Hospitality Industry Responses to Climate Change: A Benchmark Study of Taiwanese Tourist Hotels

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Abstract

Hotels are one of the tourism businesses most vulnerable to climate change because of their fixed assets. Results are presented of a baseline study that explores the awareness, attitudes, and behaviours of Taiwanese tourist hotels with respect to climate change and its potential impacts, as well as their overall environmental practices. Tourist Hotels are defined by the Taiwanese government as hotel establishments of over 80 rooms in rural areas and 50 rooms in city areas. Although the 104 tourist hotels represent only 3.7% of the total number of hotels in Taiwan, they account for over half of international guest nights and had a combined revenue of over TWD$43 billion in 2010.

Questionnaires were distributed via email to all tourist hotels in Taiwan, 45 valid returns were received representing an effective response rate of 43.3%. The results of research illustrate the level of understanding of climate change within Taiwanese tourist hotels and identify the specific climate change adaptation and mitigation strategies that tourist hotels have initiated. Access to such baseline data provides a potentially significant contribution to evaluating the response of the Taiwanese accommodation sector to environment change as well as providing a basis for further comparative studies and benchmarking.

Keywords: environmental change, environmental programmes, accommodation sector, implementation

Introduction

The issue of climate change has emerged as one of increasing importance to the tourism and hospitality industries in terms of both the potential effects of climate change on tourism and the contribution of tourism to climate change (Gössling & Hall, 2006; Simpson et al., 2008; UNWTO & UNEP, 2008; Gössling et al., 2009). However, despite the significance of tourism to many Asian economies, there is a relative dearth of research on the relationships between tourism and climate change in the region (Hall, 2008). For example, even though the IPCC fourth report recognized the economic importance of tourism, the lack of research on which to develop adaptation and mitigation strategies was seen as a significant issue, noting that: 'only a few assessment studies are on hand for this review' (Cruz et al., 2007, p.489).

Taiwan, which has the 22nd highest carbon emissions of all countries with an annual production of 28.9 billion metric tons of CO_2, is ranked as one of the top ten countries vulnerable to climate change (Environmental Protection Administration (EPA), 2010a; Germanwatch 2010; Hou, 2010). In the last hundred years, Taiwan's climate, which is highly influenced by land-sea contrasts in temperature, local terrain features, and the East Asian monsoon, has experienced higher average temperatures, greater unevenness in rainfall distribution, and an increase in the frequency and intensity of extreme weather events, such as typhoons, heatwaves and dust storms (Hsu et al., 2007; EPA, 2009a; Taiwan Central Weather Bureau, 2009). The annual mean temperature has increased by 0.8^{0}C and Taiwan's summer has also become longer, with more than 28 days of temperatures over 30^{0}C per year (Chen, 2008). For cities, the combination of climate change and heat island effects has led to an increase of average nightime temperatures, while the average sea temperature of the north and south coasts has risen by 1.1^{0}C and 0.9^{0}C respectively (Chen, 2008). Sea level is predicted to increase 16 cm by 2030, and 50 cm by 2050 (EPA, 2010a). The increased intensity and variability of rainfall has resulted in more flooding, landslides, and regional drought events (Tung & Lin, 2008; EPA, 2009a; Taiwan Central Weather Bureau, 2009).

The Taiwanese tourism industry is already highly affected by climatic events. For example, the tourism industry was estimated to have lost NTD$ 10.4 billion revenue and 750,000 tourists in 2009 because of the damage caused by Typhoon Morakot (The Japan Times, 2009). Seventeen hotels were damaged by Typhoon Morakot with a loss of NTD$137 million (Taiwan Tourism Bureau, 2009a). However, no study has specifically sought to estimate the contribution of tourism to climate change in Taiwan, or the impacts of climate change on tourism despite tourism becoming increasingly important to the Taiwanese economy (Kim et al., 2006; Ministry of Transportation and Communications, 2008; Taiwan Tourism Bureau, 2010a). In 2009 Taiwan received

4.395 million tourist arrivals and receipts of TWD$ 408,100 million (TWD$182,800 million in domestic market receipts and TWD$225,300 million in inbound), which accounted for 3.27% of total GDP in 2009 (Taiwan Tourism Bureau, 2010b; 2010c; 2010d; 2010e). Although only representing 3.7% of the total of 2,782 hotels in Taiwan (Taiwan Tourism Bureau, 2010f, 2010g), tourist hotels account for 52.5% of hotel revenue with an income of TWD$ 43 billion (approx. US$1.4 billion) in 2010 (Taiwan Tourism Bureau, 2011a, 2011b), and are used by 47.62% of international visitors for accommodation (Taiwan Tourism Bureau, 2010d), highlighting their significance in inbound tourism.

