

The Longevity Sustainability Paradox in Tourism: Development Finance Perspectives on Low Carbon Travel Behaviour in Thailand's Longevity Tourism Economy

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Abstract: *The rapid growth of longevity tourism, characterized by older travelers seeking extended, health-oriented stays, has created a paradox within sustainable tourism. While longevity tourism contributes substantially to local economies, prolonged stays and high expectations for comfort and service intensity can conflict with low-carbon objectives. From a development finance perspective, understanding the economic incentives and investment mechanisms that encourage sustainable tourist behaviour has become critical for balancing longevity tourism growth with low-carbon development goals. This research examines the economic dimensions of low-carbon travel behaviour (LCTB) among longevity tourists in Thailand, focusing on how perceived cost, convenience, and value for money interact with environmental attitudes, environmental awareness, and perceived responsibility to shape sustainability-related travel choices. Primary data were collected through a structured questionnaire administered to 345 longevity tourists across major destinations in Thailand. The associations between economic perceptions and psychological factors (independent variables) and LCTB (dependent variable) were examined using IBM SPSS (Version 26.0) and descriptive statistics, Confirmatory Factor Analysis (CFA), and multiple regression analysis. The results show that perceived travel cost negatively influences LCTB ($\beta = -0.214, p < 0.001$). Although environmental awareness is high, it often heightens concerns about increased costs, limited-service availability, and reduced comfort, thereby discouraging low-carbon choices. In contrast, pro-environmental attitude ($\beta = 0.364, p < 0.001$) and perceived responsibility ($\beta = 0.281, p < 0.001$) emerge as stronger predictors of sustainable behaviour than economic cognition alone, with environmental awareness strengthening the attitude behaviour relationship ($\beta = 0.176, p < 0.001$). Overall, the findings empirically confirm the longevity–sustainability paradox, highlighting that ethical commitment and shared responsibility are essential for promoting LCTB among longevity tourists in Thailand.*

Keywords: Longevity Tourism, Sustainable Tourism, Willingness to Pay, Low Carbon, Travel Behaviour, Thailand Tourism, Development Finance; Green Tourism Investment

Introduction

Population aging and environmental sustainability have become the two key trends that are influencing the growth of the global tourism industry. Health enhancement, active aging, and wellness-oriented travel. Longevity tourism has been growing very fast in line with the increased life expectancy, increased health awareness, and increased disposable income (Janchai & Suvittawat, 2025; Srisawat et al., 2023). Because of its first-rate medical and wellness facilities, reasonable prices, and abundant natural and cultural resources, Thailand has emerged as one of the top locations for longevity travel. Nevertheless, the swell of this industry shows a fatal paradox: whereas longevity tourism is supposed to enhance long-term human wellbeing; it is frequently based on the trends of traveling and consumption that aggravate carbon emission and environmental stress (Chanthawong & Choibamroong, 2022; Wang & Phakdeephairot, 2024).

This research defines this paradox as the longevity sustainability paradox. The longevity tourists usually take part in long-haul travel, long stays, and services that are resource-demanding and a substantial contribution to the tourist carbon footprint (Thanatrakolsri & Sirithian, 2025). Concurrently, these tourists have a high level of health and environmental principles, and, thus, there is a possibility of a tendency towards sustainable and low-carbon living. The issue of whether or not such values can lead to LCTB is an open empirical question, especially when economic conditions like cost, convenience, and perceived value come into play in decision-making (Boonrat et al., 2025; Pongsakornrungsilp & Pongsakornrungsilp, 2023). From a development finance perspective, the interaction between economic incentives, tourism investment structures, and sustainable consumption choices becomes crucial in shaping low-carbon travel behaviour among longevity tourists.

Low-carbon travel behaviour, such as utilizing sustainable transport, environmentally friendly accommodation, and minimum consumption of resources, is vital in reducing the number of emissions that are caused by tourism (Shie et al., 2022; Wan et al., 2025). Economically, price sensitivity, availability of infrastructure, incentives, and perceived trade-offs between comforts, health benefits, and environmental responsibility are all factors affecting these behaviours. These economic aspects need to be known in relation to longevity tourism, in that tourists usually value personal well-being as well as travel efficiency (Guo & Li, 2025; Dai et al. 2022). In this context, development finance mechanisms such as green tourism investment, sustainability incentives, and low-carbon infrastructure funding can play a strategic role in aligning economic motivations with environmentally responsible travel behaviour.

Thailand is an interesting place to research this paradox, as it is a leader in longevity tourism, and it has been espousing low-carbon development. Although these policy ambitions are there, scant empirical evidence has been done on the impact of economic factors on influencing LCTB among longevity tourists. Therefore, examining the issue through a development finance lens can provide insights into how economic instruments and sustainable tourism investments influence low-carbon decision-making in longevity tourism destinations.

Research Objective

The purpose of this research is to investigate the economic factors that affect LCTB among Thai longevity tourists. It specifically aims to examine how travel decisions connected to sustainability are influenced by perceived costs, convenience, and value for money, as well as environmental attitudes and perceived responsibility. From a development finance perspective, the study also evaluates how economic incentives, tourism investment conditions, and cost–benefit perceptions shape tourists’ willingness to adopt low-carbon travel practices. By analysing the main motivators and obstacles to low-carbon behaviour among older, long-stay tourists, the research also seeks to explain the lifespan sustainability paradox. The study further aims to generate insights for sustainable tourism financing and policy mechanisms that can support low-carbon transitions within Thailand’s longevity tourism economy.

