



## Exploring the factors influencing low-carbon travel: Evidence from Taiwan

Ying-Wei Wu<sup>1</sup>  
Ting-Hsiu Liao<sup>2\*</sup>  
Hao-Chen Huang<sup>3</sup>

<sup>1,2</sup>Graduate Institute of Tourism Management, National Kaohsiung University of Hospitality and Tourism, No.1, Songhe Rd., Xiaogang Dist., Kaohsiung City 812301, Taiwan, ROC.

<sup>1</sup>Email: [ryanwu@mail.nkuht.edu.tw](mailto:ryanwu@mail.nkuht.edu.tw)

<sup>2</sup>Email: [tiffanyups@hotmail.com](mailto:tiffanyups@hotmail.com)

<sup>3</sup>Department of Public Finance and Taxation, National Kaohsiung University of Science and Technology, No.415, Jiangong Road, Sanmin Dist., Kaohsiung City 80778, Taiwan, ROC.

<sup>3</sup>Email: [haochen@nkust.edu.tw](mailto:haochen@nkust.edu.tw)



(+ Corresponding author)

### ABSTRACT

#### Article History

Received: 28 February 2024

Revised: 20 August 2024

Accepted: 6 September 2024

Published: 26 September 2024

#### Keywords

Environmental attitude

Low-Carbon literacy

Low-Carbon travel

Low-Carbon travel intention

Nested model analysis

Perceived behavioral control.

This study aims to explore how low-carbon travel intentions are influenced by numerous factors such as low-carbon literacy, environmental attitudes and perceived behavioural control. The study obtained 615 valid samples through a questionnaire survey and employed confirmatory factor analysis to evaluate the reliability and validity of the constructs. Hypotheses were tested using a linear structural equation model. The mediating effect of low-carbon travel intention was assessed and different models were compared through nested model analysis. The results show that under partially mediating models, environmental attitudes and low-carbon literacy significantly impact low-carbon travel through low-carbon travel intentions but perceived behavioral control directly influences low-carbon travel. These insights are significant for tourism operators in formulating strategies and marketing promotions, helping to more accurately target audiences and promote the widespread adoption of low-carbon tourism.

**Contribution/Originality:** In this study, we uniquely combine low-carbon literacy with environmental attitudes to assess their collective impact on low-carbon travel, a connection rarely explored in previous Taiwanese research. This approach offers fresh insights into how educational and attitudinal factors together influence sustainable travel behaviors in Taiwan.

## 1. INTRODUCTION

A global transition towards a low-carbon tourism development trajectory is strongly advocated by the World Tourism Organisation (WTO) and the United Nations Environment Programme (UNEP) based on the "Davos Declaration" and the guidelines from the Second International Conference on Climate Change and Tourism. Tang, Shi, and Liu (2011) argue that the low-carbon tourism approach that prioritizes sustainable developing models comes in contrast to the traditional mass tourism methods. Low-carbon tourism not only boosts the economic benefits of the tourism industry but also brings long-term positive impacts to society and the environment. This new tourism model highlights the importance of tourists having a clear awareness of and correct perception of a sustainable environment as well as being able to transform these views into concrete actions. The prospects for the development of low-carbon tourism are vast with the advancements and popularization of low-carbon technologies coupled with the increasing demand for low-carbon consumption by tourists. When tourists adopt energy-saving

measures and reduce carbon and other harmful emissions, they can not only enjoy a high-quality travel experience but also simultaneously reap the social, environmental and economic benefits. As global attention to climate change and environmental conservation grows, the promotion and development of low-carbon tourism have become a pressing matter. This is not just a policy direction but an inevitable trend in the global tourism industry's evolution. It is hoped that in the future, low-carbon tourism will become mainstream leading the global tourism sector towards a greener and more sustainable future.

In the past, many scholars including Cheng, Su, and Tan (2013), Horng, Hu, Teng, Hsiao, and Liu (2013), Horng, Hu, Teng, and Lin (2014), Kuo and Dai (2012) and Zhang (2017) have focused their research on the field of low-carbon tourism. For instance, Cheng et al. (2013) employed the Delphi and Analytic Hierarchy Process (AHP) methods to explore how to effectively develop low-carbon tourism strategies. Similarly, Zhang (2017) also conducted a similar study using the fuzzy Delphi-Analytical Network Process (ANP) method. Horng et al. (2013) designed a measurement tool for low-carbon literacy (LCL). On the theoretical level, Kuo and Dai (2012) applied the modified theory of planned behavior to study factors that might influence low-carbon travel behaviors while Horng et al. (2014) introduced the protection motivation theory to explore the reasons behind tourists' intentions for low-carbon travel. These scholars' research not only provides in-depth insights into the field of low-carbon tourism but also offers invaluable references for subsequent researchers.

The Theory of Planned Behavior (TPB) is one of the primary theories for understanding and predicting individual behaviors. This theory proposes that an individual's behavioral intention (i.e., their willingness to adopt a particular behavior) is the direct predictor of actual behavior (Ajzen, 1985). Moreover, this behavioral intention is influenced by the following three primary factors: attitude (a positive or negative evaluation of the behavior), subjective norms (what one believes others expect them to do) and perceived behavioral control (one's perceived ability and control over the behavior). In many domains, the TPB has proven to be highly effective especially in predicting and explaining health, environmental and consumer behaviors. In the context of low-carbon tourism, it is essential to comprehend why tourists select low-carbon travel and the reasons behind their decisions especially in the context of the severe challenges caused by climate change and the public's growing concern for protecting the environment.

On January 30, 2020, when COVID-19 was declared a public health emergency of international concern by the World Health Organization (WHO), the global tourism industry faced unprecedented challenges. In this new context, it raises the question, "Will Taiwanese people prefer low-carbon tourism after the pandemic?" Does this imply that low-carbon tourism will become the new mainstream choice? This research delves deep into the multiple factors and motivations affecting the choice of low-carbon tourism guided by the modified theory of planned behavior. In the subsequent sections, we will delve into a literature review and present research hypotheses. In the research methodology section, we will elucidate the framework of this study, the measurement methods employed, the chosen study area and how the relevant research data was collected. In the empirical results section, we will present findings from factor analysis, structural equation modeling and impact analysis among other essential results. Ultimately, we will summarize the primary discoveries of this research and provide suggestions for future research directions.

## 2. THEORY AND HYPOTHESES

### 2.1. Low-Carbon Tourism and Sustainable Tourism

The concept of low-carbon tourism was first introduced at the World Economic Forum (WEF) (2009) where it was referred to as "Towards Low-Carbon Travel and Tourism Industry." This type of travel is not just a novel form of travel but represents a sustainable tourism model that considers the balanced development of the environment, economy and society (Cheng et al., 2013; Tang et al., 2011; Weston & Mota, 2012).