This article aims to provide a baseline study with respect to the Taiwan tourism industry and climate change by exploring the perception of the Taiwanese tourist hotels to climate change, and their response to this issue in terms of adaptation and mitigation strategies. The paper first provides an overview of climate change adaptation and mitigation as well as broader environmental strategies in the Taiwanese hospitality industry. It then discusses the conduct and results of a survey of Taiwanese tourist hotels with respect to their environmental practices and climate change. It concludes by noting the level of implementation of green hotel practices and the UNWTO and UNEP recommendations with respect to accommodation sector responses to climate change.

Climate Change and the Taiwanese Hospitality Industry

Due to investment in fixed assets, the hospitality sector is particularly vulnerable to climate change (Kyriakidis & Felton, 2008; Simpson et al., 2008; Gössling, 2011). However, this sector is also a significant contributor to climate change producing 274 million tons of CO_2 in 2005, representing 21% of total tourism emissions. It is predicted that the accommodation sector will soon account for nearly one-quarter of tourism industry's carbon emissions because of the high growth in hotel establishment and its energy intensive nature (UNWTO & UNEP, 2008). The World Economic Forum (WEF) (2009) estimates that, even allowing for greater energy efficiencies, accommodation carbon emissions are forecast to grow at 3.2% per year, reaching 728 Mt CO_2 by 2035. The WEF further indicates the Asia-Pacific region will have the highest rate of accommodation emissions growth, increasing from 21% of all accommodation emissions in 2005 to 40% in 2035.

The Taiwanese hotel sector, accounting for the highest sectoral share (39.33%) of international visitor's daily expenditures, is classified into tourist hotel, standard hotel and home-stay on the basis of their facility standards (Taiwan Tourism Bureau, 2010d). According to Taiwan Green Productivity Foundation (2010), the top 50 intensive energy users in the hospitality industry, mostly tourist hotels, produced 363,810 tons

carbon emissions in 2008. It is estimated that the electricity consumption of international tourist hotels is approximately 205.9kWh/㎡·yr, and that of standard tourist hotels 233.7kWh/㎡·yr (Bureau of Energy, 2011). Water consumption is another significant factor in the accommodation sector's contribution to emissions (Bohdanowicz, 2005; Graci & Dodds, 2008). The existing international literature suggests water consumption rates operate in a wide range of between 84 to 2,000 L per tourist per day, or up to 3,423 L per bedroom per day (Gössling et al., 2011). The Taiwanese Water Resources Agency found hotel room's daily water consumption of up to 1,635 litres while hotel guests consume an average 902 litres per day (Lin & Lee, 2008).

Although there is a lack of specific research on the Taiwanese hotel industry response to climate change, some studies have been conducted on hotel environmental management systems and practices. In keeping with international research (Bohdanowicz, 2006; McNamara & Gibson, 2008), Hung and Lai (2006) identified cost reduction as the primary consideration for Taiwanese accommodation sector in their environmental actions. Economic concerns, such as the perceived high initial investment, are considered as the major barrier to participate in environmentally friendly practices and initiatives by Taiwanese hotels (Hung & Lai, 2006). Chang (2006) also identified a lack of qualified of staff as another obstacle for Taiwan hotels in 'going green', but other literature indicates that barriers may also include: existing building structures (McNamara & Gibson, 2008); uncooperative customers (McNamara & Gibson, 2008); and lack of information, time, incentives and suitable suppliers and technologies (McNamara & Gibson, 2008; UNWTO & UNEP, 2008; Chan, 2011).