Rest of the Research

There are six sections in this research. The context and goals of the research are presented in Section 1. In Section 2, the conceptual framework is developed and pertinent literature is reviewed. In Section 3, the research methodology is explained. Section 4 displays the results and analysis. Section 5 discusses the results. Section 6 concludes the study with implications and suggestions for more research.

Previous Research

Evaluated the extent of marine tourism's carbon footprint on Sichang Island, Thailand, by examining the greenhouse gas emissions of three lifestyle-based marine tourism experiences: merit-making, nature, and relaxation-adventure-education tours. Waste management, transportation, lodging, food, and activities were all looked at (Sakcharoen et al., 2024). According to the findings, the carbon footprints of meals, lodging, land transportation, and sea travel on Routes I, II, and III are 9.9, 10.5, and 26.2 kg CO₂e per person per trip, respectively. The research is limited by the planned routes to follow, the selective sources of emissions, and the destination context, even though the results supported the planning of low-carbon tourism and the reduction of emissions.

Thailand implemented the Sustainable Tourism Goals (STGs) at the end of 2023 to promote sustainable development in the hotel and transportation sectors. Khiaolek et al. (2024) conduct field research on ten hotels and ten transportation enterprises in Chiang Mai with an emphasis on the application of STG 7 (Clean Energy) and STG 13 (Climate Action). The results demonstrate a significant potential for mitigating greenhouse gases (GHGs) of about 15,192.17 tCO₂-eq/year, along with four primary barriers to the low-carbon transition: financial, institutional and regulatory, technological and innovative, and knowledge barriers. The most significant factor in the decline was the use of solar energy, which was followed by the switch from diesel-powered to electric vehicles. However, the study's sample size is too small to draw generalizations.

Wang et al. (2023) investigated individual LCTB in connection to daily travel and commuting using the Theory of Planned Behaviour and the Attitude-Behaviour-Context model. Mplus 8.0 was used to evaluate the survey data, which revealed that there are clear behavioural differences between a daily dwelling and a tourist destination based on the survey of 506 respondents. Using behavioural intention, the LCTB in both settings is significantly mediated by the behavioural intention, with situational factors playing a positive moderating role, especially in tourism. The research provided information on how low-carbon travel can be promoted, but its use of self-reported and cross-sectional data prevents causal interpretation and inference.

Pantaratorn et al. (2023) used a mixed-methods strategy to address the barriers to the growth of low-carbon tourism in Thailand. 224 tourist professionals were interviewed using a questionnaire that was developed based on the examination of in-depth interviews with 17 supply-side tourism stakeholders using NVivo 20. Exploratory and Confirmatory Factor Analyses demonstrate that there are three primary dimensions of barriers, i.e., structural constraints, intrapersonal constraints, and interpersonal constraints. Although its findings are an important source of relevant information to policymakers and industry stakeholders planning to enhance low-carbon tourism, the research was constrained by the supply-side views and moderate sample size.

Using a mixed-method approach, Suwannakul et al. (2025) investigated the idea of low-carbon tourism (LCT) in culinary tourism. It uses structural equation modelling to analyse survey data from 947 gastronomy-based tourists and develops and validates a seven-dimensional scale of LCT experience. Results show that in the development of sustainable tourism, LCT experiences are crucial in determining satisfaction, intentions to return, destination image, and environmentally conscious behaviour.

Bhaktikul et al. (2021) discussed low-carbon tourism as a sustainable development approach in rural highland villages in Chiang Rai, Thailand. With the support of a royal initiative, the research integrates economic, social, and environmental aims. In-depth interviews, observation, quantitative analysis using a mixed-methods approach, and ethnographic Delphi approaches serve as its foundation. The results show a positive impact in four primary areas: improved community capacity for change, community health management, forest protection and restoration, and environmentally friendly agriculture. The research provides useful recommendations and assessment standards for promoting and validating the community's sustainable low-carbon development.

Chang et al. (2020) examined how low-carbon service operations affected responsible tourist behaviour in sustainable cultural tourism using Xiao Liuqiu Island in Taiwan as an example. The study examined the psychological relationships between cultural experiences and sustainable tourism practices using in-depth interviews of domestic tourists and online assessments of overseas passengers. The results demonstrate that the two interconnected aspects of sustainable island tourism are low-carbon service activities on the supply side and responsible tourist behaviour on the demand side, which are influenced by cognition, emotion, motivation, and authenticity perception. This study demonstrates the significance of tourist psychology in managing sustainable cultural tourism, especially when it comes to natural and ecological locations.

Research Gap

Measuring the carbon footprint, supply-side barriers, or general visitor behaviour are the main foundations of low-carbon tourism (Sakcharoen et al., 2024; Khiaolek et al., 2024; Pantaratorn et al., 2023). According to Wang et al. (2023) and Pantaratorn et al. (2023), behavioural research has primarily focused on examining diverse tourist groups through psychological frameworks, with limited attention given to economic trade-offs or long-stay travel contexts. Furthermore, despite the rapid growth of longevity tourism in Thailand, empirical evidence remains scarce on how economic perceptions, environmental attitudes, and PR interact to shape low-carbon travel behaviour (LCTB) among longevity tourists.

