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The intention and determining factors for airline passengers' participation in carbon offset schemes

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A B S T R A C T

Many airlines are now offering carbon offset schemes for their passengers to reduce their carbon footprint. This study uses the model of goal-directed behavior (MGB) as a basis to understand the intention and determining factors for airline passengers participating in carbon offset plans. Structural equation modeling is used to analyze data collected from 360 passengers in Taiwan. The results show that personal norms and positive anticipated emotions have a positive effect on desires. Desires have a positive and significant influence on intentions to participate in carbon offset schemes. The findings of this study can be beneficial for airlines wishing to promote carbon offset schemes.

1. Introduction

The impact of aviation on the environment is receiving increasing attention. Airlines are important members of the aviation industry and they have adopted a number of measures to reduce the adverse effects that their operations have on the environment (Li et al., 2003; Clarke, 2006; Girvin, 2009). Carbon offset schemes, such as the Fly Greener plan adopted by Cathay Pacific and the CO_2 ZERO plan of the KLM Royal Dutch Airlines, are among the many measures established. Airline passengers can volunteer to participate in carbon offset schemes and choose to use cash or earned member mileage to offset the amount of CO_2 emitted during flights (Mair, 2011; Lu and Shon, 2012).

However, improving the earth's environment cannot be accomplished over the short-term, and the effect of an individual's pro-environmental action is limited. Therefore, airline passengers' participation in carbon offset schemes cannot be fully explained using traditional cost-benefit analysis. Some researchers have called for the inclusion of other factors in explaining people's ecological behaviors (Kals et al., 1999; Carrus et al., 2008). This study proposes that goals, motivations, and emotions are potential factors that inspire airline passengers to participate in carbon offset schemes. The model of goal-directed behavior (MGB) is employed as a basis to understand the intention and determining factors for airline passengers participating in carbon offset schemes. Specifically, the goal of this study is to protect the environment, with the participation in the offset schemes specified as the focal behavior that can be pursued to achieve this goal. The results of this study cannot only enhance academic understanding of this issue, but also provide a reference for airlines implementing carbon offset schemes.

2. Conceptual background

The MGB was proposed by Perugini and Bagozzi (2001) as an extension of the theory of planned behavior (TPB). The TPB uses attitudes, subjective norms, and perceived behavioral control to predict and explain individual behaviors (Ajzen, 1985, 1990). Although the TPB has been successfully applied to understand a wide variety of human behaviors (Chu and Chiu, 2003; Shaw et al., 2007; Han and Kim, 2010), some have questioned its predictive and explanatory power (Perugini and Bagozzi, 2001). The MGB broadens and deepens the TPB by introducing new concepts of desires, positive and negative anticipated emotions, and past behavior that emphasize the importance of emotions, motivations, and goals in decision-making processes.

Attitudes are evaluative reactions to an action and are thought to reflect predispositions to respond in a favorable or unfavorable manner (Eagly and Chaiken, 1993; Bagozzi and Dholakia, 2006). Attitudes are therefore formulated to refer to a target behavior (i.e., attitudes toward the act). As an antecedent in the TPB, attitudes are considered to lack strong motivational content needed to induce an intention to act (Perugini and Bagozzi, 2001; Bagozzi et al., 2003). A consumer, for example, may have a positive attitude toward an Apple iphone 5 and has the money to make a purchase, but he/she may not form an intention to buy it simply because of personal

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preference (i.e., lack of motivation). Motivation is therefore the driving force that makes people take action and ultimately accomplish aims and goals. The MGB incorporates desires as a key intervening variable that provide the motivating impetus for intentions to form and suggests that all antecedents work through desires (intrinsic motivations) enroute to influencing intentions (Perugini and Bagozzi, 2001). Therefore, desires are conceptually distinct from attitudes and intentions within the MGB. Perugini and Bagozzi (2004) defined desires as "a state of mind whereby an agent has a personal motivation to perform an action or to achieve a goal". This type of motivation is triggered by an integration of different sources of appraisals (e.g., emotional, evaluative, and social) and represents the first step toward a decision to act, typically followed by an intention to do so (Carrus et al., 2008). In its deepest essence, desires are conceptualized to encapsulate a future orientation, whereby future outcomes are deemed 'desirable' or 'undesirable' (Shiu et al., 2008).

