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低碳觀光體驗之建構：構念與量表發展

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中文摘要：為了填補低碳觀光體驗的概念化與量表的發展的不足，本研究率先採用一年期三階段的研究方式，進行低碳觀光體驗的概念化，並進一步發展具有信效度的低碳觀光體驗量表。第一階利用內容分析法及模糊德爾非法的專家共識，以概念化遊客低碳觀光體驗並發展出適合的測量題項共66項；第二階段，分別在玉山國家公園及南仁山生態保護區，兩個研究地點，以等距抽樣法(10個遊客取1個)進行問卷調查，收集662份有效問卷。利用驗證性因素分析，提出具有理想的信度、收斂效度、區別效度、及建構效度的7構面40題項的低碳觀光體驗量表。第三階段以玉山國家公園及南仁山生態保護區的遊客樣本為測定樣本(466份)，以關渡自然公園及七股溼地的遊客樣本為效度樣本(523份)，進行多母樣本的複核效化分析，建構具有跨母體應用的低碳觀光體驗量表。本研究顯示，遊客進行低碳觀光體驗，有助永續觀光的發展。研究成果提供發展一個具有信、效的低碳觀光體驗量表，提出學術及管理意涵與後續研究的建議，對實踐低碳旅遊有貢獻。

中文關鍵詞：低碳觀光體驗、概念化、量表發展、複核效化、森林、溼地

英文摘要：This study first conceptualizes and develops a reliable and valid scale to assess low-carbon tourism experience (LCTE) from the perspective of nature-based tourists and then tests the scale in three empirical studies. In Study 1, a 66-item scale is developed using a series of qualitative methods. In Study 2, confirmatory factor analyses is used to develop a 40-item reliable and valid scale consisting of seven constructs: sensory experience, affective experience, learning experience, socio-cultural experience, behavioral experience, escapism experience, and prestige experience. In Study 3, the cross-validation of this 40-item scale is verified by demonstrating moderate replication of the data. We conclude that while nature-based tourists are engaging in LCTE, they are likely to benefit from the development of sustainable tourism. This study extends the theoretical LCTE framework into the operational realm of tourism management by rendering LCET perceptible and assessable, which represents a potentially significant contribution to the literature.

英文關鍵詞：Low-carbon tourism experience, Nature-based tourist, Scale development, Taiwan

Low-carbon tourism experience: Conception and measure

ABSTRACT

This study first conceptualizes and develops a reliable and valid scale to assess low-carbon tourism experience (LCTE) from the perspective of nature-based tourists and then tests the scale in three empirical studies. In Study 1, a 66-item scale is developed using a series of qualitative methods. In Study 2, confirmatory factor analyses is used to develop a 40-item reliable and valid scale consisting of seven constructs: sensory experience, affective experience, learning experience, socio-cultural experience, behavioral experience, escapism experience, and prestige experience. In Study 3, the cross-validation of this 40-item scale is verified by demonstrating moderate replication of the data. We conclude that while nature-based tourists are engaging in LCTE, they are likely to benefit from the development of sustainable tourism. This study extends the theoretical LCTE framework into the operational realm of tourism management by rendering LCET perceptible and assessable, which represents a potentially significant contribution to the literature.

Keywords: Low-carbon tourism experience, Nature-based tourist, Scale development, Taiwan

1. Introduction

The issue of climate change has been widely discussed recently (Scott & Becken, 2010), and according to Cabrini, Simpson, and Scott (2009), approximately 5% of CO₂ emissions originate from the tourism industry. Transportation represents approximately 75% of the CO₂ emissions of the tourism industry (UNEP, 2011). The intensive use of energy in the accommodations industry is also contributing to the gradual worsening of climate change (UNEP, 2011).

To reduce the environmental impact of tourism, several scholars have proposed alternative travel modes to mass tourism, such as “slow travel” (Dickinson, Lumsdon, & Robbins, 2011), “compassion tourism” (Weaver & Jin, 2016), and “low-carbon tourism” (Scott, Peeters, & Gössling, 2010), to encourage sustainable tourism development.

Tourists can reduce emissions in the tourism sector by modifying how they travel, including by traveling fewer miles, using lower emission transportation options, staying longer in one destination, and using environmentally friendly products (Scott et al., 2010). Meanwhile, Dickinson et al. (2011) have indicated that tourists can reduce emissions by using low carbon emission transportation options and experiencing local history, food, and culture in depth. Thus, tourists’ adoption of low-carbon practices is crucial to reducing carbon emissions.

In the marketing context, experience is an important element that influences customer behavior and intention. For example, Brakus, Schmitt, and Zarantonello (2009) have indicated that past experiences affect customers' future behavior. Moreover, a company that provides unforgettable and satisfactory experiences may foster tourists' recommendation intention and subsequently increase customer satisfaction and loyalty (Hosany & Witham, 2010). In the context of nature-based tourism, tourism experiences can be considered predictors of environmentally responsible behavior (ERB) among tourists (Lee, Jan, & Huang, 2015; Lee & Jan, 2015a, b). Providing educational experiences may also increase environmental attitudes among tourists/students, which may in turn encourage them to engage in ERB (Collado, Staats, & Corraliza, 2013; Duerden & Witt, 2010; Lee & Jan, 2015a, b). As discussed above, as on-site recreation experiences may affect human environmental behavior and behavioral intention, a detailed exploration of low-carbon tourism experiences (LCTEs) is warranted to promote sustainable tourism.

Schmitt (1999) has proposed that experience should include five components (i.e., sensing, feeling, thinking, acting, and relating) from a marketing perspective. Several scholars have adopted Schmitt's (1999) construct to study tourism experiences, such as zoo experience (Tsaur, Chiu, & Wang, 2007), wine tourism experience (Lee & Chang,

2012), wildlife experience (Ballantyne, Packer, & Falk, 2011a), and wetlands experience (Wang, Chen, Fan, & Lu, 2012). However, Pine and Gilmore (1998) have suggested that experience should also include entertainment, educational, escapist, and esthetic experiences. Several studies have used Pine and Gilmore's (1998) findings to measure lodging experience (Oh, Fiore, & Jeoung, 2007), cruisers' experience (Hosany & Witham, 2010), and nature-based recreation experience (Lee & Jan, 2015, a, b).

Low-carbon tourism has recently become popular as an alternative tourism model for tourists interested in mitigating climate change. However, no studies have been conducted that conceptualize and measure tourists' LCTE. Thus, conceptualizing and developing a scale to measure tourists' LCTE is necessary to extend our knowledge of low-carbon tourism and to support the promotion of sustainable tourism. The current study aims to fill the gaps in the current literature by conceptualizing and developing a reliable and valid scale to measure nature-based tourists via three studies. First, a literature review was conducted, and the Delphi method was used to establish the measurement items. Second, the instrument was developed and tested. Third, cross-validation was used to assess and verify the scale.

2. Theoretical framework

2.1. Low-carbon tourism

Greenhouse gases (GHGs) increase between the IPCC's Fourth Assessment Report and its Fifth Assessment Report (Victor et al., 2014), and the continuing increase of GHGs is causing climate change, which substantially affects humans and all of nature.

