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ANALYSIS ON IMPLEMENTING MITIGATION STRATEGIES OF CLIMATE CHANGE IN SOUTH KOREA'S TOURISM INDUSTRY

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Synopsis:

The purpose of this study is to identify practical issues of Korea tourism industries trying to reduce greenhouse gas emission. This study conducted focus group interviews on those who are in charge of energy management in tourism enterprises. This study reviewed coping strategies and analyzed practical problems of tourism enterprises in implementing reduction strategies of greenhouse gas emission.

Analysis on Implementing Mitigation Strategies of Climate Change in South Korea's Tourism Industry

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I . Introduction

Recently, the whole world has been suffering from severe damage such as typhoon, heavy rain and heavy snow due to the impacts of climate change. In particular, the tourism industry largely dependent on natural resources is inevitably vulnerable to such climate change. Accordingly, efforts to reduce greenhouse gas as main culprit of climate change and global warming around the world have been strengthened. Many other countries like the United States, China and Japan have been already introducing and operating Emissions trading as part of a policy to reduce greenhouse gas and South Korea also is on the verge of implementing the Emissions trading from 2015.

In this situation, tourism industry also needs to cope actively with international cooperation by reducing greenhouse gas such as carbon dioxide and prepare for future climate change threats via establishment of a strategy to respond to climate change. In particular, according to UNWTO(2008), the tourism sector is also responsible for a certain ratio of greenhouse gas emissions and its responsibility for implementing climate change mitigation strategies is much heavy in that the amount of carbon dioxide emitted by transportation, lodging and amenities, and tourism activities accounted for 3.7 to 5.4% (optimal estimate 4.9%) in 2005.

Therefore, researches for climate change and tourism have rapidly increased recently for 6-7 years and in particular previous researches in respect of mitigation strategies cover a range from a research for calculation of the amount of green gas emissions in tourism sector to a mitigation strategy of aviation sector (Bows, Anderson, & Upham, 2008; Gössling, Broderick, Upham, Ceron, Dubois, Peeters, & Strasdas, 2007; Peeters, Gössling, & Becken, 2006), and a mitigation strategy of lodging sector (Charara, Cashman, Bonnell, & Gehr, 2011; Dalton, Lockington, & Baldock, 2007, 2008; Smerecnik & Anderson, 2011), etc. However, while these previous researches have been generally limited to countries in Europe, Oceania and North America there is almost little known about the status of countries in Africa, South America and Asia (Beckon & Hay, 2012).

South Korea, one of the countries in Asia, is showing the 3rd fastest trend in the world with the amount of greenhouse gas emissions having increased by 136% for 20 years since 1990. The report of current status of the amount of country-specific carbon emissions in 2010 by European Commission JRC (2011) stated that South Korea was recorded as ranked the 7th biggest country in the amount of carbon emissions following China, USA, India, Russia,

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Japan and Germany. In addition to this, the number of foreign tourists visiting Korea in 2013 exceeded 12 million and is continuously in a growing trend thanks to the tourism form of Korean wave tourism, medical tourism, etc. Even under this situation, any research has not so far been conducted to comprehensively capture the information about mitigation strategies for climate change in the sector of tourism in South Korea.

Thus, this research is intended to investigate the climate change mitigation strategies of 10 leading tourism business entities in South Korea such as hotels, resorts, casinos, conventions and theme parks. Also, it attempts to provide the suggestions for activating the response to climate change in tourism sector in the future by analyzing the issues in implementing the climate change coping strategies in terms of tourism business entities. Specific research issues are as follows:

First, South Korea's leading tourism companies are running any climate change coping strategies?

Second, what are the issues in implementing the climate change coping strategies?

II. Theoretical Background

1. Status of climate change in South Korea

Temperature, precipitation, snowfall, and abnormal climate in South Korea were examined as follows:

First, the annual average temperature in South Korea rose by about 1.8 °C over the last 100 years and the annual temperature rise rate is analyzed to have risen by 0.5 °C when removing the effect of urbanization (Choi & Kwon, 2005: 256). The temperature change trend examined by averaging each 10 years for recent 30 years revealed that in most areas recent 10 years (1991 to 2000) had a temperature rise by 0.27 to 1.17 °C compared with earlier 20 years (Kim, 1998). A research (Choi, Kim, & Lee, 2007: 194) to analyze the data of highest temperature of large cities (Seoul, Busan, Incheon, Daegu, Ulsan) over last 40 years from 1961 to 2000 showed that the temperature change increase rate in South Korea was much higher compared with 0.013 °C per year (change range 0.010~0.016 °C per year), a global temperature increase rate provided by 4th Report of IPCC (IPCC, 2007).

