point out the following recommendations:

- Include natural disaster risks in any form of tourism planning. Provide hazard zoning maps and discuss possible scenarios with tourist businesses. Coastal and mountain risk mitigation has to be an integrated part of development planning and an important asset for tourism in ASEAN countries.
- Establish or enlarge hazard and risk-related government agencies in ASEAN countries and alter their roles as public sources of risk information. This way, experiences from previous disasters can be considered in meeting future disasters.
- Establish or expand regional and national disaster funds for risks that cannot be insured as an immediate measure to support tourist businesses affected by a natural disaster in ASEAN countries.

- Representatives of tourism businesses to become stakeholders in disaster risk reduction efforts of local and regional governments. Major enterprises to develop emergency action plans for anticipated disasters in the enterprise.
- The classification as a sustainable tourist destination based on indicators and including disaster risk mitigation and supply chain management are additional targets. Experience from EU destinations could be transferred to ASEAN countries. Highlighting efforts in achieving sustainability goals can help tourist businesses improve their economic performance.

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