Tourism has become an important industry in recent years, contributing to 9.8% of global GDP and providing 284 million jobs in 2015 (WTTC, 2016). However, nearly 54% of overnight tourists travel by air, and air travel is growing faster than surface transport modes (UNWTO, 2016). Moreover, emissions produced by the energy used for accommodations constitute another major contributor to GHGs. The Davos Declaration has indicated that the tourism industry must take action to mitigate GHGs resulting from transport and accommodation (UNWTO, 2007).

In the tourism context, a carbon footprint is calculated on basis of the entire industry (Dwyer, Forsyth, Spurr, & Hoque, 2010) and based on specific tourism activities (Dawson, Stewart, Lemelin, & Scott, 2010). Previous studies have indicated that the tourism industry's carbon footprint derives primarily from air travel. Although travelers are aware of climate change and global warming, most remain unwilling to make any changes in their travel modes (McKercher, Prideaux, Cheung, & Law, 2010). To promote carbon neutrality, voluntary carbon offsetting options are offered by several

airlines, European tourists exploit these voluntary options more frequently than Asian tourists because there is more emphasis on carbon offsetting in social marketing in Europe (McLennan, Becken, Battye, & So, 2014). Lumsdon and McGrath (2011) have suggested that an alternative travel mode, such as slow travel, may reduce air travel and carbon emissions from tourism. Short-haul travel encourages tourists to use low-carbon transport (e.g., walk, bicycle, bus, train, and car pool) instead of traveling by air, which effectively reduces the environmental impact of their travel and allows them to enjoy experiences in a local area (Lumsdon & McGrath, 2011).

In the hospitality industry, Gössling, Garrod, Aall, Hille, and Peeters (2011) have suggested that food providers may adopt strategies to reduce the carbon footprint associated with materials purchasing, food preparation, and food presentation. Scholars have indicated that buying local products will decrease food footprints and carbon emissions (Dickinson et al., 2011; Gössling et al., 2011; Lumsdon & McGrath, 2011). Meanwhile, the accommodations sector must increase the efficiency of its energy use and adopt emission mitigation strategies to help reduce GHG emissions (Tsai, Lin, Hwang, & Huang, 2014).

Scholars have demonstrated the ‘tourist paradox’ of climate change awareness and tourism destination choice (Eijgelaar, Thaper, & Peeters, 2010; McKercher et al., 2010),

and the tourism suppliers are reluctant to adopt emission reduction practices (Kasim & Ismail, 2012). Unfortunately, due to the impact of global warming, some fragile areas (e.g., Antarctica, the Arctic, and glaciers) will become “last chance tourism” destinations (Dawson et al., 2011; Dawson et al., 2010; Eijgelaar et al., 2010). Thus, promoting low-carbon tourism is urgent.

2.2. Conceptualizing the low-carbon tourism experience

Experience involves philosophy, cognitive science, marketing, and management; thus, it is complex and should be measured multi-dimensionally (Brakus et al., 2009; Schmitt, 1999). Schmitt (1999) has suggested that customer experience should include rational and emotional experiences, which can be classified as: sense, feel, think, act, and relate.

Base on customer participation and connection to environment, Pine and Gilmore (1998) have suggested that there are two dimensions of memorable experiences – customer participation and connection to the environment – that can be categorized into four constructs: entertainment, education, esthetics, and escapist. According to Scott and Becken (2010), slow travel, which is similar to low-carbon tourism, is an alternative travel mode that reduces carbon emissions as much as possible while traveling.

Lumsdon and McGrath (2011) have suggested that the primary element of the travel

experience involves interacting with local people, culture, and landscapes. In terms of experience, Brakus et al. (2009) have concluded that experience includes sensory, cognitive, and emotional experiences, and elicits a behavioral response.

Kim (2012) has suggested that tourists may feel prestige because they undertake a wonderful journey, and prestige is a pull factor that motivates tourists to visit a tourism destination (McIntosh & Gupta, 1977). Therefore, tourists who engage in an LCTE have the opportunities to distinguish themselves and demonstrate their prestige by participating in a wonderful journey that also aids in reducing global warming and promoting sustainable tourism.

Based on the previously discussed studies, we thus conceptualized LCTE as involving dimensions of sensory, affective, learning, socio-cultural, behavioral, escapist, and prestige experience.

2.2.1. Sensory experience

Sensory experience during travel is derived from sight, sound, touch, taste and smell (Lee & Chang, 2012). By using low-carbon emission transport options, tourists may have more opportunities to view beautiful scenery, hear the sounds of animals, taste local food, and smell the scents of nature (Dickinson et al., 2011; Lumsdon & McGrath,

2011). Sensory experiences can help tourists identify tourism products, increase the value of tourism, and encourage individuals to engage in tourism (Schmitt, 1999). Moreover, sensory experiences provide a better understanding of a locality than indirect experience (Ballantyne, Packer, & Sutherland, 2011b; Duerden & Witt, 2010). Brakus et al. (2009) have suggested that sensory experience consists of the esthetic experience suggested by Pine and Gilmore (1998), which elicits important responses from tourists. Sensory experiences provide a deep impression that may last for an extended period of time (Ballantyne et al., 2011b).

2.2.2. Affective experience

Affective experience arouses tourists' positive emotions and feelings regarding tourism (Schmitt, 1999). Emotions come from contact and interaction with the local area and people during a visit (Tsaur et al., 2007). Scholars have indicated that emotional responses include the dimensions of arousal, pleasure, and dominance (Mehrabian & Russell, 1974). A destination's environment stimulates a psychological response among tourists that involves emotional experiences and behaviors (Lee, Chang, & Lo, 2015; Lee, Fu, & Chang, 2015; Mehrabian & Russell 1974). Tourists convert sensory experiences into empathy for a locality and feel an emotional connection with a place,

which may cause them to reflect and change their behavior (Ballantyne et al., 2011b).

Thus, affective experience is an important dimension of LCTE.

2.2.3. Learning experience

Learning experiences involve cognitive and problem-solving experiences during travel (Schmitt, 1999). Pine and Gilmore (1998) have suggested that learning/education experiences attract tourists who want to learn something new. Learning may increase the richness of tourists' experiences when these tourists perceive challenges and the learning environment is under the tourists' control (Poulsson & Kale, 2004). For tourists, gaining environmental knowledge during tourism activities is an important and achievable travel goal (Duerden & Witt, 2010). Scholars have indicated that the educational/learning construct of tourism experiences has affected tourists' on-site ERB (Falk, Ballantyne, Packer, & Benckendorff, 2012; Lee et al., 2015; Orams, 1997).

Providing learning settings that motivate tourists to learn and that reinforce their future behavior is important. In the nature-based tourism context, Fennell and Weaver (2005) have indicated that ecotourism should provide learning opportunities for tourists to learn to reduce their impact on the environment. Tourists with more environmental and ecosystem concerns may exhibit ERBs voluntarily, which benefits sustainable tourism

(Lee & Jan, 2015a, b).

