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Evaluating Carbon Credit Offsets: Carbon Neutral Tourism for Passengers Traveling from Thailand to China

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Abstract: This study investigated sustainable tourism practices in the aviation sector by assessing how passenger awareness and carbon offset pricing could be integrated into travel behaviors. With the International Civil Aviation Organization (ICAO) Carbon Emissions Calculator, the analysis covered five Thai Airways routes from Thailand to Shanghai, Guangzhou, Beijing, Kunming, and Chengdu. The calculated offset costs per passenger ranged between 6.55 and 36.99 CNY, which were derived by applying a benchmark of 95 CNY/tCO_2e (≈ 445 THB) to per-passenger emissions. These proposed offset contributions were not obtained from evidence of direct survey on the offset cost per passenger. On the other hand, the benchmark selected was based on the estimate in the international literature, anticipated price trends, and the goal of encouraging broader participation. The findings prioritized the importance of consistent terminology, explicit standards, and collaborative policies between public and private stakeholders to strengthen travelers' engagement in carbon offset programs.

Keywords: Carbon credit offsets; Full-service airlines; Offset costs; Compensation; Per-passenger

1. Introduction

China has emerged as one of the top tourist spots (Lei et al., 2024) in the world as tourism has gained popularity. Ever since the visa-free policy for China has been in force from March 1, 2024, there has been a significant rise in the influx of tourists, especially to big cities such as Beijing, Shanghai, Nanjing, Guangzhou, Harbin, and Chengdu. The growth of eco-tourism in China, particularly in cities like Beijing and Shanghai, has stirred a great deal of interest among Thai travelers, thus emphasizing sustainable travel development and cross-cultural interaction (Yang & Bi, 2024). Observations of public space consumption in urban China, especially cities like Guangzhou and Nanjing, indicated that Thai visitors were inclined to visit open public space or places of cultural diversity (Ma et al., 2021). Culturally oriented sites like Shanghai and Chengdu have been specially designed for international tourists, including Thai tourists, by focusing on maintaining historical and cultural heritages (Kanekar, 2024). The cultural music, events, and festivals in Harbin and Xi'an continue to be fascinating attractions for Thai tourists seeking to immerse in deep cultural and heritage experiences (Homan et al., 2024), thus reflecting how cultural perceptions influence travel choices. As a large number of tourists opt for air transport, this in turn generates serious concerns about greenhouse gas emissions, which are a major cause of climate change. Extreme climate change would result in natural disasters in most countries and societies (Liao et al., 2022). Consisting mainly of CO_2, aviation emissions account for approximately 2% of global greenhouse gas emissions, a substantial and increasing share that underscores the urgency of climate mitigation (Laphet & Tandamrong, 2025; Kapoor, 2020). Recognizing this, the International Civil Aviation Organization (ICAO), a United Nations specialized agency, launched the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) in January 2021. The program mandates that airlines operating internationally report CO_2 emissions every year and offset the surplus, with a long-term goal of achieving net-zero emissions (Ebissa et al., 2023). While the CORSIA emphasizes the requirement for offsetting, it does not reduce the burden on the aviation industry to reduce emissions through technology. The mitigating strategies, which include considering Sustainable Aviation Fuel (SAF), enhancing fuel efficiency, and developing innovative technologies, echo the environmental sustainability commitment and social responsibility of airlines (International Air Transport Association, 2023).

With the growing importance of sustainable tourism, this research aimed to evaluate passengers' attitudes toward carbon credit offsetting by tourists traveling from Thailand to China. The views of full-service airlines will be vital for understanding how awareness and willingness to invest in carbon credits could be effectively integrated into travel habits, thus contributing to a more sustainable aviation industry (Al-Abdulqader et al., 2025). The study also emphasized the need for effective communication to enrich passengers' knowledge of the impact of aviation on health, lifestyle, and the environment. Airlines typically provide such information to strengthen passengers' understanding of the importance of carbon credits. Existing literature suggested that environmental awareness significantly influenced passengers' offset cost per passenger for carbon offsets (Park et al., 2024). Active participation of passengers could be encouraged by arousing their awareness of the values of carbon offset programs, supporting reforestation or establishing renewable energy. Promoting eco-friendly initiatives is a question of presenting quality information and targeted marketing; training airline staff in environmental communication can prove particularly effective. Simple and accessible information on the advantages and proper use of carbon credits will enable travelers to make knowledgeable decisions.