Second, most natural disasters occurring in South Korea are related to the heavy rain. According to Choi(2002), the number of days of heavy rain in South Korea were found to be not significant statistically but increase. Especially heavy rain occurred 415 times over the past 10 years (2002-2011), accounting for the figure close to approximately 50% among a total of 864 times as natural disasters. Consequent damages amounted to about 4.6 trillion Korean won.

Third, since the 1950s, the amount of new snowfall has decreased in South Korea (Lee & Rhyu, 2003). There is also a difference of snowfall depending on regions, for example, the amount of new snowfall in the West Coast tends to decrease while that in Gangneung located in East Coast tends to increase.

Fourth, a research by Kwon, Kwon, Bu, & Choi(2007) expects that subtropical climate zone applied to partial regions in South Coast including Jeju Island at present will expand to the area of even Cheungchungbook-do including Jeju Island and Ulleung Island except for

the surrounding areas centering around Taebaek mountain range and Sobaek mountain range in 2071 to 2100. It views the change to subtropical climate zone as expanding from South Coast to East Coast, West Coast and inland area. Hence, due to subtropical climate the scenery as subtropical tourist destination can be deployed in Sokcho and Ulleung Island as currently leading tourist destinations in East Coast within this century.

The summary of these data indicates that a climate change is already accelerating in South Korea too.

2. Current status of carbon emissions in tourism sector in South Korea

Before looking into the status of carbon emissions of tourism sector in South Korea, the entire carbon emissions status in South Korea was examined as follows: The amount of greenhouse gas emissions in South Korea for 20 years since 1990s showed the 3rd fastest trend in the world by increasing by 136%. The examination for the amount of specific-country carbon dioxide emissions showed that South Korea recorded 7th place in 2010 from 9th place in 2008 in the world and in particular the amount of carbon dioxide emissions per capita of South Korean people in 2010 was 12.3t, a figure increasing by 109% compared with that of 1990, as ranked 4th place following Australia, USA and Canada, meaning more amount of emissions than those of Germany, England and Japan. Thus, given a growing trend in the amount of greenhouse gas emissions in South Korea, greenhouse gas mitigation strategies need to be prepared urgently.

Meanwhile, the amount of carbon emissions in tourism sector in South Korea was estimated by Ministry of Culture, Sports and Tourism in Korea (2009) based on the investigation scheme for the amount of carbon emissions in tourism industry investigated in 2008 by the World Tourism Organization (UNWTO) and the United Nations Environment Programme (UNEP). That is, in order to calculate the amount of carbon emitted from the domestic tourism sector (transportation, lodging facilities, tourism activities), the amount of carbon emissions in the sector of domestic tourism and transportation was estimated at first and then on the basis of this the amount of carbon emissions in the rest of tourism sector was estimated by applying the rate of carbon emissions in tourism sector of the world provided in 2008 by UNWTO and UNEP. As a result of estimating like this, the total amount of carbon emissions in the domestic tourism sector was 17.36MtCO² and those of the components of tourism sector were shown in the following table.

<Table 1> Estimates of carbon emissions in Tourism Sector in Korea

Sector of Tourism	Calculation of amount of carbon emissions	Ratio (%)
Transportation	13.03MtCO ²	75
Lodging Facilities	3.63MtCO ²	21
Tourism Activities	0.70MtCO ²	4
Sum	17.36MtCO ²	100

Source: Basic Design for Green Growth in Tourism Industry, Ministry of Culture, Sports and Tourism in Korea (2009)

3. Climate change policy in South Korea

South Korea's climate change policy has come to the fore, starting from presenting “Low Carbon and Green Growth” in 2008 as a paradigm of comprehensive national strategy. In 2009 South Korea decided discussions to establish and implement a national strategy including policy target, promotion strategy and focused promotion tasks for Low Carbon and Green Growth at the national level and prepared a legal basis regarding the introduction of Emissions trading by enacting ‘Basic Act on Low Carbon and Green Growth’ in April 2010. Afterward, while ‘Law on Allocation and Trading of the emission rights of greenhouse gas’ passed in the National Assembly in May 2012, South Korea is near to implementation of Emission Trading System beginning in 2015.