2.2.4. Socio-cultural experience

Socio-cultural experience involves eating local food and engaging with hosts and cultures during travel (Murray & Graham, 1997; Dickinson et al., 2011). Engagement with people and places is an important motivation and tourism experience (Dickinson et al., 2011). Tourists are generally unfamiliar with the local culture, and they could learn a great deal about local culture, local history, and traditions through socio-cultural experiences (Stem, Lassoie, Lee, Deshler, & Schelhas, 2003; Wight, 1993). By using low-emission travel modes, tourists can experience local culture and people slowly and in more depth (Gardner, 2009). Low-carbon tourism provides more opportunities for tourists to interact with local culture, food, and people than mass tourism (Lumsdon & McGrath, 2011). By endeavoring to understand the society and culture of local residents, tourists may gain respect for a local area and develop a sense of place (Lumsdon, & McGrath, 2011).

2.2.5. Behavioral experience

Behavioral experience refers to certain types of behavioral responses to a tourism

destination through specific tourism stimuli (Brakus et al., 2009), and behavioral experience focuses on physical changes or new behaviors (Ballantyne et al., 2011b; Schmitt, 1999). By participating in opportunities for environmental education, tourists may take different/new actions (e.g., look for more information on environmental issues, talk about environmental issues with friends and family and accept more responsibility at home and when traveling) to reduce their environmental impact (Ballantyne et al., 2011b). Behavioral experience may influence individuals' behavior and is thus is a crucial component of sustainable tourism (Brakus et al., 2009; Schmitt, 1999).

2.2.6. Escapism experience

Escapist experiences are highly immersive events in which tourists participate actively; tourists are engrossed and absorbed in activities that are completely different from those they experience in their daily lives (Hosany & Witham, 2010; Uriely, 2005).

Participating in an on-site tourism experience that involves recreation experiences can motivate them to implement general ERBs in their daily lives and site-specific ERBs at tourist destinations (Lee et al., 2015). Involving tourists and obtaining their input and feedback may increase the escapism experience (Poulsson & Kale, 2004). Destination manager can provide engaging, interesting, and enjoyable environments to enhance

tourists' escapist experiences (Shernoff, Csikszentmihaiyi, Schneider, & Shernoff, 2003). Moreover, through escapist experiences, tourists learn about specific activities and the environment, which can increase their environmental attitudes and encourage them to engage in ERBs, thus contributing to sustainable tourism (Lee et al., 2015).

2.2.7. Prestige experience

Prestige is an important motivation for tourism that meets tourists' interpersonal needs (Correia & Moital, 2009). Individuals perceive prestige for themselves and others around them while engaging in certain types of tourism (Kim, 2012; Riley, 1995).

These tourism activities are extraordinary compared to typical tourism (Riley, 1995), and include activities such as luxury cruises (Hwang & Han, 2014), backpacker travel (O'Reilly, 2006), tourist food consumption (Mak, Lumbers, Eves, & Chang, 2013), and gastronomic tourism (Chaney & Ryan, 2012). Prestige experience may be influenced by socio-demographic variables (Correia & Moital, 2009; Riley, 1995), different perspectives (Riley, 1995), and different situations (Riley, 1995). As low carbon tourism is an alternative type of tourism that may enhance individuals' status and increase their prestige (O'Reilly, 2006). Prestige experience therefore may be a pivotal dimension of LCTE.

2.3. Low-carbon tourism and sustainability

Previous empirical studies have confirmed that recreation experience is an important antecedent of future behavior/behavior intention, such as loyalty (Brakus et al., 2009; Hosany & Witham, 2010; Lee & Chang, 2012; Tsaur et al., 2007). Several scholars have investigated whether recreation experiences are predictors of environmental behavior (Ballantyne et al., 2011a; Collado et al., 2013; Duerden & Witt, 2010; Lee & Jan, 2015a, b; Lee et al., 2015). In the slow travel context, recreation experiences include learning about the local environment and culture, which may effectively assist tourists in understanding the local area and reducing their impact to the extent possible (Dickinson et al., 2011; Lumsdon & McGrath, 2011). However, limited research has conceptualized and measured LCTEs, although it is a hot topic of debate, indicating that an investigation into the dimensions of LCTE is needed.

3. The empirical survey

3.1. Study 1: Development of the measures

3.1.1. Developing the measurement items

This stage aimed to develop the measurement items for LCTEs. Using the above LCTE

constructs, the measurement items were obtained from the related literature via various databases, such as the Web of Science, Science Direct on Line, EBSCOhost, and Google Scholar. Related articles were identified using keywords such as “Low-carbon tourism experience”, “Low-carbon recreational experience”, “Low-carbon tourism”, “Slow travel”, “Slow tourism”, “Slow tourism”, “Carbon footprints”, “Ecological footprints”, “Locality experience”, “Low carbon consciousness”, “Benefit to local community”, and “Benefit to destination”. The measurement items that were originally in English were translated into Chinese by the authors. Subsequently, to minimize translation bias, we invited two native English-speakers who are acquainted with Chinese to back-translate the items into English. The authors then developed the Chinese version by comparing the meaning of each translated item with that of the item in its original language. Any inconsistencies between the Chinese and English versions were discussed by repeating the back-translation until the final wording was determined.

Next, applying the Delphi approach, opinions were solicited regarding the importance of the measurement items, and consensus was reached for specific concerns (Miller, 2001). Thirteen experts (including eight professors of tourism, two nature-based tourism experts, and three nature-based tourism managers) were selected to carry out

the fuzzy Delphi expert questionnaire in October 2015. The consensus values were determined using two triangular fuzzy numbers (Cheng & Lin, 2002).

3.1.2. Results

In total, 148 items were collected from 32 key articles. After removing items with similar meanings, behavioral intentions, preferences, or attitudinal meanings and items that were related to cultural factors, 67 items remained. These 67 items were classified into seven constructs: sensory, affective, learning, socio-cultural, behavioral, escapist, and prestige experiences.

According to the analytical results of the first round of the fuzzy Delphi survey, one item was added based on the experts' suggestions. Because consensus did not exist for three of the items, a second round of fuzzy Delphi examination was conducted. After the second round, consensus was not achieved for two items. In sum, two items were dropped, and one item was added after the second round. Therefore, the research instrument for Study 2 consisted of 66 items (also see Table 1).

Table 1
A 66-item scale of low-carbon tourism experience.