To recapitulate, environmental awareness among passengers is crucial as it directly affects their offset cost per passenger for carbon credits. Publicity and educational campaigns advocating for environmentally conscious travel behavior will heighten their awareness of the environmental impact of aviation. This will complement the overall shift to curb pollution and greenhouse gases in the aviation sector to a great extent. Developing policies and programmers that prioritize environmental education, open communication, and culturally sensitive messaging will be key to improving the uptake of carbon credit schemes among tourists, especially in multicultural and international itineraries like Thailand-China toward global, culturally inclusive, and carbon-neutral tourism.

2. Background of Research

The Methodology section should be written concisely, yet provide enough details to allow others to replicate and build on published results. The well-established methods can be introduced briefly with proper citations. Do not describe these published methods in details. In contrast, detailed descriptions are required for new methods. If multiple methods are adopted in the work, this section may be divided into several subsections, each providing details on a specific method. Note that the publication of your manuscript means all materials, data, codes, and protocols associated with the publication must be made available to readers. Remember to disclose restrictions on the availability of materials or information at the submission stage. If your manuscript uses large datasets deposited in an opensource database, please specify where the data have been deposited. If your study requires ethical approval, do not forget to list the authority and code of the ethical approval.

2.1 Carbon Offsets and Market Mechanisms

Carbon offsets represent the amount of greenhouse gases reduced or sequestered through mitigation projects relative to a business-as-usual (BAU) scenario. Measured in tonnes of carbon dioxide equivalent (tCO_2e), carbon offsets must be certified under recognized standards before being traded between entities seeking to offset emissions and those that have achieved reductions. Projects generating carbon offsets typically fall into two categories: (1) emission reduction or avoidance, such as renewable energy, energy efficiency, and waste management; and (2) greenhouse gas removal or nature-based sequestration, including carbon capture and storage technologies and reforestation initiatives.

In Thailand, the Greenhouse Gas Management Organization (TGO, 2025) facilitates a carbon credit market that allows offsets to be traded, and provides a mechanism for accounting and pricing the social costs of emissions (Rosales et al., 2021). Full-service airlines, such as Thai Airways, are key participants in this market. By integrating carbon offsets into ticket pricing or offering them as optional add-ons, airlines could address rising consumer demand for environmentally responsible travel. Evidence from survey indicates that carbon offset compensation extends across multiple sectors, including agriculture, forestry, energy, transport, tourism, banking, finance, aviation, and Meetings, Incentives, Conferences, and Exhibitions (MICE) (Figure 1). Airlines often utilize carbon offset tools, such as the ICAO Carbon Emissions Calculator, to efficiently estimate passenger emissions and determine appropriate offset contributions.

2.2 Carbon Neutral Tourism

Tourism significantly contributes to greenhouse gas emissions, both directly through transportation and indirectly via related activities. With increasing passenger travel, longer journeys, and escalating energy consumption, the transport sector accounts for a growing share of tourism-related emissions (Wang et al., 2023).

Carbon Neutral Tourism refers to practices designed to balance emitted CO_2 with equivalent offsets, in order to achieve a net-zero carbon footprint (Ranasinghe et al., 2021). This approach combines strategies to reduce emissions from tourism operations with measures to compensate for residual emissions. For example, the United Nations World Tourism Organization (UNWTO) emphasized the importance of accelerating climate action in tourism to enhance sector resilience and mitigate its contribution to global warming (UNWTO, 2025).

In Thailand, the Tourism Authority of Thailand (TAT) has adopted the principle to "adjust, reduce, and compensate" for guiding tourism businesses toward carbon-neutral operations. Under this framework, conventional tourism activities are redesigned to minimize carbon intensity, whereas carbon offsets are adopted to neutralize unavoidable emissions. These initiatives, supporting the sustainability and accountability of the national tourism sector, align with the Bio-Circular-Green (BCG) Economy Model in Thailand (NSTDA, 2025; TAT, 2022).

