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The anchoring effect of aviation green tax for sustainable tourism, based on the nudge theory

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ABSTRACT

Anchors functions as a reference point for human behavior to adjust the boundaries of a plausible range of values for a question, assuming that a given anchor is greater than the boundary value for a range of plausible answers. This study tests the anchoring effect on travelers who may need to pay aviation green tax. The analyses results reveal that the anchor had a significant effect on approximately 65% of the total of 333 participants (excluding those who entered the same amount before and after ($N=216$)). This study contributes to the literature on sustainable tourism by investing the factors that induce voluntary change in consumer behavior. The practical implications are to improve transparency and to minimize tax resistance by positively influencing converting travelers' perceptions of aviation green taxes. Further, in countries where aviation green tax is not introduced, these results could serve as a guide to encourage travelers' voluntary participation to pay aviation green taxes. As such, tourists' voluntary participation will contribute to sustainable tourism in the long-term.

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Nudge theory; anchoring effect; aviation green tax; pro-environmental identity

Introduction

According to the distribution of emissions by the tourism industry as reported in 2008 by the World Tourism Organization (UNWTO), air transport is expected to increase to 53% by 2035. The tourism industry is increasingly and excessively dependent on air transport (Gössling et al., 2007). In Europe, 11% of traveler movements were by air, but air travel occupied 46% of traveler transport-related emission (UNWTO, 2008). Especially, international aviation significantly exacerbates climate change through fossil fuel consumption and greenhouse gas emissions (Becken, 2007). The aviation industry currently accounts for 2% of all artificial CO₂ emissions. If nothing changes, this ratio is expected to increase to 22% by 2050 (CNN, Dec. 17, 2019). Previous studies reported that about 17% of global tourism by air transport accounts for approximately 40% (CO₂ only) to 75% (maximum estimate) of radiative forcing, including the non-CO₂ impact on climate change (Nawijn & Peeters, 2010; Sausen et al., 2005). The aviation industry comprises the largest share (40%) of total CO₂ emissions, followed by car transport (32%) (Scott et al., 2010). The aviation industry's significant impact on climate change is causing increasing concern on environment sustainability. Its exacerbation of global warming, measured by radiative forcing, is much greater due to the effects of non-carbon emissions and cruise altitudes (Lee et al., 2009; Scott et al., 2010).

As a significant part of the modern transportation systems, airlines have a great impact on the development of modern society (Li et al., 2016). In recent years, in concern of the CO₂ emissions by airplanes, Swedish environmental activist Greta Thunberg initiated the environmental movement called “flight shame” (flygskam in Swedish); the movement has spread to Europe (*Business Insider*, Aug. 24, 2019). To counter climate change problems caused by tourism, European countries have introduced aviation green taxes (McKercher et al., 2010).

Environmental tax reform (ETR), also known as ecological tax reform, environmental fiscal reform, green tax reform, green tax shifting, or green tax swap (Bosquet, 2000; European Commission, 1997b; Goulder, 1995; Hamond et al., 1997; OECD, 1997; von Weizsacker & Jesinghaus, 1992), is a significant development in the fields of environmental policy and public fiscal reform (Bosquet, 2000). The target of green tax is to raise awareness on environmental policy as well as achieve public fiscal reform.

Many tourism companies have also introduced carbon-offset programs. For example, the United Airlines introduced its Eco-Skies® CarbonChoice carbon offset sponsorship program that calculates each traveler’s carbon footprint and invests in projects that go beyond offset to reduce carbon and return it to its destination (United, Carbon Choice carbon offset program; UNWTO, 2017). Moreover, European countries such as France and the Netherlands are imposing environmental aviation tax on passengers using aircrafts. Furthermore, the KLM Royal Dutch Airlines launched a sustainability campaign in 2019 called “Fly Responsibly.” The campaign encourages travelers to pack lighter to diminish weight carried by aircrafts so that they burn less fuel, and it offers passengers an easy way to pay offsets for CO₂ emissions generated by their travels (*The Washington Post*, Jul. 9, 2019).

The mandatory aviation green tax limits consumers’ freedom of choice and is criticized not only by tourists traveling to or from Europe but also by the International Air Transport Association (IATA). The IATA points out the negative aspects of implementing aviation green taxes, such as passenger travel costs, airline revenues, and government revenues (Lange et al., 2018). This study attempts to analyze the anchoring effect of existing aviation tax to travelers’ willingness to pay aviation tax, based on nudge theory. As an aspect of anchoring, labeling aims to contribute to voluntary environmental protection behaviors by raising environmental awareness of consumers.

The objective of this study is to discuss the legitimacy of imposing aviation green taxes on passengers in countries that recognize the importance of the environment and climate change. In addition, it examines the anchoring effect of the nudge theory that affects the decisions of consumers who are voluntarily willing to pay environmental tax.

Theoretical background and hypotheses

The nudge theory and the anchoring effect

Human behavior is complicated. In the book *Nudge*, “nudge” is defined as “any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any option or significantly changing their economic incentives” (Thaler & Sunstein, 2009: 7). People often behave in ways that can be predicted by economic theories (Kosters & Van der Heijden, 2015; Thaler & Sunstein, 2009). Thus, “nudge” deviates behavior from those projected by standard economic forecasts (Hansen & Jespersen, 2013). Thaler and Sunstein insist that nudges imply only minimal costs; therefore, they are not troublesome to libertarians (Hausman & Welch, 2010).