Sensory experience

1. This low-carbon tourism experience made a strong impression on my visual sense or other senses
2. I found this low-carbon tourism experience interesting in a sensory way
3. It was a great experience to taste local food.
4. I felt a real sense of harmony during this low-carbon tourism experience
5. I was able to get a good view of the animals during this low-carbon tourism experience
6. There was plenty of activity to see during this low-carbon tourism experience
7. The landscape was very charming in this low-carbon tourism experience
8. The overall design of this activity can arouse tourists' interest in this low-carbon tourism experience
9. I associated certain sights, smells, sounds, tastes, and textures with this low-carbon tourism experience
10. I was aware of the different activities I could do at the destination

Affective experience

11. This low-carbon tourism experience induced feelings and sentiments
12. Something I saw or heard in this low-carbon tourism experience made me feel sad or angry about environmental problems
13. This low-carbon tourism experience was cheerful
14. This low-carbon tourism experience was enjoyable
15. This low-carbon tourism experience was comfortable
16. This low-carbon tourism experience was exciting
17. This low-carbon tourism experience was caring
18. This low-carbon tourism experience was romantic
19. This low-carbon tourism experience was passionate
20. I felt a sense of awe during this low-carbon tourism experience
21. This low-carbon tourism experience was relaxing
22. This low-carbon tourism experience was peaceful and calm
23. This low-carbon tourism experience was interesting

Learning experience

24. I engaged in a lot of thinking when I participated in this low-carbon tourism experience
25. I found myself reflecting on new ideas about animals and their environments
26. It was a great opportunity to learn more about the interesting stories of the local cuisine through this low-carbon tourism experience
27. It was a great experience to learn many stories about this low-carbon tourism destination
28. I am being educated and informed through this low-carbon tourism experience
29. I discussed new information with my companions
30. This low-carbon tourism experience made me more knowledgeable and I learned a lot
31. It was an exploratory experience
32. It was a new cultural experience
33. I gained a new perspective on my life
34. I reflected more upon myself
35. I developed my personal and spiritual values
36. I learned about something new
37. I experienced different things on this trip

Social-cultural experience

38. I interacted with people at the destination
39. I understood the unique characters of local people at the destination
40. I had good impressions about the local people
41. I closely experienced the local culture
42. The local people at the destination were friendly
43. I had opportunities to meet new people and do new things

- 44. I was immersed in the local culture
- 45. I have a closer relationship with my family/friends
- 46. I expected to see local characteristics or exotic cultures

Behavioral experience

- 47. I engaged in physical actions and behaviors when I had this low-carbon tourism experience
- 48. This low-carbon tourism experience is action oriented
- 49. Playing promotes tourists' association with others
- 50. I bought local produce at the destination
- 51. I tried local street food at the destination
- 52. I did something meaningful
- 53. I did something important to save energy and reduce carbon emissions
- 54. I experienced low-carbon tourism

Escapism

- 55. I completely escaped from my daily routine
- 56. This was different from previous experiences
- 57. I experienced something new
- 58. I am involved in this low-carbon tourism experience
- 59. I became so involved when I participated in this low-carbon tourism experience that I forgot everything else
- 60. Participating in this low-carbon tourism experience made me feel as if I was in another world
- 61. While I was playing, I forgot that time was passing
- 62. I would like to experience all the facilities or as many as possible
- 63. I felt that I totally belonged to the environment

Prestige

- 64. This low-carbon tourism helps me to make a good impression on others
 - 65. With this low-carbon tourism experience, I can convey social status
 - 66. I am proud of paying attention to environmental issues by engaging in this low-carbon tourism experience
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3.2. Study 2: Purify the research instrument

3.2.1. Methods

3.2.1.1. Study sites. The Yushan National Park and Najenshan Ecological Reserve Area

were selected as the study sites because they represent low- and high-altitude forest settings. The first site, the Yushan National Park (120°53'59.95" E, 23°28'32.55" N; elevation 1,100-3,952 m a.s.l.; c.a. 105,490 ha), is located in central Taiwan. Yushan National Park is famous for its spectacular mountains: two-thirds of the mountains

within the park are over 2,000 meters high, and 30 of its mountains are higher than 3,000 meters. The highest mountain is Yushan, which is also the highest mountain in East Asia, at 3,952 meters. With its plentiful biodiversity, Yushan National Park has approximately 50 species of mammals, 151 species of birds, 228 species of butterflies, 18 species of reptiles, and 13 species of amphibians that are valuable for academic research and conservation. In addition, there are several cultural and historic monuments in the park, and the park is inhabited by the Bunun aboriginal tribe (Yushan National Park, 2016).

The second site, the Najenshan Ecological Reserve Area (120°86'41"E, 22°08'46"N; elevation 319 m a.s.l.; with an area of 124 ha), is located in southern Taiwan. Because this area is an ecological reserve area, visitors must apply to visit Najenshan, and only 400 people are allowed to visit during any given day. Before visiting, visitors must attend ecological conservation classes. During their visit, tourists may observe low-altitude species by using the hiking trails in the park (Kenting National Park, 2016).

3.2.1.2. Research instrument. A pretest was conducted at Yushan National Park in October 2015 using the 66 items obtained in Study 1. In total, 131 valid questionnaires were collected using a systematic sampling approach. Six tourists visiting Yushan also

commented on the comprehensibility of each item. An item analysis was performed to assess the Likert scales. Based on the item analysis and feedback from the six tourists, five items were dropped. Moreover, based on suggestions made by three of the experts, sixteen items were removed and three items were modified, leaving forty-five items. The final questionnaire contained eight sections: sensory experience (8 items); affective experience (9); learning experience (9); socio-cultural experience (7); behavioral experience (3); escapism experience (6); and prestige experience (3). The item responses were recorded on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The respondents' characteristics (including gender, marital status, age, educational level, occupation, residential region, and monthly income) were also collected via the questionnaire.

3.2.1.3. Sample and survey. The questionnaire survey was conducted between early November 2015 and early January 2016. As discussed above, the data were collected from subjects who were selected using a systematic sampling approach (every 10th tourist was sampled). Nine well-trained research assistants administered the survey. A total of 662 valid questionnaires were obtained.

3.2.1.4. Research instrument's quality. Based on the sample size of 662, the survey

results were accurate within a sampling error of 3.8% with a confidence level of 95%.

The Cronbach's alpha values for the latent variables of sensory experience, affective experience, learning experience, socio-cultural experience, behavioral experience, escapism experience, and prestige experience were 0.895, 0.935, 0.929, 0.899, 0.819, 0.892, and 0.878, respectively. All the values were larger than the benchmark of 0.70 (Hair, Black, Babin, & Anderson, 2010), suggesting that the research instrument had a satisfactory internal consistency to assess the items in the same latent variables.

3.2.1.5. Statistical analysis. The data were analyzed as follows. First, the corrected item-total correlation (CITC) for each construct (i.e., sensory experience, affective experience, learning experience, socio-cultural experience, behavioral experience, escapism experience, prestige experience) was assessed to verify that the items appropriately measured each latent variable (Lee, Agarwal, & Kim, 2012). Second, an exploratory factor analysis (EFA) was performed to reduce the large set of variables (i.e., measurement items) and to identify underlying dimensions in a group of variables (Hair et al., 2010). An EFA using a principal component analysis with varimax rotation was performed to identify the constructs via IBM SPSS Statistics 21 for Windows. Finally, we employed confirmatory factor analysis (CFA) to assess the model's

effectiveness by using LISREL 8.80 for Windows. The measurement model was assessed by testing the model fit, composite reliability, convergent validity, and discriminant validity of the constructs.

3.2.2. Results

3.2.2.1. Descriptive findings. Briefly, 53.6% of respondents were female and 46.4% were male; 55% were married and 45% were single; 27.6% were 21-30 years of age and 26.4% were 31-40; 63.1% had a university/college degree and 19.8% had a high school education; 24.8% were laborers, 23.1% worked in the service industry, and 15.3% were officers or teachers; 26.6% lived in the Kaohsiung or Pingtung region and 22.7% lived in the Taichung region; and 36.6% had a monthly income between NT\$20,001 and NT\$40,000 and 26.1% had a monthly income ranging from NT\$40,001 to NT\$60,000 (1 US\$ = 31.81 NT\$ as of October 21, 2016).