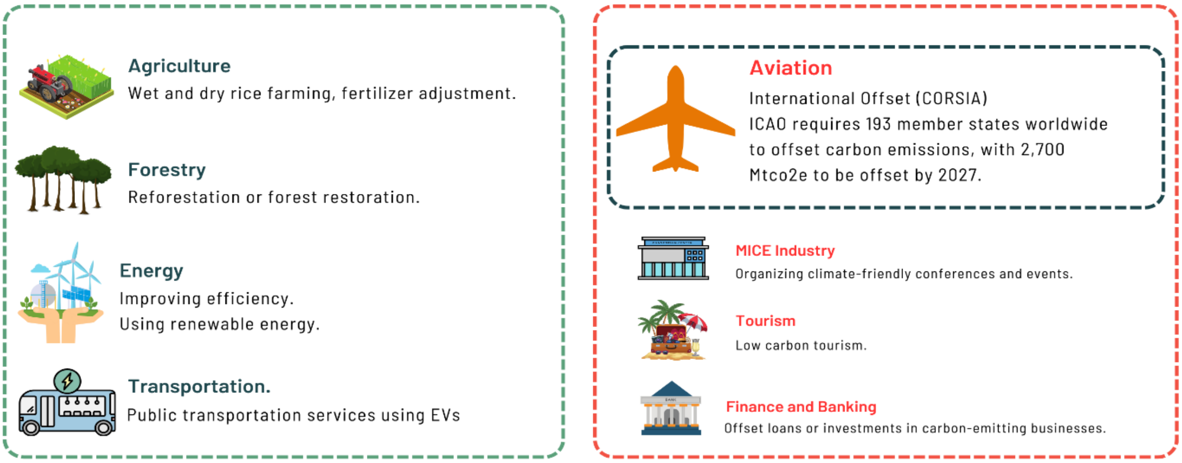

Figure 1. Carbon credit compensation

3. Methodology

The Scopus database was searched, in January 2025, using combinations of the following search terms: "carbon" AND "offset" AND "aviation". A total of 120 articles were identified through the screening process; among them, 30 articles were specifically related to carbon credit offsets for airline passengers. It was discovered from further classification that 16 articles were related to the monetary amounts of carbon credit offsets, 3 articles studied the percentage of carbon credit offsets, and 11 articles examined carbon credit offsets without directly surveying passengers, as presented in Figure 2. The number of papers included aligns with the criteria established by Pickering & Byrne (2014), which stipulates a range of 15 to 300 papers for a systematic review.

As illustrated in Figure 2, eleven articles (Bazrbachi et al., 2017; Dray et al., 2022; Guix et al., 2022; Le, 2024; Lee & Koo, 2020; Liao et al., 2022; Liu et al., 2021; Pimiä et al., 2024; Wendt et al., 2024; Yirgu & Kim, 2023; Zheng et al., 2019.) have examined airline carbon offsets, but none include passenger surveys regarding the amount contributed to carbon credits to offset their purchases. The relevant section of the research is presented in Table 1. The study on carbon credit compensation across various industries revealed that Thailand lacked a comprehensive carbon credit compensation scheme currently, particularly within the aviation sector. The researcher evaluated the carbon dioxide emissions released into the atmosphere by commercial aircraft operating at their maximum capacity for each model commonly in use today, with a particular study on popular routes frequently traveled by tourists to China. The study focused on aircraft such as Airbus A320 and A350, as well as Boeing B737 and B777, among others. The popular routes analyzed involve Bangkok (BKK) to Shanghai (PVG), Bangkok (BKK) to Guangzhou (CAN), Bangkok (BKK) to Beijing (PEK), Bangkok (BKK) to Kunming (KMG), and Bangkok (BKK) to Chengdu (TFU), considering seats for both Business and Economy Classes. Moreover, the study aimed to determine an appropriate amount of carbon offsets that airlines could adopt as a policy and potentially enhance as an additional charge for Thai passengers in the future.