Currently, influential behavioral scientists including Daniel Kahneman (2011), Roberto Cialdini (2009), and Dan Ariely (2008) have proven that people behave in ways with the knowledge that it may not benefit their own interests (bounded will power), or they do so, because they deem benevolent behavior to be more fair than selfish behavior (bounded self-interest) (Kosters & Van der Heijden, 2015). To describe the anchoring effect, Tversky and Kahneman (1974) proposed a

mechanism by which anchors act as a starting point for adjustment (Strack & Mussweiler, 1997; Tversky & Kahneman, 1974). Strack and Mussweiler (1997) argued that “Anchor values serve as the reference point for people to adjust the boundary of the range of plausible values for the question, presuming that the given anchor is more extreme than the boundary value for the range of plausible answers.”

According to *Nudge*, the anchoring effect involves an anchor serving as a nudge, adjustments in the way one thinks is appropriate, and the numbers one knows. Bias occurs, because anchoring is typically insufficient. Anchors affect how people think about their lives. For example, a college student was asked two questions: (a) “How happy are you?” and (b) “How often do you date?” When asked in the order of a then b, the relationship between the two questions was very weak. However, when the order of the questions was switched (first b then a), the correlation increased by .62. The students referred to dating heuristics (how happy they are) in their answers (Thaler & Sunstein, 2009; Strack et al., 1988).

In his book *Predictably Irrational*, Dan Ariely (2008) provides an “arbitrary coherence” of examples of the impact of anchors on purchasing decisions. Arbitrary coherence means that if the price is set as “arbitrary,” it not only ends up being low at the time when it is settled but also later on. A total of 55 students from the MIT Sloan School of Business were asked to write down the last two digits of their social security number and bid on items including wine. Analysis results revealed that the last two digits of one’s social security number served as an anchor (Ariely, 2008).

Lange et al. (2018) explored a new paradigm measurement tool under controlled laboratory conditions to determine whether people actually practice pro-environmental behavior tasks (PEBTs). The PEBT paradigm is the theoretical basis for the prediction of pro-environmental behavior, and each variable that constitutes the PEBTs significantly influences the other variables (Lange et al., 2018). The anchoring effect and the effect of choice architecture on consumer choice can be explained using the tip culture of the United States. Most restaurants in the United States provide tip choices (15%, 18%, or 20%) on receipts, which act as an anchor for customer choice. Furthermore, Nelson et al. (2019) studied the donation activity of tourists who have been asked to donate to coastal conservation to solve land and maritime problems. Their analysis results show that the majority of tourists do not think the island will be environmentally sustainable under the practices of the current management and that they have the willingness to pay (WTP) an eco-fee to fund conservation efforts on the island (Nelson et al., 2019).

Aviation green tax

Environmental taxes are an important tool for governments to adjust the relative prices of goods and services (OECD, 2017). While airport expansions may be justified by the need to support economic prosperity, the transport sector, including aviation, must also cover the incurred environmental costs (Eddington, 2006). The imposition of aviation green taxes affects a broad section of the economy including passengers, governments/revenue authorities, the broader tourism sector, and airlines. Emissions due to growth in the aviation industry will increase the proportion of carbon budgets that it accounts for Anderson et al. (2007) and Ryley et al. (2010). For this reason, governments should encourage the development and use of sustainable aviation fuels, new technologies to decrease aviation industry’s carbon emissions and imposing inefficient aviation green taxes.

The “price” elasticity of demand is generally high in air travel (i.e., sensitive to price changes). Thus, levying additional forms of taxes on air travel prices will have a negative impact on the overall demand in air travel (IATA, 2018). From an academic point of view, a complication in the designing of aviation green tax is that there is little research about passenger’s willingness to pay (WTP) for mandatory taxes (Sonnenschein & Smedby, 2019). Also, customers generally do

not trust that the government will spend the revenue generated from environmental taxes on environmental action. A survey that asked consumers, “Do you trust governments to spend money from environment taxes specifically on environmental protection programs?” demonstrated that consumers were uniformly skeptical in many key European Union markets (*Travel Weekly*, Jun. 20, 2019).

Government interventions to reduce CO₂ emissions caused by air transport, through measures such as tax or emissions trading schemes with strict global or sectoral limits that affect air travel costs, can limit tourists in choosing travel destinations (Nawijn & Peeters, 2010). Therefore, limiting air travel will certainly reduce the emission of greenhouse gases; however, it will also affect some of the 17% of all holiday travel by air transport, as there might not be a reasonable alternative transportation mechanism to travel to some destinations (Nawijn & Peeters, 2010). These tax aversion studies have been carried out only in the United States, and the results could be smaller in Northern Europe where taxes are less stigmatized (Hardisty et al., 2019).

Sonnenschein and Smedby (2019) studied the valuation of WTP for mitigating air travel emissions to increase its policy relevance for a mandatory aviation green tax.

Measurement factor: the anchoring effect of aviation green tax

One of the variables that affect environmental behavior is pro-environmental self-identity (PESI). Pro-environmental behavior emphasizes the diverse factors that affect environmental behavior (Whitmarsh & O'Neill, 2010), and self-identity is differentiating oneself from others or social groups in terms of one's beliefs, values, and behaviors (Christensen, Rothberger, Wood, & Matz, 2004; Whitmarsh & O'Neill, 2010). Self-identity is an important predictor of behavior related to pro-environmental actions (Fekadu & Kraft, 2001; Sparks et al., 1995; Sparks & Shepherd, 1992; Terry et al., 1999). Self-identity has a significant influence on the predictor of behavior as well as TPB variables (action, subjective norm and perceived behavioral control) related to eco-friendly behavior (Fekadu & Kraft, 2001; Sparks et al., 1995; Sparks & Shepherd, 1992; Terry et al., 1999; Whitmarsh & O'Neill, 2010). The TPB model has proven strong predictive power for many pro-environmental behaviors (Carfora et al., 2017; Gatersleben, Murtagh, & Abrahamse, 2014; Sparks, Hinds, Curnock, & Pavey, 2014; Whitmarsh & O'Neill, 2010). Therefore, based on these previous studies, PESI determined that it is closely related to TPB variables (GPV, ACC and CCRP) and proposed hypotheses H1, H2 and H3.

