Impact of Attitude, Subjective Norm and Perceived Behavioral Control on Carbon Offset Purchasing Intention: A Case Study of Thai Passengers

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Abstract

Regarding greenhouse gas (GHG) mitigation, the aviation industry sector should plan a response to CO_2 emission and promote a carbon neutral scheme. This research aims to investigate the extent how purchasing intention of airlines' carbon offsetting program among Thai passengers is affected by using the theory of planned behavior. The study investigates the relationship between attitude, subjective norm, and perceived behavioral control in relation to purchasing intention. The moderating roles of gender, age, and education are examined. Data was collected from 447 participants via an online questionnaire. The Partial Least Square Structural Equation Modeling (PLS-SEM) was used to test hypotheses. The result reveals that subjective norm shows the strongest effect on the relationship followed by perceived behavioral control and attitude. Age moderates the relationship between perceived behavioral control and purchasing intention while the other moderators do not. This result indicates that airlines in Thailand should align their green strategies with consumer behavior.

Keywords: attitude, subjective norm, perceived behavioral control, purchasing intention, carbon offset program, CORSIA

Introduction

A major cause of climate change is human activities. Several studies reveal that climate change produces higher temperatures, increases in precipitation patterns, rising sea levels, weather-related natural disasters, increased drought, and decreased food security (e.g., Ali et al, 2017; Trenberth, 2018). Additionally, it has been found that increasing amounts of carbon dioxide (CO2) causes the greenhouse effect which produces higher global temperature. Freedman and Mooney found that CO_2 increased continually from May 2019 to May 2020 (from 415 ppm. to 417 ppm). Morales (2020) found that in the

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Arctic, temperatures are rising at 0.6 degrees Celsius per decade, twice as much as the average global increase in temperature. This rise in temperature is causing glaciers to melt which in turn is causing a rise in global sea level. Furthermore, climate change makes heatwaves more intense and more frequent. Climate change is an inter-generation problem so people need to be aware of the dangers and health risks that come with it (Sorqvist & Langeborg, 2019; Trenberth, 2018; Yeung, 2020).

Climate change is also gaining attention in the field of organizational management (Daddi et al, 2018). Currently, the aviation industry promotes carbon offsetting programs to encourage their customers to buy carbon credit to compensate for the carbon emission during their flight (IATA, n.d.). "Carbon offsetting programs" refers to programs that allow individuals or organizations to "neutralize" their proportion of an aircraft's carbon emissions on a particular journey by investing in carbon reduction projects (IATA, n.d.). The program allows airlines to set their own policies by investing the money obtained in forestry projects which have been set up for the purpose of generating carbon credits or may even join a clean development mechanism project which encourages the use of alternative energy sources such as a rural electrification project using solar panels or other renewable energy sources. The success of the program depends on the level of participation from stakeholders. For example, the Thai Airways Sustainable Development Report, 2018 states that the company emitted 141,871.31 carbon tons of Green House Gas (GHG) while passengers' voluntary carbon offsetting was 803 carbon tons which are only 0.57% of total co2 emission. This shows that only a few passengers participated in the carbon offsetting program.

This current study is based on the Theory of Planned Behavior (Ajzen, 1991) and the Social Exchange Theory (SET) (Blau, 1964). The research model indicates that individual behavioral intention determines one's behavior. This means that in relation to carbon offsetting, airlines should investigate how to drive the passengers' intention to contribute to the available programs. The behavioral intention or the purchasing intention of an individual to perform or not to perform a particular behavior is influenced by three constructs including: 1) attitude towards the product 2) subjective norm, and 3) perceived behavioral control. Additionally, individual behavioral intention is according to the reciprocity process which is embedded in the subjective norm construct.

Background of the Study

The carbon offsetting and reduction scheme for international aviation (CORSIA) was set as a standard and recommended practice in 2018 by International Civil Aviation Organization (ICAO) (ICAO, n.d.). ICAO launched its pilot phase of carbon offsetting and reduction scheme for international aviation (CORSIA) in 2021 and aims for all international flights to be subject to offset in 2027. In Thailand, the Civil Aviation Authority of Thailand (CAAT) is responsible for implementing CORSIA. CAAT voluntarily

agreed to participate in the CORSIA pilot phase in 2021. For the pilot phase to succeed, more information is needed from stakeholders, e.g., employees and passengers.