The issue of climate change has gradually come into international focus especially concerning greenhouse gas emissions and their impact on the Earth's climate (Horng et al., 2013). Environmental and climate change issues not only impact natural ecosystems but also directly threaten the stability and continuous development of the global tourism industry (Dubois & Ceron, 2006). In light of this, many countries have recognized the role and importance of low-carbon tourism in energy conservation and carbon reduction, viewing it as a strategy for achieving sustainable development. Low-carbon tourism emphasizes the use of low-energy, low-pollution, and low-carbon emission methods making travel activities more environmentally friendly and harmonious (Fan & Li, 2010).

In brief, low-carbon tourism also represents a reflection and innovation on traditional tourism. As global travelers gradually become more environmentally conscious, they begin to seek more eco-friendly and responsible ways of travel. Against this backdrop, low-carbon tourism not only meets the demands of these eco-friendly travelers but has also gradually become a new travel trend. Under this trend, countries and enterprises need to reassess and adjust their tourism products and strategies to adapt to new market demands. Moreover, low-carbon tourism will be easier to achieve and provide tourists with more environmentally friendly travel options as a result of technological improvements like the utilization of renewable energy and the development of efficient transportation techniques. The relationship between low-carbon tourism and sustainable tourism is intrinsic. Sustainable tourism emphasizes the following three main pillars: environment, economy and society. The harmonious development of these three ensures that tourism activities can continue long-term without damaging local resources and culture. In contrast, low-carbon tourism specifically targets the environmental pillar of sustainable tourism, focusing on reducing carbon footprints and environmental impacts. Low-carbon tourism encourages tourists to use eco-friendly transportation, choose energy-efficient accommodations and engage in local green activities. This not only reduces global carbon emissions but also elevates tourists' environmental awareness, inspiring them to practice eco-friendliness in daily life. Concurrently, sustainable tourism emphasizes local community participation, ensuring they benefit from tourism activities and local natural and cultural resources are preserved. When discussing the relationship between low-carbon and sustainable tourism, one could say that low-carbon tourism is a subset or an integral part of sustainable tourism. In other words, a genuine sustainable tourism strategy must consider reducing carbon footprints and low-carbon tourism is one way to achieve this goal. As global climate change issues intensify, the significance of low-carbon tourism grows making it an indispensable part of a sustainable tourism strategy.

In a nutshell, both low-carbon tourism and sustainable tourism emphasize the protection of the environment. As the world grapples with the immense challenges of climate change, the connection between the two becomes even more intertwined, working together to build a green, harmonious and sustainable future for tourism.

## 2.2. Theory of Planned Behavior (TPB)

Ajzen (1985) proposed the "Theory of Planned Behavior" (TPB) which evolved from the "Theory of Reasoned Action" (TRA) that he and Fishbein (1967) initially developed. Based on the Theory of Reasoned Action, researchers believe that a person's intention towards a particular behavior is determined by their attitude towards that behavior and the social pressure or expectations of others they perceive (i.e., subjective norms). This suggests that people are more inclined to participate in behaviour they feel is worthwhile and that their significant others encourage them to do so. Additionally, the theory of reasoned action assumes that individual behavior is based on intent, helping to explain and predict people's behavioral choices.

However, the theory of planned behavior expanded on this basic concept. Apart from attitudes and subjective norms, Ajzen (1985) believed that "perceived behavioral control" (i.e., how capable a person thinks they are at performing a particular behavior) is also a critical factor in determining behavioral intentions. In simpler terms, even if a person holds a positive attitude towards a behavior and their social environment supports it, if they believe they cannot carry out that behavior, their intention may be limited.

The theory of planned behavior provides scholars with a more comprehensive and precise tool to understand and predict people's actions with the inclusion of perceived behavioral control. Many studies have indeed shown that the effectiveness of the theory of planned behavior in predicting behavioral intentions surpasses the theory of reasoned action. Therefore, when we want to delve deeper into understanding why people engage in specific behaviors or when we wish to design strategies to encourage certain behaviors using the theory of planned behavior as a guiding framework is invaluable. The theory not only reminds us to consider people's attitudes and social environment but also their perceptions of their capabilities which are crucial for strategy design and execution.

### 2.3. Hypotheses

#### 2.3.1. Environmental Attitude and Low-Carbon Travel Intention

Wiidegren (1998) further elaborated on the definition of "environmental attitude" considering it a representation of an individual's long-term accumulated traits. These traits prompt an ongoing concern for environmental issues, ultimately translating into specific environmental protection actions. Such an attitude not only encompasses values about the environment but also includes environmental beliefs. In other words, the environmental attitude is the result of an individual's positive or negative evaluation of the natural environment (e.g., viewing it as good or bad). It represents the individual's liking or aversion to the environment or matters related to it. This attitude is consistent and persistent manifesting not just as evaluative emotions but also as a behavioral inclination. Notably, this attitude can be learned through the process of socialization.

Additionally, some scholars emphasize that a consumer's environmental attitude plays a pivotal role when making purchasing decisions (Schwepker Jr & Cornwell, 1991). In other words, people's perceptions and evaluations of the environment often influence their choices and actions in the marketplace. Positive environmental attitudes enhance the possibility that people will choose "green" or "eco-friendly" products and services. Based on the aforementioned theoretical background, this study further proposes the following hypothesis:

*Hypothesis 1: The more positive a traveler's attitude towards the environment, the stronger their intention to choose low-carbon travel.*

This suggests that not only a traveler's environmental attitude influence their views on travel but it may also directly impact their travel decisions and behavioral choices.

#### 2.3.2. Low-Carbon Literacy and Low-Carbon Travel Intention

Low-carbon literacy describes an environmental consciousness and behavior cultivated by people in their daily lives and work. It encompasses a strong emphasis on a low-carbon lifestyle and profound environmental protection values, as well as the various knowledge, cognitive abilities and practical skills required to achieve this goal. Horng et al. (2013) further pointed out that low-carbon literacy is not just a basic understanding of energy conservation and carbon reduction. More importantly, it's about integrating this knowledge and skills into everyday life. They believe low-carbon literacy can be divided into seven major areas: a deep understanding of low-carbon issues, basic concepts of ecology, the correct environmental attitude and values, a high sensitivity to environmental problems, recognizing one's significance in eco-friendly actions (control status) and clear intentions and strategies for energy-saving and carbon reduction.

On the other hand, a tourist's understanding and literacy of climate change undoubtedly have a significant impact on their travel decisions. This influence may be reflected in their travel attitudes, choices and actions. For instance, a traveler with a profound understanding of climate change might lean more towards choosing eco-friendly, low-carbon travel methods (Higham & Cohen, 2011). At the same time, Hu, Horng, Teng, and Yen (2013) also believe that when people possess a higher degree of low-carbon literacy, their proactive attitudes and willingness to take actual energy-saving and carbon-reducing actions increase. Based on the above analysis and literature review, we can propose the following hypothesis:

*Hypothesis 2: When travelers have a deeper understanding and correct values regarding low-carbon literacy, their desire and decisions to participate in low-carbon travel will also be more firms.*

This implies that enhancing the public's low-carbon literacy is not only of positive significance for environmental protection but may also bring more opportunities and potential customers to the low-carbon tourism industry.