The second variable affecting environmental behavior is green perceived value (GPV). Wu et al. (2018) examined the green switching intentions of airline customers by studying the relationship among experiential quality dimensions, GPV, green experiential satisfaction, and green corporate image and reputation regarding green experiential loyalty. Their findings show that GPV is the most significant prerequisite for a green experience, followed by enjoyment quality, green corporate reputation, and physical environmental quality. Green corporate image and interaction quality were found to be the least important (Wu et al., 2018).

The third variable is action for climate change (ACC). Self-identity seeks to establish consistency between actions and attitudes (Christensen, Rothberger, Wood, & Matz, 2004), inducing specific intentions (Carfora et al., 2017). Becken (2004) studied how tourism experts and tourists perceive climate change and carbon offsetting schemes. Respondents were asked if they would be willing to participate in tree-planting to reduce greenhouse gas emissions and whether they considered “climate change to be an issue for tourism.” Only the segment of green tourists responded that they think that tourism has a significant effect on climate change and that planting a tree has a positive effect on the environment (Becken, 2004). Ward et al. (2011) study revealed that customers were more willing to pay for an ENERGY STAR certified refrigerator than others. Further, the survey highlighted that participants' perceived need for action for climate change and the environment were motivated by their concern for the environment.

The fourth variable is climate change risk perception (CCRP) introduced by van der Linden (2015) who examined four factors related to CCRP (socio-demographic, socio-cultural, cognitive, and experiential). According to the author, societal and personal risk were highly related to each other in converting public risk perceptions into personal risk perception (Xie et al., 2019). Environmental risk perception demonstrated individuals' perception of the influence of human behavior on the environment and nature surrounding themselves (Han & Hyun, 2017; Kollmuss & Agyeman, 2002). Environmental perception is often used interchangeably with the term adverse outcome of valued objects (Han, 2015; Han & Hyun, 2017). Han and Hyun (2017) found that one's cognitive level of environmental perception derives his/her expected feeling of guilt, which is a key aspect of negative anticipated affect.

The fifth variable is attitude toward green policy (AGP). According to the TPB, the predictor of behavior is person's intention to involve in the behavior; This intention is determined by perceived behavioral control, subjective norms, and attitudes toward perceived behavior (Ajzen, 1991; Han, 2015; Han et al., 2010). Attitude is a person's overall evaluation of participating in concrete behavior (Ajzen, 1991).

Chen and Peng (2012) found that visitors with sufficient environmental knowledge about green hotel products, build intention to visit if they are convinced that they are physically capable and if they have positive attitude toward green hotel stay (Han, 2015). Also, Ru et al. (2019) studied attitudes toward fine particulate matter (PM 2.5) reduction behavior based on young people's negative and positive evaluations of PM 2.5 and found that personal moral norms and behavioral control significantly affect PM 2.5 reduction intentions (Ru et al., 2019).

The sixth and last variable is willingness to pay (WTP). An environmental behavior intention refers to the likelihood that a customer revisits and pays for an environmental product and service (González-Rodríguez et al., 2020). In this context, WTP a price is related to the amount of money a customer would be willing to pay for a product or service's perceived value of environmental benefit (Han et al., 2009; Lee et al., 2010; González-Rodríguez et al., 2020). The anchoring affects consumers' willingness to accept and pay. The results of the study suggested that circumstantial differences between selling and buying decisions affect systematic differences to anchoring effects, the impact of anchoring on judgments of WTA and WTP are essentially the same (Simonson & Drolet, 2004). Environmental concern has been demonstrated to be positively related to respondents' actual WTP for a product with positive environmental externalities (Krarup & Russell, 2005; Ward et al., 2011). Also, Olya et al. (2019) studied tourists' willingness to purchase climate insurance and loyalty based on an expectation-disconfirmation model. As a result, climate insurance in the tourism industry plays key role as a practical implication for addressing uncertain spatial and temporal climatic conditions.

Moderating effects of materialism and hedonism

Human value and lifestyles relate concretely to freedom, equality, altruism, security and hedonism (Arlt et al., 2011). Schwartz (1992) suggested personal values were determined using the simple version of the Schwarz Value Survey (SVS). He identified that the 10 motivationally distinct 'universal' values of power, hedonism, achievement, stimulation, universalism, self-direction, benevolence, tradition, security and conformity can be divided into the two dimensions of openness to change versus conservation and self-enhancement and self-transcendence versus to investigate into public skepticism about uncertain climate change (Poortinga et al., 2011; Schwartz, 1992).

People have a range of disparate conflicting values such as materialism and personal ambition, those who identify with self-enhancement value. The core self-transcendence and self-enhancement are significant role in personal value research regarding public engagement with climate change (Corner et al., 2014).