Objectives/Research Questions

This research aims to investigate the influence of attitude, subjective norm, and perceived behavioral control on purchasing intention of Thai passengers among airlines with carbon offsetting programs. Additionally, the moderating effects of gender, age, and education on the relationship between attitude, subjective norm, and perceived behavioral control on purchasing intention will be investigated. Therefore, two research questions were set as (1) What is the relationship between attitude, subjective norm, and perceived behavioral control and purchasing intention in Thai passengers in regard to an airlines' carbon offsetting program? and (2) What are the moderating roles of gender, age, and education in the relationships?

Literature Review

Attitude

Attitude refers to the degree of favorable or unfavorable feeling of an individual when evaluating particular objects or even behavior. It is involved with judging the possible consequences of actions that lead to different decisions (Hua & Wang, 2019). A person's positive attitude towards any behavior creates the intention to perform that specific behavior (Ajzen, 1991). Several studies show that attitude has a positive association with purchasing intention of environmental products (e.g., Yadav & Pathak, 2017; Zhang et al, 2018; Hua & Wang, 2019). The existing literature shows that a positive attitude towards pro-environmental behavior has the highest direct influence on consumers' green purchasing intention (Botetzagias et al; Paul et al., 2015; 2015; Maichum et al., 2016; Sreen et al., 2017). Based on the above, a hypothesis is formulated.

H (1): Attitude towards carbon offset has a positive impact on carbon offset purchasing intention.

Subjective Norm

Subjective Norm refers to the perception of an individual that most people in a society approve or disapprove of a specific behavior. Hua and Wang (2019) state that people will get information and values from neighbors, relatives, and other prestigious people. When they express views or choose any actions, they encounter judgment from the surroundings, especially, those who are important to them. Thus, behavioral intention occurs when individuals perceive that those important persons expect them to behave in a particular way (Ajzen, 1991). Furthermore, people usually pay back to the society they live in on the basis of giving and taking (Blau, 1964). He explains that social exchange is a kind of social norm of reciprocity in which the giver needs something in return. Studies show that when a person does not want to feel guilty about lack of concern for the environment (Eco-guilt), they can assuage that guilt by using or purchasing green

products (Weber & Stern, 2011; Fredericks, 2014; Sorqvist & Langeborg, 2019). Passengers admit that they pay for the carbon offsetting program because they do not want to feel guilty about not helping (Mair, 2016). Therefore, passengers who pay for carbon offset are not necessarily concerned or have a positive attitude towards the environment but purchase carbon offset to avoid feeling guilty. Therefore, the following hypothesis is formulated:

H (2): Subjective Norm has a positive impact on carbon offset purchasing intention.

Perceived Behavioral Control

Ajzen (1991) describes perceived behavioral control as "perceived ease or difficulty of performing a behavior". The more people perceive that a behavior is easy to perform, the more people have the intention to perform that behavior. However, Hua and Wang (2019) comment that the intensity of the intention depends on the availability of resources and time. Meinhold and Markus (2005) and Hsu et al. (2017) find that perceived behavioral control has a significant impact on purchasing intention of green products. They state that the country of origin of consumers may enhance such relationships. Consumers purchase green products because they expect a healthier life (Banerjee & Ho, 2018). Additionally, perceived behavioral control has a noteworthy impact on adolescent future pro-environmental behavior intention (Astrid et al., 2015). Therefore, the following hypothesis is formulated:

H (3): Perceived Behavioral Control has a positive impact on carbon offset purchasing intention.

The Moderating Effect of Gender, Age, and Education

Gender. Not only the biological difference makes males and females different but also the way they are brought up differently in the socialization process. The pro-environmental study shows that women are more concerned about environmental issues than men and have a more positive attitude towards green products than men (Lee, 2009). Yarnell et al. (2018) explain that self-compassion makes males and females different since females have less self-compassion than men. To support that notion, the study of Zelezny et al. (2000) reveals that among women in 14 countries women have a stronger pro-environment attitude than men. The existing research supports that women's purchasing behavior is usually persuaded and influenced by social interaction (e.g., Noble et al., 2006; Lee, 2009). This study is questioning whether gender has any influence on the relationship between attitude, subjective norm, perceived behavioral control, and purchasing intention. Therefore, the following hypotheses are formulated:

H (4a): Gender moderates the relationship between attitude and carbon offset purchasing intention.