On the other hand, for the greenhouse gas reduction roadmap in South Korea 30% versus BAU (Business as Usual) till 2020 announced on July 12, 2011 has been kept till now. To achieve this reduction target, 470 companies in South Korea (as of 2011) since 2010 have been included in Management by Objective(MBO) system for Greenhouse Gas and Energy and forced compulsively to establish greenhouse gas reduction targets every year and implement greenhouse gas mitigation policies, respectively. Management By Objective (MBO) system refers to presenting an implementation schedule of reduction objective to a supervisory agency, reporting the fulfillment performance after accomplishing the objective and then being evaluated along with a comprehensive inspection. At this time, in case of a targeting company’s neglecting or not fulfilling of presentation of MBO statement, implementation schedule and report of performance, it might be subject to fines up to 60 million won under Subparagraph 2 of Article 44 and Appendix 7, Enforcement Decree of Basic Act on Low Carbon and Green Growth. Accordingly, 10 tourism companies among 470 were included in the MBO system in 2010, which meant that the tourism industry also got into climate change coping system in earnest. Currently, while ahead of implementation of Emission Trading System, more tourism companies are trying to implement the climate change mitigation strategies actively.

4. Climate change mitigation strategies in the tourism sector

Climate change coping strategies are classified largely as mitigation strategy and adaptation strategy. Adaptation strategy refers to a strategy to shift the social system and structure suitably to the new climate change phenomenon. In contrast, mitigation strategy is a strategy to reduce Greenhouse gas (GHGs) emission, meaning to reduce carbon dioxide generated mainly from combustion of fossil fuels in the sector of tourism. For mitigation strategies in tourism sector, Becken & Hay (2007) classified into (1) conserves energy, (2) uses energy more efficiently and (c) replaces fossil energy with renewable classified as energy.

Next, the results of previous researches for mitigation strategies in tourism industry are as follows:

Relatively many studies cover mitigation strategies on transportation sector in tourism industry and among them most researches were conducted on mitigation strategies of aviation sector (Bows et al., 2008; Peeters et al., 2006; Gössling et al., 2007). These researches deal

with calculation of the amount of carbon dioxide emissions due to aviation, measures to improve energy efficiency of airplanes, and measures of energy saving through adjusting routes of airplanes. Meanwhile, Dickinson & Lumsdon (2011) have proposed a conceptual framework for a 'slow travel' as an alternative to usage of air transportation.

Next, researches by Dalton et al. (2007), Charara et al. (2011), and Smerecnik & Anderson (2011) are included as researches of mitigation strategies for lodging sector. Dalton et al. (2007) studied the attitude for renewable energy supply born by operators of lodging facilities in Queensland, Australia. Charara et al. (2011) studied water use efficiency in the hotel sector in Barbados while Smerecnik & Anderson (2011) conducting a study on environmental innovation in the ski resorts and hotels in North America. In most cases, these studies investigated intensively the cases in one of tourism companies and so it is difficult to find any results analyzing synthetically a variety of cases. This research chose 10 leading tourism companies in South Korea, including hotels, resorts, casinos, conventions and theme parks and is intended to analyze comprehensively the mitigation strategies of tourism companies.

III. Research Method

This research investigated the greenhouse gas reduction and climate change coping strategies of all 10 tourism companies included in MBO system on the basis of 2011 to analyze the climate change coping strategies of leading tourism companies in South Korea. Concretely, it is intended not only to capture the listing of greenhouse gas reduction strategies in tourism companies by applying two ways of research method such as topic-presentation and round-table formed discussion largely targeting the personnel in charge of greenhouse gas reduction and management but also to capture in-depth understanding for what would be difficulties and restrictions entailed in reducing greenhouse gas in the stance of tourism companies in reality.

Investigations were conducted two times in 2011 and 2014 and the investigation of 2014 was undertaken to review any difference in existing coping strategies over 3 years since 2011. The 1st investigation was conducted in a total of 4 times September 8, 2011 through November 22, 2011 while the 2nd investigation two times June 12, 2014 through 13. The contents of meetings were recorded and utilized for analysis data later on after obtaining the agreement from people participating in this research.