A number of other factors have also been identified in the international lierature as key drivers that determine hotels' involvement in environmental practices. These include: customer demand (Bohdanowicz, 2006); public relations and reputation (Gössling & Hall, 2008); competitive advantage (Tzschentke et al., 2004); increasing market share, ensuring customer and employee loyalty (Graci & Dodds, 2008); government's regulations (Tzschentke et al., 2004); as well internal business considerations such as stakeholders' expectations, parent company's CSR policy, and staff environmental concerns and ethical values (Hall, 2006; Claver-Cortes et al., 2007; Scanlon, 2007). Hotel characteristics, such as size, ownership, and location, also influence the implementation of green practices. For example, large, chain and affiliated hotels are more likely to have better environmental knowledge and performance (Kasim, 2009; Bohdanowicz, 2005, 2006; Chan, 2011); lodging facilities in less-developed areas appear greener than ones in large cities and coastal destinations (McNamara & Gibson, 2008); while hotels that have experienced high-risk weather events may be more likely to engage in positive environmental practices (Hall, 2006; Hall & Gössling, 2009).

Government regulations and incentives may also be significant for encouraging better environmental practices by tourism businesses (Gössling, 2011). For example, in Taiwan tourism enterprises are encouraged to adopt practices that reduce air and water pollution and recycle waste under the *Statute for the Development of Tourism*. The Statute also requires hotels to purchased insurance to reduce their financial loss from extreme weather events. Taiwanese hotels have also engaged in government initiatives to decrease carbon emissions and save energy. For instance, under the *Energy Management Law,* a tourist hotel with a central air-conditioning system and over 800 kW annual energy consumption is required to have an energy monitor system, an energy-saving plan and engage an energy management specialist. In 2008, 21 hotel groups voluntarily signed an Energy Conservation Agreement with the Bureau of Energy (EPA, 2010b).

The results of The Green Hotel Contest, a 2008 pilot programme of the EPA, indicated that participants had focused on mitigation practices, such as 'no or less use of disposable items', 'waste recycle, reuse, and retreatment' and 'energy saving control' (Wang, 2008; EPA, 2009c). Shen (2010) also found that environmentally friendly hotels held monthly energy-cost-control meetings, and developed resource monitoring systems, but had low commitment to green purchasing practices due to higher costs, and quality and supply issues. Although low-interest Taiwanese government loans and tax incentives may encourage more hoteliers to purchase products with green marks, water-saving labels, energy-saving labels, and carbon footprint labels, and replace incandescent bulbs in the longer term (EPA, 2009b), there appears to be little benchmarking to see if this will be the case.

Because of competitive and cost concerns and a desire to maintain growth, the tourism industry internationally, including the accommodation sector, has focused more on adaptation than mitigation in its climate change response (Gössling et al., 2010; Hall, 2010). Some lodging facilities have started to position themselves as a 'green hotel' by offering eco-room, low-carbon packages (Buygreen Net, 2010). In addition to carbon reduction education for employees, water-saving practices, such as 'hotel visitors' reuse of towels and liens', 'bathroom's water-saving facilities', and 'water recycle and reuse', are also regarded as common adaptation strategies in the hotel industry (Shen 2010). However, the Taiwanese government's mixture of environmental policies based on regulation, certification and financial incentives is highly fragmented with different agencies and levels of government having different responsibilities and goals. As a result, there is no integrated environmental strategy and detailed emission reduction strategies for hotels to follow (Peeters et al., 2009; Gössling, 2011). In addition, industry attention is given primarily to using technology to create greater efficiencies –

lower emissions per consume – rather than reducing the absolute amount of emissions which may require much more fundamental changes in the way tourism and hospitality businesses operate (Gössling et al., 2010; Hall, 2010). Thus, it is important to monitor the environmental strategies of hotels as a way of benchmarking their performance and effectiveness.

Tourist Hotel Survey

Method

This study reports on a survey of the climate change and environmental practices of Taiwanese tourist hotels, consisting of international tourist hotels and standard tourist hotels, which are defined as establishments of over 80 rooms in rural areas or over 50 rooms in urban areas. Although the 104 tourist hotels represent less than 4% of all hotels in Taiwan they account for over half of all hotel revenue and are used by almost half of international visitors for accommodation (Taiwan Tourism Bureau, 2010d).