### *2.3.3. Perceived Behavioral Control and Low-Carbon Travel Intention*

Perceived behavioral control describes an individual's self-evaluation or confidence in successfully performing a specific behavior (Ajzen, 1991). It involves an individual's recognition of their abilities and resources and how to use these resources to achieve their goals. Numerous studies using the theory of planned behavior have found that perceived behavioral control plays a significant role in determining the intent for low-carbon travel. Han (2015) found that not only attitudes and subjective norms but also perceived behavioral control had a significant influence on the intention of travelers to choose green hotel accommodations. When travelers believe they have the ability and resources to choose and support green hotels, they are more likely to adopt such eco-friendly behaviors.

Furthermore, when people feel they have greater control and resources in a certain area, their behavioral intentions also strengthen. For instance, if travelers feel they can easily find and book low-carbon travel and know how to implement energy-saving and carbon-reducing behaviors, their willingness to choose such travel will also increase. Based on the above discussion and literature analysis, we can further propose the following hypothesis:

*Hypothesis 3: When travelers feel more confident about their perceived behavioral control in choosing and implementing low-carbon travel, their willingness and plan to participate in low-carbon travel will also correspondingly strengthen.*

This implies that reinforcing travelers' perceived behavioral control can not only encourage them to choose more eco-friendly travel methods but also prompt them to adopt more energy-saving and carbon-reducing measures during their travels.

### *2.3.4. Low-Carbon Travel Intention and Low-Carbon Journey*

The exploration of travel behavior and intention has long been a hot topic in the tourism academic community. Many scholars believe that an individual's specific behavior is formed based on their prior intentions implying that intention is a vital tool for predicting behavior (Tangeland, Vennessland, & Nybakk, 2013). When attempting to understand or predict an individual's particular action, their behavioral intention becomes a key indicator (Engel, Blackwell, & Miniard, 1993). According to some perspective, tourism might be considered a type of consumer choice behaviour. When tourists plan or choose a specific travel experience, they are making consumption decisions (Kroesen, Handy, & Chorus, 2017). Such travel decisions are influenced by various factors including individual internal psychological motives and external sociocultural pressures (Gu, Deakin, & Long, 2017).

Moreover, Jang and Namkung (2009) further pointed out that travelers' mindsets and their experiences can profoundly influence their future travel decisions. In other words, a person's past travel experiences and feelings might shape their future travel intentions and choices. Furthermore, a recent study conducted by Xie and Luo (2021) confirmed this view finding a close relationship between tourists' travel intentions and their actual travel behaviors. Based on the above literature review and analysis, we can propose the following hypothesis in more detail:

*Hypothesis 4: The stronger the tourists' intention for low-carbon travels, the higher the likelihood of them choosing and implementing low-carbon travel behaviors.*

This implies that tourists' intentions are a significant factor that can be used to predict whether they choose and practice low-carbon travel. Moreover, we can find strategies and approaches to encourage more people to adopt low-carbon travel by understanding this intention deeply.

### 3. METHODS

#### 3.1. Conceptual Framework

This study adopts the theory of planned behavior as its core framework forming a comprehensive model to investigate the interactions and relationships between different variables. The graphical representation of this theoretical model is presented in Figure 1.

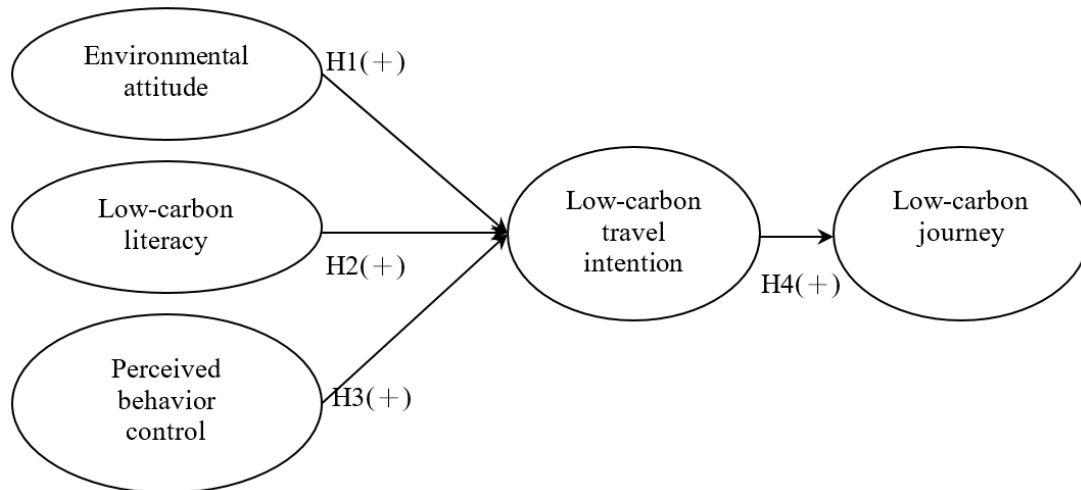


Figure 1. Conceptual framework.

#### 3.2. Measures

In this study, a 5-point Likert scale is employed for the measurement items where responses range from 1, representing "strongly disagree," to 5 indicating "strongly agree." Demographic factors include gender, education level, marital status, family status, age and past low-carbon travel experiences.

Environmental attitude refers to an individual's psychological reaction of approval or disapproval, preference or aversion towards the environment or environmental-related matters. Based on the study by Dunlap and Van Liere (1978), the measurement items developed for this study are:

- (1) I believe that human interference with nature can lead to severe disasters.
- (2) I perceive the balance of nature as fragile and easily disrupted.
- (3) My view is that humans should live in harmony with nature.
- (4) I am convinced that human activities are significantly harming the environment.

Low-Carbon Literacy: This relates to the awareness and understanding of practices in energy saving and carbon reduction particularly within the context of travel. According to Horng et al. (2013) the measurement items include

- (1) My understanding of carbon emissions (such as carbon footprint) within tourism.
- (2) My attentiveness to energy conservation and carbon reduction information in tourism.
- (3) My awareness of the environmental benefits of energy-saving and carbon reduction in tourism.
- (4) My belief in the importance of active participation in low-carbon tourism.

Perceived Behavioral Control (PBC): This refers to the degree of ease travelers feel in accessing resources for low-carbon tourism. Based on research by Ajzen (1985), Ajzen (1991), Heesup Han, Hsu, and Sheu (2010) and Kuo and Dai (2012) the measurement items are as follows:

- (1) My feeling is that participating in low-carbon tourism is manageable.
- (2) My belief in having adequate resources for low-carbon tourism.
- (3) My conviction that undertaking low-carbon tourism is under my control.
- (4) My sense of capability to engage in low-carbon tourism.



Low-Carbon Travel Intention: This indicates a traveler's future plans to participate in and endorse low-carbon tourism. Adapted from the study by Sung, Hsiao, Huang, and Morrison (2021) the items are as follows:

- (1) My high likelihood of engaging in low-carbon tourism soon.
- (2) My future intention is to advocate for low-carbon tourism.
- (3) During the relaxation of the COVID-19 pandemic, I am likely to undertake low-carbon travel.