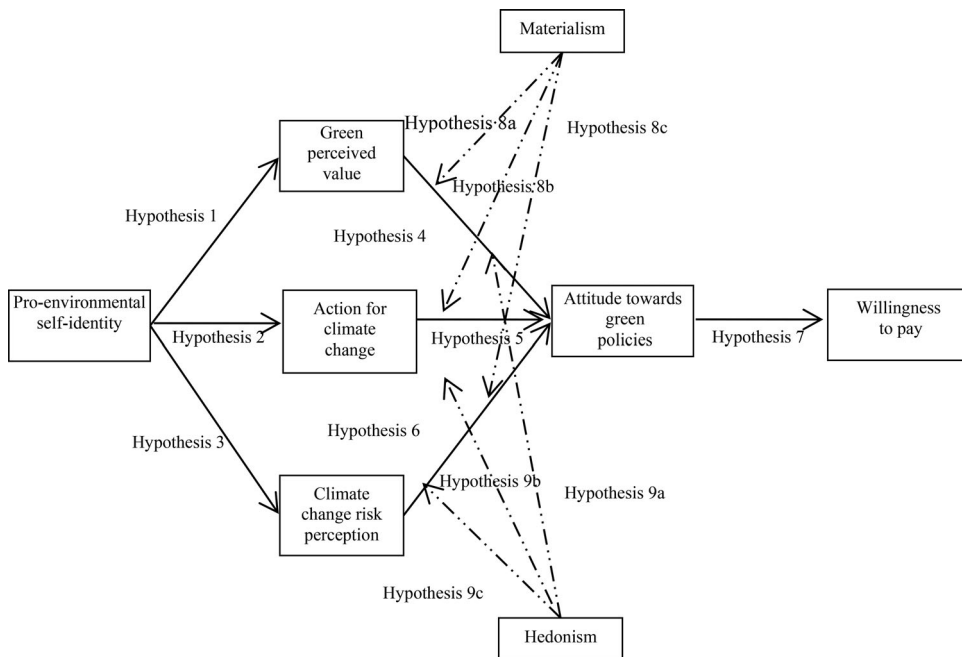


Figure 1. Research model. Note: Two identical models (models for high and low materialism and hedonism groups) are proposed.

Our study adapted the six items from the materialism scale devised by Richins and Dawson (1992) as moderating effects. Materialism has been identified as the significance individuals place on property as a personal value (Felix & Almaguer, 2019; Richins & Dawson, 1992). Further, Richins (1994) defined the relationship between individual values and material possessions, concluding that individuals find various meanings in their possessions regarding their personal values. Materialism has been characterized as a value that guides conduct in a variety of consumption contexts (Richins & Dawson, 1992). Felix and Almaguer (2019) found that the happiness side of materialism is positively related to purchase intentions for pro-environmental products. Banerjee and McKeage (1994) found a negative correlation between environmentalism and materialism, the relationship of two constructs were as opposite indication of personal orientation toward consumption.

Our study also adapted the five items of hedonism from Bozkurt et al. (2008) study as moderating effects. Hedonism is an individual's tendency to pursue psychological benefits such as emotional happiness as well as intangible, experiential, and multi-sensory benefits (Ahtola, 1985; Holbrook & Hirschman, 1982; Hyun & Kang, 2014). Hedonists seek fun and immediate pleasure (Holbrook & Hirschman, 1982; Hyun & Kang, 2014), and they have strong behavior intentions compared to that of non-hedonists when obtaining pleasure from consumption (Hyun & Kang, 2014). Based on the literature review, this study proposes a conceptual model (Figure 1).

H1: PESI has a positive impact on GPV.

H2: PESI has a positive impact on ACC.

H3: PESI has a positive impact on CCRP.

H4: GPV has a positive impact on attitude toward green policies (AGP).

H6: CCRP has a positive impact on AGP.

H7: AGP has a positive impact on WTP.

H8a: Materialism has a moderating effect on the relationship between GPV and AGP.

H8b: Materialism has a moderating effect on the relationship between ACC and AGP.

H8c: Materialism has a moderating effect on the relationship between CCRP and AGP.

H9a: Hedonism has a moderating effect on the relationship between GPV and AGP.

H9b: Hedonism has a moderating effect on the relationship between ACC and AGP.

H9c: Hedonism has a moderating effect on the relationship between CCRP and AGP.

Methodology

Measurement instruments

This research aims to study the environmental issues associated with aviation, and attitudes toward existing aviation taxes and use of additional revenue from aviation taxes, based on the research methods of Bloor (2001). The questionnaire applied in our research gathered demographic characteristics of participants comprising personal information, age, gender, and income, as well as information on participants' environmental awareness, attitudes, and willingness to pay aviation green taxes. The comprised six theoretical variables in the proposed conceptual model: PESI (Whitmarsh & O'Neill, 2010), GPV (Wu et al., 2018), ACC (Becken, 2004), CCRP (van der Linden, 2015; Xie et al., 2019), AGP (Ru et al., 2019), and WTP as endogenous variable (Han et al., 2009; González-Rodríguez et al., 2020; Lee et al., 2010). Moderating variables were measured using two items, hedonism (Arlt et al., 2011; Corner et al., 2014; Poortinga et al., 2011; Schwartz, 1992) and materialism (Banerjee & McKeage, 1994; Felix & Almaguer, 2019; Richins, 1994; Richins & Dawson, 1992).

We used a total of 20 measurement items based on previous research. The questionnaire items were based on a five-point Likert scale ranging from "Not at all" (1) to "Very much" (5).

Furthermore, we used the software programs, SPSS 23 and AMOS 24, to analyze the collected sample data. First, we conducted a confirmatory factor analysis (CFA) to estimate a measurement model. Second, we used structural equation modeling (SEM) and a modeling comparison to evaluate the hypothesized and proposed model relationships among the constructs. This two-step process and the moderating impact for test metric invariance were based on the suggestions by Anderson and Gerbing (1988).