H (4b): Gender moderates the relationship between subjective norm and carbon offset purchasing intention.

H (4c): Gender moderates the relationship between perceived behavioral control and carbon offset purchasing intention.

Age. A previous study revealed that it is difficult for children and adolescents to understand and analyze sufficiently to make purchasing decisions concerning green or pro-environmental products (Chan, 2001). Aminrad et al. (2013) indicate older people have a stronger pro-environmental attitude than younger people. A study of the relationship between age and environmental awareness among people in 28 countries in the EU shows that middle-aged people had the strongest pro-environmental awareness (Morrison & Beer, 2017). It may be concluded that an age difference may have an influence on the relationship between attitude, subjective norm, perceived behavioral control, and purchasing intention. Therefore, the following hypotheses are formulated:

H (5a): Age moderates the relationship between attitude and carbon offset purchasing intention.

H (5b): Age moderates the relationship between subjective norm and carbon offset purchasing intention.

H (5c): Age moderates the relationship between perceived behavioral control and carbon offset purchasing intention.

Education. Previous studies which classify education into bachelor's degree, master's degree, or doctoral degree; reveal that those with higher education have more awareness of environmental issues and a more positive attitude towards environmentally-friendly initiatives than do those with lower education level (Aminrad et al., 2013). Findings in a study by Arnocky and Stroink (2011) support the claim that education affects environmental concern. Several studies indicate that people with high education levels can analyze, understand, and make decisions on environmental concerns better than those who have a lower level of education (e.g., Han et al.,2010; Han & Kim, 2010; Hedlund, 2011; Paul et al.,2015). It is interesting to note that education may affect the relationship between attitude, subjective norm, perceived behavioral control, and purchasing intention. Therefore, the following hypotheses are formulated:

H (6a): Education moderates the relationship between attitude and carbon offset purchasing intention.

H (6b): Education moderates the relationship between subjective norm and carbon offset purchasing intention.

H (6c): Education moderates the relationship between perceived behavioral control and carbon offset purchasing intention.
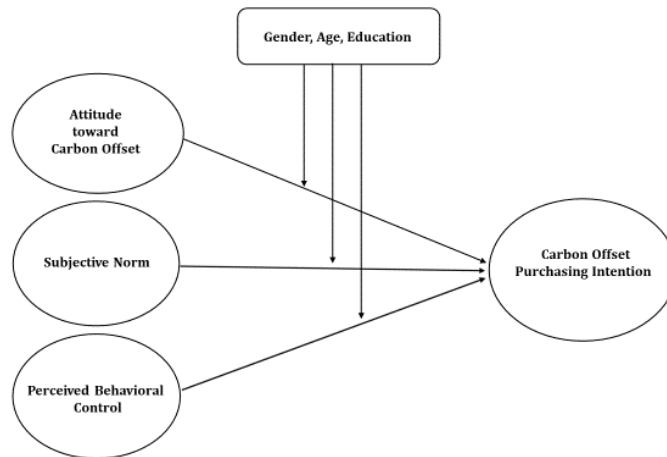
Figure 1 *Research Framework*

Research Methodology

Participants and procedure

The target population for this study is Thai airline passengers. All respondents are over 20 years of age as it is difficult for children and adolescents to understand the purpose of pro-environmental products and make relevant purchasing decisions (Chan, 2001). Following the recommendation of Henseler et al. (2016), data was collected from 484 online respondents using simple random technique from 15th January to 15th February 2021. After data screening, 447 completed sets were used for data analysis. Demographics of the participants are as follows: 298 female (66.7%) and 149 male (33.3%); in terms of age, 106 respondents (13.8%) are between 21-30 years old, 64 respondents (14.3%) are between 31-40 years old, 122 respondents (27.3%) are between 41-50 years old and 166 respondents (37.1%) are aged 51 years or older; in terms of educational level, 309 respondents (69.2%) have a bachelor's degree, 119 respondents (26.6%) have a master's degree, and 17 respondents (3.8%) have a doctoral degree.

The questionnaire was developed based on a review of the literature. It was validated using Index of Item – Objective Congruence (IOC) technique by three professors in the field before being trialed with 45 samples. The Cronbach's Alpha Coefficient obtained from the data for this set of questionnaires is 0.862.

All items were measured using a 6-point rating scale ranging from "1 - strongly disagree" to "6 - strongly agree".