Low-Carbon Journey: Tourists streamline their travel itinerary and spend a prolonged time at a travel destination. The measurement items developed after referring to the study by Kuo and Dai (2012) are as follows:

- (1) I would arrange a simple itinerary.
- (2) I would stay for an extended time at a destination to deepen the travel experience.
- (3) I would travel to places indicated as green or to low-carbon footprint destinations.

### 3.3. Sample and Procedure

The subjects of this study were selected using a convenience sample technique that was based on the theory of planned behaviour. We chose several travel agencies in the three major cities of Taipei, Taichung, and Kaohsiung in Taiwan as the mediums for our questionnaire survey. The survey was conducted from February to July 2023, spanning six months to ensure that the samples obtained were adequately representative. The questionnaire was primarily administered online with travel agencies forwarding it to their clients.

Out of the 700 questionnaires distributed, we received a total of 625. After screening and excluding incomplete or non-standard responses, we eventually obtained 615 valid questionnaire responses. This means that the effective response rate was 87.86%.

The ratio of males to females was 49% to 51% showing a relatively balanced gender distribution among the participants regarding the background of the participants. In terms of educational level, most participants had a university degree accounting for 77%. Concerning marital status, 60% of participants were single and 45% had children in terms of family situation. Most participants' ages ranged between 31 and 50 years. Concerning past low-carbon travel experiences, 36% of the travelers had experience while 64% had no prior experience.

We utilized wave analysis to assess the representativeness of the sample in this study and determine whether non-response bias exists. We sought to determine the presence of non-response bias by comparing the data from early responders to those from late responders. Based on the recommendations of Armstrong and Overton (1977) we conducted a t-test comparing whether participants who responded at different times had differences in key characteristics (e.g., age). The results showed that early and late responders did not have significant differences in these characteristics implying that non-response bias is not evident in our survey data.

### 3.4. Detection of Common Method Variance (CMV)

Common Method Variance (CMV) has always been a major potential concern in behavioral research. This issue might arise when a respondent answers multiple research variables or scales simultaneously (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff & Organ, 1986). Such bias can lead to misleading research results making it crucial to prevent its occurrence. Our study employed multiple strategies to reduce the risk of CMV beforehand. Firstly, we anonymized the respondent's information to ensure they were not influenced by personal details when filling out the questionnaire. Secondly, we designed some reverse-coded items. The purpose of these items was to validate the consistency of respondents' answers ensuring they read and answered the questionnaire diligently.

In addition to these preventative measures, we conducted post hoc statistical tests to determine whether there was CMV in the study. Specifically, we used Harman's single-factor test (Podsakoff & Organ, 1986). We could see if a single factor dominated through this analysis. In this study, we identified five primary factors that together explained 73.5% of the variance after performing a factor analysis on all measurement items. The largest factor accounted for only 29.2% which is well below the generally accepted threshold of 50%. This implies that no single

factor dominated our dataset confirming that the impact of CMV in our research is limited. In a nutshell, CMV is a potential issue through prevention and post hoc checks and we are confident in the relative reliability and validity of our study results.

## 4. EMPIRICAL RESULTS

### 4.1. Descriptive Statistics and Correlation Analysis

Table 1 presents the descriptive statistics and the results of the Pearson correlation analysis for the variables in this study. From this data, we can see that all variables display a significant positive correlation with one another. More specifically, the correlation coefficients shown in Table 1 indicate that as one variable increases, another related variable tends to follow the same trend suggesting that there is some degree of co-movement among these variables. These significant correlations provide an important foundation for our subsequent research analyses.

Moreover, from the perspective of internal consistency, Cronbach's alpha value for each variable is all above 0.84. This is a relatively high value indicating that these variables possess excellent internal consistency. In essence, this suggests that the scales or measurement methods used in this study are reliable and respondents demonstrated consistency when answering questions related to the same concept.

The data collected in this study not only exhibits significant positive correlations but also that each research variable has high internal consistency and reliability taking the aforementioned analyses into account. These findings provide a solid foundation for our subsequent analyses and interpretations.

Table 1. Descriptive statistics and correlation analysis.

Constructs	1	2	3	4	5
1.Environmental attitude	1				
2.Low- carbon literacy	0.693**	1			
3.Perceived behavior control	0.623**	0.646**	1		
4.Low-carbon travel intention	0.707**	0.691**	0.580**	1	
5.Low- carbon journey	0.687**	0.710**	0.648**	0.781**	1
Mean	3.576	3.666	3.765	3.407	3.307
S.D.	0.761	0.654	0.682	0.753	0.859
Cronbach's alpha	0.850	0.849	0.854	0.846	0.908

Note: \*\* p<0.01, n=615.

### 4.2. Results of Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is a powerful statistical tool specifically used to validate whether the predefined measurement model in research matches the actual data. According to the data given in Table 2, we can delve into an in-depth analysis of the various dimensions and observed variables in this study.

Firstly, the t-values for each dimension's measurement items all exceed 1.96, a commonly accepted threshold for significance. This suggests that each observed variable has a significant relationship with its underlying latent variable. The factor loadings ranged from 0.69 to 0.87 not only surpassing the 0.45 threshold proposed by Bentler and Wu (1993) but also highlighting the strength and consistency of each observed variable in measuring its latent construct. Further examination reveals individual reliabilities of the observed variables ranging from 0.48 to 0.76. These figures surpass the 0.20 threshold proposed by Bentler and Wu (1993) indicating that each observed variable not only possesses high reliability but is also a trustworthy measurement tool. As for the composite reliability of dimensions, all values exceeded 0.80 even surpassing the 0.6 threshold recommended by Fornell and Larcker (1981). These results further attest to the validity and consistency of each dimension. Lastly, in terms of the Average Variance Extracted (AVE), values for each dimension fall between 0.56 and 0.73 surpassing the 0.36 threshold suggested by Fornell and Larcker (1981). This indicates excellent convergent validity for each dimension, denoting the high consistency between observed variables and their latent constructs.



In a nutshell, the data analysis results of this study not only confirm the reliability and validity of each observed variable and dimension but also meet the high standards recognized in academia. These robust results provide a solid foundation for our subsequent analysis and recommendations.

**Table 2.** Individual item reliability, composite reliability, and average variance extracted.

Constructs	No. of items	Factor loading ( $\lambda$ )	Individual item reliability ( $\lambda^2$ )	t-value	Composite reliability (CR)	Average variance extracted (AVE)
1. Environmental attitude	4	0.69~0.78	0.48~0.61	18.44~21.81	0.84	0.56
2. Low-carbon literacy	4	0.69~0.82	0.48~0.67	18.69~23.76	0.84	0.58
3. Perceived behavior control	4	0.71~0.78	0.50~0.61	19.28~21.76	0.84	0.57
4. Low-carbon travel intention	3	0.76~0.81	0.58~0.66	21.25~23.18	0.83	0.62
5. Low-carbon journey	3	0.84~0.87	0.71~0.76	25.29~26.75	0.89	0.73

Note:  $\chi^2=540.63$ ;  $df=125$ ;  $RMSEA=0.074$ ;  $n=615$ .