This research fits the given gap, as it focuses on longevity tourists in Thailand, which is an under-researched area of low-carbon tourism. The research transcends descriptive and supply-side reasoning by incorporating economic perceptions with psychological factors and analysing them empirically with survey data and statistical modelling, which provides them greater insight into specific policy and practice to enable sustainable tourism.

Hypotheses Framework

The hypotheses are evaluated in terms of the effects of economic perceptions and psychological drivers on low-carbon traveling behaviour among longevity tourists in Thailand. It suggests that the perceived cost deters sustainable behaviour, and convenience and value of money influence pro-environmental attitudes in the model. Such attitudes and beliefs of environmental responsibility have a direct favourable effect on the LCTB and also environmental awareness strengthens the attitude behaviour relationship. Figure 1 shows the relationships between economic perceptions and psychological factors in shaping LCTB among longevity tourists.

H1: Longevity tourists' low-carbon travel behaviour (LCTB) is considerably impacted negatively by perceived cost (PC).

Higher PC increases financial concerns among longevity tourists, making low-carbon options appear less attractive. As a result, higher perceived cost discourages the adoption of LCTB.

H2: Perceived convenience (PCV) of low-carbon tourism services positively influences perceived value for money (VFM).

When PCV low-carbon tourist services are easily accessible and low-carbon, travellers are more likely to view them as good VFM. Convenience reduces effort and time costs, which improves economic value judgments.

H3: Pro-environmental attitudes (PEA) are significantly positively impacted by value for money (VFM).

The low-carbon tourism image as good value improves the positive appraisals of friendly practices that are environmentally friendly. This financial rationale reinforces the PEA of the tourists on the sustainable travel decisions.

H4: Low-carbon travel behaviour (LCTB) and perceived value for money (VFM) are mediated by pro-environmental attitude (PEA).

VFM has an indirect impact to LCTB, which has an effect on PEA. Attitudes of the tourists, which result in desirable behavioural intentions and actions, are formed when they feel that there are economic gains.

H5: Pro-environmental attitudes (PEA) have a substantial positive influence on low-carbon travel behaviour (LCTB).

The tourists who are more PEA would be more likely to adopt low-carbon travelling. Favourable environmental ethics are driving pro-environmental accommodation, transport and consumption practices.

H6: Perceived responsibility (PR) significantly influences low-carbon travel behaviour (LCTB).

Greater personal and collective responsibility towards the environment will motivate tourists to engage in low-carbon behaviours. When making ethical decisions in long-term travel, responsibility perceptions facilitate this.

H7: The association between low-carbon travel behaviour (LCTB) and pro-environmental attitude (PEA) is moderated by environmental awareness (EA).

The effect of PEA on LCTB is enhanced by EA. Tourists who are highly aware would tend to translate the positive attitudes into a reality of sustainable practices.

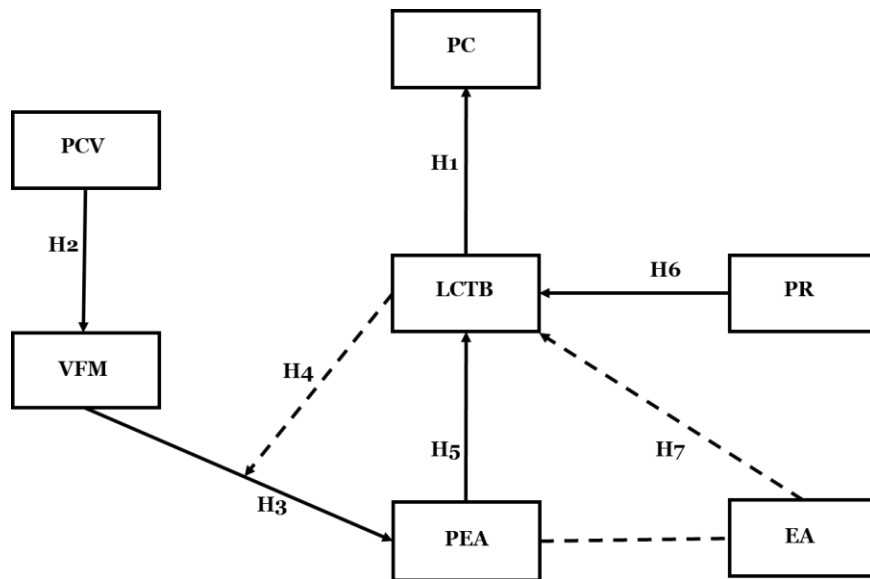


Figure 1: Low-Carbon Travel Behaviour Conceptual Model

Methodology

The economic factors of LCTB among longevity tourists in Thailand are examined in this research using a quantitative, cross-sectional research approach. A systematic questionnaire was used to gather primary data from 345 longevity travellers in several popular locations. A five-point Likert scale was used in the survey to assess economic perceptions, environmental attitudes, awareness, PR, and LCTB. Multiple regression analysis, CFA, and descriptive statistics, were used in the data analysis process using SPSS to test the suggested correlations. The sequential procedures used in the research for data collection, processing, analysis, and interpretation are represented in Figure 2. Data were collected between June 2025 and December 2025 from undergraduate and postgraduate students using a structured questionnaire (20/06/25)-(25/12/25).