3.2.2.2 Measurement refinement.

Based on the CITC analysis for each construct, a cut-off value below 0.3 was applied (Lee et al., 2013), and two items were dropped. A CFA with maximum likelihood estimation was conducted to assess the reliability and validity of the overall

measurement model. The Chi-square (χ^2) value was 2790.82 (d.f.=171, $p<0.05$), indicating that the measurement model did not fit the data well. Given that the sample size can influence the χ^2 value, other model fit indices were calculated for the measurement model: adjusted goodness of fit index (AGFI) of 0.80, normed fit index (NFI) of 0.98, comparative fit index (CFI) of 0.98, root mean square error of approximation (RMSEA) of 0.066, and standardized root mean square residual (SRMR) of 0.061. Based on these fit indices, the measurement model fit the sample well (Hair et al., 2010).

Table 2 shows the t-values, the average variance extracted (AVE) values, and the composite reliability for the latent variables. All the composite reliability values were greater than 0.6, indicating a high internal consistency for the latent variables. The measurement achieved convergent validity at the item level because all factor loadings were larger than 0.5 and significant ($t > 1.96$, $p < 0.05$), which provided evidence of convergent validity (Anderson & Gerbing, 1988). Moreover, intercorrelations among the seven latent variables were evaluated to examine discriminant validity. All the intercorrelations ranged from 0.35 to 0.83, which were below the recommended threshold of 0.85 (Table 3), suggesting evidence of discriminant validity (Kline, 2005). Additionally, all the AVE values exceeded the threshold of 0.5, indicating that this

study had adequate convergent and discriminant validity (Bagozzi & Yi, 1988).

Table 2

Factor loadings, average variance extracted (AVE) and composite reliability (CR) of the measurement model.

	Factor loading*	t-value	AVE**	CR***
<i>Sensory experience</i>			0.54	0.89
1. This low-carbon tourism experience made a strong impression on my visual sense or other senses	0.76	22.29		
2. I found this low-carbon tourism experience interesting in a sensory way	0.83	25.79		
3. I felt a real sense of harmony during this low-carbon tourism	0.81	24.51		
4. I felt a real sense of harmony during this low-carbon tourism experience	0.57	15.41		
5. The landscape was very charming in this low-carbon tourism experience	0.72	20.82		
6. I associated certain sights, smells, sounds, tastes, and textures within this low-carbon tourism experience	0.69	19.84		
7. The overall design of this activity can arouse tourists' interest in this low-carbon tourism experience	0.75	22.14		
<i>Affective experience</i>			0.66	0.94
8. This low-carbon tourism experience induced feelings and sentiments	0.65	18.66		
9. This low-carbon tourism experience was cheerful	0.88	28.69		
10. This low-carbon tourism experience was enjoyable	0.90	29.64		
11. This low-carbon tourism experience was comfortable	0.88	28.44		
12. This low-carbon tourism experience was exciting	0.87	28.03		
13. I felt a sense of awe during this low-carbon tourism experience	0.67	19.09		
14. This low-carbon tourism experience was relaxing	0.81	24.87		
15. This low-carbon tourism experience was interesting	0.82	25.46		
<i>Learning experience</i>			0.59	0.93
16. I engaged in a lot of thinking when I participated in this low-carbon tourism experience	0.75	22.35		
17. I found myself reflecting on new ideas about animals and their environments	0.74	21.65		
18. I am being educated and informed through this low-carbon tourism experience	0.77	22.88		
19. I discussed new information with my companions	0.79	23.81		
20. It was an exploratory experience	0.79	24.11		
21. It was a new cultural experience	0.81	24.91		
22. I gained a new perspective on my life	0.79	23.87		
23. I reflected more upon myself	0.74	21.72		
24. I experienced different things on this trip	0.73	21.50		
<i>Socio-cultural experience</i>			0.67	0.91
25. I interacted with people at the destination	0.88	28.20		
26. I understood the unique characters of local people at the destination	0.88	27.75		
27. I had good impressions about the local people	0.82	25.02		

28. The local people at the destination were friendly	0.79	23.67		
29. I had opportunities to meet new people and do new things	0.70	20.07		
Behavioral experience			0.71	0.83
30. I engaged in physical actions and behaviors when I had this low-carbon tourism experience	0.77	22.10		
31. I experienced low-carbon tourism	0.91	27.56		
Escapism			0.59	0.90
32. I completely escaped from my daily routine	0.63	17.58		
33. I experienced something new	0.74	21.62		
34. I am involved in this low-carbon tourism experience	0.85	26.51		
35. Participating in this low-carbon tourism experience made me feel as if I was in another world	0.80	24.31		
36. While I was playing, I forgot that time was passing	0.78	23.56		
37. I felt that I totally belonged to the environment	0.80	24.24		
Prestige			0.71	0.88
38. This low-carbon tourism helps me to make a good impression on others	0.85	26.43		
39. With this low-carbon tourism experience, I can convey social status	0.87	27.14		
40. I am proud of paying attention to environmental issues by engaging in this low-carbon tourism experience	0.81	24.37		

*: All the t-value of factor loadings larger than 1.96

**AVE: Average variance extracted= $(\Sigma\lambda^2) / [\Sigma\lambda^2 + \Sigma(\theta)]$

***CR: Composite reliability= $(\Sigma\lambda)^2 / [(\Sigma\lambda)^2 + \Sigma(\theta)]$ (Jöreskog & Sörbom, 1996)

Table 3

Correlation matrix of the latent variables.

	1	2	3	4	5	6	7
1. Sensory experience	1.00						
2. Affective experience	0.81	1.00					
3. Learning experience	0.73	0.71	1.00				
4. Social-cultural experience	0.35	0.36	0.61	1.00			
5. Behavioral experience	0.59	0.56	0.72	0.55	1.00		
6. Escapism	0.75	0.75	0.76	0.53	0.77	1.00	
7. Prestige	0.68	0.70	0.70	0.47	0.75	0.83	1.00

According to Deery, Iverson, and Erwin (1999), discriminant validity can be

achieved when the parameters of covariance among pairs of latent constructs are free to be estimated (the model fit is described above, and was demonstrated by AGFI=0.80, NFI=0.98, CFI=0.98, RMSEA=0.066, SRMR=0.061), which has a better model fit than a model in which pairs of latent constructs are fixed to perfectly co-vary (in this study, $\Delta\chi^2$ was 1982.20 with 17 d.f., $p<0.001$, and the model fit indices were as follows: AGFI=0.59, NFI=0.95, CFI=0.96, RMSEA=0.121, SRMR=0.39). Consequently, the measurement model for LCTE had acceptable convergent and discriminant validity.

3.3. Study 3: Cross-validation of this research instrument

Study 3 examined the cross-validation of the research instrument. Two types of nature-based tourism destinations (i.e., Yushan National Park and Najenshan Ecological Reserve Area are forest-based destinations; Guandu Nature Park and Cigu wetland are wetland-based destinations) were chosen; Yushan National Park and Najenshan Ecological Reserve Area were depicted in study 2, whereas Guandu and Cigu are described below.