#### 4.3. SEM Analysis and Goodness-of-Fit Test

Table 3 presents the results of the fit indices for the structural equation model. This study selected three major categories of fit measures: absolute fit measures, incremental fit measures, and parsimonious fit measures to thoroughly review the fit of the model. The closer the model's fit is to the recommended ideal values, the higher the explanatory and practical value of the model making the strategic implications of the research findings even more significant (Bagozzi & Yi, 1988).

First, Doll, Xia, and Torkzadeh (1994) suggested that a GFI value above 0.8 is preferable regarding the absolute fit measures. MacCallum and Hong (1997) recommended that AGFI should also be above 0.8. RMSR should be below 0.05 and values for RMSEA and standardized RMR should both be less than 0.08. According to the data from this study, the values for GFI, AGFI, RMSR, RMSEA, and standardized RMSR are 0.908, 0.876, 0.0335, 0.0744 and 0.0438, respectively. These figures either meet or exceed the mentioned standards implying that from an absolute fit perspective, the model is acceptable.

Regarding incremental fit measures, the data shows NFI=0.977, RFI=0.972, IFI=0.982, and CFI=0.982. Bagozzi and Yi (1988) mentioned that if the values of NFI, RFI, IFI and CFI all exceed 0.9, the model is considered to have a good fit. All indicators in our model surpass this threshold indicating that the incremental fit of the model is also acceptable.

As for the parsimonious fit measures, the  $\chi^2/df$  for the model proposed in this study is 4.399. While this exceeds the threshold of 3 proposed by Kline (2005) it is still below the acceptable 5 as believed by Schumacker and Lomax (2004). Additionally, the values for PGFI and PNFI are 0.679 and 0.817, respectively both exceeding the 0.5 threshold recommended by Mulaik et al. (1989) indicating that the model in this study is not overly complex and retains appropriate simplicity.

In brief, the model proposed in this study obtains strong support indicating its theoretical and strategic appropriateness and applicability regardless of whether it is examined from an absolute, incremental, or parsimonious fit perspective. This also implies that we can confidently base our subsequent explanations and derivations on this model.

Table 3. Results of the goodness of fit indexes.

Fit measure	Index	Standard value	Result
Absolute fit measures	$\chi^2$	—	563.03
	Goodness of fit index (GFI)	> 0.80	0.908
	Adjusted goodness of fit index (AGFI)	> 0.80	0.876
	Root mean square residual (RMSR)	< 0.05	0.034
	Root mean square error of approximation (RMSEA)	< 0.08	0.074
	Standardized RMR	< 0.08	0.044
Incremental fit measures	Normed fit index (NFI)	> 0.90	0.977
	Relative fit index (RFI)	> 0.90	0.972
	Incremental fit index (IFI)	> 0.90	0.982
	Comparative fit index (CFI)	> 0.90	0.982
Parsimonious fit measures	$\chi^2/df$	< 3	4.399
	Parsimony goodness of fit index (PGFI)	> 0.50	0.679
	Parsimony normed fit index (PNFI)	> 0.50	0.817

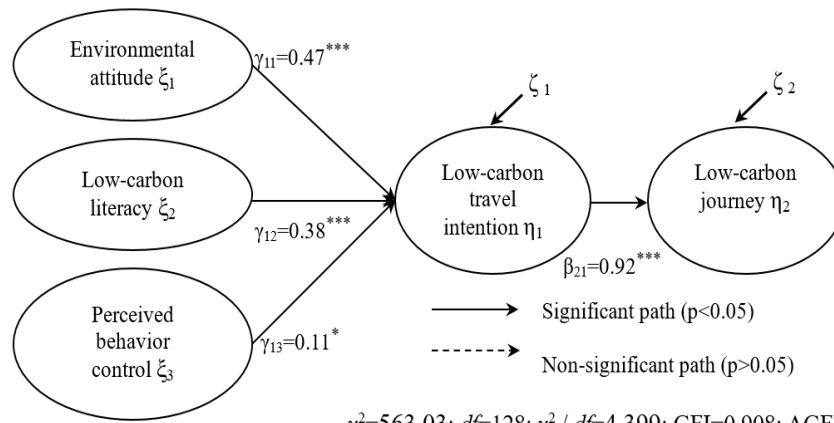
#### 4.4. Causal Path Analysis of the Theoretical Model

In this study, the linear structural equation model covers five major latent variables. The detailed causal relationships are presented in Figure 2. Table 4 provides the specific verification results of the theoretical causal paths in our research model. Firstly, for the variable environmental attitude ( $\xi_1$ ), it has a positive and clear impact on low-carbon travel intentions ( $\eta_1$ ). The specific parameter estimation result is  $\gamma_{11} = 0.47$  with a t-value of 7.40. This indicates that a positive attitude towards the environment among the public makes it more likely for them to develop intentions for low-carbon travel. Next, low-carbon literacy ( $\xi_2$ ) also showed a significant positive effect on low-carbon travel intentions ( $\eta_1$ ) as expected with parameter estimation showing  $\gamma_{12} = 0.38$  and a t-value reaching 6.23. This suggests that personal cultivation in low-carbon knowledge and abilities further strengthens their willingness to engage in low-carbon travel. Furthermore, we found that perceived behavioral control ( $\xi_3$ ) also had a significant positive impact on low-carbon travel intentions ( $\eta_1$ ) with a parameter estimate of  $\gamma_{13} = 0.11$  and a t-value of 2.10. This indicates that when people believe they have the capability and control to engage in low-carbon travel, their intentions for such travel are relatively enhanced. Lastly, from our analysis, low-carbon travel intentions ( $\eta_1$ ) evidently had a strong positive impact on actual low-carbon journeys with a specific parameter of  $\beta_{21} = 0.92$  and a high t-value of 20.90. This suggests that once an intention for low-carbon travel is formed, it is very likely to translate into actual low-carbon travel behavior. In a nutshell, all variables in this study showed significant correlations with low-carbon travel intentions and positively influenced actual low-carbon travel behaviors. These results provide valuable guidance and suggestions for future low-carbon travel promotion strategies.

Table 4. Parameter estimates for structural equations model.

Hypothesized model ( paths )	Parameter estimates	t-value	Result
H1 : Environmental attitude $\xi_1 \rightarrow$ Low-carbon travel intention $\eta_1$ ( $\gamma_{11}$ )	0.47***	7.40	Supported
H2 : Low-carbon literacy $\xi_2 \rightarrow$ Low-carbon travel intention $\eta_1$ ( $\gamma_{12}$ )	0.38***	6.23	Supported
H3 : Perceived behavior control $\xi_3 \rightarrow$ Low-carbon travel intention $\eta_1$ ( $\gamma_{13}$ )	0.11*	2.10	Supported
H4 : Low-carbon travel intention $\eta_1 \rightarrow$ Low-carbon journey $\eta_2$ ( $\beta_{21}$ )	0.92***	20.90	Supported

Note: "\*"  $p < 0.05$ ; "\*\*\*"  $p < 0.001$ ;  $n = 615$ .