To investigate the anchoring effect, we asked 333 respondents about their willingness to pay aviation green taxes: "How much would you pay if you had to pay an aviation environmental tax when using an aircraft?" The base amount for aviation green tax was presented as about €25 (approximately \$28), based on Sweden and Germany's (destination of less than 6,000 km) aviation tax. This study assumes that travelers with high PESI (Whitmarsh & O'Neill, 2010) would be willing to pay green tax and that pro-environmental identity has a significant impact on environmental protection behavior intentions. It can also be assumed that the higher the pro-environmental identity, the more environmentally friendly behavior intentions and attitudes travelers will have.

Data collection and sample characteristics

This study examines travelers' perceptions and behavioral intentions regarding sustainable tourism and the environment, through questions relating to pro-environmental identity. Travelers

Table 1. Correlation, AVE, composite reliability, and mean, SD.

Demographic profiles of participants		Frequency (N = 333)	Percent (%)
Gender	Male	165	49.5
	Female	168	50.5
Marital status	Single	120	36.0
	Married	213	64.0
Age	20-30	65	19.5
	30-40	64	19.2
	30-50	68	20.4
	50-60	68	20.4
	60 years and older	68	20.4
	High school degree	51	15.3
Education level	College degree	35	10.5
	Bachelor's degree	192	57.7
	Graduate degree or above	55	16.5
Monthly income	Under \$2,000	18	5.4
	Under \$2,000 ~ over \$3,000	62	18.6
	Under \$3,000 ~ over \$4,000	56	16.8
	Under \$4,000 ~ over \$5,000	55	16.5
	Over \$5,000	143	42.6
Total		333	100

were asked to respond to two questionnaires, one with a brief description that functions as a label (anchoring effect) of environmental protectionism and one without it. We conducted a comparison analysis of two groups of travelers to find out how labeling affects their willingness to pay aviation green taxes as well as their behavioral intentions of environmental protection. Using a combination of qualitative and quantitative research methods, the study aims to analyze travelers' intent to act as influenced by the anchoring effect of the nudge theory.

To collect the data, we used the survey system of an online research firm in South Korea. The online marketing research firm sent the questionnaire invitation via e-mail to travelers who were randomly selected from the firm's database. This study was conducted by distributing online surveys to 400 potential participants including those who had traveled within the past year from February 7, 2020 to March 27, 2020. As a result, 333 (83.25%) valid questionnaires were analyzed excluding sixty-seven (16.75) unreliable responses.

Results

Demographic profiles

We evaluated the respondents' characteristics and information. After excluding 30 unreliable responses, we analyzed the final sample (N = 333). The survey was conducted over a two-week period from March 13, 2020 to March 27, 2020. [Table 1](#) shows the profile of survey respondents.

Among the 333 travelers, 165 (49.5%) participants were male and 168 (50.5%) were female. The respondents' age ranged from 20 to 70. The most recent airline use was within the last year. Most respondents were highly educated. Most participants (192, 57.7%) had a bachelor's degree and 55 (16.5%) had a graduate degree or above. Among all participants, 51 (15.3%) had only a high school diploma and 35 (10.5%) had a college degree. Most participants (143, 42.6%) reported a monthly income of over \$5,000. The monthly income of 62 (18.6%) participants were between \$2,000 and \$2,999; that of 56 participants (16.8%) between \$3,000 and \$3,999; that of 55 participants (16.5%) between \$4,000 and \$4,999; and that of 18 participants (5.4%) were below \$2,000.

Anchoring effects

[Table 2](#) shows the comparison results of the respondents' WTP before and after the anchoring amount (approximately \$28) is presented. In our analysis, we excluded the responses of 15

Table 2. The results regarding anchoring effect.

Total (N = 333)	Survey respondents	Average of difference before anchoring (A)	Average of difference after anchoring (B)	Average of difference before and after anchoring (B-A)
Excluding respondents not willing to pay	318	USD 21.34	USD 15.27	USD -6.07
Excluding respondents with same amount before and after anchoring	216	USD 21.99	USD 13.09	USD -8.89

respondents who did not intend to pay environmental taxes. The average amount of the difference between the responses and the anchor amount decreased from \$21.4 to \$15.3 (by \$6.1). In addition, we excluded the responses of 117 who did not change their responses after the anchor was presented; the average amount of the difference for the remaining 216 respondents decreased from \$22 to \$13.1 (by \$8.9). The results show that the average amount of the difference from the anchor decreased especially for the respondents who were willing to pay aviation taxes. These results support our research hypothesis that the anchoring effect is significant.

Confirmatory factor analysis (CFA)

We conducted an assessment of the measurement model; the CFA with a method of maximum likelihood estimation indicated that the goodness-of-fit (GFI) statistics for the measurement model is acceptable ($\chi^2 = 345.543$, $df = 174$, $\chi^2/df = 1.986$, $p < .001$, GFI = .910, CFI = .955, IFI = .956, TLI = .946, RMSEA = .054). Details are shown in Table 3. All variables were significant in terms of their relevant latent construct ($p < .01$). The composite reliability decreased to between .80 and .95 and exceeded the criterion of .70 for the strong internal consistency suggested by Anderson and Gerbing (1988). Then, we calculated the average variance extracted (AVE) for convergent validity assessment. The values decreased to between .514 and .864, all AVE exceeding the criterion of .500 suggested by Fornell and Larcker (1981) and Hair et al. (2017). Furthermore, as shown in Table 4, the correlations among variables were all lower than the AVE values. Therefore, the measures of convergent and discriminant validity were evident.

