

Tourist perceptions of air travel and climate change: an assessment of the polluters pay principle in South Africa

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Abstract

There is an ongoing debate about possible taxation of air travel and the inclusion of aviation in emission trading schemes. One proposal is the introduction of a carbon tax as part of a broad range of mitigation options to address climate change. However, the effectiveness of such a tax depends largely on the responsiveness to it by tourists. Consequently, the aim of the study is to explore the attitudes of domestic tourists in South Africa toward the introduction of a carbon tax, together with their knowledge and perceptions of climate change. Therefore, the perceptions of the polluters pay principle amongst domestic tourists who use air travel in South Africa are investigated. Data was collected using a structured survey involving two hundred domestic air travel passengers at O.R. Tambo International airport, selected through a random sampling technique. The study is the first of its kind in South Africa and it concludes that the average domestic tourist has moderate to good knowledge regarding climate change, believes climate change to be very serious and in need of attention and is willing to pay a carbon tax in order to offset their contribution to climate change; provided that it is regulated and used effectively.

Keywords: tourism, sustainable tourism, climate change, polluters pay principle, South Africa



Source: http://upload.wikimedia.org/wikipedia/commons/c/c2/C-141_Starlifter_contrail_crop1.png

Introduction

Air transport plays an extremely significant role in the tourism sector (Becken, 2007) and Gössling (2002) suggests that transport may be responsible for over 90% of tourism's overall contribution to global climate change. Air travel dominates these emissions (Hares, Dickinson & Wilkes, 2010) and, as such, it is attracting increasing attention as an emitter of greenhouse gases (Hart, Becken & Turney, 2010). In terms of CO₂ emissions within global tourism, air transport contributes 40% of the overall CO₂ emissions within tourism and contributes 54-75% of radiative forcing and these figures are likely to increase further (Bows, Anderson & Peeters, 2009). This led Higham & Cohen (2011) to suggest that tourism is becoming a major contributor to climate change and tourism trends show that there are an increasing number of people travelling by aircraft, an increasing number of trips made per year and increases in the average travel distances per flight (Peeters, Gössling & Becken, 2006). The future credibility of the concept of sustainable or responsible tourism depends largely on reducing tourism's greenhouse gas emissions and its associated contribution to anthropogenetically-induced climate change (Gössling, Broderick, Upham, Ceron, Dubois, Peeters & Strasdas, 2007). Mitigation options for the tourism industry include improving energy efficiency, replacing fossil fuels with renewable energy sources, and carbon offsetting (Hart, Becken & Turney, 2010). There are currently no practical alternatives to kerosene-based fuels for aircraft and, therefore, the aviation industry has been identified as the most important area for reducing emissions within the tourism sector (Hares, Dickinson & Wilkes, 2010). It is imperative that the aviation industry take steps to reduce its impacts but emissions reduction appears to be more difficult and more expensive in transport, specifically in aviation, than it

is in other sectors (Tol, 2007). The aviation sector may try to solve the problem by forcing a technological breakthrough followed by a fast fleet renewal scheme (Bows, Anderson & Peeters, 2009). However, the cost and risk involved with this have become prohibitive factors, and this required technology cannot be named yet, let alone developed (Bows, Anderson & Peeters, 2009). Even if emission reductions occurred through improved aircraft engine and fuel technologies, the ongoing growth of air travel would cancel out these measures (Becken, 2007).

In the absence of significant improvements in fuel efficiency and extremely slow and incremental technological developments, the global aviation growth rate will lock aviation into becoming a very significant contributor to climate change over the next few decades, as the industry's emissions continue to grow unabated (Bows, Anderson & Peeters, 2009). This highlights an urgent need for policy and regulation to ensure that the aviation sector's emissions are monitored. Driven by the polluters pay principle, governments are currently considering the implementation of various policy instruments that would extract funds from the aviation industry and its passengers, specifically for climate change mitigation and adaptation initiatives (Brouwer, Brander & Van Beukering, 2008). The polluters pay principle states that whoever is responsible for damage to the environment should bear the costs associated with it and, when applied correctly, the principle should enable protection of the environment without sacrificing the efficiency of an economic system (Cordato, 2001). The major concerns towards the principle include deciding who the polluter is, who should pay the charge and if payments will actually achieve their intended purpose. Another negative reaction to the principle involves the concern that additional charges or higher costs to

products will be difficult to absorb, especially for developing countries, particularly during times of economic hardships (Choudhary, 2007). Nevertheless, the polluters pay principle has the potential to reduce pollution as increased costs may discourage people from that activity. The funds collected can be utilized for the prevention and remedy of damage to the environment by boosting investments in energy efficiency and renewable energy. If applied in the aviation industry, increased airfares would probably result in a decrease in demand, especially among leisure travellers, thus reducing pollution (Becken, 2007).