Tourism companies included in this research were 10 tourism companies designated as targets of MBO system on the basis of 2011 as show in the following <Table 3>. In the meantime, the 2nd investigation in 2014 was intended to identify whether any changes took place in terms of existing mitigation strategies by selecting 3 leading companies such as Tourist Accommodation Business (Sokong Branch of Lotte Hotel), Casino Business (Kangwon Land), and Amusement Facility Business (Lotte World) in each type of tourism companies.

<Table 2> Research Target: Tourism Companies targeted as MBO system

Management Company	Classification	Type of Business	Application Criteria
Hotel Lotte (Lotte World)*	Amusement facility Business	Building	Place of Business
Kangwon Land, Hotel Casino*	Casino Business	Building	Place of Business
Hotel Lotte*	Tourist Accommodation Business	Building	Place of Business
Lotte Hotel, Busan	Tourist Accommodation Business	Building	Place of Business
Samsung Everland Resort Biz. Dept.	Amusement facility Business	Building	Place of Business
Daemyeong Leisure Industry	Resort Condominium Business	Building	Place of Business
Yongpyeong Resort	Resort Condominium Business	Building	Place of Business
Bokwang Phoenix Park	Resort Condominium Business	Building	Place of Business
SK Networks Walker Hill	Tourist Accommodation Business	Building	Place of Business
COEX	Int'l Conference Business	Building	Place of Business

Source: Ministry of Culture, Sports and Tourism, Korea

*Companies included in 2nd investigation, 2014

IV. . Results of Analysis

This research analyzed the climate change coping strategies targeting 10 tourism companies encompassing leading hotels, resorts, casinos, conventions and theme parks in Korea.

The result revealed that their coping strategies were classified largely into replacement for high efficiency equipment, energy information management system, managerial strategies for practicing energy-saving of staff and new renewable energy plans. The details are described as follows:

1. Replacement for high efficiency facility and equipment

The installment and replacement of high efficiency facility and equipment is a strategy to replace for and install more efficient equipment and facility instead of past energy inefficiency equipment and facility. The details are examined as follows: First, a strategy

applied by 10 companies as subjects of investigation appeared to be ‘a replacement for high efficiency lightning fixtures (LED) 2.’ Most companies was establishing plans to continuously replace existing high consuming lightning fixtures with LED lightning step by step in the future. Second, the introduction of a grey water treatment system, a system to reuse used water for toilet water and wash water without abandoning it was found to be a strategy utilized by nine of 10 companies to be investigated. Third, the heat pump system introduced by 4 companies is an energy saving method improving the existing method using gas or petroleum in a manner of absorbing and elevating low-temperature heat into high-temperature heat. On the other hand, for heat sources used for heat pump systems the hydrothermal sources and air heat were being applied diversely depending on facilities of tourism companies except for geothermal sources with investment payback period being expended relatively longer. For example, Yongpyeong Resort owning a water park was reducing greenhouse gas and saving fuel costs by installing 2 units of hydrothermal sourced heat pump and 3 units of air heated heat pump and as a result of introducing this heat pump system was enjoying dual effects by producing hot water for sauna and also resolving a problem of an error occurring in a wave generator in a wave pool due to high temperature in Fan Room within existing water park by cooling the surrounding air around Fan room. Fourth, a waste heat recovery furnace refers to an equipment to recover and recycle heats of disposed high temperature water, steam and gas to prevent energy loss caused by discharging existing high temperature water, steam and gas as they were after using them and all 10 tourism companies were found to utilize it. Lotte Hotel, Busan reduced the production cost of hot water by installing a waste heat recovery unit in 2009, showing it as a most efficient energy saving method making possible a relatively shorter investment payback period (5.2 months) compared with investment cost(approximately 30 million won). Besides, a strategy of installing devices such as water-saving shower, food handler and artificial intelligence auto power saver was also found.

2. Energy information management system

A secondly analyzed GHG reduction strategy is an energy information management system. An energy information management system is an energy efficiency method to accumulate energy usage-related data, manage them synthetically and use a benchmark and a total of 3 tourism companies were found to utilize it while some were preparing to introduce it. An energy information management system was rated as a management system capable of responding effectively to MBO system such as economic operation of the heating and cooling facility, optimal operation of generator, identification of saving of energy cost through a variety of functions including analysis of energy usage trend, energy modeling, analysis of greenhouse gas, analysis of administrative expenses billing, allocation of costs to each department, analysis of power quality (PQ), and integration of multi sites, etc. BeMS under operation developed by COEX, a convention center, calculated production cost for each time-zone and equipment by predicting real-time energy unit price for optimal operation of chiller, boiler and generator, determined the order of equipment operation in minimum operating costs per day through this, and reduced the production cost directly by calculating maximum

efficiency conditions.