3.1 Data Acquisition

The average Thai voluntary carbon credit price was 305 THB/tCO_2e in year 2024. However, this study adopted a higher benchmark of 445 THB/tCO_2e (≈ 95 CNY). The benchmark was selected based on three reasons: (i) it aligns with international willingness to pay (WTP) as summarized in Table 1, which typically reports higher benchmarks than the Thai domestic average; (ii) it anticipates upward trends in global carbon credit prices; and

(iii) it provides a normative basis for encouraging stronger participation in voluntary offsetting schemes. To test the robustness, a sensitivity analysis was recommended using both the Thai market average of 305 THB and the benchmark of 445 THB. This would enhance methodological transparency and ensure practical feasibility, given the purchasing power of Thai travelers.

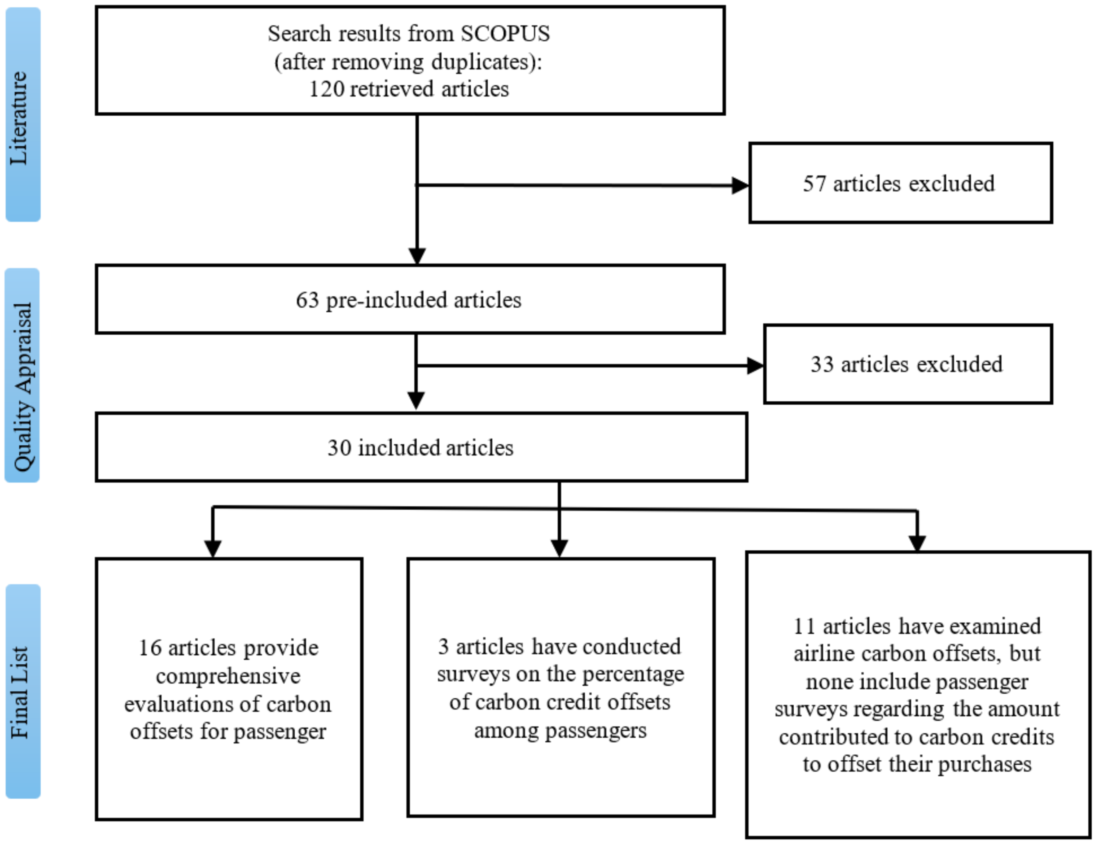

Figure 2. Results of selecting unrelated research

An average benchmark price of 95 CNY/tCO_2e was used to calculate the proposed per-passenger carbon offset contributions for Thai travelers. The emissions factor applied is 0.3284 $kgCO_2e$ per kg of fuel, based on the Thai National Life Cycle Inventory (LCI) Database, TIIS-MTEC-NSTDA. To estimate per-passenger contributions, the study analyzed five popular routes from Bangkok to China: Shanghai (PVG), Guangzhou (CAN), Beijing (PEK), Kunming (KMG), and Chengdu (TFU). Aircraft models commonly used on these routes, including Airbus A320 and A350, as well as Boeing B737 and B777 series were considered. Seats for both Economy and Business Classes were included in the calculations.