Located in New Taipei County, Taiwan, Guandu Nature Park is an important stopover spot for migrating birds such as waterfowls and shorebirds. The park is approximately 57 hectares, and it is a famous wetland area in northern Taiwan. Over

830 species of animals are found in the park. Guandu Nature Park has also been identified as an Important Bird Area by Bird Life International (Guandu Nature Park, 2016).

The Cigu wetland area is one of the attractions of Taijiang National Park, which is located in Tainan City, Taiwan. The wetland is famous for the black-faced spoonbills that inhabit the area from late winter to early spring. The government and NGOs have carried out environmental protection campaigns to protect this valuable wetland area and the black-faced spoonbills' habitat and have thus preserved this wetland environment (Lee, 2009).

The questionnaires were distributed from the end of February to mid-May 2016 using a systematic sampling approach (each 10th tourist was sampled). Ten well-trained research assistants administered the survey. Totally, 466 usable surveys were obtained from the forest-based destinations, and 523 usable surveys were obtained from the wetland-based destinations.

3.3.1. Results

3.3.1.1. Respondents' profile

Table 4 lists the respondents' characteristics according to the two types of nature-based

destinations. Of the tourists who visited the forest destinations, 53.2% were male; 64.4% were married; 29.4% were 31-40 years old; 59.7% had a university/college degree; 30.3% were in the service industry; 34.3% had monthly incomes ranging from NT\$20,000 to NT\$40,000; and 28.8% lived in Yunlin, Chiayi, or Tainan. Of those who visited the wetland destinations, 52.4% were male; 52.6% were unmarried; 35.4% were between 21-30 years old; 66.3% had a university/college degree; 34.4% were laborers; 40.0% had monthly incomes ranging from NT\$20,000 to NT\$40,000; and 35.0% lived in Taipei, New Taipei City, or Ilan in Wetland.

These two types of study sites differed significantly in terms of marital status, age, occupation, monthly income, and residence according to the Chi-square tests. The forest-based destinations attracted tourists who were married, middle-aged, and living in central Taiwan, whereas the wetland-based destinations attracted tourists who were single, young adults, and living in northern Taiwan.

Table 4
Profiles of the respondents.

Variable		Forest		Wetland		Total		Chi-square test	
		N	%	N	%	N	%	χ^2	<i>p</i>
Gender								.039	.844
	Male	248	53.2	274	52.4	522	52.8		
	Female	218	46.8	249	47.6	467	47.2		
Marital status								28.003	.000
	Single	166	35.6	275	52.6	441	44.6		
	Married	300	64.4	248	47.4	548	55.4		
Age (years old)								100.086	.000
	16-20 years old	30	6.4	40	7.6	70	7.1		

	21-30 years old	70	15.0	185	35.4	255	25.8		
	31-40 years old	137	29.4	174	33.3	311	31.4		
	41-50 years old	123	26.4	93	17.8	216	21.8		
	51-60 years old	92	19.7	26	5.0	118	11.9		
	Over 61 years	14	3.0	5	1.0	19	1.9		
Educational level								12.244	.007
	Junior high school and below	22	4.7	7	1.3	29	2.9		
	High school	93	20.0	92	17.6	185	18.7		
	University or college	278	59.7	347	66.3	625	63.2		
	Graduate school	73	15.7	77	14.7	150	15.2		
Occupation								19.488	.007
	Office or teacher	70	15.0	55	10.5	125	12.6		
	Agriculturist, farmer, fisherman	15	3.2	17	3.3	32	3.2		
	Laborer	128	27.5	180	34.4	308	31.1		
	Service industry	141	30.3	125	23.9	266	26.9		
	Housewife	34	7.3	36	6.9	70	7.1		
	Retired	11	2.4	6	1.1	17	1.7		
	Student	45	9.7	79	15.1	124	12.5		
	Others	22	4.7	25	4.8	47	4.8		
Monthly income (NT\$*)								24.090	.000
	≤20,000	69	14.8	116	22.2	185	18.7		
	20,001-40,000	160	34.3	209	40.0	369	37.3		
	40,001-60,000	140	30.0	133	25.4	273	27.6		
	60,001-80,000	55	11.8	36	6.9	91	9.2		
	80,001-100,000	28	6.0	14	2.7	42	4.2		
	≥100,001	14	3.0	15	2.9	29	2.9		
Residence								151.630	.000
	Taipei, New Taipei City, Ilan	45	9.7	183	35.0	228	23.1		
	Taoyuan, Hsinchu, Miaoli	37	7.9	70	13.4	107	10.8		
	Taichung, Chunghwa, Nantou	130	27.9	76	14.5	206	20.8		
	Yunlin, Chiayi, Tainan	134	28.8	147	28.1	281	28.4		
	Kaohsiung, Pingtung	119	25.5	39	7.5	158	16.0		
	Hualien, Taitung	1	.2	8	1.5	9	.9		

* 1 US\$ =31.81 NT\$ as of October 21, 2016

To assessing the cross-validation of the research model, the seven-dimension model that was obtained in Study 2 was examined using the two samples (i.e., forest and wetland settings). The forest setting was specified as a calibration sample, and the wetland setting was specified as a validation sample. Three strategies, including loose

replication (fixed factor structure), moderate replication (fixed factor structure and factor loadings), and tight replication (fix the structure, factor loadings, and residuals) were used to test the cross-validation of the LCTE scale (Cudeck & Browne, 1983).

Using the loose, moderate, and tight strategies, the contributions to Chi-square for the cross-validation models were 52.76%, 53.18%, and 52.43% respectively (Table 5), suggesting that replication between the calibration and validation models could be examined. The loose replication strategy specified that the factor structure of the calibration and validation models was equal. The $\Delta\chi^2$ value for the models when moving from loose replication to moderate replication was 32.35 (d.f.=40, $p > 0.05$), indicating that the two samples had equivalent factor loadings. Moreover, according to the fit indices (ECVI and SRMR), moderate replication resulted in a better fit to the data than loose replication. The $\Delta\chi^2$ value for the models when moving from moderate replication to tight replication was 177.22 (d.f.=61, $p < 0.05$), showing significant differences between the two samples. Moreover, the fit indices (ECVI and SRMR) showed moderate replication and resulted in a better fit to the data than tight replication.

Overall, the cross-validation data supported the analytical results that the moderate replication model was the best fit to the data. Thus, cross-validation with moderate replication was adopted.

Table 5

Comparison among the loose, moderate, and tight replication for cross-validation model.