$\chi^2=563.03$ ;  $df=128$ ;  $\chi^2 / df=4.399$ ;  $GFI=0.908$ ;  $AGFI=0.876$ ;  
 $CFI=0.982$ ;  $NFI=0.977$ ;  $IFI=0.982$ ;  $RFI=0.972$ ;  
 $RMSEA=0.0744$ ;  $RMR=0.0335$ ;  $SRMR=0.0438$ .

Figure 2. Structure of the theoretical model.

Note: \*  $p<0.05$ , \*\*\*  $p<0.001$ .

4.5. Direct and Indirect Effect Analysis of the Theoretical Model

We can delve into how various factors indirectly influence low-carbon journeys through low-carbon travel intentions based on the analysis results from Table 5. Firstly, environmental attitude has the most significant impact among all factors. Its indirect effect on low-carbon journeys through low-carbon travel intentions reached 0.4324. This implies that when people have a more positive attitude towards environmental protection, the likelihood of them intending to travel in a low-carbon manner also increases. This underscores the importance of elevating public environmental awareness in promoting low-carbon travel. Secondly, low-carbon literacy also has a noticeable indirect effect on low-carbon journeys with an impact of 0.3496 through low-carbon travel intentions. This reflects that when the public enhances their knowledge and skills in low-carbon matters, they can more consciously choose low-carbon travel, subsequently leading them to opt for low-carbon journeys in their actual actions. Lastly, although perceived behavioral control has a relatively smaller indirect effect on low-carbon journeys exhibiting an influence of 0.1012 through low-carbon travel intentions, it is still noteworthy. When people believe they possess the capability and resources for low-carbon travel, even if they didn't originally intend to, they are more likely to choose low-carbon journeys in practice.

Combining the above analysis, environmental attitude, low-carbon literacy and perceived behavioral control all exert indirect effects on low-carbon travel intentions with environmental attitude being the most significant. These results offer valuable insights, helping us understand how to more effectively promote low-carbon travel and encourage the public to opt for low-carbon journeys.

Table 5. Results of direct and indirect effect analysis of low-carbon journey.

Factors	Direct effects	Indirect effects through	Total effects
		Low-carbon travel intention $\eta_1$	
Environmental attitude $\xi_1$	-	$\gamma_{11} \times \beta_{21}=0.47 \times 0.92$	0.4324
Low-carbon literacy $\xi_2$	-	$\gamma_{12} \times \beta_{21}=0.38 \times 0.92$	0.3496
Perceived behavior control $\xi_3$	-	$\gamma_{13} \times \beta_{21}=0.11 \times 0.92$	0.1012

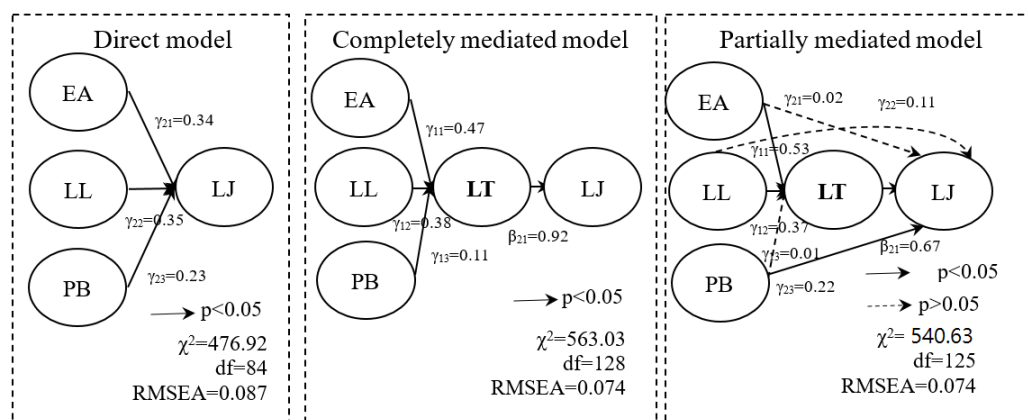
4.6. Analytical Results of Mediating Effect

This study explored three main factors, namely environmental attitude, low-carbon literacy and perceived behavioral control and how they might indirectly influence low-carbon journeys through low-carbon travel intentions. We adopted a nested model analysis that primarily evaluated model hypotheses through a chi-squared

difference test to deeply examine the mediating role of low-carbon travel intentions. We identified four competing models that were used to compare and test the mediation effect of low-carbon travel intentions following the method of [Tippins and Sohi \(2003\)](#). Table 6 shows the comparison results of these four models. The first is the null model which serves as a reference baseline and assumes no causal relationships between any latent variables. Next, the direct model considers the three main factors directly influencing low-carbon journeys without any mediation. The full mediation model assumes all effects are channeled through low-carbon travel intentions while the partial mediation model considers both direct and indirect effects. After comprehensively comparing the fit indices of these models, the partial mediation model was the best with its  $\chi^2/df$ , CFI, GFI, AGFI, NFI, IFI and SRMR all superior to other models. This indicates that the partial mediation model best explains our data. Delving into the partial mediation model [Figure 3](#), we found that the indirect effect of environmental attitude on low-carbon journeys through low-carbon travel intentions ( $0.53 \times 0.67$ ) is greater than its direct effect (0.02), proving the full mediating role of low-carbon travel intentions. Similarly, low-carbon literacy also showed a similar mediation effect. However, perceived behavioral control seemed not to influence low-carbon journeys through low-carbon travel intentions but had a direct effect. The findings of this study emphasize the full mediating role of low-carbon travel intentions between environmental attitude and low-carbon literacy and low-carbon journeys. For perceived behavioral control, it appears to be directly related to low-carbon journeys without any mediation. These findings are crucial for our understanding and promotion of low-carbon travel especially considering the significant impacts of environmental attitude and low-carbon literacy on low-carbon travel intentions and actual journey choices.

**Table 6.** Results of mediating effect of competing model analysis for low-carbon travel intention.

Models	$\chi^2$	df	$\chi^2 / df$	$\Delta\chi^2$	$\Delta df$	CFI
1.Null model	3137.56	135	23.24	-	-	0.901
2.Direct model	476.92	84	5.678	2660.64	51	0.978
3.Completely mediating model	563.03	128	4.399	2574.53	7	0.982
4.Partially mediating model	540.63	125	4.325	2596.93	10	0.984
Models	GFI	AGFI	NFI	IFI	SRMR	RMSEA
1.Null model	0.638	0.541	0.896	0.888	0.411	0.190
2.Direct model	0.906	0.866	0.974	0.978	0.045	0.087
3.Completely mediating model	0.908	0.876	0.977	0.982	0.044	0.074
4.Partially mediating model	0.911	0.878	0.978	0.984	0.042	0.074



**Figure 3.** Nested-model comparison of mediating effect for low-carbon travel intention.

**Note:** EA: Environmental attitude; LL: Low-carbon literacy; PB: Perceived behavior control; LT: Low-carbon travel intention; LJ: Low-carbon journey.