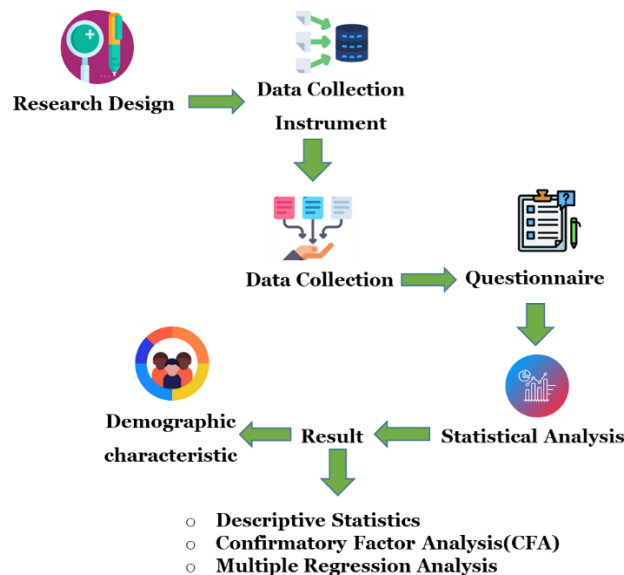


Figure 2: Schematic Representation of the Research Process

Research Design

To investigate the economic factors influencing LCTB among longevity tourists in Thailand, this research used a quantitative, cross-sectional research methodology. The survey-based method was selected because it makes it possible to measure perceptions, attitudes, and behavioural tendencies of tourists systematically and at one time only. The design is

appropriate to establish the relationships among various independent variables, i.e., economic perceptions, environmental attitudes, PR, and low-carbon travel behaviour. By using quantitative methods, it is possible to analyse and generalize the results across the destinations of longevity tourism and conduct an empirical study to justify the sustainable tourism policy and management approaches. 345 valid responses were obtained, which is more than the minimum sample size needed to perform the multivariate statistics methods, which include CFA and multiple regression analysis. The sample size increases the statistical power of the analysis, as well as the reliability and generalizability of the study findings.

Data Collection Instrument

A standardized questionnaire based on the body of research on longevity tourism, low-carbon travel behaviours, and sustainable tourism was used to collect the data. The questionnaire's sections on demographics, economic perception, environmental attitude, EA PR, longevity-related variables, and LCTB were divided into various blocks. A five-point Likert scale was used to score each measurement item (strongly disagree to strongly agree). In order to measure respondents' attitudes and behaviours about low-carbon travel choices, the questionnaire was made to be sufficiently clear, relevant, and consistent.

Data Collection Procedure

This research used the data of the survey to obtain primary data on the economic perceptions of the longevity tourists, attitudes towards the environment, PR, and LCTB through survey data of 345 longevity tourists across big longevity tourism destinations in Thailand. A structured, self-administered questionnaire was created, and data were collected through the questionnaire, which was sent online and in person. The respondents were chosen according to the predetermined longevity tourism characteristics, such as the length of stay, and the purpose of travelling, which was health-oriented. There was voluntary participation, and anonymity was guaranteed to make people tell the truth.

Questionnaire

The purpose of the questionnaire was to assess the psychological and economic aspects of LCTB among long-term travellers. Table 1 uses a five-point Likert scale to measure items on PC, PCV VFM, environmental attitudes, EA, PR, and low-carbon behaviour.

Table 1: Questionnaire Items

<i>Factors</i>	<i>Revised Questions</i>
PC	1. Do you believe that choosing low-carbon travel options increases your overall travel expenses? Do higher prices discourage you from choosing low-carbon tourism services?
PCV	1. Do you find low-carbon transportation options convenient during your stay? 2. Are sustainable tourism services easily accessible at your destination?
VFM	1. Are you satisfied with the quality of eco-friendly services relative to their cost? 2. Do you feel that the benefits of low-carbon tourism justify the price paid?
PEA	1. Do environmental concerns influence your travel decisions? 2. Do you believe tourists should actively support low-carbon tourism practices?
EA	1. Are you aware of the environmental impacts caused by tourism activities? 2. Do you understand how low-carbon travel helps reduce carbon emissions?
PR	1. Do you feel your travel choices can positively impact environmental sustainability? 2. Do you consider environmental responsibility when selecting tourism services?
LCTB	1. Do you choose eco-friendly accommodation when it is available? 2. Do you prefer low-carbon or energy-efficient transportation options while traveling? 3. Do you try to reduce waste and energy consumption during your trips?

Statistical Analysis Techniques

Using the International Business Machines – Statistical Package for the Social Sciences (IBM-SPSS) software (Version 26.0), descriptive statistics were used to summarize the respondents' demographic profile and general travel characteristics. The CFA factor analysis was used to validate the measurement model and the form of the latent variables. Multiple regression analysis was then used to look at how independent variables, such as economic perceptions, willingness to pay, VFM, environmental attitudes, EA, PR, and longevity-related traits, affected LCTB. These techniques provided a chance to thoroughly assess the measurement reliability and causal connections.

Result

This section assesses the proposed research structure and presents the research's statistical results. Using IBM SPSS (Version 26.0) Statistics, reliability and validation tests are used to assess the measurement model and provide a brief description of the key patterns in the variables that were examined. The section also analyses the direct, mediating and moderating impacts of economic perceptions, psychological factors and LCTB using regression analysis and path analysis, which was conducted in IBM SPSS Statistics (Version 26.0).