Structural equation modeling (SEM)

We used SEM to estimate the proposed model. The model fit statistics revealed that the data is an adequate fit to the values ($\chi^2 = 445.093$, $df = 163$, $\chi^2/df = 2.731$, $p < .001$, GFI = .879, CFI = .915, IFI = .916, TLI = .901, RMSEA = .072). SEM results and the hypotheses testing results are shown in Figure 2 and Table 5 in detail. As presented in Figure 2, the results showed that the variables (PESI, GPV, ACC, and CCRP) and the factors (AGP and WTP) are positively significant. The standardized coefficient values were .724 for PESI, .848 for GPV, .782 for ACC, .652 for CCRP, .351 for AGP, and .351 for WTP.

As shown in Table 5 and Figure 2, we evaluated the hypothesized constructs according to the proposed theoretical framework. First, the results indicate that PESI has a significant influence on positive GPV ($\beta = .724$, $p < .05$), ACC ($\beta = .848$, $p < .05$), and CCRP ($\beta = .778$, $p < .01$). As such, Hypotheses 1, 2, and 3 were supported. Second, the results showed that GPV ($\beta = .170$, $p > .05$) and CCRP ($\beta = .184$, $p > .05$) did not have a significant effect on AGP. However, ACC ($\beta = .406$, $p < .05$) has a significant effect on AGP. As such, Hypothesis 5 was supported but Hypotheses 4 and 6 were not. Third, the results revealed that AGP is a significant function of WTP ($\beta = .617$, $p < .05$), thus supporting Hypothesis 7.

Table 3. Confirmatory factor analysis: Items and loadings.

Construct and scale item	Standardized loading
<i>Pro-environmental self-identity</i>	
I think of myself as an environment-friendly consumer.	0.592
I think of myself as someone who is very concerned about environmental issues.	0.936
I would be embarrassed to be seen as having an environmentally friendly lifestyle	0.873
<i>Green Perceived Value</i>	
This airline's environmental functions (e.g., eco-friendly dishes, weight lightening seats, eco-friendly aircrafts) provide very good value.	0.682
This airline's environmental performance meets my expectations.	0.782
I use this airline, because it addresses environmental concerns more than the other airlines do.	0.859
<i>Action for climate change</i>	
The production of electricity from renewable sources such as solar, wind, and biomass is an effective way to combat global climate change.	0.651
We need more government regulations to force people to protect the environment.	0.705
There is no urgent need to take measures to prevent global climate change today.	0.879
Global climate change will have a noticeably negative impact on the environment in which my family and I live.	0.687
<i>Climate change risk perception</i>	
In your judgment, how likely are you, sometime during your life, to experience serious threats to your health or overall well-being as a result of climate change?	0.783
How often do you worry about the potentially negative consequences of climate change?	0.763
In your judgment, how likely do you think it is that climate change will have very harmful, long-term impacts on our society?	0.749
How serious would you rate current impacts of climate change worldwide?	0.816
<i>Attitude towards green policies</i>	
I am positive about environmental policies.	0.724
I am generally satisfied with environmental policies.	0.554
I think environmental policies are worth it.	0.742
<i>Willingness to pay</i>	
I am willing to pay the green aviation tax to protect the environment.	0.918
I am willing to pay the green aviation tax to protect future generations.	0.950
I am willing to pay the green aviation tax for sustainable tourism.	0.898
<i>Materialism</i>	
I admire people who own expensive homes, cars, and clothes.	
Some of the most important achievements in life include acquiring material possessions.	
I place much importance on the amount of material objects people own as a sign of success.	
The things I own say a lot about how well I am doing in life.	
I like to own things that impress people.	
I pay much attention to the material objects that other people own.	
<i>Hedonism</i>	
I think people should live their lives in accordance with their feelings and desires.	
People cannot take their money with them when they die, so we should live for today.	
People should always pursue pleasure in their lives.	
People should always live for the present moment.	
People should not sacrifice the pleasure of the present for the possibility of something better in the future.	

Note: All factor loadings are significant at $p < .001$.

Structural invariance model

Based on previous studies, we tested for the moderating effects of materialism and hedonism (H8a, H8b, H8c, H9a, H9b and H9c). We divided the total of 333 samples into “low” and “high” materialism and “low” and “high” hedonism based on analysis results of the K-means cluster. Those with low materialism comprised 120 cases whereas those with high materialism comprised 110 cases. The assessment results of the baseline model comprising these high and low groups for materialism and hedonism are displayed in [Table 6](#) and [Figure 2](#). We conducted an empirical comparison between baseline and nested models by using a difference test of Chi-square for the degree of freedom (Anderson & Gerbing, 1988). The moderating score results show that the

Table 4. Correlation, AVE, composite reliability, and mean, SD.

	PESI	GPV	ACC	CCRP	AGP	WTP
PESI	–	.496 ^b	0.485	0.526	0.441	0.412
GPV	.246 ^a	–	0.720	0.559	0.458	0.490
ACC	0.235	0.518	–	0.631	0.463	0.410
CCRP	0.277	0.312	0.398	–	0.473	0.455
AGP	0.194	0.210	0.214	0.224	–	0.541
WTP	0.170	0.240	0.168	0.207	0.293	–
Mean	3.613	4.033	4.173	4.040	3.6046	3.430
SD	.660	.531	.473	.572	.630	.899
CR	.904	.922	.842	.924	.800	.912
AVE	.765	.799	.514	.688	.575	.864

1PESI: pro-environmental self-identity, GPV: green perceived value, ACC: action for climate change, CCRP: climate change risk perception, AGP: attitude towards green policies, WTP: willingness to pay.

2Goodness-of-fit statistics for the measurement model: $\chi^2 = 445.093$, $df = 163$, $\chi^2/df = 2.731$, $p < .001$, GFI = .879, CFI = .915, IFI = .916, TLI = .901.

aCorrelations between variables are below the diagonal.

bSquared correlations between variables are above the diagonal.