Strategy	Overall model fit						Contribution to χ^2	%
	MFF χ^2 (df)	WLS χ^2 (df)	ECVI	NNFI	CFI	SRMR	MFF χ^2	
Loose replication	5696.55 (1438)	6316.74 (1438)	6.81	0.97	0.97	0.069	3003.59 (1438)	52.76
Moderate replication	5728.90 (1478) $\Delta\chi^2=32.35$, $\Delta df=40$, $p>0.05$	6357.65 (1478) $\Delta\chi^2=40.91$, $\Delta df=40$, $p>0.05$	6.77	0.97	0.97	0.064	3023.09 (1478) $\Delta\chi^2=19.50$, $\Delta df=40$, $p>0.05$	53.18
Tight replication	5906.12 (1539) $\Delta\chi^2=177.22$, $\Delta df=61$, $p<0.05$	6641.24 (1539) $\Delta\chi^2=283.59$, $\Delta df=61$, $p<0.05$	6.93	0.97	0.97	0.066	3096.66 (1539) $\Delta\chi^2=73.57$, $\Delta df=61$, $p<0.05$	52.43

4. Discussion

4.1. Theoretical implications

Several scholars have conceptualized experience scales in different contexts, such as brand experience (Brakus et al., 2009), the experience economy (Pine & Gilmore, 1998), experiential marketing (Schmitt, 1999), and cruise experience (Hosany & Witham, 2010). As global warming issues have received increasing attention and discussion, low-carbon tourism has emerged as an alternative tourism model and has been promoted as an international trend (Scott & Becken, 2010). Dickinson et al. (2011) and Lumsdon and McGrath (2011) have proposed slow travel as a way to reduce carbon emissions from tourism. According to Dickinson et al. (2011) and Lumsdon and McGrath (2011), recreation experience is a crucial component of the slow travel context.

Scholars have also noted that recreation experience is an important factor influencing the ERBs of nature-based tourists (Lee & Jan, 2015a, b; Lee et al., 2015). However, studies assessing LCTE are scarce (Dickinson et al., 2011; Lumsdon & McGrath, 2011). This study represents an attempt to fill that research gap by conceptualizing LCTE and developing a general measurement scale for nature-based tourists.

According to Schmitt (1999), experiential marketing involves sensory, affective, cognitive, physical, and social-identity experiences. Several studies have adopted of Schmitt's constructs to measure brand experience (Brakus et al., 2009), zoo experience (Tsaor et al., 2007), and wine tourism (Lee & Chang, 2012). In the competitive tourism market, tourism experience providers focus not only on entertaining customers but also on engaging them in activities (Pine & Gilmore, 1998). Low-carbon tourism provides activities for tourists that help them acquire environmental knowledge and interact with local culture. Encouraging tourists' engagement in activities and obtaining their feedback are crucial steps in understanding the tourism experience (Poulsson & Kale, 2004). However, Schmitt's experience constructs do not include a means of measuring the degree of engagement in various activities. Escapism represents the degree of engagement in activities in the experience economy, which is meaningful for educational activities (Pine & Gilmore, 1998). LCTEs include not only leisure activities

but also educational activities (Dickinson et al., 2011; Lumsdon & McGrath, 2011).

Measuring tourists' escapism experiences is warranted to more clearly understand tourists' engagement in and feedback regarding these activities. To fill this gap in the research, our LCTE scale includes the escapism construct.

Pine and Gilmore (1998) have conceptualized experience as education, entertainment, esthetics, and escapism on the basis of the experience economy. Studies of the experience economy primarily measure the degree of customer participation and engagement in activities. Several studies have adopted Pine and Gilmore's (1998) notion of the experience economy to measure lodging experience (Oh et al., 2007), cruise experience (Hosany & Witham, 2010), and community-based tourism recreation experience (Lee & Jan, 2015b). However, research on the experience economy focuses more on commercial (Poulsson & Kale, 2004) than socio-cultural experiences. Understanding local socio-culture contexts and becoming immersed in a local area is the only way to engender respect for place and promote sustainable tourism (Dickinson et al., 2011; Lumsdon & McGrath, 2011). Thus, this study fills this research gap by investigating socio-cultural experience in LCTEs.

The notation of prestige is seldom discussed in the tourism context (Riley, 1995). Prestige experience may originate from engaging in a travel experience that is unusual

in an individual's reference groups (Riley, 1995), such as film tourism (Kim, 2012), luxury cruise tourism (Hwang & Han, 2014), international budget travel (Riley, 1988), and backpacker travel (O'Reilly, 2006). Low-carbon tourism is a new and alternative travel mode that promotes sustainable tourism. However, few studies have assessed prestige experience in relation to low-carbon tourism. To obtain the holistic perspective of LCTEs, this study includes prestige experience as one of the LCTE constructs to expand the knowledge of the tourism literature.

Based on a review of several existing conceptualizations of or scales for experience, few studies have focused on environmental issues. For example, brand experience (Brakus et al., 2009), cruise experience (Hosany & Witham, 2010), and lodging experience (Oh et al., 2007) focus primarily on consumer experiences rather than on environmental concerns. The LCTE scale developed from the findings of this study pays more attention to pro-environmental considerations such as "I did something important to save energy and reduce carbon emissions" and "I experienced low-carbon tourism". Assessing these environmental behaviors provides a better understanding of how LCTE can aid in reducing environmental impacts and in developing sustainable tourism; thus the findings of this study contribute to the literature.

This LCTE scale measures the LCTE of nature-based tourists and was developed

and validated rigorously with tourists in forest-based destinations, and the scale's cross-validation was tested with tourists in both forest- and wetland-based destinations. This study contributes to the literature by filling research gaps noted in the findings of Brakus et al. (2009), Pine and Gilmore (1998), Schmitt (1999), and Brakus et al. (2009). The measurement scale developed during the study includes 40 items covering seven constructs (i.e., sensory experience, affective experience, learning experience, socio-cultural experience, behavioral experience, escapism experience, and prestige experience) to effectively measure the LCTE of nature-based tourists.

4.2. Managerial implications

Previous research has suggested that recreation experience is an important factor that influences human behavior (Ballantyne et al., 2011a; Collado et al., 2013; Duerden & Witt, 2010; Lee & Jan, 2015a, b). Destination managers should therefore provide high-quality LCTEs for tourists, including by designing and providing diverse trails or bicycle routes for tourists to easily access and explore a local area by walking or bicycling, which in turn may encourage tourists to engage in ERBs. Through slow travel, tourists may gain a greater appreciation for the beauty of natural resources and local culture. Simultaneously, by reducing the use of cars, the carbon emissions of a visit

could be significantly reduced (Dickinson et al., 2011; Lumsdon & McGrath, 2011).

By providing interpretation services that explain local culture and history, destination managers can help tourists expand their perspectives through experiences with local heritage and interactions with local people. Tourists who gain a better understanding of local cultural assets will respect local culture and relate well to local people (Dickinson et al., 2011; Lumsdon & McGrath, 2011). Consequently, tourists' ERBs will increase, which may in turn support the development of sustainable tourism (Lee et al., 2013; Lee & Jan, 2015a, b). Additionally, destination managers may encourage tourists to taste or make local foods. Tourists can experience local materials and ingredients while cooking and tasting traditional local food and will thus experience the local food culture and reduce the food mileage effect and the associated carbon emissions (Jang & Jung, 2015). Through these culinary experiences, tourists will gain an understanding of and respect for local culture and will develop an interest in local or traditional food, which will ultimately promote the cultural inheritance of culinary experiences and sustainable tourism (Lee, Chao, & Lin, 2016).