Measurement

Attitude was measured by 3 items developed by Casalo et al. (2010). Sample items are: "I believe that to participate in carbon offset program is good for me", and "I have a positive opinion about joining the airlines' carbon offset program."

Subjective norm was measured by 4 items developed by Chen & Peng (2012), Dean et al. (2012), and Arvola et al. (2008). Sample items are: "Most people who are important to me think that I should buy carbon offset program when traveling by air.", and "Friends' positive opinions have influenced me to buy carbon offset program when traveling by air."

Perceived behavioral control was measured by 4 items developed by Armitage and Conner (1999). Sample items are" "It is entirely my decision to buy carbon offset program", and "I am confident about the credibility of carbon offset program."

Carbon offsetting purchasing intention was measured by 3 items developed by Armitage and Conner (1999). Sample items are" "I intend to buy airlines' carbon offset program", and "I will purchase an airlines' carbon offset program on my next flight."

Measurement Reliability and Validity

In the PLS approach, there is an outer model evaluation for measurement reliability and an inner model evaluation for measurement validity. Table 1 shows the outer loading values which must be higher than 0.7. The composite reliability (CR) of each construct in the measurement is accepted as good for confirmatory purposes at a value higher than 0.8 (Piriyakul, 2019). All indicators represent a specific construct (AVE > 0.5) (Hari et al (2013).

Table 1

Outer model evaluation

Latent Variable	Indicator Variable	Outer Loading	Composite Reliability	AVE
at	at 1	0.867	0.911	0.774
	at 2	0.874		
	at 1	0.897		
sn	sn 1	0.896	0.934	0.781
	sn 2	0.924		
	sn 3	0.932		
	sn 4	0.771		
bc	bc 1*	0.365	1.000	1.000
	bc 2*	-0.386		
	bc 3*	-0.254		
	bc 4	0.820		
in	in 1	0.933	0.953	0.872
	in 2	0.943		
	in 3	0.925		

Note: *deleted items (outer model < 0.7); at = attitude; sn = subjective norm; bc = perceived behavioral control

The $\sqrt{AVE}$ values represent the discriminant validity (Fornell-Larcker, 1981). Table 2 shows that each latent variable does not interrelate since the value of each construct is higher than the others.

Table 2

Discriminant Validity through the Square Root of AVE

Variable	at	sn	bc	in
at	0.880			
sn	0.358	0.883		
bc	0.410	0.541	1.000	
in	0.438	0.516	0.498	0.934

Note: at = attitude; sn = subjective norm; bc = perceived behavioral control;
in = purchasing intention

The inner model evaluation is the testing of multicollinearity (VIF), coefficient determinant (R^2), cross-validated Redundancy (Q^2), effect size (f^2), path coefficient, t-statistics and significance level respectively. According to Hair et al. (2011), independent variables in the model are not correlated with one another showing no multicollinearity (VIF < 5.00). The effect size (f^2) of each independent variable upon purchasing intention is acceptable (> 0.020) (Hair et al., 2014). Attitude, subjective norm and perceived behavioral control can predict the impact on carbon offset purchasing intention (0.300, 0.118 and 0.114 respectively - Table 3).

Table 3

VIF testing result

Independent Variable	VIF	Independent variable on dependent variable	f^2
at	1.578	at on in	0.300
sn	1.443	sn on in	0.118
bc	1.494	bc on in	0.114

Note: at = attitude; sn = subjective norm; bc = perceived behavioral control; in = purchasing intention

Hair et al. (2014) indicate that the cutoff value of coefficient determinant (R^2) should not be less than 0.250 to be able to explain the variance of the dependent variable. Table 4 shows that R^2 value of 0.463, which means that the attitude, subjective norm and perceived behavioral control can predict the carbon offset purchasing intention for 46.30%. The cross validated redundancy (Q^2) has a value of 0.377 indicating that the independent variables can successfully predict purchasing intention (Hair et al., 2014; Piriyakul, 2019).