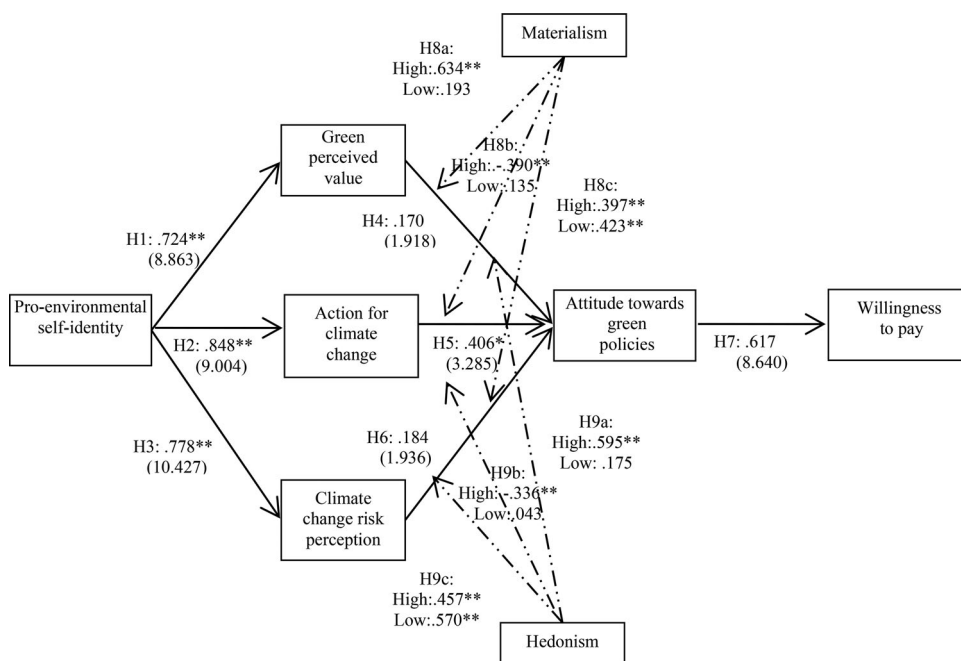


Figure 2. Results of the structural equation modeling. Notes. 1. Two identical models (models for high and low materialism and hedonism groups) are proposed. 2. Goodness-of-fit statistics for the structural model: $\chi^2 = 445.093$, $df = 163$, $\chi^2/df = 2.731$, $p < .001$, GFI = .879, CFI = .915, IFI = .916, TLI = .901, RMSEA = .072 (* $p < .05$, ** $p < .01$).

effects of GPV, ACC, and CCRP on AGP are significantly different between high and low groups ($\Delta\chi^2 [1] = .001$, $p < .05$).

We then calculated the moderating effect of materialism on the relationship between GPV and AGP (H8a), ACC and AGP (H8b), and CCRP and AGP (H8c). The chi-square difference for Hypothesis 8a between the constrained and unconstrained models was found to be significant ($\Delta\chi^2 (1) = 4.777$, $p < .05$). The chi-square difference for Hypothesis 8b between the constrained and unconstrained models was also found to be significant ($\Delta\chi^2 (1) = 4.941$, $p < .05$). However, the chi-square difference for Hypothesis 8c between the constrained and unconstrained models was not found to be significant ($\Delta\chi^2 (1) = 0.05$, $p > .05$). Thus, the moderating effect of materialism in Hypothesis 8a and 8b was supported while in Hypothesis 8c, it was not.

Table 5. Coefficient, t-value, R^2 (n = 333).

Hypothesis	Linkage	Standardized estimates	t-value	Hypothesis
Hypothesis 1	PESI → GPV	.724	8.863**	Supported
Hypothesis 2	PESI → ACC	.848	9.004**	Supported
Hypothesis 3	PESI → CCRP	.778	10.427**	Supported
Hypothesis 4	GPV → AGP	.170	1.918	Not supported
Hypothesis 5	ACC → AGP	.406	3.285**	Supported
Hypothesis 6	CCRP → AGP	.184	1.936	Not supported
Hypothesis 7	AGP → WTP	.617	8.640**	Supported
Hypothesis 8a	Moderating effect of MTL on the relationship between GPV and AGP			
Hypothesis 8b	Moderating effect of MTL on the relationship between ACC and AGP			
Hypothesis 8c	Moderating effect of MTL on the relationship between AGP and AGP			
Hypothesis 9a	Moderating effect of HDN on the relationship between GPV and AGP			
Hypothesis 9b	Moderating effect of HDN on the relationship between ACC and AGP			
Hypothesis 9c	Moderating effect of HDN on the relationship between AGP and AGP			

1PESI: pro-environmental self-identity, GPV: green perceived value, ACC: action for climate change, CCRP: climate change risk perception, AGP: attitude towards green policies, WTP: willingness to pay, MTL: materialism, HDN: hedonism.

2Goodness-of-fit statistics for the structural model: $\chi^2 = 445.093$, $df = 163$, $\chi^2/df = 2.731$, $p < .001$, GFI = .879, CFI = .915, IFI = .916, TLI = .901, RMSEA = .072.

* $p < .05$, ** $p < .01$.

Table 6. Baseline model and nested model assessment, chi-square test.