Demographic characteristic

To provide an image of the sample characteristics, the respondents' demographic information was examined. The study comprised longevity tourists of equal gender. As would be expected for the target market for longevity tourism, the majority of respondents were middle-aged or older. Many of the respondents had both undergraduate and doctoral degrees, indicating that the respondents are generally well-educated. Most of the respondents were from middle-class to upper-class backgrounds, indicating that they had enough money to travel sustainably and for longer periods of time. Travel-related characteristics reveal that many participants preferred long-duration stays and had prior exposure to environmentally friendly tourism services. Overall, the demographic composition confirms the suitability of the sample for analysing LCTB among longevity tourists in Thailand in Table 2 and Figure 3 demographic representation of (a) age group, (b) length of stay, and (c) travel purpose.

Table 2: Respondents' Demographic Profile (N = 345)

<i>Demographic Variable</i>	<i>Category</i>	<i>Frequency (n)</i>	<i>Percentage (%)</i>
Gender	Male	182	52.8
	Female	163	47.2
Age Group	50–59 years	96	27.8
	60–69 years	142	41.2
	70 years and above	107	31.0
Marital Status	Married	221	64.1
	Single / Widowed	124	35.9
	Secondary or below	78	22.6
Education Level	Undergraduate	156	45.2
	Postgraduate	111	32.2
Length of Stay	1–3 months	118	34.2
	4–6 months	139	40.3
	More than 6 months	88	25.5
Travel Purpose	Health & Wellness	147	42.6
	Leisure & Lifestyle	118	34.2
	Medical / Retirement stay	80	23.2

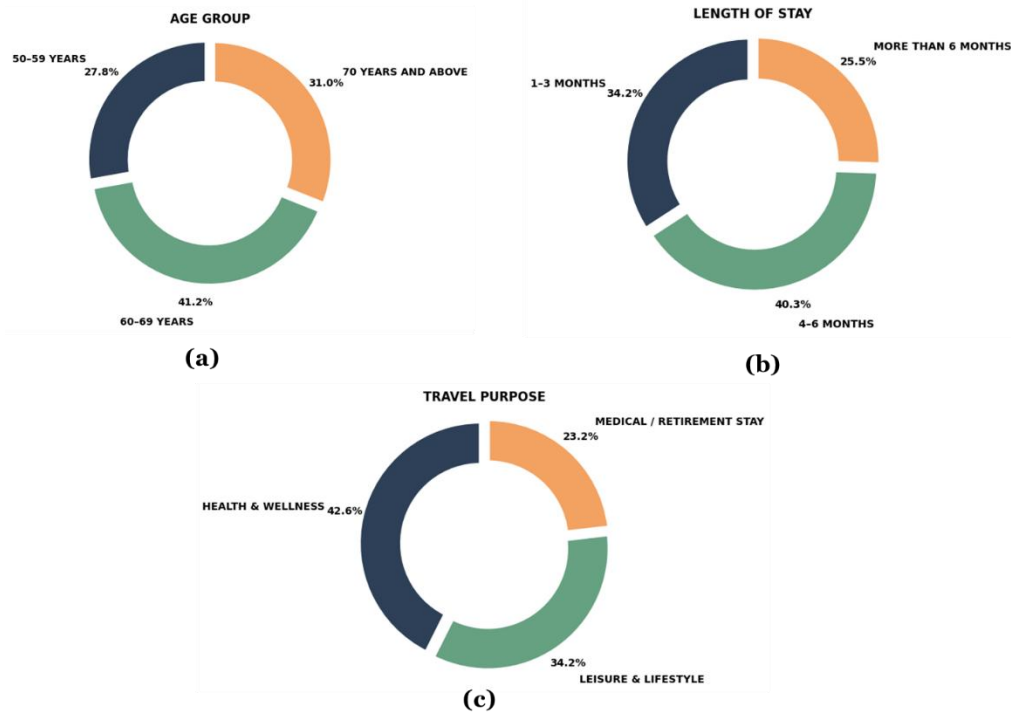


Figure 3: Demographic and Travel Characteristics of Longevity Tourists ((a) Age Group, (b) Length of Stay, and (c) Travel Purpose)

Descriptive Statistics

The respondents' demographics and key research factors were compiled using descriptive statistics. Table 3 and Figure 4 present the mean, standard deviation, frequency, and percentage to describe the economic perceptions, environmental attitudes, EA, PR, longevity-related attributes, and the behaviour of low-carbon traveling among longevity tourists in Thailand. The findings suggest that EA and pro-environmental attitudes of the respondents are moderate to high. Nevertheless, the perceptions connected to price, convenience, and service accessibility were more variable, and they represented the economic differences. Altogether, the descriptive statistics give a preliminary idea about the perceptions of sustainability that the respondents have, and they are used as a basis to conduct further inferential data analysis.

Table 3: Core Study Variables: A Statistical Description

<i>Variable</i>	<i>Min</i>	<i>Max</i>	<i>SD</i>	<i>Mean</i>
PC	1.00	5.00	0.78	3.62
PCV	1.00	5.00	0.81	3.45
VFM	1.00	5.00	0.74	3.71
PEA	1.00	5.00	0.63	4.08
EA	1.00	5.00	0.59	4.15
PR	1.00	5.00	0.66	4.02
LCTB	1.00	5.00	0.68	3.76