Table 4

coefficient determinant (R^2) and cross validated redundancy (Q^2)

Dependent Variable	R^2	R^2 Adjusted	Q^2	Fit index Level
in	0.463	0.445	0.377	High

Note: in = purchasing intention

Hypothesis Testing

With PLS-SEM approach, the bootstrapping process calculates standard errors, constructs confidence intervals, and performs hypothesis testing. The value of the path coefficient must be higher than 0.10 with a significant level less than 0.05 and t- statistics higher than the critical value at 1.960 (Figure 2). All of the mentioned values are shown in Table 6 and Table 7. The hypotheses testing results show that attitude, subjective norm and perceived behavioral control significantly impact carbon offset purchasing intention. Hence, this research accepts H1, H2 and H3. On the other hand, the moderation effect of gender, age and education which were tested using multi-group analysis show unacceptable path coefficients, t-statistics and significant level except for Age x Perceived Behavioral Control (as shown in Table 7). Therefore, hypothesis H4(a), H4(b), H4(c), H(5a), H5(b), H6(a), H6(b) and H6(C) are rejected whereas H5(c) is accepted.
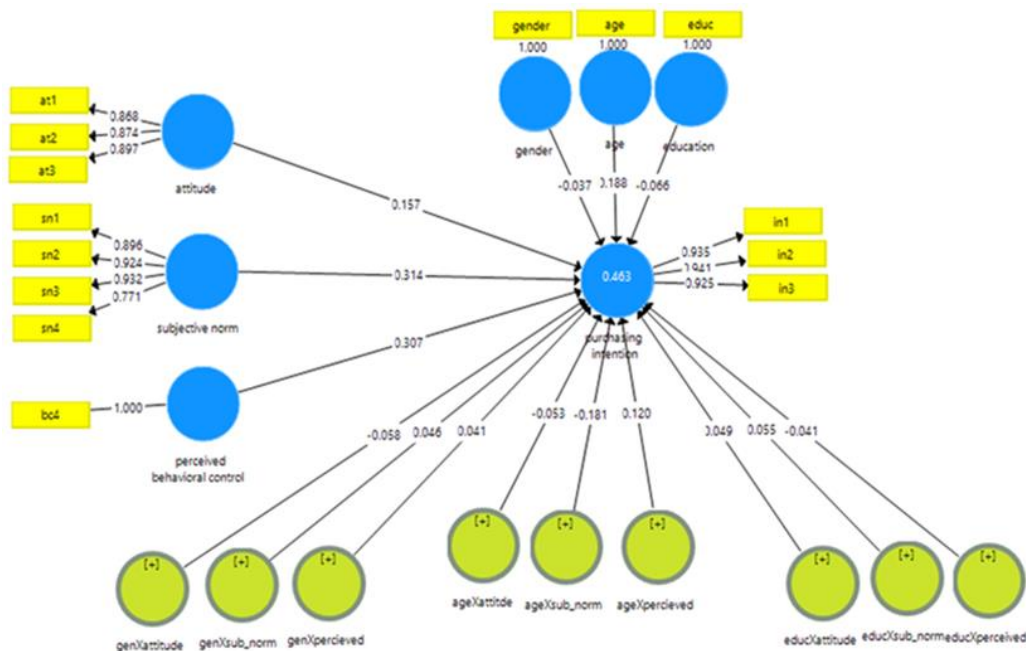

Figure 2 *Structural Model*

Table 6

Path coefficient, t-statistics, and P-value

Impact of Independent variable upon dependent variable	Path Coefficient	t-Statistics	P-Value
Impact of at on in	0.157	3.230	0.001
Impact of sn on in	0.314	6.186	0.000
Impact of bc on in	0.307	5.867	0.000

Note: at = attitude; sn = subjective norm; bc = perceived behavioral control; in = purchasing intention

Table 7

Moderating Variables	Path Coefficient	t-Statistics	P-Values
gender x at	-0.058	1.324	0.000
gender x sn	0.046	0.833	0.405
gender x bc	0.041	0.760	0.448
age x at	-0.053	1.200	0.231
age x sn	-0.181	3.401	0.113
age x bc	0.120	2.557	0.011
education x at	0.049	0.836	0.404
education x sn	0.055	0.860	0.390
education x bc	-0.041	0.709	0.478

Note: at = attitude; sn = subjective norm; bc = perceived behavioral control; in = purchasing intention