An e-mail based survey was conducted in August and September 2010 for the purpose of understanding the awareness, attitudes, and behaviours of Taiwanese tourist hotels with respect to climate change and its potential impacts as well as their overall environmental practices. The survey questions are drawn in part from previous sustainable tourism and climate change literature. The four-part questionnaire includes sections on company information, (size, affiliation, location); perception and attitude regarding to environment and climate change; implementation of the 32 environmental practices recommended by the UNWTO and UNEP (2008, pp.11-12) in relation to climate change; and demographics. The survey was designed to receive responses from senior hotel managers, often in conjunction with other staff. Emails were followed up by phone-calls and correspondence.

Fourty-five tourist hotels, comprising of 25 chain hotels and 20 independent hotels, answered the survey providing an effective response rate of 43.3%. Over 80% of respondents were from hotels of over 150 rooms, and just over half (51.1%) were located in north Taiwan. Despite the distribution of responses an attempt is made in the analysis to illustrate some of the potential differences in adaptation between regions and hotel size.

Awareness

Nearly all respondents (95%) agree that climate change exists. The main sources of information were from media, such as newspaper, TV, radio and Internet. Hotel

participants generally perceive that more climate change will occur in the long term. Over 65% of respondents expected more negative impacts on the national tourism industry, hotel's region and hotel's business in the next five years, which is ten percentage points higher than that of the previous five years at the time of answering the survey. Hotels expect higher summer temperatures, more frequent extreme weather events such as typhoon, extreme rainfall and floods, and more threats to water and electricity security (Table 1). From a geographic perspective, Northern Taiwan lodging facilities are more aware of such changes happening in their location than other regional hotels although hotels in all regions believed that the number of typhoons would increase in the future.

Insert Table 1 here

Attitude

Although Taiwanese tourist hotels show a higher awareness of climate change than that found in some other tourism industry studies (e.g., Hall, 2006; Saarinen & Tervo, 2006), participants disagree that their individual hotel has an affect on climate, and only slightly agree hotels should take action (Table 2). But respondents' attitudes are more supportive with respect to their responsibility to environment. There is moderate agreement that government should regulate the tourism industry regarding climate change, and that their hotel would voluntarily implement strategies to respond to climate change, but support for environmental initiatives, such as carbon taxes, carbon offset schemes, and carbon trading schemes, is relatively low. This research further applied the hotel scale classification used in Bohdanowicz (2005), and found that large hotel facilities with more than 150 rooms have more positive response to the above issues than small and medium hotel facilities. Although based on a relatively small population, the results of this study supports Bohdanowicz's (2005) findsings in the European context that managers in chain-affiliated hotels were generally more likely to pay attention to environmental issues than were independent operators, many of whom run small properties.

Insert table 2 about here

Behaviour

This research surveyed Taiwanese tourist hotels' implementation of the specific recommendations of the UNWTO and UNEP (2008) with respect to accommodation sector measures in relation to climate change. As far as is known this is the first time that the extent to which these recommended environmental practices are utilized in the

accommodation sector has been specifically investigated. The average implementation rate of respondent hotels is only 2.7 (based on a Likert scale of 1='low level of implementation', 3= 'moderate level of implementation', 5='High level of implementation'). The best-performed practice of respondents is to implement a control system for heating/cooling/lighting facilities, which is the only measure with a score of over four (Table 3).

Insert Table 3 here

The mitigation measures of Taiwanese tourist hotels focus on the use of electricity and materials, the adoption of locally-produced and seasonal food, and waste management, including reduction, pretreatment and recycling (Table 3). Water-saving practices are the only adaptation practice popular with hotel respondents while other measures, such as 'Locating new establishments in low-climate-risk areas', involement in the 'climate change network to promote activities proposed in UNWTO's Davos Report and Declaration', 'Developing links with international policies, mechanism, cooperation and standards regarding to climate change', 'Offering incentives for adaptation and mitigation measures', are poorly adopted. The relatively low answer rate for these statements may also imply that respondents are not familiar or comfortable with these UNWTO and UNEP recommended potential measures.