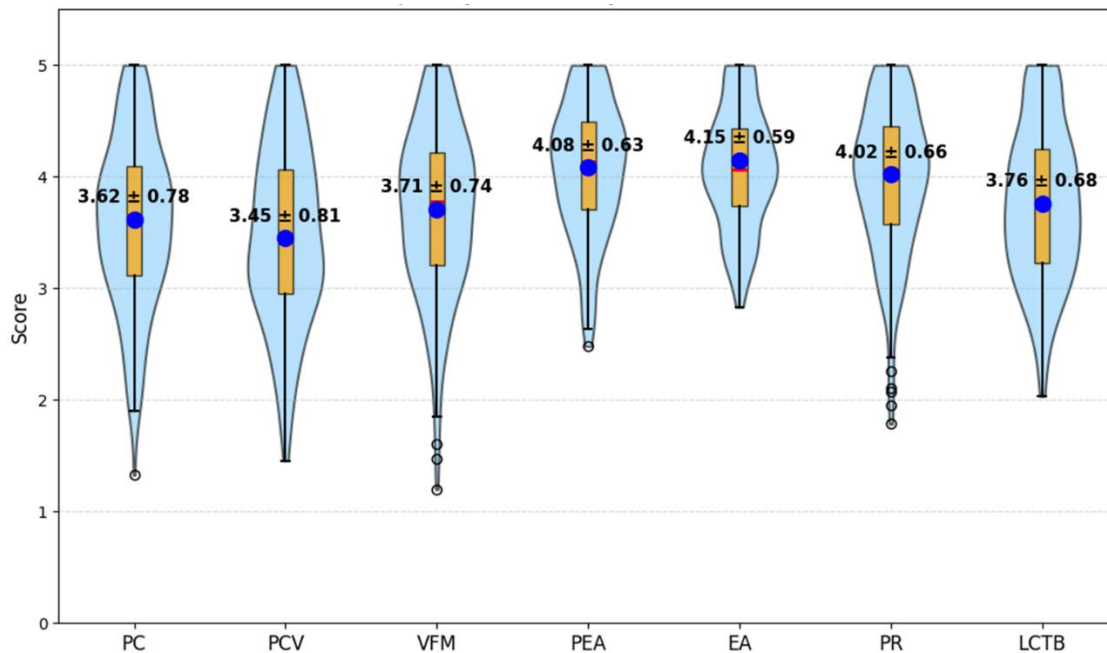


Figure 4: Descriptive Distribution of Economic and Psychological Variables

Reliability and Validity Testing

The validity and reliability of the measuring scales were examined prior to the hypothesis testing in Table 4 and Figure 5. The alpha of Cronbach was used to measure the internal consistency reliability, and all constructions had an acceptable consistency value more than the suggested alpha. To test construct validity, CFA was employed. Convergent validity was demonstrated by high factor loadings, acceptable factor composite reliability values, and average variance extracted that exceeded minimum values. To compare the extracted square root of average variance and assess discriminant validity, inter-construct correlations were employed. The results show that the measurement instruments used in this research to assess the LCTB of longevity tourists are valid and dependable.

Table 4: Convergent validity and dependability The Measurement Model's Results

<i>Factors</i>	<i>Items</i>	<i>(α)</i>	<i>Loadings</i>	<i>CR</i>	<i>AVE</i>
PC	PC1	0.76	0.81	0.80	0.67
	PC2		0.83		
PCV	PCV1	0.74	0.79	0.79	0.65
	PCV2		0.82		
VFM	VFM1	0.78	0.84	0.82	0.69
	VFM2		0.86		
PEA	PEA1	0.80	0.87	0.84	0.72
	PEA2		0.83		
EA	EA1	0.77	0.85	0.81	0.68
	EA2		0.80		
PR	PR1	0.79	0.86	0.83	0.71
	PR2		0.82		
LCTB	LCTB1	0.82	0.88	0.86	0.75
	LCTB2		0.85		