Discussion

The current study examines the impact of attitude, subjective norm, and perceived behavioral control on carbon offset purchasing intention of Thai passengers. The moderating effects of gender, age, and education were highlighted to test the perceptual differences regarding carbon offset purchasing intention. The results showed there was a significant relationship among the three constructs of attitude, subjective norm, and perceived behavioral control with carbon offset purchasing intention. Subjective norm showed the strongest impact (β= 0.314) on carbon offset purchasing intention which is in line with previous studies (Mancha & Yoda ,2015; Barber et al., 2014). Perceived behavioral control influences carbon offset purchasing intention (β= 0.307) which confirmed the results of a previous study by Tarkiainen and Sundqvist (2005) on the prediction of organic food purchasing intention. Attitude towards carbon offset showed the smallest impact on carbon offset purchasing intention (β = 0.157) which is in line with previous studies on the influence of pro-environmental attitude on green purchasing intention (Thogersen & Zhou, 2012; Chen et al., 2014).

On the other hand, this study did not find that gender and education influenced the relationship between purchasing intention and attitude, subjective norm, or perceived behavioral control. This result is contrary to the results of previous studies in Egypt (Mostafa, 2007) and Hong Kong (Lee, 2009) but is in line with the results of a study in Malaysia (Hassana & Ismailb, 2011) which showed no difference between men and women regarding concern for the environment. Also, a more recent study supports the hypothesis that education has no influence on the relationship between attitude, subjective norm and perceived behavioral control and purchasing intention (Despotovic et al., 2019). Age moderates the relationship between perceived behavioral control and carbon offset purchasing intention but does not moderate the relationship between attitude and subjective norm on the same intention. Therefore, it could be inferred that as Thai passengers get older, they have more confidence in joining the carbon offset program. This claim is supported by the study of Cheng et al. (2006) which determines a strong relationship between confidence and intention to perform or not perform any particular action.

Conclusion

This study investigates the relationship between attitude, subjective norm and perceived behavioral control, and carbon offset purchasing intention of Thai passengers. Also, the moderating influence of gender, age and education on the mentioned variables is examined. The findings from this research will be of benefit to airlines when developing their environmental strategy in the future.

Practical implications

Subjective norm: The finding that subjective norm has the strongest impact on purchasing intention indicates that Thai passengers are influenced by social norms and by the behavior of people who are important to them. Mcleod (2018) indicated from Solomon Asch's subjective norm experiment that people need to be accepted by the society they live in, hence they will follow and perform the behavior the societies or society members expect them to. Airlines' marketers should create advertisements showing how great it would be if people pay back to the environment as a form of social exchange. Presenters in these advertisements should be people who are respected and liked by most members of the society to influence them to join the carbon offsetting program.

Perceived behavioral control: Perceived behavioral control impacts the carbon offset purchasing intention of Thai passengers, especially when moderated by age. This would indicate that airlines should target older passengers more than the younger passengers when creating advertisements.

Attitude: Attitude towards carbon offset has the least positive impact on carbon offset purchasing intention when compared to the subjective norm and perceived behavioral control. Possibly, just having a positive attitude towards environmental protection cannot ensure passengers will join the program if they do not also have trust in the airlines' carbon offsetting process. Airline policymakers should be knowledgeable about the program and how it benefits the environment. Furthermore, airlines should be transparent in their reports to the public on how the funds obtained from the carbon offset program are used.

Theoretical implication

The theories of planned behavior and social exchange along with gender, age and education as moderators can explain the carbon offset purchasing intention for 46.30% of the participants in this study. Therefore, other variables need to be investigated to explain the remaining 53.7%. This study can be used as a framework for those who are interested in extending the research using other theories, models, or variables.

Research Limitation

There are some limitations to this study. Firstly, the simple random sampling technique via online questionnaire using Google may limit the respondents to just those using social media. Secondly, online data collection is a one-way communication approach so respondents cannot request more details. Lastly, the study used only a close-ended questionnaire so it cannot garner in-depth details from passengers.

Future Research

Possibilities for future research can be classified under the following 4 topics: 1) Researchers can use both quantitative and qualitative approaches to collect data and conduct in-depth interviews. 2) More variables can be added to the study such as environmental awareness, knowledge of global warming, carbon credits and knowledge on how airlines offset carbon. 3) Research can include a cross-cultural dimension or can compare people in two or more countries. Results gained from comparing across cultures can help policymakers or marketers choose different approaches in different countries in order to more effectively achieve their goals. 4) A longitudinal study could compare purchasing intention during the covid-19 pandemic and after the pandemic is finished in order to check and update consumer behavior.

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