Destination managers may provide environmental education for tourists to educate them about the importance of precious natural resources. Ballantyne et al. (2011b) have indicated that wildlife experiences begin with a sensory experience that may last for a

long time and arouse tourists' emotions. Consequently, destination managers can design itineraries that involve all five senses to help tourists experience nature resources in depth and to promote an appreciation for the natural environment. In particular, managers can provide environmental programs that cultivate tourists' environmental awareness, concern, and attitudes, which may motivate tourists to engage in ERBs and develop a better understanding of the impacts of climate change and may ultimately motivate them to reduce their carbon emissions (Dickinson et al., 2011; Lee et al., 2013; Lee & Jan, 2015a,b).

To develop and promote low-carbon tourism, host residents could design slow-travel packages and LCTEs, provide green accommodations to encourage tourists to stay longer, and inspire tourists to interact with local culture, history, food, and nature resources by walking or bicycling. By implementing LCTEs, the impacts of carbon emissions from tourism might be reduced, which could support the development of sustainable tourism (Dickinson et al., 2011; Lumsdon & McGrath, 2011).

To promote and market LCTE destinations, destination managers could use the LCTE scale developed in this study to design and provide attractions that offer unique sensory, affective, learning, socio-cultural, behavioral, and escapism experiences. This strategy may enhance the prestige of tourists who have demonstrated their concern for

environmental issues by engaging in low-carbon tourism. Ultimately, managers can generate a sense of prestige among tourists by emphasizing that low-carbon tourism is an alternative travel mode of which they can be proud because they have contributed to mitigating climate change (Park, 2010; O'Reilly, 2006). Such marketing strategies will benefit sustainable tourism in a destination.

4.3. Limitations and future studies

Although this study extends our knowledge by conceptualizing and measuring LCTEs, several limitations must be addressed. First, this 40-item scale was developed for a sample of Taiwanese nature-based tourists. Different recreational activities and interpretative services are provided in different countries, which may lead to differences in LCTEs. To overcome this limitation, studies with samples in other countries are needed to verify that this LCTE scale reflects international and multicultural perspectives.

Second, this study did not examine the predictive power of certain behaviors.

Previous studies have suggested that recreation experience affects human behavior (Ballantyne et al., 2011a; Collado et al., 2013; Duerden & Witt, 2010; Lee & Jan, 2015a,

b). To mitigate climate change, future studies are warranted that assess how LCTE

influences low-carbon behavior. The use of the research instrument developed in this study in combination with qualitative research could facilitate a close examination of such behaviors.

Third, theoretical models of recreation experience, brand experience, experiential marketing, and the experience economy have been developed (Ballantyne et al., 2011a; Brakus et al., 2009; Hosany & Witham, 2010; Lee & Jan, 2015a, b.; Oh et al., 2007).

However, no theoretical model of the LCTE has been examined. To promote low-carbon tourism behavior, the use of structural equation modeling is warranted to develop theoretical models based on this study's LCTE scale to understand the factors that influence LCTEs and how LCTEs influence satisfaction, loyalty, and ERB of tourists.

5. Conclusions

Currently, carbon emissions are a topic of great interest in the tourism context (Scott & Becken, 2010). Low-carbon tourism is a growing travel mode and plays a role in mitigating the carbon emissions of tourism. As there have been no studies of LCTE using the suggestions for scale development proposed by DeVellis (2011) and Lee et al. (2013), this study applied a mixed-method approach involving qualitative and

quantitative methods in three stages of investigation (Molina-Azorín & Font, 2016).

This study conceptualizes LCTE and develops a scale that exhibits high internal consistency, content validity, construct validity, and cross-validation to measure LCTEs, indicating that the research instrument was rigorously developed and validated. Thus, the findings of this study represent a considerable advance in assessing the theoretical and managerial implications of sustainable tourism.

Carbon emissions are becoming increasingly problematic, and this study represents the first attempt to measure tourists' LCTE, which may be useful in reducing carbon emissions and in supporting the development of low-carbon behavior models and theoretical models of the implications of sustainable tourism.

Low-carbon tourism is an alternative form of tourism that promotes the reduction of carbon emissions while traveling. It is necessary for tourists to make a variety of changes in their tourism modes, particularly with respect to transportation and how long they visit a destination. By applying the findings of this study and the LCTE scale to better elucidate LCTE, destination managers can design package activities for LCTEs, which in turn may promote low-carbon tourism behavior in the future, thus contributing to sustainable tourism.

Finally, we conclude that when people visit a nature-based tourism destination,

such as those that offer LCTEs, they are more likely to respect the natural environment, local history, and culture, and to interact with local residents, thus strengthening their sensory, affective, learning, socio-cultural, behavioral, escapism, and prestige experiences. Consequently, when nature-based tourists engage in LCTE, they are likely to support the development of sustainable tourism. Thus, the findings of this study extend the theoretical framework for LCTE into the operational realm of tourism management by rendering LCTE perceptible and assessable, which represents a potentially significant contribution to the academic literature.

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科技部補助計畫衍生研發成果推廣資料表

日期:2015/10/30

科技部補助計畫	計畫名稱：低碳觀光體驗之建構：構念與量表發展	
	計畫主持人：李宗鴻	
	計畫編號：104-2410-H-224-035-SSS	學門領域：休閒遊憩
無研發成果推廣資料		

104年度專題研究計畫成果彙整表

計畫主持人：李宗鴻				計畫編號：104-2410-H-224-035-SSS				
計畫名稱：低碳觀光體驗之建構：構念與量表發展								
成果項目				量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)		
國內	學術性論文	期刊論文		0	篇			
		研討會論文		0				
		專書		0	本			
		專書論文		0	章			
		技術報告		1	篇			
		其他		0	篇			
	智慧財產權及成果	專利權	發明專利	申請中	0	件		
				已獲得	0			
			新型/設計專利		0			
		商標權		0				
		營業秘密		0				
		積體電路電路布局權		0				
		著作權		0				
		品種權		0				
		其他		0				
	技術移轉	件數		0	件			
		收入		0	千元			
	國外	學術性論文	期刊論文		1	篇		
研討會論文			0					
專書			0	本				
專書論文			0	章				
技術報告			0	篇				
其他			0	篇				
智慧財產權及成果		專利權	發明專利	申請中	0	件		
				已獲得	0			
			新型/設計專利		0			
		商標權		0				
		營業秘密		0				
		積體電路電路布局權		0				
		著作權		0				
		品種權		0				
		其他		0				

	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	7		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	9		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)			無		

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

☒ 達成目標

☐ 未達成目標（請說明，以100字為限）

☐ 實驗失敗

☐ 因故實驗中斷

☐ 其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文：☐ 已發表 ☒ 未發表之文稿 ☐ 撰寫中 ☐ 無

專利：☐ 已獲得 ☐ 申請中 ☒ 無

技轉：☐ 已技轉 ☐ 洽談中 ☒ 無

其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

為了填補低碳觀光體驗的概念化與量表的發展的不足，本研究率先採用一年期三階段的研究方式，進行低碳觀光體驗的概念化，並進一步發展具有信效度的低碳觀光體驗量表。本研究顯示，遊客進行低碳觀光體驗，有助永續觀光的發展。研究成果提供一個具有信、效的低碳觀光體驗量表，提出學術及管理意涵與後續研究的建議，對實踐低碳旅遊有貢獻。

4. 主要發現

本研究具有政策應用參考價值：☒ 否 ☐ 是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現：☒ 否 ☐ 是

說明：（以150字為限）