Paths	High MTL group (n = 110)		Low MTL group (n = 120)		Baseline model (freely estimated)	Nested model (equally restricted)
	β	t-value	β	t-value		
GPV lueGP	.749	5.182**	.237	1.822	χ^2 (452) = 1116.325	χ^2 (453) = 1121.102 ^a
ACC) = 1	-.432	-4.130**	.177	1.457	χ^2 (452) = 1116.325	χ^2 (453) = 1121.266 ^b
CCRP = 11	.330	5.582**	.330	5.582**	χ^2 (452) = 1116.325	χ^2 (453) = 1116.375 ^c

Paths	High HDN group (n = 110)		Low HDN group (n = 106)		Baseline model (freely estimated)	Nested model (equally restricted)
	β	t-value	β	t-value		
GPV → AGP	.737	4.982**	.206	1.647	χ^2 (452) = 1024.774	χ^2 (453) = 1030.209 ^b
ACC → AGP	-.433	-3.437**	.048	.422**	χ^2 (452) = 1024.774	χ^2 (453) = 1028.295 ^b
CCRP → AGP	.425	4.764**	.503	4.312	χ^2 (452) = 1024.774	χ^2 (453) = 1024.926 ^c

Chi-square difference test:	Hypothesis testing results:
^a $\Delta\chi^2$ (1) = 4.777, $p < .05$	H8a: supported
^b $\Delta\chi^2$ (1) = 4.941, $p < .05$	H8b: supported
^c $\Delta\chi^2$ (1) = 0.05, $p > .05$	H8c: not supported
^a $\Delta\chi^2$ (1) = 5.435, $p < .05$	H9a: supported
^b $\Delta\chi^2$ (1) = 3.521, $p > .05$	H9b: not supported
^c $\Delta\chi^2$ (1) = 0.152, $p > .05$	H9c: not supported

1PESI: pro-environmental self-identity, GPV: green perceived value, ACC: action for climate change, CCRP: climate change risk perception, AGP: attitude towards green policies, WTP: willingness to pay, MTL: materialism, HDN: hedonism (* $p < .05$, ** $p < .01$).

Then, we calculated hedonism's moderating effect on the relationship between GPV and AGP (H9a), ACC and AGP (H9b), and CCRP and AGP (H9c). The chi-square difference for Hypothesis 9a between the unconstrained and constrained models was found to be significant ($\Delta\chi^2$ (1) = 5.435, $p < .05$). The chi-square difference for Hypothesis 9b between the unconstrained and constrained models was not found to be significant ($\Delta\chi^2$ (1) = 3.521, $p > .05$). The chi-square difference for Hypothesis 9c between the unconstrained and constrained models was also found to be not significant ($\Delta\chi^2$ (1) = 0.152, $p > .05$). Thus, the moderating effect of hedonism in Hypothesis 9a was supported but not in Hypotheses 9b and 9c.

Discussions and implications

This research aimed to study the anchoring effect of the nudge theory on changing the behaviors and perceptions of tourists. Although it has recently emerged as a social issue, there is little research on aviation green taxes in the sustainable tourism sector. This study aimed to test the effect of the anchor on travelers who may need to pay aviation green taxes. The results revealed that the anchor had a significant effect on about 65% of all participants ($N = 333$), excluding those who entered the same amount before and after ($N = 216$).

The results of the analysis show that PESI (environment-friendly consumer, concerned with environmental issues, environmentally friendly lifestyle) has a significant effect on environmental business (GPV), supporting Hypothesis 1. The results also showed that PESI has a significant impact on ACC (an effective way to compound global climate change, measures to prevent global climate change), supporting Hypothesis 2. However, the analysis results did not support Hypothesis 3 as PESI did not display a significant impact on CCRP. In addition, Hypothesis 4 that assumed GPV to have a significant effect on AGP and Hypothesis 6 that assumed CCRP to have a significant effect on AGP were not supported. On the other hand, Hypothesis 5 that assumed ACC to have a significant impact on AGP and Hypothesis 7 that assumed AGP to have a significant impact on WTP were supported.

According to the results of the validation test for moderating effect, respondents with a strong tendency toward materialism (owning expensive material possessions) demonstrated a significant effect on the path that GPV impacts ACC and did not display a statistically significant impact on the path that CCRP impacts AGP. Respondents with high hedonism (people who live in accordance with their feelings, desires, the present moment, and pleasure) displayed a significant correlation on the path that GPV impacts AGP. In other words, hedonists have GPVs such as an environmental business and performance as well as a positive AGP. On the other hand, GPV did not have a significant impact on the correlation between ACC and AGP.

This study contributes to the literature of sustainable tourism by examining the factors that induce voluntary change in consumer behavior. In theoretical contributions, hospitality research has been mainly focused on marketing and human resource management. However, the nudge theory was applied to the aviation industry, and the economic approach was focused on consumer behavior. Therefore, this study has significance in that it attempted to converge studies of hospitality and economics.

The practical implications of this study are to improve transparency and to minimize tax resistance by positively nudging travelers' perceptions of aviation green taxes. First, workable implication to increase willingness to pay green tax for the aviation industry is to share the burden environmental financial support and to raise environmental issues with passengers. Second, in countries where aviation green tax is not introduced, the purpose is to decrease any tax resistance that traveler may have. Through this research, government can present examples of aviation green tax of other countries, as well as emphasize the importance of climate change to people and assert the justification of aviation green tax to people. Third, the IATA will have to actively review how to increase airline revenues while reducing passenger's travel costs, and not to focus on the negative aspects of aviation green taxes, taking social responsibility for the environment. To conclude, tourists' voluntary participation in these matters will contribute to long-term sustainable tourism.

The limitations of this study are as follows. First, the data of socio-demographic variables (age, gender, occupation, or income) were limited to the population of South Korean. This limit measuring the anchoring effect because the research results cannot be generalized as it has not been studied in various populations. Therefore, future study should verify the proposed conceptual model by considering various countries. Second, the data was collected via online survey by an online marketing researcher company. Therefore, future research should require to verify the proposed conceptual model using data collected by face-to-face and mail survey.

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