Oxfam (2007) estimates that at least US\$50 billion will be needed to support climate change adaptation measures in developing countries each year and this figure will only increase if greenhouse gas emissions are not reduced soon. Observations of accelerating global climate change have increased the urgency with which the world considers the need to reduce and mitigate carbon emissions (Smith & Rodger, 2009). Public risk perceptions can strongly influence political, economic, and social action to address particular risks but public support or opposition to climate policies will be greatly influenced by public perceptions of climate change (Leiserowitz, 2005). Therefore, mitigating the climate impacts of air transport remains a formidable challenge (Daley & Preston, 2009) and success in meeting this challenge within the tourism industry depends upon the public's literacy of global climate change, the formulation and development of effective policy and the tourism industry's responsiveness to policy.

Society's opinions on climate change policies are significantly influenced by an individual's knowledge on the issue but little is known regarding the public's literacy regarding global climate change (Bostrom, Morgan, Fischhoff & Read,

1994). In order to educate society about climate change, it must first be established what is already known and/or believed and how this differs from what people need to know in order to make effective decisions (Bostrom, Morgan, Fischhoff & Read, 1994). Therefore, the implementation of any policy is more likely to be successful if research is carried out on those that will be affected by these policies (Becken, 2007). A considerable amount of research has been conducted (e.g. Leiserowitz, 2005; Kempton, 1991; Becken, 2004; Becken, 2007; Brouwer, Brander & Van Beukering, 2008; Hares, Dickinson & Wilkes, 2010; Higham & Cohen, 2011; Lu & Shon, 2012; Ryley, Davison, Bristow & Pridmore, 2010) on tourists' perceptions of climate change and their travel behaviours in developed countries. On the African continent, Gössling, Bredberg, Randow, Sandström & Svensson (2006) have established the perceptions of climate change of international tourists to Zanzibar, Tanzania, however, no such research has been conducted for African tourists and specifically domestic tourists within South Africa. The aim of this study is to determine the knowledge and perceptions of domestic travellers in South Africa toward climate change and their attitudes toward the introduction of a voluntary carbon tax for the aviation industry. In addition, the study will assess if the perceptions and attitudes on domestic tourists in a developing country on the African continent differ from domestic tourists in developed countries (e.g. Becken, 2007). Therefore, the study will specifically investigate whether polluters (*i.e.* domestic tourists) within the tourism industry are truly willing and supportive of the necessary steps needed to limit their contribution towards climate change in order to assist policy makers in South Africa to design effective financial tools that discourage climate unfriendly travel activities.

Regional Context

South Africa has an energy-intensive economy making it the biggest emitter of greenhouse gases on the African continent and, on a global scale, it ranks third when measured on a total emissions per capita basis (Creamer, 2011). CO₂ emissions in South Africa have increased by approximately 30% over the past decade (Department of Environmental Affairs, 2010) and within the domestic aviation sector in South Africa emissions have also been rising steadily since 1990 with an average growth rate of 6% per year between 1990 and 2007 (Climate Connect, 2011). Measurements in South Africa indicate that climate change is already occurring and is, therefore, considered to be a priority area for adaptation and mitigation schemes (Archer, 2010). During the Copenhagen climate negotiations of 2009, South Africa voluntarily announced that it would move to reduce domestic greenhouse gas emissions by 34% by 2020 and by 42% by 2025 (Creamer, 2011). The National Treasury of South Africa propose a direct tax on carbon emissions starting at US\$8.30 (R75)/t CO₂ emissions and later increasing to around US\$22 (R200)/t CO₂ emissions to achieve the desired emission reduction targets (Creamer, 2011). According to Winkler & Marquard (2011), the South African government, economy and society should only consider a carbon tax as part of a broad range of mitigation actions. Winkler & Marquard (2011) also indicate that a carbon tax may be one of the most effective mitigation options analysed for the long-term mitigation scenarios for South Africa. Therefore, the purpose of such a tax would not be to raise revenue, but rather to offset aviation's contribution to greenhouse gas emissions. This would be achieved through two main methods. Firstly, through a demand effect, by reducing demand due to higher prices, and secondly through a substitution effect

(Winkler & Marquard, 2011). However, the effectiveness of such a tax would, to a significant degree, depend upon the responsiveness to it by the public (Winkler & Marquard, 2011). Therefore, the willingness of domestic tourists within a developing country (South Africa) on the African continent to pay a carbon tax will be examined as part of this study.