Another difference between the MBG and the TPB is the addition of the anticipated emotions that take into account the emotional consequences of both achieving and not achieving a certain goal. Positive emotions arising as a result of anticipated goal attainment and negative emotions as a result of anticipated goal failure motivate one to act so as to promote goal achievement and avoid goal failure (Bagozzi and Dholakia, 2006; Leone et al., 2004). Some researchers have suggested that ecological behaviors should not be considered as the mere result of a rational choice. Factors such as interest, love, and emotional affinity toward nature can also stimulate people's ecological behaviors (Kals et al., 1999). Similarly, Vining and Ebreo (2002) suggested that both positive and negative emotions could be predictors of ecological behavior. It is now generally accepted that an integration of cognitive and affective factors can better explain people's ecological behaviors. Norms are guidelines or rules that control behaviors in the social environment and can affect people's inner psyches and external behaviors. Personal norms emphasize that a person is personally convinced that a certain behavior is either right or wrong, and is not affected by pressure from other people or groups (Bamberg et al., 2003, 2007). The central characteristic of personal norms is internalization. In other words, personal norms are adopted by people not because they fear social sanctions, but because they worry that negative emotions (such as regret and guilt) will be generated when the norm is violated.

Previous studies have documented the effectiveness of the MGB in the prediction of a wide range of human behaviors. Building on the TPB, Perugini and Bagozzi (2001) developed the MGB and tested it in two studies. In the body weight regulation study, attitudes and subjective norms positively influenced desires, which in turn had a positive influence on intentions. In the study effort data, attitudes, negative anticipated emotions and subjective norms positively influenced desires. Desires also had a positive influence on intentions. For both studies, the MGB explained significantly more variance in intentions and behavior than the TPB. Bagozzi and Dholakia (2006) investigated the social and psychological antecedents of customer participation in a Harley-Davidson and a non Harley-Davidson motorcycle riding groups. For the Harley rider groups, desire to participate in the brand community was significantly influenced by attitude, positive anticipated emotions, and negative anticipated emotions. For the non-Harley rider groups, desire was significantly affected by attitude and positive anticipated emotions. For both groups, desire had a strong influence on social intentions and fully mediated the effect of attitude on social intentions.

Han and Ryu (2012) extended the MGB by incorporating important factors relating to the re-buying intentions and tested the new model in a full-service restaurant setting. The results indicated that desire was a positive function of attitude, and re-buying intention was positively predicted by desire. In the tourism context, Lee et al. (2012) developed an extended MGB to explore potential travelers' decision-making processes when the risk of 2009 H1N1 infection discouraged international travel. The results showed that attitude, subjective norm, positive anticipated emotion, and negative anticipated emotion were positively associated with desire to travel internationally. Desire was positively associated with intention to travel internationally. Bamberg et al. (2007) investigated the role of personal norms in the decision to use public transportation instead of the car in two samples. The results showed that personal norm was a significant predictor of public transportation-use intention. Other studies have provided further support for the role of personal norms as an additional determinant of pro-environmental behavioral intention (Harland et al., 1999).

Researchers have also pointed out that the MGB is an appropriate framework for the study of pro-environmental behavior because it takes into account personal goals, motivations, and emotions that were largely ignored by previous research in this area (Carrus et al., 2008). The work of Carrus et al. (2008) applied the MGB to predict intentions to use public transportation instead of the private car for going to work, and to recycle household waste. The results showed that the MGB was superior to the TPB in explaining intentions to perform the two ecological behaviors. Negative anticipated emotions were found to be significant psychological drivers of individual desire to engage in pro-environmental actions. Desire, in turn, exerted a positive influence on pro-environmental behavioral intentions. A recent study by Song et al. (2012) provided further support for the application of the MGB in the ecological behavior domain. They proposed an extended MGB incorporating environmental concern, perceived customer effectiveness, and environmentally friendly tourism behaviors to understand the nature-based festival visitors' behavioral intention formation process. The results demonstrated that attitudes, subjective norms, and positive anticipated emotions affected desires, which in turn influenced behavioral intentions.