## 5. DISCUSSION

The significance of the findings of this study is noteworthy not only because it reveals the mediating role of environmental attitudes and low-carbon knowledge in influencing low-carbon travel intentions but also identifies perceived behavioral control as an independent factor directly affecting low-carbon journeys. These insights suggest that different strategies should be adopted for different influencing factors in promoting low-carbon travel behavior.

First, environmental attitudes and low-carbon knowledge indirectly influence low-carbon journeys through travel intentions. It is crucial to enhance public awareness and knowledge about the environment. This necessitates not only intensified educational and promotional efforts but also engagement in practical societal activities that allow the public to experience the feasibility and convenience of low-carbon travel, thus internalizing it into their travel choices.

Secondly, the direct impact of perceived behavioral control on low-carbon journeys highlights the importance of enhancing individuals' control over low-carbon travel. This means that providing supportive low-carbon travel infrastructure and services such as popularizing low-carbon transportation, providing green travel information, and increasing accessibility could effectively encourage more people to opt for low-carbon journeys.

Moreover, the results of this study should provoke deep reflection by travel industry operators in strategy formulation and market promotion. For instance, travel product design should pay more attention to integrating travelers' environmental attitudes and knowledge levels and incorporate elements that promote travelers' perceived control of services.

Finally, future research should expand to a broader scope to explore how perceived behavioral control affects low-carbon travel behavior under different conditions and how policies, social environments and cultural factors could further increase the prevalence of low-carbon travel considering that behaviors may vary across different cultural and regional contexts.

In essence, the discussion section of this study should focus on interpreting the meaning of the results rather than repeating them and should pay attention to strategies and recommendations for translating these findings into practical actions.

## 6. CONCLUSION AND IMPLICATIONS

### 6.1 Conclusion

This study investigated how three main factors, namely environmental attitude, low-carbon literacy and perceived behavioral control influence low-carbon journeys through low-carbon travel intentions. We thoroughly compared different mediation effect models and found that the partial mediation model best explains the variance in the data through nested model analysis. When it comes to low-carbon travel intentions and environmental attitude, both variables had definite indirect effects on low-carbon journeys.

This suggests that people's environmental perceptions and their knowledge of low-carbon practices indeed influence their travel choices which in turn lead to low-carbon journeys through travel intentions. Regarding perceived behavioral control, unlike the aforementioned two factors, it directly impacts low-carbon journeys without necessarily influencing low-carbon travel intentions. This indicates that when people feel they can control and execute low-carbon travel, they are more likely to opt for low-carbon journeys without needing a prior travel intention.

This study emphasizes the central role of low-carbon travel intentions in translating environmental attitudes and low-carbon literacy into actual actions (low-carbon journeys). Additionally, perceived behavioral control as an independent direct influencing factor is also an area worth noting and further research. Future studies can further explore how perceived behavioral control functions in different cultural or regional contexts and how to enhance its

positive impact on low-carbon travel. Furthermore, strategies to strengthen people's environmental attitudes and low-carbon literacy can be examined to promote more low-carbon travel choices.

### 6.2. Managerial Implications

The managerial implications of this study are as follows:

1. Target positioning for travel operators: Travel operators should integrate environmental and low-carbon concepts into their promotional and marketing strategies to attract environmentally conscious consumers given that environmental attitudes and low-carbon literacy significantly influence low-carbon travel intentions.
2. Education and training: The travel industry should offer relevant training and education to enhance the low-carbon literacy of both tourists and staff making them understand the importance of low-carbon travel and take actual actions.
3. Development of direct strategies: Since perceived behavioral control directly affects low-carbon journeys, managers should formulate strategies that directly emphasize and enhance this sense of behavioral control making consumers more confident in implementing low-carbon travel.
4. Innovation in products and services: Travel operators can develop and provide more eco-friendly products and services, such as eco-hotels, low-carbon transportation etc. considering consumers' preference for low-carbon travel.
5. Diversified promotional strategies: There should be an exploration of new media and technologies, like social media and virtual reality to attract a diverse range of consumers beyond traditional promotional methods.
6. Strategic Partnerships: Consider establishing collaborative relationships with environmental organizations and other relevant institutions to jointly promote low-carbon travel, enhancing its influence and credibility.
7. Continuous monitoring and adjustment: Managers should regularly monitor market trends of low-carbon travel and consumer responses. Strategies should be continuously adjusted and refined based on market changes and consumer demands.

In a nutshell, this study offers valuable insights for managers in the travel industry allowing them to better understand consumer needs and preferences and to formulate effective strategies to promote the development of low-carbon travel.

### 6.3. Suggestions for Future Research

This study offers the following research recommendations for future researchers:

1. Expand the sample base: Although this study provides insights into how three main factors influence low-carbon travel intentions and journeys, future studies could be conducted across different cultures, regions or age groups to enhance the generalizability of the research.
2. Examine other potential factors: This study mainly focuses on three factors. Future research could delve into other possible influences, such as individual ecological anxiety, social influence, or economic considerations to see how they impact low-carbon travel choices.
3. Deep dive into perceived behavioral control: Future research should explore the specific mechanisms and underlying motivations of this factor in detail as perceived behavioral control directly impacts low-carbon journeys.
4. Experimental research design: Consider adopting experimental approaches, such as randomized controlled trials to determine the precise impact of different factors on low-carbon travel intentions and behaviors.
5. Promotion strategies for low-carbon travel: Further research should delve into how to effectively translate environmental attitudes, low-carbon literacy and perceived behavioral control into actual low-carbon travel actions, especially in the realms of strategy or promotion.
6. Role of technology and innovation: Explore how new technologies (like mobile apps or virtual reality) can aid in enhancing people's intentions and behaviors towards low-carbon travel.



7. Study long-term effects: Beyond immediate decision-making factors, there should be exploration into long-term influences such as education and prolonged media exposure and how they affect people's low-carbon travel choices.

It is hoped that these suggestions can provide new directions and ideas for future research in this field.