The per-passenger carbon offset (Cos) was calculated as follows:

$$\text{Cos} = \frac{\text{Rfb} \times 0.3284}{\text{N}} \times \text{PVOs} \tag{1}$$

where,

Cos = (Rfb × 0.3284)/N×PVOs

Cos = Carbon offset (tCO_2e)

Rfb = Aircraft Fuel Burnt by ICAO Carbon Emissions Calculator (ICEC) according to the desired route (one-way or round-trip) ($kgCO_2e$)

0.3284 $kgCO_2e$ = Emissions Factor Comparison (1 kg of fuel equals to 0.3284 $kgCO_2e$)

PVOs = the amount of money that passengers voluntarily offset (95 CNY)

N = Number of seats on the aircraft

This approach allows estimation of a standardized per-passenger contribution that airlines could implement as a voluntary carbon offset policy. It is essential to note that these contributions are calculated estimates rather than empirically measured offset cost per passenger by passengers.

Table 1. Research conducted in relation to carbon offsets and passenger credits over the past 10 years

Author	Sample	Route	Average WTP Original	Average WTP THB
Hui et al. (2024)	Passenger	Long-haul route	86%	N/A
Tang et al. (2024)	Passenger	International route	311.04 CNY	1,500
Schleich & Alsheimer (2024)	Passenger	Domestic route	0 EUR	0
Geng et al. (2023)	General Public	Domestic route International route	86 CNY	405
Berger et al. (2022)	Passenger	Domestic route International route	1 EUR	35.64
Kuo (2022)	Passenger	International route	194 NTD	201.58
Ma et al. (2021)	Passenger	International route	58.53 CNY	282.28
Tao et al. (2021)	Passenger	International route	419 CNY	2,020.62
Shaari et al. (2022)	Passenger	Domestic route International route	86 MYR	661.24
Zhang et al. (2021)	Passenger	Domestic route International route	10%	N/A
Rotaris et al. (2020)	Passenger	Short-haul route Medium-haul route Long-haul route	30 EUR	230.67
Sonnenschein & Smedby (2019)	Passenger	Short-haul route Medium-haul route Long-haul route	29 EUR	1,033.5
Shrivastava et al. (2019)	Passenger	International route	121 INR	83.19
Zhao & Yu (2018)	General Public	Domestic route	10%	N/A
Seetaram et al. (2018)	Passenger	Short-haul route Long-haul route	30 EUR	1,069.14
Choi et al. (2018)	Passenger	Short-haul route Long-haul route	12.27 AU	263.03
Fatihah & Rahim (2017)	Passenger	Domestic route International route	6.1 RM	46.9
Araghi et al. (2016)	Passenger	Short-haul route	18 EUR	641.48
Jou & Chen (2015)	Passenger	Domestic route	20 TWD	21
Average WTP			95 CNY	445 THB

Note: Currency (10 January 2025) by SCB Thailand (2025).

1. Bangkok (BKK) to Shanghai (PVG) route covers a round-trip distance of 5,822 km and utilizes the Airbus A350-900 operated by Thai Airways. This analysis employed the ICEC software to evaluate the carbon emissions associated with various aircraft models servicing the route. The aircraft models considered include Airbus A320, A321, A32A, A32N, A32Q, A332, A333, A359, Boeing B73E, B73L, and B73M, as outlined in Table 2.

Table 2 illustrates the amount of carbon credit compensation that passengers are willing to pay for the Bangkok (BKK) to Shanghai (PVG) route, which covers a round-trip distance of 5,822 km. The researcher highlighted the travel patterns of passengers using Thai Airways, specifically aboard the Airbus A350-900 aircraft. The suggested compensation amounts were divided into two service classes: Economy Class passengers were expected to contribute 13.28 CNY, whereas Business Class passengers should compensate with 28.49 CNY.