3. Use of renewable energy

Use of renewable energy use was still found to show low rate of application in most tourism companies. Only one tourism company was found to use part of solar energy. However, they were found to have established plans to consider and use new renewable energies such as solar, photovoltaic, geothermal, small hydro power and wind power in the future, putting emphasis on them. In particular, for solar and photovoltaic energy, some tourism companies were found to have established plans to apply them starting from 2012. Everland, a theme park, was reviewing a plan to install photovoltaic in parking lots; Kangwon Land was also reviewing the replacement for high efficiency equipment using new renewable energy such as photovoltaic and solar; COEX was reviewing new renewable energies such as solar, hydrogen, geothermal. While Yongpyeong Resort had a plan to apply new renewable energies to employees' facilities as well as those used by tourists, it was planning to introduce a solar system to an office building where course management staff in a golf course stayed and install 48 sheets of solar collecting panels.

4. Energy conservation management

Energy conservation Management, a strategy applied to a space where employees within a tourism company worked, includes various strategies to conserve energy. Some tourism companies were found to make every effort such as creating an exclusive team or TFT to be in charge of saving energy. In addition, most tourism companies was undertaking energy saving education and campaign activities targeting employees and the times of education ranged from 2 times to 12 times annually. Besides, there were the attachment and promotion of energy saving posters and the compulsory cyber environmental education aiming at new employees. In particular, what were rated as good strategies were an Energy Saving Idea Bank and a reward system, having merits to induce voluntary participation of employees. While some companies were recording energy used by each department or each business place and were sharing information by creating a usage and management Web, they were enhancing awareness of employees and were inducing them to look for voluntarily and take part in energy saving methods.

<Table 3> Level of implementation of climate change mitigation strategies in tourism companies in Korea

Classification	Mitigation Strategies	Frequency	Ratio
Replacement for high efficiency facility and equipment	Installment of high efficiency lightning (LED)	10	100%
	Grey water treatment system	9	90%
	Heat pump system	4	40%
	Waste heat recovery furnace	10	100%
	Operation of electric car	3	30%
Introduction of energy information management system		3	30%

Use of new renewable energy	Use of wind power energy	-	-
	Use of photovoltaic energy	1	10%
	Use of small hydro power energy	-	-
Energy conservation management		10	100%

On the other hand, as a result 2nd investigation, 2014, 3 companies was implementing mitigation strategies similar to those at the time of investigation in 2011 and the creation ratio for each strategy was found to be higher. Further, Lotte World was introducing and operating an energy information management system.

V. Analysis of Problem in existing GHG Reduction Strategies

This research revealed that 10 tourism companies in South Korea are trying to reduce greenhouse gas through diverse methods. However, it was analyzed that there were various difficulties in reducing greenhouse gas in terms of tourism companies as follows:

First, carbon dioxide is produced by tourists, as which a tourism industry is characterized. However, as providing satisfactory service to tourists is a competitive edge for tourism companies it is very difficult realistically to emphasize energy saving toward tourists. Indeed, a lot of difficulties appeared at the fields because some cases where energy saving efforts came to naught happened due to users' failure to recognize them properly, though most tourism companies introduced best energy saving facilities, whatsoever. Tourism companies adjusting cooling temperatures upwards to save energy were found to face a lot of troublesome situations due to increasing receipt of complaints of tourists. Also, to attach posts noticing the severity of greenhouse gas to customers and convincing them of energy saving efforts can cause a problem in terms of design and so in most cases they were being attached to passages only used by employees. Given the characteristics of tourism industry, even though tourism companies reduce the amount of greenhouse gas, if tourists make an effort, it can just lead to a direct reason of the amount of emissions, and accordingly an active response to this is necessary.

Second, result of research showed that tourism companies applied passive methods not consuming relatively costs of technology and taking long in payback of investment costs and in most cases established just plans in active coping strategies applying new renewable energies such as photovoltaic and solar. When not recovering the investment costs for energy saving within 3 to 5 years it meant the occurrence of deficit but since the recovery of investment costs usually took more than 5 years in the case of new renewable energies it was found to be not easy to invest in development of technology. Especially, tourism companies which were small or in no capacity of financing had difficulties in terms of cost to apply green technologies or replace for energy high efficiency equipment.