In light of the above literature, this study proposes the following hypotheses

H_1. Attitudes have a positive effect on desires.

H_2. Personal norms have a positive effect on desires.

H_3. Positive anticipated emotions have a positive effect on desires.

H_4. Negative anticipated emotions have a negative effect on desires.

H_5. Desires have a positive effect on intention to participate in carbon offset schemes.

3. Methodology

The conceptual framework is presented in Fig. 1. Attitudes, personal norms, positive anticipated emotions, and negative anticipated emotions were latent exogenous variables. Perceived behavioral control and past behavior were excluded because they were less relevant to this study. Desires were used as the intervening variable through which the exogenous variables influence intention to participate. The goal of this study (i.e., protecting the environment) is implicitly expressed in the measures of anticipated emotions and desires. People who are concerned about the environment are more likely than others to perform certain behaviors (e.g., participate in the offset scheme) to reach their goals (i.e., protecting the environment). Although the influence of an individual's pro-environmental behavior is small, the aggregate

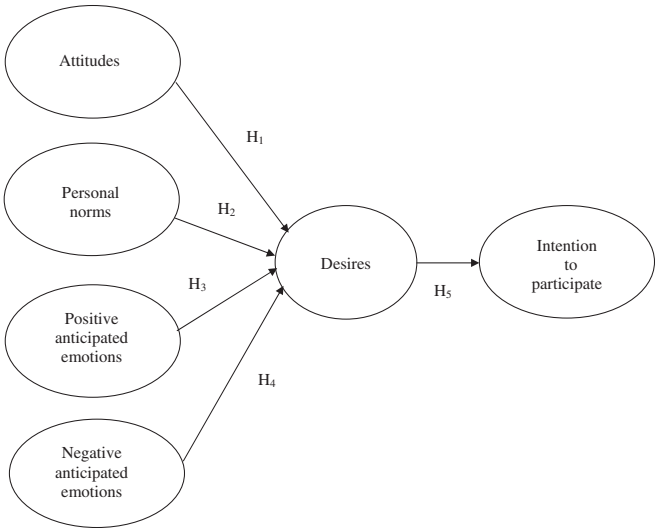

Fig. 1. Research framework.

impact may be significant when many people choose to do so (Stern, 2000); thereby contributing to the attainment of the goal.

A self-administered questionnaire was developed based on a thorough literature review. This review helped guarantee the content validity of the scales. Attitudes were focused on behavior itself and defined as "the assessment and perspective of airline passengers regarding participation in carbon offset schemes". This variable was measured using three items adapted from the scale developed by Casaló et al. (2010). Each item was measured using a 5-point scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The higher the respondents' level of agreement with the questionnaire items, the more positive their attitudes toward participating in carbon offset schemes.

In this study, subjective norms, a predictor of desires in the MGB, were replaced with personal norms because participation in carbon offset schemes is voluntary and need not obtain approvals from important others. Personal norms were defined as "the degree to which individual airline passengers believe they should participate in carbon offset schemes" and were measured using two items from Bamberg et al. (2007). Each item was measured using a 5-point scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The greater the respondents' level of agreement with the questionnaire items, the stronger their belief that they should participate in carbon offset schemes.

Anticipated emotions were focused on the achievement of personal goals and defined as "emotions experienced by airline passengers when assessing whether they could achieve certain goals". The scales developed by Perugini and Bagozzi (2001) were used to measure anticipated emotions. Respondents replied to one hypothetical question regarding positive anticipated emotions ("How would you feel if you could improve the earth's environment?") using a 5-point scale to express the intensity felt for each emotion (*delighted*, *excited*, *happy*, *satisfied, proud, and self-assured*), where 1 represented "not at all" and 5 represented "very much". Another hypothetical question was designed to assess negative anticipated emotions ("How would you feel if you could not improve the earth's environment?"). Respondents also used a 5-point scale to express the intensity felt for each emotion (*angry*, *frustrated*, *disappointed*, *unsatisfied*, *sad, and guilty*), where 1 represented "not at all" and 5 represented "very much".