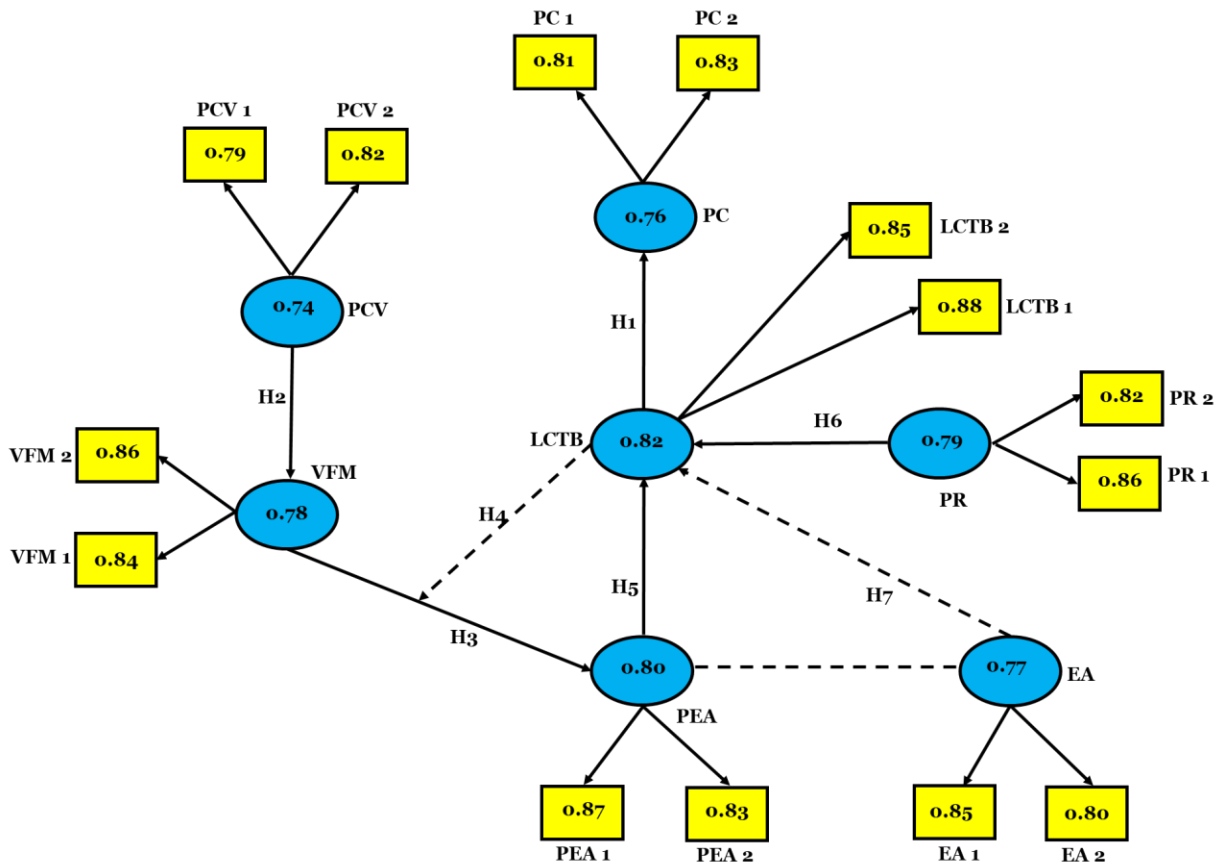


Figure 5: Measurement Model with Standardized Factor Loadings

Multiple Regression Analysis

To determine how economic perceptions, desire to spend, value of money, environmental attitudes, EA, PR, and longevity-related factors impact the LCTB of longevity tourists in Thailand, the research employed multiple regression analysis. The dependent variable was taken to be low-carbon travel behaviour, whereas the other constructs were viewed as independent variables. Assumptions of multicollinearity, linearity, and normality were evaluated before the analysis and proved to be satisfactory. According to the results, LCTB is mainly predicted by the pro-environmental and PR, but not by economic perceptions. The regression model describes a significant percentage of variance in sustainable traveling behaviour, as shown in Table 5.

Table 5: Regression Coefficients Predicting LCTB

Predictor Variable	Std. Error	B	t-value	Standardized β	p-value
PC	0.048	-0.193	-4.02	-0.214	< 0.001
PEA	0.047	0.328	6.91	0.364	< 0.001
PR	0.049	0.254	5.22	0.281	< 0.001
EA	0.044	0.117	2.66	0.126	0.008
PEA \times EA	0.039	0.141	3.64	0.176	< 0.001

Path Analysis

The relationships between economic perceptions and psychological factors, as well as LCTB, were tested using path analysis. The findings indicate that the effect of PC on LCTB is negative, and VFM is positively affected by the effect of PCV. Value-for-money improves pro-environmental attitudes, which largely support LCTB and mediate the value-for-money

behaviour relationship only partially. There is also a strong influence of PR on sustainable behaviour. Also, the association between PEA and LCTB is reinforced by the EA. On the whole, the results are in favor of the proposed conceptual model in Table 6 and Figure 6.

Table 6: Estimated Effects of the Research Model

<i>Hypothesis</i>	<i>Structural Path</i>	<i>t-value / Z-value</i>	<i>Standardized β</i>	<i>p-value</i>	<i>Decision</i>
H1	PC → LCTB	-4.02	-0.214	< 0.001	Supported
H2	PCV → VFM	6.18	0.327	< 0.001	Supported
H3	VFM → PEA	5.47	0.298	< 0.001	Supported
H4 (Mediation-Indirect Effect)	VFM → PEA → LCTB	3.89	0.108	< 0.001	Supported
H5	PEA → LCTB	6.91	0.364	< 0.001	Supported
H6	PR → LCTB	5.22	0.281	< 0.001	Supported
H7 (Moderation-Interaction Effect)	PEA → EA → LCTB	3.64	0.176	< 0.001	Supported