The UNWTO and UNEP's (2008) recommendations are also examined with respect to variations in response with respect to region, hotel size and type of hotel (Table 4). Tourist hotels located in eastern Taiwan have significantly higher environmental implementation rates than other areas with nine measures having a score over four. In addition, large hotels appear to perform better than small and medium hotels, and chain hotels better than independent establishments. Domestic chain hotels' performance is also slightly better than that of international affiliated hotels.

Insert Table 4 about here

Hotels were also asked how they perceived and adopted Taiwanese government environment initiatives and policies. Only 13% of the respondent hotels adopted the Green Hotel Label, although 93% of the respondents were aware of the initiative. Nearly 70% of participants stated that they planned to adopt the Green Hotel Label and associated certification subsidies in the future with seven hotels indicating that they will apply in the next five years. Respondents are also sensitive to the energy use and saving regulations. Nearly 80% of respondents, who are aware of 'Sponsorship Directions of Providing Preferential Loans for Enterprises Purchasing of Energy-Saving Equipment for the Banks', 'Regulations Governing Application of Tax Credit to Companies

Purchasing Equipment or Technology Used for Energy Saving Purposes or Employing New and Clean Energy' and the '585 Incandescent Replacement Program', either have or will adopt these programmes. In the case of the latter 65.9% of respondents indicated that they have already implemented the replacement program.The lowest level of awareness was with respect to the voluntary Energy Conservation Agreement and CO_2 Emission Registration with less than 30% of respondents also adopting these policies.

The survey also tried to identify the critical factors on their environmental actions by asking respondents to evaluate the importance of 23 features, referred to in previous research, on a five-point Likert scale of 1 ('not very important') to 5 ('very important') (Table 5). All were rated reasonably highly in terms of importance, although stakeholder pressure was rated the lowest. The most important factors were 'cost reduction' and 'Owner or top manager's personal value and belief'. The results also indicated that domestic chain hotels are more cautious about their environmental actions and show greater consideration with respect to company policies, government regulation and incentives, and hotel capability with respect to time, staff, and facilities. 'Climate change concern' was the least important factor for the environmental actions of small and medium size lodging facilities.

Insert Table 5 about here

Discussion and Conclusion

Taiwanese tourist hotels were found to have high awareness of climate change and its negative impacts on industry, but maintain conservative attitudes towards government's legislative actions and hotel's corresponding responsibilities. Media reports and natural disasters have influenced hotel respondents' perceptions of climate change and its possible implications, but they are not aware how to relate hotel's environmental and business strategies directly to climate change concerns. 'Cost reduction' and 'owner or top manager's personal value and belief' are the key factors that influence hotel's adoption of environmentals (Hung and Lai, 2006). The low implementation rate and uneven adoption of adaption and mitigation measures suggest that Taiwanese tourist hotel's environmental practices are more closely oriented to more immediate revenue-generation than developing longer-term adaptive capability.

Bohdanowicz (2009) notes that simple and behaviour-related measures could reduce 10%-15% of hotel's energy consumption. Taiwanese tourist hotels' mitigation efforts are therefore still valuable. For example, eastern Taiwan hotels have widely engaged in environmental policy, EMS, and the saving practices with respect to energy, waste, and resource. One possible explanation for this is eastern Taiwan hotels receive more

holiday customers and are primarily located in natural area destinations and may therefore face particular constraints arising from regulation, cost management and marketing. McNamara and Gibson (2008) also found that hotel facilities in less-developed areas were greener than those in urban centres. There numerous suggestions in the literature that large or chain hotels are more likely to engaged in environmentally friendly practices than small or independent operations (Bohdanowicz, 2005; Erdogan & Tosun, 2009; Chan, 2011), are also supported by the present findings. However, while these results are significant in the context of tourist hotels they cannot be applied to the Taiwanese accommodation sector as a whole.

Overall there are three key findings in this study of Taiwanese tourist hotel responses to climate change. First, the low level of implementation of environmental practices by respondents, especially for measures directly related to climate change, highlighted a gap between participants' awareness and perceptions and actual actions. There was also a relatively low level of adoption of Taiwanese government programmes, even though there was a high degree of awareness. The result suggests hotel respondents do not consider it is their responsibility to make environmentally friendly changes except for economic or leadership concerns. Nevertheless, Taiwanese government's efforts, especially via regulatory measures, appear to have made some progress in encouraging tourist hotels to implement waste, energy, and resource management programs.