Desires were defined as the "airline passengers' mental state when they have a motivation to perform an action". Desires were measured using two items based on the work of Carrus et al. (2008). Each item was assessed using a 5-point scale that ranged from 1 (*absolutely incorrect/very weak*) to 5 (*absolutely correct/very strong*). Intention to participate was defined as "airline passengers' behavioral tendency to participate in carbon offset schemes". The scale was adapted from the scales developed by Casaló et al. (2010) and Carrus et al. (2008). Each item was measured using a 5-point scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The greater the respondents' level of agreement with the questionnaire items, the stronger their intention to participate in carbon offset schemes.

We conducted an airline passenger survey in Taiwan. Taiwan was chosen as the research setting because most Taiwanese passengers were unaware of carbon offset schemes (Lu and Shon, 2012). The research findings can provide useful insights for Taiwanese airlines when introducing these schemes. The initial questionnaire was pre-tested on a convenient sample of 30 Taiwanese passengers at the survey site. Based on the comments collected during the process, a final questionnaire was developed (Table 1). The formal survey was conducted in June 2012 by trained assistants with airline passengers at Taoyuan International Airport. The convenient sampling method was employed. The interviewers first asked the respondents whether they understood the meaning and significance of carbon offset schemes. If the respondents stated that they did not understand, the interviewers would explain the meaning and significance to the respondents before distributing questionnaires. The survey period lasted for 2 weeks and included weekdays, holidays, and peak and off-peak hours to reduce sampling bias and increase the representativeness of the sample.

4. Results

A total of 360 questionnaires were distributed and 330 valid responses were retained for analysis. The response rate is 91.7%. The final sample comprised slightly more males (51.1%) than females (48.9%). The major proportion of the respondents (38.6%) was aged between 20 and 29, followed by ages between 30 and 39 (30.8%) and ages between 40 and 49 (20.2%). The sample appeared to be overrepresented by more well-educated customers (78.0% held university-level or higher education).

Confirmatory factor analyses (CFAs) were used to test the adequacy of the measurement model using LISREL 8.52. The results indicated a good fit between the model and the observed data: $\chi^2_{(174)} = 474.47$, $p = 0.00$, GFI = 0.91, NNFI = 0.98, CFI = 0.98, RMSEA = 0.063, and RMR = 0.035. The large χ^2-value was not surprising because the χ^2 statistic in LISREL has been shown to be directly related to sample size. The ratio of χ^2 to degree-of-freedom (df) was 2.73, lower than the suggested value of 3. GFI, CFI, and NNFI all exceeded the recommended 0.9 threshold level (Bollen and Long, 1992). In addition, RMR and RMSEA were lower than or close to 0.05 (Hu and Bentler, 1999).

Convergent validity was supported because all standardized loadings were highly significant and all of the items' squared multiple correlations exceeded 0.50 (Fornell and Larcker, 1981). In addition, the average variance extracted (AVE) for each construct was greater than 0.50, thus providing support for the convergent validity of the measure for each construct. Composite reliability was used to analyze the reliability of the constructs. All of the composite reliability values exceeded the threshold of 0.7, indicating that all constructs were reliable (Table 1). Discriminant validity is the extent to which a construct is distinct from other constructs and is assessed through comparing the AVEs to square inter-construct correlations for any two constructs. The results indicated that all AVEs were greater than the corresponding inter-construct correlation estimates, confirming the existence of discriminant validity across all pairs of constructs. Table 2 shows

Table 1
Measurement model results.