**Funding:** This study received no specific financial support.

**Institutional Review Board Statement:** Not applicable.

**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

**Competing Interests:** The authors declare that they have no competing interests.

**Authors' Contributions:** All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

## REFERENCES

- Ajzen, I. (1985). From intentions to action: A theory of planned behaviour in Kuhl, J., & Beckmann, J. Eds., Action-control: From cognition to behaviour. In (pp. 11-39). Heidelberg: Springer-Verlag.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
- Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, 14(3), 396-402. <https://doi.org/10.2307/3150783>
- Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 74-94.
- Bentler, P. M., & Wu, E. J. C. (1993). *EQS/ windows use's guide*. Los Angeles, CA: BMDP Statistical Software.
- Cheng, Q., Su, B., & Tan, J. (2013). Developing an evaluation index system for low-carbon tourist attractions in China—A case study examining the Xixi wetland. *Tourism Management*, 36, 314-320. <https://doi.org/10.1016/j.tourman.2012.10.019>
- Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A confirmatory factor analysis of the end-user computing satisfaction instrument. *MIS Quarterly*, 18(4), 453-461. <https://doi.org/10.2307/249524>
- Dubois, G., & Ceron, J.-P. (2006). Tourism and climate change: Proposals for a research agenda. *Journal of Sustainable Tourism*, 14(4), 399-415. <https://doi.org/10.2167/jost539.0>
- Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm". *The Journal of Environmental Education*, 9(4), 10-19.
- Engel, J. F., Blackwell, R. D., & Miniard, P. W. (1993). *Consumer behavior*. New York: Dreyden Press.
- Fan, Y., & Li, M. (2010). Low-carbon economic and chinese transformation on the development mode. *Shanghai Journal of Economics*, 12(2), 30-35.
- Fishbein, M. (1967). A behavior theory approach to the relations between beliefs about an object and the attitude toward the object in M. Fishbein (Ed.), Readings in attitude theory and measurement. In (pp. 389-400). New York: John Wiley & Sons.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable and measurement errors. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.2307/3150979>
- Gu, Y., Deakin, E., & Long, Y. (2017). The effects of driving restrictions on travel behavior evidence from Beijing. *Journal of Urban Economics*, 102, 106-122. <https://doi.org/10.1016/j.jue.2017.03.001>
- Han, H. (2015). Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory of planned behavior. *Tourism Management*, 47, 164-177. <https://doi.org/10.1016/j.tourman.2014.09.014>
- Han, H., Hsu, L.-T. J., & Sheu, C. (2010). Application of the theory of planned behavior to green hotel choice: Testing the effect of environmental friendly activities. *Tourism Management*, 31(3), 325-334. <https://doi.org/10.1016/j.tourman.2009.03.013>

- Higham, J. E., & Cohen, S. A. (2011). Canary in the coalmine: Norwegian attitudes towards climate change and extreme long-haul air travel to Aotearoa/New Zealand. *Tourism Management*, 32(1), 98-105. <https://doi.org/10.1016/j.tourman.2010.04.005>
- Hornig, J., Hu, M. M., Teng, C. C., Hsiao, H., & Liu, C. S. (2013). Development and validation of the low-carbon literacy scale among practitioners in the Taiwanese tourism industry. *Tourism Management*, 35, 255-262. <https://doi.org/10.1016/j.tourman.2012.08.001>
- Hornig, J., Hu, M. M., Teng, C. C., & Lin, L. (2014). Energy saving and carbon reduction behaviors in tourism—a perception study of Asian visitors from a protection motivation theory perspective. *Asia Pacific Journal of Tourism Research*, 19(6), 721-735. <https://doi.org/10.1080/10941665.2013.797002>
- Hu, M.-L. M., Hornig, J.-S., Teng, C.-C. C., & Yen, C.-D. (2013). Assessing students' low carbon literacy by Ridit IPA approach. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 13, 202-212. <https://doi.org/10.1016/j.jhlste.2013.09.006>
- Jang, S. S., & Namkung, Y. (2009). Perceived quality, emotions, and behavioral intentions: Application of an extended Mehrabian–Russell model to restaurants. *Journal of Business Research*, 62(4), 451-460. <https://doi.org/10.1016/j.jbusres.2008.01.038>
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford.
- Kroesen, M., Handy, S., & Chorus, C. (2017). Do attitudes cause behavior or vice versa? An alternative conceptualization of the attitude–behavior relationship in travel behavior modeling. *Transportation Research Part A: Policy and Practice*, 101, 190-202. <https://doi.org/10.1016/j.tra.2017.05.013>
- Kuo, N.-W., & Dai, Y.-Y. (2012). Applying the theory of planned behavior to predict low-carbon tourism behavior: A modified model from Taiwan. *International Journal of Technology and Human Interaction*, 8(4), 45-62. <https://doi.org/10.4018/jthi.2012100103>
- MacCallum, R. C., & Hong, S. (1997). Power analysis in covariance structure modeling using GFI and AGFI. *Multivariate Behavioral Research*, 32(2), 193-210. [https://doi.org/10.1207/s15327906mbr3202\\_5](https://doi.org/10.1207/s15327906mbr3202_5)
- Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin*, 105(3), 430-445. <https://doi.org/10.1037//0033-2909.105.3.430>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, 12(4), 531-544. <https://doi.org/10.1177/014920638601200408>
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Schwepker Jr, C. H., & Cornwell, T. B. (1991). An examination of ecologically concerned consumers and their intention to purchase ecologically packaged products. *Journal of Public Policy & Marketing*, 10(2), 77-101. <https://doi.org/10.1177/074391569101000205>
- Sung, P. L., Hsiao, T. Y., Huang, L., & Morrison, A. M. (2021). The influence of green trust on travel agency intentions to promote low-carbon tours for the purpose of sustainable development. *Corporate Social Responsibility and Environmental Management*, 28(4), 1185-1199. <https://doi.org/10.1002/csr.2131>
- Tang, Z., Shi, C., & Liu, Z. (2011). Sustainable development of tourism industry in China under the low-carbon economy. *Energy Procedia*, 5, 1303-1307. <https://doi.org/10.1016/j.egypro.2011.03.226>
- Tangeland, T., Vennesland, B., & Nybakk, E. (2013). Second-home owners' intention to purchase nature-based tourism activity products—A Norwegian case study. *Tourism Management*, 36, 364-376. <https://doi.org/10.1016/j.tourman.2012.10.006>
- Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal*, 24(8), 745-761.

- Weston, R., & Mota, J. C. (2012). Low carbon tourism travel: Cycling, walking and trials. *Tourism Planning and Development*, 9(1), 1-3. <https://doi.org/10.1080/21568316.2012.658168>
- Wiidegren, Ö. (1998). The new environmental paradigm and personal norms. *Environment and Behavior*, 30(1), 75-100. <https://doi.org/10.1177/0013916598301004>
- World Economic Forum (WEF). (2009). *Towards a low carbon travel and tourism sector*. Davos, Switzerland: WEF.
- Xie, P. F., & Luo, J. (2021). Investigating visitor attitudes towards the reopening of a theme park: An application of the push-pull-mooring model. *Journal of Travel & Tourism Marketing*, 38(8), 867-880. <https://doi.org/10.1080/10548408.2021.1961653>
- Zhang, J. (2017). Evaluating regional low-carbon tourism strategies using the fuzzy Delphi-analytic network process approach. *Journal of Cleaner Production*, 141, 409-419. <https://doi.org/10.1016/j.jclepro.2016.09.122>

*Views and opinions expressed in this article are the views and opinions of the author(s), Journal of Tourism Management Research shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.*