Table 2. BKK-PVG/round-trip based on the ICEC

Class	No. of Seats	Aircraft Fuel Burnt	Carbon Offsets
Economy Class	289	123,097 kg	13.28 CNY
Business Class	32	29,223 kg	28.49 CNY

2. Bangkok (BKK) to Guangzhou (CAN) route covers a round-trip distance of 3,430 km and utilizes the Boeing B787-900 operated by Thai Airways. The calculations were based on the formula indicating that 1 kg of aircraft fuel burnt is equivalent to 0.3284 kg of CO_2e. This analysis employed the ICEC software to evaluate the carbon emissions associated with various aircraft models servicing the route. The aircraft models considered include Airbus A320, A32Q, A359, Boeing B738, B73E, B772, B788, and B7M8, as outlined in Table 3.

Table 3 sets out the amounts of carbon credit compensation that passengers are willing to pay for the Bangkok (BKK) to Guangzhou (CAN) route, which covers a round-trip distance of 5,822 km. The researcher highlighted the travel patterns of passengers using Thai Airways, specifically aboard the Boeing B787-900 aircraft. The proposed compensation amounts were divided into two service classes: Economy Class passengers were expected to contribute 7.63 CNY, while Business Class passengers should compensate with 18.16 CNY.

Table 3. BKK-CAN/round-trip based on the ICEC

Class	No. of Seats	Aircraft Fuel Burnt	Carbon Offsets
Economy Class	268	65,578 KG	7.63 CNY
Business Class	30	17,472 KG	18.16 CNY

3. Bangkok (BKK) to Beijing (PEK) route covers a round-trip distance of 5,822 km and utilizes the Airbus A350-900 operated by Thai Airways. The calculations were based on the formula indicating that 1 kg of aircraft fuel burnt is equivalent to 0.3284 kg of CO_2e. This analysis employed the ICEC software to evaluate the carbon emissions associated with various aircraft models servicing the route. The aircraft models considered include Airbus A320, A32Q, A359, Boeing B738, B73E, B772, B788, and B7M8, as outlined in Table 4.

Table 4 illustrates the amounts of carbon credit compensation that passengers are willing to pay for the Bangkok (BKK) to Beijing (PEK) route, which covers a round-trip distance of 5,822 km. The researcher highlighted the travel patterns of passengers using Thai Airways, specifically aboard the Airbus A350-900 aircraft. The proposed compensation amounts were divided into two service classes: Economy Class passengers were expected to contribute 13.66 CNY, while Business Class passengers were required to compensate with 36.99 CNY.

Table 4. BKK-PEK/round-trip based on the ICEC

Class	No. of Seats	Aircraft Fuel Burnt	Carbon Offsets
Economy Class	289	127,948 KG	13.66 CNY
Business Class	32	37,946 KG	36.99 CNY

4. Bangkok (BKK) to Kunming (KMG) route covers a round-trip distance of 2,594 km and utilizes the Airbus A330-300 operated by Thai Airways. The calculations were based on the formula indicating that 1 kg of aircraft fuel burnt is equivalent to 0.3284 kg of CO_2e. This analysis utilized the ICEC software to evaluate the carbon emissions associated with the aircraft servicing this route. The aircraft models considered for this route include Airbus A330, A359, Boeing B737, B738, and B73E, as outlined in Table 5.

Table 5 presents the amounts of carbon credit compensation that passengers are willing to pay for the Bangkok (BKK) to Kunming (KMG) route, which covers a round-trip distance of 2,594 km. The researcher emphasized the travel preferences of passengers utilizing Thai Airways, specifically on the Airbus A350-900 aircraft. The recommended compensation amounts were categorized into two service classes: Economy Class passengers were expected to contribute 6.55 CNY, while those traveling in Business Class should compensate with 14.44 CNY.