Construct	Items	Standardized loading	Variance explained	Composite reliability	Average variance extracted
Attitudes				0.89	0.73
	I believe that participating in carbon offset schemes is good for me.	0.51***	0.55		
	I believe that participating in carbon offset schemes is beneficial for me.	0.68***	0.74		
	I have a positive view of participating in carbon offset schemes.	0.62***	0.65		
Personal norms				0.88	0.78
	Because of my values, I feel an obligation to participate in carbon offset schemes.	0.75***	0.86		
	Regardless of what other people think, because of my own values I feel an obligation to participate in carbon offset schemes.	0.66***	0.55		
Positive anticipated emotions				0.89	0.58
	Delighted	0.76***	0.81		
	Excited	0.72***	0.72		
	Happy	0.79***	0.80		
	Satisfied	0.76***	0.77		
	Proud	0.72***	0.53		
	Self-assured	0.76***	0.62		
Negative anticipated emotions				0.89	0.57
	Angry	0.91***	0.83		
	Frustrated	0.92***	0.86		
	Disappointed	0.90***	0.82		
	Unsatisfied	0.92***	0.85		
	Sad	0.91***	0.85		
	Guilty	0.88***	0.70		
Desires				0.73	0.58
	I desire to participate in carbon offset schemes to protect the environment.	0.74***	0.82		
	My desire for participating in carbon offset schemes to protect the environment is _____.	0.72***	0.75		
Intention to participate				0.91	0.83
	I have the intention to participate in carbon offset schemes.	0.76***	0.84		
	The next opportunity I get, I will participate in carbon offset schemes.	0.76***	0.85		

means, standard deviations, and inter-correlations among the variables.

The same fit indices were used to examine the structural model. The fit indices were indicative of adequate fit to the sample data: $\chi^2_{(178)} = 527.13$, $p = 0.00$, GFI = 0.90, NNFI = 0.97, CFI = 0.98, RMSEA = 0.067, and RMR = 0.053. Fig. 2 presents the results of the structural equation model. Attitudes did not significantly affect

Table 2
Means, standard deviations, and intercorrelations.[a]

		Mean	Standard deviation	1	2	3	4	5
1	Attitudes	4.47	0.75					
2	Personal norms	3.87	1.18	0.43***				
3	Positive anticipated emotions	3.28	0.91	0.29***	0.61***			
4	Negative anticipated emotions	2.32	1.01	0.10	0.24***	0.36***		
5	Desires	3.50	0.83	0.38***	0.79***	0.68***	0.23***	
6	Intention to participate	3.42	0.83	0.14**	0.54***	0.68***	0.25***	0.70***

**Parameter estimate is significant at the 0.01 level.
***Parameter estimate is significant at the 0.001 level.
[a] Correlations are Φestimates from LISREL output.

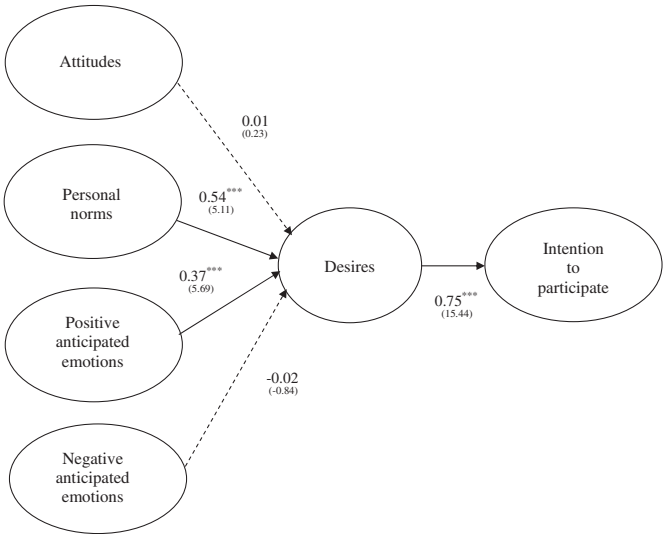

Fig. 2. Results of the structural model. ***Parameter estimate is significant at the 0.001 level. *t* values are in parentheses. Dotted lines indicate non-significant paths.

Table 3
Direct/indirect/total effects on desires and intention to participate.