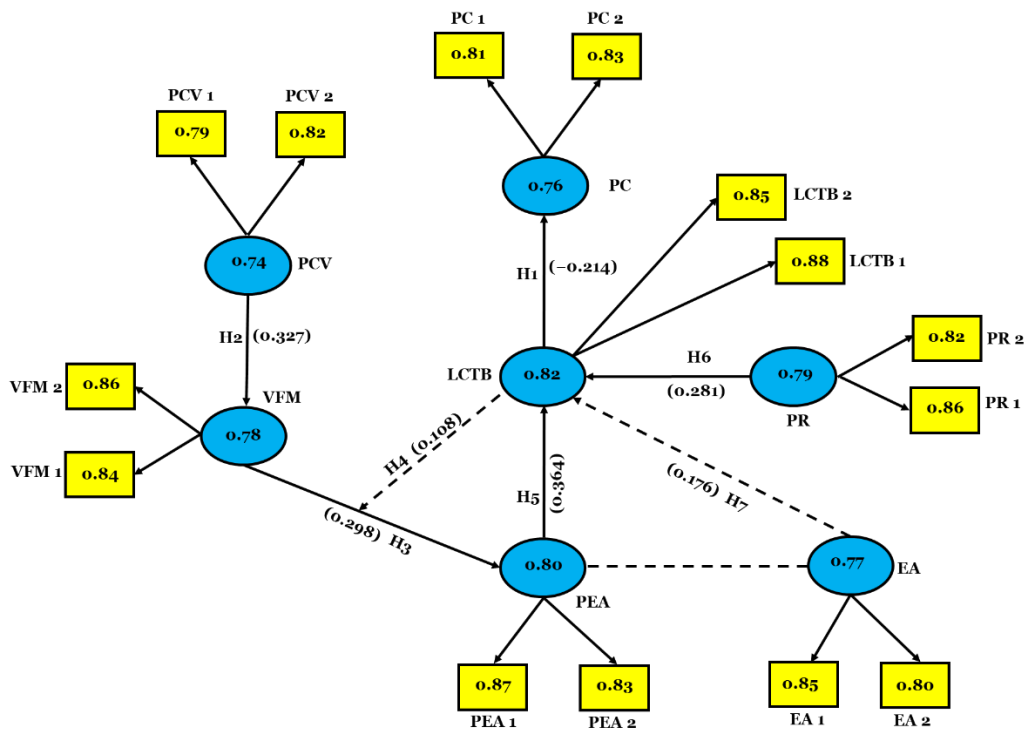


Figure 6: Validated Measurement Model with Standardized Indicator Loadings

Discussion

The research is also constrained by the small number of people used as a sample and a single location, which limits the generality of its results (Khiaolek et al., 2024). It is mostly an expression of mitigation potential in the short term and highly emphasizes solar energy and electric vehicles, and perhaps forgets other alternatives of low-carbon sources. Moreover, the

policy implementation differences and uncertainties in the estimated decrease of GHGs can also influence the validity of the outcomes. Although the research is valuable in terms of its contribution to knowledge on barriers to low-carbon tourism in Thailand (Pantaratorn et al., 2023) the findings also highlight the need to consider economic incentive structures and sustainable tourism investment mechanisms when promoting low-carbon practices. It is dominated by the supply-side views with no demand-side views like tourist views being included; hence, it may result in an unauthentic picture of the constraints. Furthermore, the results' applicability to the rest of the tourism sector is limited by the moderate sample size. Finally, bias in the responses could result from the use of self-reported data, which could influence how strong the conclusions are.

The research advances low-carbon tourism scholarship by examining longevity tourists, a sizeable but insufficiently studied tourism segment, and by utilizing a large multi-destination sample, thereby improving the robustness and generalizability of the results. In contrast to the previous research that focuses on the importance of measuring carbon footprint or the measurement of awareness, the research combines the economic, psychological, and attitudinal variables to elucidate actual low-carbon travel behaviour. Using strong statistical techniques, it addresses the weakness of descriptive designs and proves that perceived well-being and responsibility are drivers of sustainable decisions, and not the awareness of the same. From a development finance perspective, the findings suggest that financial incentives, green investment in tourism infrastructure, and supportive policy instruments are essential to align economic motivations with low-carbon travel behaviour among longevity tourists.

Conclusion

The research has examined the economic aspects of LCTB of longevity tourists in Thailand based on survey data of 345 respondents, which was analysed using CFA and path analysis through regression. The data reveal that the PC has a considerable negative effect on the LCTB (0.214) despite the high level of EA ($M = 4.15$) and pro-environmental attitudes ($M = 4.08$) among longevity tourists. Conversely, PEA ($\beta = 0.364, p = 0.001$) and PR ($\beta = 0.281, p = 0.001$) prove to be the most significant positive predictors of sustainable travel behaviour, and the EA has a smaller yet significant direct impact ($\beta = 0.126, p = 0.008$) and enhances the attitude and behaviour relationship (interaction $\beta = 0.176, p = 0.001$). By these findings, the longevity sustainability paradox is empirically valid, and thus awareness alone fails to bring about sustainable behaviour unless ethical commitment and PR go along with this consideration. Although there are constraints in the cross-sectional study design, self-reported information, and sample specific to Thailand, the research offers solid empirical ground on how to incorporate psychological and economic factors in the low-carbon longevity tourism policies. The findings therefore contribute to the understanding of how financial mechanisms and policy instruments can support the transition toward a low-carbon longevity tourism economy.

Author Contributions:

Conceptualization, W.M.; methodology, W.M.; software, W.M.; validation, W.M.; formal analysis, W.M.; investigation, W.M.; data curation, W.M.; writing—original draft preparation, W.M.; writing—review and editing, W.M.; visualization, W.M.; supervision, W.M.; project administration, W.M. The author has read and agreed to the published version of the manuscript.

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Ethical Considerations

The research described in this article was reviewed and approved by the University of Phayao Human Ethics Committee, Thailand. The approval reference number is HREC-HSS 2.2/175/68. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. Data were collected between June 2025 and December 2025 from undergraduate and postgraduate students using a structured questionnaire (20/06/25)-(25/12/25).

Informed Consent Statement:

Informed Written consent was obtained from all participants prior to data collection. Verbal informed consent was not required as the study involved minimal risk, collected no personally identifiable information, and used an anonymous, self-administered online questionnaire. The use of written consent was approved by the Institutional Ethics Committee to reduce participant burden and to ensure respondent anonymity, in accordance with institutional and ethical guidelines.

Data Availability Statement:

The data that support the findings of this study are available from the corresponding author, W.M, upon reasonable request.

Acknowledgments: Not Applicable

Conflicts of Interest: The authors declare no conflicts of interest.

Reference

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