Table 5. BKK-KMG/round-trip based on the ICEC

Class	No. of Seats	Aircraft Fuel Burnt	Carbon Offsets
Economy Class	263	55,268 KG	6.55 CNY
Business Class	31	14,354 KG	14.44 CNY

5. Bangkok (BKK) to Chengdu (TFU) route, which encompasses a round-trip distance of 3,832 km and utilizes the Boeing B787-800 operated by Thai Airways. The calculations were based on the formula indicating that 1 kg of aircraft fuel burnt is equivalent to 0.3284 kg of CO_2e. This assessment employed the ICEC software to analyze the carbon emissions associated with various aircraft models servicing the route. The aircraft models considered include Airbus A320, A321, A32B, A333, A359, Boeing B736, B737, B788, and B789, as outlined in Table 6.

Table 6 illustrates the amounts of carbon credit compensation that passengers are willing to pay for the Bangkok (BKK) to Chengdu (TFU) route, which covers a round-trip distance of 3,832 km. The researcher focused on the travel patterns of passengers utilizing Thai Airways, specifically aboard the Boeing B787-800 aircraft. The financial compensation amounts were delineated for two service classes: Economy Class passengers were expected to contribute 9.84 CNY, while those traveling in Business Class should compensate with 20.1 CNY.

Table 6. BKK-TFU/round-trip based on the ICEC

Class	No. of Seats	Aircraft Fuel Burnt	Carbon Offsets
Economy Class	234	73,822 KG	9.84 CNY
Business Class	22	14,178 KG	20.1 CNY

4. Results and Discussion

The carbon offset calculations provide estimated offset costs per passenger, as derived from the ICEC and benchmarked at 95 CNY/tCO_2e (≈ 445 THB). The analysis involved five popular Thai airways routes commuting from Bangkok (BKK) to Shanghai (PVG), Guangzhou (CAN), Beijing (PEK), Kunming (KMG), and Chengdu (TFU) in China, with results differentiated by Economy and Business Class seating. For example, the Bangkok–Shanghai route (5,822 km, Airbus A350-900) yielded offset costs of 13.28 CNY for Economy Class and 28.49 CNY for Business Class, while the Bangkok–Beijing route showed higher costs of 13.66 CNY and 36.99 CNY for Economy and Business Classes, respectively. Shorter routes, such as Bangkok–Kunming (2,594 km), resulted in lower contributions of 6.55 CNY (Economy) and 14.44 CNY (Business). A complete summary demonstrating how offset costs vary by distance and aircraft type is provided in Table 7. These values do not reflect direct evidence from passenger survey regarding willingness to pay but rather represent proposed offset contributions, consistent with benchmarks reported in international studies.

Table 7. Evaluating Carbon Offsets for Passengers Traveling from Thailand to China

Class	Route	Carbon Offsets/CNY	Carbon Offsets/THB
Economy Class	PVG	13.28 CNY	64.04 THB
Business Class	PVG	28.49 CNY	137.39 THB
Economy Class	CAN	7.63 CNY	36.79 THB
Business Class	CAN	18.16 CNY	87.57 THB
Economy Class	PEK	13.66 CNY	65.87 THB
Business Class	PEK	**36.99 CNY**	**178.38 THB**
Economy Class	KMG	6.55 CNY	31.58 THB
Business Class	KMG	14.44 CNY	69.63 THB
Economy Class	TFU	9.84 CNY	47.45 THB
Business Class	TFU	20.10 CNY	96.93 THB

Note: CNY = 4.8225 (as at 10 January 2025) by Siam Commercial Bank in Thailand.

The objective of this study is to synthesize evidence regarding carbon credit offsetting among tourists flying between Thailand and China, with a particular focus on the role of full-service airlines. The operating aircraft involved in the current calculation were Airbus A330-300, Airbus A350-900, and Boeing B787-900 across five major routes: Bangkok–Shanghai, Guangzhou, Beijing, Kunming, and Chengdu. Existing studies offered robust benchmarks; for instance, Hui et al. (2024) found that 86% of long-haul passengers in Hong Kong were willing to purchase carbon offsets. Schleich & Alsheimer (2024) in Germany examined domestic routes, while Geng et al. (2023) identified an average WTP of 86 CNY among Chinese passengers across domestic and international routes. Furthermore, broader European surveys confirmed consistent passenger support for offsetting (Abdeta et al., 2023; Araghi et al., 2016; Berger et al., 2022; Choi et al., 2018; Rotaris et al., 2020; Seetaram et al., 2018; Sonnenschein & Smedby, 2019). Although there is currently no definitive evidence for Thai passengers, related studies in Asia, particularly Malaysia, Taiwan, and China, highlighted passengers' willingness to contribute for offsetting programs on both short-haul and long-haul flights (Danish et al., 2018). Building on the literature, the present study proposed a benchmark price of approximately 25 EUR/tCO_2eq, with the intention of channeling funds to the offsets in the forestry sector.