Endogenous variable	Direct effects	Indirect effects	Total effects
Desires			
Attitudes	0.01	–	0.01
Personal norms	0.54***	–	0.54***
Positive anticipated emotions	0.37***	–	0.37***
Negative anticipated emotions	−0.02	–	−0.02
Intention to participate			
Attitudes	–	0.01	0.01
Personal norms	–	0.41***	0.41***
Positive anticipated emotions	–	0.28***	0.28***
Negative anticipated emotions	–	−0.02	−0.02
Desires	0.75***	–	0.75***

***$p < 0.001$.

desires ($\gamma_{11} = 0.01$, $p > 0.05$). Hypothesis 1 was not supported at the 0.05 level of significance. This could be explained by the phenomenon of attitudinal ambivalence which might have weakened the attitude-intention link (Costarelli and Colloca, 2004; Carrus et al., 2008). As predicted in Hypothesis 2, personal norms had a significant impact on desires ($\gamma_{12} = 0.54$, $p < 0.001$). As hypothesized in Hypothesis 3, positive anticipated emotions had a moderate effect on desires ($\gamma_{13} = 0.37$, $p < 0.001$). Contrary to Hypothesis 4, the relationship between negative anticipated emotions and desires was not supported at the 0.05 level of significance ($\gamma_{14} = -0.02$, $p > 0.05$). This finding reveals that positive anticipated emotions may be a more significant variable than negative anticipated emotions in influencing one's desire formation. Finally, as expected, desires had a strong influence on intention to participate ($\beta_{21} = 0.75$, $p < 0.001$). All together, the model explained 72% and 53%, respectively, of the variance of desires and intention to participate.

Following Perugini and Bagozzi's (2001) approach, chi-square difference tests were used to test for the significance of direct paths from attitudes, personal norms, positive anticipated emotions, and negative anticipated emotions to intention to participate, respectively. The results revealed that each added path from the antecedents to intention to participate was insignificant. It can therefore be concluded that desires provide impetus for intention formation and fully mediate the effects of all antecedents on intention to participate, which is consistent with the mediation effect implied in the MGB.

Comparing the direct, indirect, and total effects among the study variables showed that personal norms had the strongest direct effect on desires, followed by positive anticipated emotions. Attitudes and negative anticipated emotions had no significant effect on desires. Personal norms also had the largest indirect and total effect on intention to participate (Table 3).

5. Conclusions

This study investigated the factors behind air passengers' participation in carbon offset schemes using a different perspective. It complements and adds to similar analyses in the acceptance of carbon offset schemes (MacKerron et al., 2009; Van Birgelen et al., 2011; Lu and Shon, 2012) by stressing that personal goals, desires, and emotions all have a part to play in affecting individuals' intention to participate in carbon offset schemes. The study found that personal norms were the most important determinants of desires, followed by positive anticipated emotions. Passengers develop a desire to participate when they believe that protecting the environment is the right thing to do. Furthermore, the positive emotions elicited as a result of anticipating the achievement of goals are also an important psychological driving factor when it comes to developing personal desires. Lastly, desires had a positive and significant influence on intention to participate; passengers' intention to take part in a carbon offset scheme increased in line with a developing desire to protect the earth and environment.

The present study provides valuable practical implications for the promotion of carbon offset schemes. According to the results, airlines can appeal to and act on both people's beliefs and affects, which supports the findings of Carrus et al. (2008). First, to encourage people to take more personal responsibility for the environment, airlines could highlight through appropriate media and promotional tools that it is right to protect the environment and that everyone is obliged to do so. Second, when it comes to pushing a carbon offset scheme, airlines must not ignore the role emotive factors can play aside from rational appeals. Airlines' environmental communications should be conveyed in a healthy and positive manner and should put more emphasis on the psychological states of happiness, pleasure and contentment brought about by the understanding that individuals' participation in carbon offset activities can make up for the damage caused to the environment. Positive anticipated emotions of this kind are useful for airlines to inspire motivations on the passengers' part so as to trigger their intention to participate in carbon offset schemes.

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