Secondly, there is a relatively low level of implementation of the UNWTO and UNEP (2008) advised responses to climate change by the accommodation sector. Some of the recommendations were clearly not regarded as relevant at the present time to the Taiwanese respondents or they were not even aware of some of the suggestions with respect to adaptation strategies. Such a situation raises issues about the extent to which the UNWTO and UNEP (1980) recommendations are being promoted through the international hotel industry and the need for more comprehensive hotel relevant environmental education and corporate social responsibility programmes for hotel managers and staff.

Thirdly, this implementation gap appears relatively common in tourism industry practice with respect to climate and environmental change, and represents a major policy and action challenge (Hall, 2009; Gössling, et al., 2009, 2010). Future research is required to see the extent to which hotels actually followed up on their stated plans to implement environmental management and climate change policies in the near future.

Although the results of this survey are not representative of the wider Taiwanese hospitality and tourism industry, the economic contribution of the tourist hotels to Taiwanese tourism as well as their potential benchmark status by virtue of the linkages

to overseas chains and international hotel brands, do make them extremely significant players in the Taiwanese tourism and hospitality industry. However, the mismatch between levels of environmental awareness and actions found in this study are not unique to Taiwan and arguably reflect the hard reality of the wider tourism industry trying to reconcile collective environmental costs with individual economic benefits.

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Table 1. Respondent's perception of climate change impacts in hotel's location (Analysed by Region)

	Change in the next 5 years (Mean response of hotels in region ≥4)				Change in the next 20 years (Mean response of hotels in region ≥4)			
	Central Taiwan	East Taiwan	North Taiwan	South Taiwan	Central Taiwan	East Taiwan	North Taiwan	South Taiwan
Summer temperature				●	●		●	●
Extreme rainfall	●	●			●	●	●	●
Typhoon	●	●	●	●	●	●	●	●
Floods		●				●	●	●
Water availability						●	●	
Electricity availability							●	

Note. Bullet point indicates that mean response of hotels ≥ 4: based on scale of 1='lower', 3="No changes", 5='Higher' for temperature; 1='Less frequent', 3="No changes", 5='More frequent' for extreme weather events; 1='Less threatened', 3="No changes", 5='More threatened' for resource availability

Table 2 Respondent's attitudes towards environment, climate change, and environmental regulations

Statement	Level of Agreement (Mean)		
	Large hotel facilities (N=36)	Small hotel facilities (N=9)	Mean (all respondents) (N=45)
My hotel …			
– has an impact on the environment	3.4	3.3	3.3
– contributes to climate change	2.5	2.4	2.5
– has a responsibility to respond to the environmental impacts	4.0	3.7	4.0
– has a responsibility to respond to climate change impacts	3.7	3.4	3.7
– believes that government should regulate the tourism industry regarding climate change	4.0	3.6	3.8
– supports current government environmental policy over climate change concern	3.9	3.6	3.9
– supports a carbon tax	3.3	2.7	3.2
– supports a carbon offset scheme	3.6	3.3	3.6
– supports a carbon trading scheme	3.4	3.1	3.4
– will implement strategies to respond to climate change even it is not required by government regulation	4.0	3.6	3.9

Note: Mean: based on scale of 1='Strongly disagree', 3="Neither agree nor disagree", 5='Strongly agree'.

Table 3 Level of implementation of UNWTO and UNEP (2008) recommended measures for the accommodation sector to respond to climate change

