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Investigating the impacts of air travellers' environmental knowledge on attitudes toward carbon offsetting and willingness to mitigate the environmental impacts of aviation

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ABSTRACT

Several previous studies have explored air travellers' willingness to compensate for their aviation carbon emissions or their willingness to pay for voluntary carbon offsetting programs. These studies have concluded that it is important to educate air travellers about the negative impacts of aviation on the environment. This study proposes two types of communication media and measures their effects on passengers' knowledge about the environmental impacts of aviation. Then, travellers' attitudes toward carbon offsetting and their willingness to offset their flights or change their travel behaviour are measured. Finally, a path model is estimated to analyse the effects of the various sources of knowledge on travellers' knowledge about aviation and the environment, their attitudes toward the environmental impacts of aviation and their willingness to mitigate these impacts. The outcomes suggest that appropriate media could be adopted to enhance passengers' knowledge of aviation impacts and the benefits of carbon offset programs, which could help passengers develop positive attitudes toward carbon offsetting and be more willing to offset their flights and change their travel behaviour. Not only does this study verify the relationships among knowledge, attitude, and behaviour (intention), it also has implications beyond academic research: it demonstrates that environmental education for air travellers should be prioritized.

1. Introduction

Many airlines around the world have launched efforts to mitigate aviation emissions, including renovating their fleets to be more fuel efficient, optimizing route planning, improving operating procedures, reducing aircraft weight by using lightweight containers and cabin articles, and introducing market-based measures such as carbon offsetting. However, those environmental efforts initiated by airlines are not usually visible to passengers (Hagmann et al., 2015; Budianschi et al., 2012). In addition, passengers receive very little specific information on the environmental impacts of aviation, the concept of carbon offsetting, and the potential impact of travel behaviour change on reductions in carbon emissions. Dodds et al. (2008) found that no more than 16% of Canadian air travellers were aware of the concept of carbon offsetting. Another study by Lu and Shon (2012) indicated that only 6% of Taiwanese passengers knew the details of carbon offsetting schemes, and only approximately 5% believed that such schemes were effective in mitigating carbon emissions. A study by Cheung et al. (2015) investigating Australian travellers' awareness of carbon offsetting found that less than 30% of respondents knew what carbon offsets were. Hagmann et al. (2015) revealed that approximately 32% of EU

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passengers, 84% of whom were German, had heard of carbon offsetting schemes but only 8% had ever used such schemes.

Clearly, there is an information gap between the airline industry and air passengers regarding the environmental impacts of air travel and the actions that can be taken to mitigate these impacts. Therefore, several studies have suggested that such information should be provided to passengers and that it should efficiently improve air passengers' awareness. Then, air passengers will be more likely to pay more for the environmental costs of their travel and/or to travel in a more environmentally friendly manner. For example, Brouwer et al. (2008) indicated that Asian travellers' low willingness to pay for carbon offsets was due to their lack of understanding of aviation impacts on the environment. Lu and Shon (2012) also concluded that if passengers knew nothing about carbon offset schemes, their willingness to pay for such offsets would be significantly reduced. Furthermore, Kim et al. (2014) implied that air passengers' environmental knowledge positively and significantly influenced their attitudes toward voluntary carbon offsetting. Jou and Chen (2015) concluded that passengers' willingness to pay for carbon offsets can be enhanced by explaining the purpose and content of carbon offset policies. An investigation by Cliff (2014) also found that less than 9% of UK passengers had ever carbon-offset their flights, and one reason for such low engagement was a lack of information on – and understanding of – the concept of carbon offsetting.

However, the studies cited above did not fully provide air passengers with information on aviation emissions, its impacts on the environment, and the concept of carbon offsetting prior to measuring or exploring their willingness to pay for carbon offsets. Those studies might neglect to offer the information or just want to investigate the original opinions of passengers; anyhow, the analyses were conducted under the condition of low knowledge levels and therefore, resulted in lower concerns and lower willingness to act on the problem. Hence, would air passengers' attitudes toward carbon offsetting and their willingness to participate in an offset programme – or even change their travel behaviour – be further enhanced if they were well informed regarding aviation impacts on the environment and the idea behind carbon offsetting? The main purpose of this study is to develop media tools that can be used to provide passengers with basic knowledge of aviation impacts (on the environment) as well as the idea of carbon offsetting. This study also aims to measure the attitudes and intentions of air passengers once they know more about the issues (or after they have been educated).

Influenced by existing programmes regarding cabin safety education, this study develops two types of media, a card and a video, for briefing passengers on the environmental impacts of aviation and corresponding strategies for carbon mitigation. Then, we investigate air passengers' attitudes toward the carbon offset programmes and their willingness to participate in carbon offsetting or to change their travel behaviour to mitigate carbon emissions. Finally, a cause-effect model analysed by path analysis is used to explore the relationships among the knowledge, attitudes, and willingness of the participants. Taiwanese travellers who have ever travelled outbound at least once in the past two years are chosen as the population for our case study.

2. Research design

2.1. Developing the communication media

Briefing cards and videos are two media commonly used for airline cabin safety education. This study adopts the same strategy of designing a card and a video to introduce passengers to the environmental impacts of air transportation and potential strategies for carbon mitigation. The structure of the two media are basically the same: first, they introduce the growing trend of air transportation and its possible environmental impacts in terms of carbon emissions; then, they explain the theory and benefits of voluntary carbon offsetting programmes; finally, the media suggest an alternative way to reduce aviation carbon emissions, namely, by changing travel behaviours. The sources of the content of these educational media are primarily the official websites of the International Air Transport Association (IATA) (IATA, 2015), the International Civil Aviation Organization (ICAO) (ICAO, 2015), and several research papers (e.g., Lu and Shon, 2012; Jou and Chen, 2015; Kim et al., 2014; Araghi et al., 2014).

Before being released to interviewees, the content of the two media was reviewed by three researchers in Taiwan and one researcher in Australia who are familiar with issues related to aviation and the environment and the concept of carbon offsetting. Furthermore, the two media were sent to approximately 15 people via the authors' personal connections, and those individuals' perceptions of the content of the two media were collected for further revision. Hence, the content validity of the two media can be ensured. Fig. 1 shows the content of the printed card. The full content of the other media – a video with both a traditional Chinese version and an English version – can be watched on YouTube.com.[1] (Note that both the card and video have traditional Chinese and English versions, but only the traditional Chinese version was used for the survey in Taiwan.)

2.2. Measurements and pre-test survey

21 measurements are defined for empirical analysis. The details are listed in Table 1. The first six measurements (M1-M6) are used to measure passengers' knowledge of aviation impacts on the environment and the concept of carbon offsetting. The seventh through 12th measurements (M7-M12) are associated with passengers' attitudes toward voluntary carbon offset schemes. The 13th through 16th measurements (M13-M16) are related to passengers' willingness to voluntarily offset their flights. The last five (M17-M21) measurements correspond to passengers' willingness to change their travel behaviours. To measure passengers' knowledge levels, a

[1] Traditional Chinese version: http://youtu.be/-B2wgztowMs; English version: http://youtu.be/lkXIoHg4fQU; or search for "Voluntary carbon offset programme" on Youtube.com.