Third, there was a problem found that CEO and technicians of facility sector inside companies had insufficient recognition. First of all, deficit of recognition by CEO on necessity of greenhouse gas reduction was shown to be a severe problem, for example, although a staff in charge had volition to apply a green technology the opinion of that staff

was not reflected when CEO only took account into design element of a tourism company and satisfaction element of tourists. Even though a person in charge inside a tourism company recognized the investment projects and tax incentive systems in respect of energy saving and green technologies and then a technician tried to apply them in reality there were some cases unrealized due to negative responses by technicians in facility sector within a company. Particularly engineers in charge of facilities caused a problem of being reluctant to replace facilities due to any responsibility following the replacement of facilities. Like this, rather, as engineers in technology sector might neglect energy saving the change and enhancement of recognition of engineers in technology sector are desirable intensively and positive support for energy saving activities of engineers by a layer of executives and managers is necessary.

Fourth, currently tourism companies included as targets in MBO system are making efforts to save energy but have not shared information or know-how about this. Taking into account implementation of Emission Trading System around the corner, they should share information about climate change mitigation strategies between tourism companies and give and take helps each other.

Fifth, next problem is a problem regarding calculation of the amount of carbon dioxide emissions in tourism business. At present, while a floor area setting a building as a basis unit is used as a method to calculate the target of greenhouse gas reduction the tourism companies also are applying it equally, which leading to a problem not to reflect the characteristics of tourism industry. In particular, in the case of tourism companies their types are much diversified such as golf courses and ski resorts unlike other normal companies using a building as a basic unit and accordingly it was problematic to apply floor area. For example, for ski resorts as the amount of energy usage according to various facilities and pumps due to operation of ski slopes accounted for a large part of energy costs, if the amount of reduction is calculated on the basis of floor area in a building, it can result in a problem and also make reduction of energy impossible substantially in operating slopes. Also, problems related to meters were founded, consisting of erroneous problems in meters, inconvenience caused by manual operation of meters, incorrect grasp of the amount of energy usage. At present, most tourism companies gauge the amount of energy usage floor to floor in a building and record it versus area and operating time but it is also reported that in the case of meter an error has occurred due to time difference till transmission after observation. Therefore, it is necessary to build a reading system of meter linked with a system such as a smart meter and ERP and EEP for exact and efficient measure on the amount of energy usage and the saving sector. Besides, as in order to save energy it is very important to correctly identify the facility where energy is being consumed and the part where energy is being saved it should be improved to an extent that the amount of energy usage can be measured by guest rooms and by facilities to expand energy saving strategies to customers (tourists).

VI. Conclusion

This research analyzed climate change mitigation strategies applied by leading tourism

companies in South Korea and problems in the implementation and this result is expected to broaden the range of existing researches centered around North America, Europe and Oceania only. Based on the result of this research, future directions for tourism companies over the world including South Korean companies to move forward for mitigating climate change are proposed as follows:

First, it is necessary to enhance recognition of CEO and engineers playing important roles on climate change coping strategies within tourism companies. Result of research according to Zografakis, Gillas, Pollaki and Profylienou (2011) suggested that the reasons why tourism companies such as hotels failed to apply alternative energy technologies easily included the lack of experience to support and promote energy projects of engineers and the deficiency of necessary information and performing procedures next to financial factor (shortage of investment money and payback period of investment). In order to enhance recognition on climate change coping of tourism companies CEO, engineers and staff should be able to be trained by developing education programs suitable with them.

Second, the result of this research showed that for usage of new renewable energies the ratio applied in most tourism companies was still low. However, it revealed that most tourism companies recognized that new renewable energies such as solar, photovoltaic, geothermal, small hydro power and wind power were important in overcoming the limitation of energy saving and replacing existing energies in the future. Nonetheless, as most companies failed to use renewable energies due to investment costs and time expended to develop and apply them, the problems in respect of new renewable energies in tourism sector in the future are thought to require the effort and support at the level of government.

Finally, the sector of tourism in the whole world including that of South Korea should seek the positive coping strategies to climate change. Just the mitigation strategies to reduce the amount of greenhouse gas emissions cannot prevent climate change that has already started. For continuous development of tourism sector in the future, it is required to not only secure the safety of tourists in preparation for climate change but also diversify the types of tourism industry in accordance with climate change.

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