Instead of providing descriptive accounts of tourist destinations, this analysis underscored two insightful comments. First, demand for Chinese tourism is anticipated to remain strong in 2024 and beyond, hence reinforcing the importance of embedding offset schemes into high-traffic routes (Huang, 2024; Xue & Bai, 2023; Zhao & Yuan, 2023; Zhao & Sun, 2024). Second, international policy frameworks such as the CORSIA progressively incorporate the impacts of climate change into the establishment of aviation regulations, further strengthening standardized offset pricing and its associated mechanisms (Prussi et al., 2021).

5. Policy Recommendations for Both the Public and Private Sectors

To effectively reduce greenhouse gas emissions from air travel, clear carbon offset standards should be established to ensure transparency and effectiveness in compensating for emissions from commercial flights (Gupta, 2024). The government should play a crucial role in supporting local carbon credit projects by investing in initiatives such as reforestation, land rehabilitation, and renewable energy development. These projects not only help generate carbon credits but also create economic opportunities for local communities while mitigating environmental impacts (Cordes, 2020). In addition, tourism authorities should take an active role in designing carbon offset programs for tourists, such as integrating carbon credit purchases into flight tickets or offering incentives for travelers who voluntarily participate in offset programs (de Mello, 2024).

Raising public awareness and public engagement are indispensable to achieving the success of carbon offsetting, a critical step in promoting sustainable travel. Governments and organizations should educate the public by conducting campaigns via various media platforms to emphasize the environmental impacts of air travel and the advantages of offsetting emissions (Fabiana Peixoto de & Rosario, 2024). Furthermore, investing in research and development of novel technologies such as energy-efficient aircraft and alternative fuels would contribute to long-term emission reductions in the aviation sector. Lastly, fostering collaboration among the government, private sector, and local communities could be conducive to the successful implementation of carbon offset projects, leading to both environmental and economic benefits for society (Heitmann, 2023).

6. Conclusions

This paper conducted a study on the carbon credit offsetting for air travel between Thailand and China. The significant contributions and findings can be summarized into three main areas. First, it delivers empirical evidence by quantifying offset costs per passenger across five major routes from Bangkok to Shanghai, Guangzhou, Beijing, Kunming, and Chengdu using the ICEC. These quantitative findings established benchmark values to guide the design of offset program in the absence of Thai-specific willingness to pay surveys.

Second, it demonstrates the methodological value of integrating the ICAO-based emission calculations with evidence garnered from the international research. This approach guaranteed that the recommended benchmark price of approximately 95 CNY/tCO_2e (≈ 445 THB) was both theoretically informed and practically relevant, while acknowledging that it exceeded the current average of 305 THB/tCO_2e in Thai market.

Third, it highlights policy relevance for airlines and government stakeholders with the following recommendations: (i) establishing transparent offset pricing; (ii) integrating offset purchases into airline ticketing systems; and (iii) supporting domestic carbon credit projects in line with the CORSIA and Bio-Circular-Green (BCG) Economy Model in Thailand. By sharpening the conclusion around these three contributions, the study avoided redundancy and communicated its significance more effectively to an international readership.

Author Contributions

Design research, D.T., J.L., and T.G.; methodology, D.T., J.L., and T.G.; software, J.L.; validation, D.T. and J.L.; formal analysis, D.T. and J.L.; investigation, D.T.; data curation, J.L.; writing - original draft preparation, D.T. and J.L.; writing - review and editing, D.T. and T.G.; Project administration, D.T. and T.G.; Summarize results, J.L. and T.G.; Provide recommendations, J.L. and T.G. All authors have read and agreed to the published version of the manuscript. All authors have approved the final manuscript.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Acknowledgments

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Conflicts of Interest

The authors declare no conflict of interest.

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