Rank	Environmental Practice	Number of Hotels	Level of implementation (Mean)
1	Implement control system for heating/cooling/lighting facilities	44	4.02
2	Provide locally-produced and seasonal food	44	3.90
3	Recycle waste and raising customer's awareness of waste	45	3.80
4	Frequently clean and maintain electricity facilities	43	3.79
5	Reduce and pre-treat chemical and hazardous wastes	43	3.70
6	Measure and monitor resource usage and waste production	44	3.61
7	Reduce the use of materials	44	3.57
8	Use energy-efficient appliances	43	3.53
9	Implement water-saving and reuse measures	42	3.38
10	Encourage guest/staff to use green vehicles/public transport	44	3.16
11	Purchase fair-trade/green-label products where possible	44	3.00
12	Reduce the use of air conditioning	44	2.98
13	Initiate a hotel environmental policy	42	2.88
14	Adapt hotel's products, marketing and positioning	44	2.72
15	Set up environmental targets and benchmarking	43	2.67
15	Adapt building design for energy saving	43	2.67
16	Volunteer for local conservation or community projects	44	2.57
17	Implement environmental management system	43	2.53
18	Use alternative fuels and renewable energy	43	2.49
19	Implement energy-saving education/incentive for staff/ guest	42	2.38
20	Develop an environmental code of ethics' for supplier chain	41	2.29
21	Involve and comply with climate change policies and plans	42	2.17
22	Provide climate change and environment education for customers and staffs	44	2.05
23	Involve in the national tourism program regarding to energy efficiency and renewable energy use	41	1.95
24	Achieve environmental certification	41	1.88
25	Designate a manager with specific responsibility for environment management system and emission issues	41	1.71
26	Integrate emission management with supply chain	39	1.69
27	Involve in and provide carbon offset projects for guests	40	1.65
28	Offer incentives for adaptation and mitigation measures	43	1.58
28	Develop links with international policies, mechanism, cooperation and standards regarding to climate change	40	1.58
29	Involvement in the climate change network to promote activities proposed in UNWTO's Davos Report and Declaration	37	1.41
30	Locate new establishments in low-climate-risk areas	37	1.40
Overall mean all responses:			2.65

Note: Mean: based on scale of 1='low level of implementation', 3= 'moderate level of implementation',

5=’High level of implementation’.

Table 4 Level of implementation of UNWTO and UNEP (2008) recommended measures by region, hotel size, and hotel status.

		Level of implementation (Mean≥4)									
		Central Taiwan	East Taiwan	North Taiwan	South Taiwan	Large hotel facilities	SM hotel facilities	Chain Hotel			Indep den Hote
								Domestic	International	Average	
Level of implementation of all measures (mean)		2.7	3.0	2.3	3.1	2.7	2.3	2.9	2.6	2.8	2.5
Mitigation measures	Hotel environmental policy		●								
	Environmental management system		●								
	Electricity facilities maintenance	●			●			●			
	Energy control system	●	●		●	●		●	●	●	
	Energy-efficient appliances		●								
	Locally-produced and seasonal food	●			●			●	●	●	
	Reduce the use of materials		●					●			
	Recycle waste and raise customer's awareness of waste		●								
	Reduce and pre-treat chemical and hazardous wastes	●	●								
	Monitor resource usage	●	●								
Adaptation measures	Water-saving and reuse measures		●								
Average level of implementation (Mean) = 2.7											

Note. Bullet point indicates that mean response of hotels ≥ 4: based on scale of 1='low level of implementation', 3= 'moderate level of implementation', 5='High level of implementation'

- Central Taiwan (N=5); East Taiwan (N=5); North Taiwan (N=23); South Taiwan (N=12)
- Large hotel facilities (N=36); Small and Medium hotel facilities (N=9)
- Chain Hotel (N=25), Independent Hotel (N=20)
- Domestic Chain Hotel (N=12), International Chain Hotel (N=13)

Table 5 The importance of factors influencing tourist hotel's adoption of environmental actions

Ranking	Mean	Factors
1	4.4	· Cost reduction
		· Owner or top manager's personal value and belief
3	4.3	· Capital Investment
		· Parental company's policy
		· Staff availability and expertise
		· Public relation and reputation
		· Government policy and regulation
		· Corporate social responsibility policy
9	4.2	· Customer demand
		· Competitive advantage
		· Existing building structure
12	4.1	· Existing facility
		· Time availability
		· Risk Management
		· Current information
		· Industry Leadership
		· Environment concern
		· Government Incentive
		· Technology availability
		· Climate change concern
21	4.0	· Employee loyalty
22	3.9	· Supplier availability
23	3.8	· Stakeholder pressure

Note. based on scale of 1='low level of implementation', 3= 'moderate level of implementation', 5='High level of implementation'

N=45