Methodology

O.R. Tambo International Airport was selected as it is the busiest airport in South Africa, if not Africa. Domestic travellers were chosen since short-haul flights emit more carbon per kilometer than long trips (Tol, 2007) because, compared to the cruising section, take-off and landing are energy-intensive sections of a flight. Only respondents older than 21 years of age participated in the study. Due to the fact that an airport is a busy and noisy place and tourists may only have a limited amount of available time, the research employed a short and concise survey in order to obtain the results. The social survey comprised a structured questionnaire with predetermined questions and answers. The fieldwork took place during the months of April, May and June 2012 in the Domestic Departure Lounges and a random sampling technique was used to collect the data. Domestic tourists were surveyed until a sample of 200 was obtained and were collected immediately upon their completion. The questionnaire was comprised of three parts, and a consent form, which took approximately 10 to 15 minutes to complete. The researcher remained in the vicinity of the area whilst the respondent completed the questionnaire in order to answer any questions.

The first section of the questionnaire requested personal information concerning age, gender and level of education. The second section took the

form of a climate change quiz. The purpose of the quiz was to assess the respondent's knowledge of climate change and consisted of seven questions, evaluating a range of aspects within climate change. Each question consisted of four multiple choice answers. Table 1 provides category descriptions of the percentage scores from the climate change quiz. The third section addressed respondent's perceptions, views and attitudes toward climate change and the introduction of a carbon tax for aviation. This section consisted of twelve close-

ended questions and two open-ended questions. It also introduced the participant to the concept of a carbon tax for aviation, including the purpose of such a tax together with typical monetary figures. Finally, the questionnaire examined whether participants felt if a carbon tax should be regulated privately and internationally. Each climate change quiz was graded according to a mark sheet and obtained a final percentage. Once the evaluation was complete, each questionnaire was analysed with the use of frequency grids (tally charts).

Table 1. Category description of climate change quiz percentage score.

| Percentage | Category description |
|------------|---|
| 0-19% | Unsatisfactory knowledge regarding climate change |
| 20-39% | Poor knowledge regarding climate change |
| 40-59% | Incomplete knowledge regarding climate change |
| 60-79% | Moderate knowledge regarding climate change |
| 80-100% | Good knowledge regarding climate change |

Results

Climate Change Quiz

The climate change quiz established the respondent's general knowledge regarding climate change through a variety of questions. It was found that the majority of respondents understood the term climate change, knowing that the term refers to the long-term shift of the earth's climate. However 36% of the respondents incorrectly believed that the term refers to an increase in extreme weather conditions only. The vast majority (88%) of the respondents correctly attributed climate change to be from a combination of both natural and human causes. The majority (74%) of the respondents understood the meaning of the greenhouse effect, however less than half of the respondents correctly identified carbon dioxide and water vapour to be the major contributing greenhouse gases. A substantial portion (84%) of the respondents correctly identified the predicted main effect of global climate change to be an increase in temperatures and a rise in sea levels.

69% of the respondents correctly identified the leading source of human-induced climate change to be the burning of fossil fuels, with a small portion (23%) of the respondents believing it results from deforestation. Interestingly, respondents were least able to identify natural sources of climate change. Nevertheless, the overall results showed that the majority of the respondents had a good understanding about climate change topics; as reflected in Figure 1(A).

Each quiz was graded and received a percentage score. Figure 1 displays the overall results from the quiz, together with a result comparison between gender, age groups and tertiary education status (Table 2). Figure 1(A) indicates that 41% and 36% of the sample group obtained a percentage score of between 60-79% and 80-100% respectively. Figure 1(B) displays the climate change quiz results according to age group. What is prevalent from this graph, is that the three lowest categories of percentage score (0-19%, 20-39%, 40-59%) were all contributed

to mostly from the age group 56-75. The two highest categories of percentage score (60-79%, 80-100%) were contributed to mostly from the age

groups 21-35 and 36-55, with a more significant contribution from the age group 36-55.

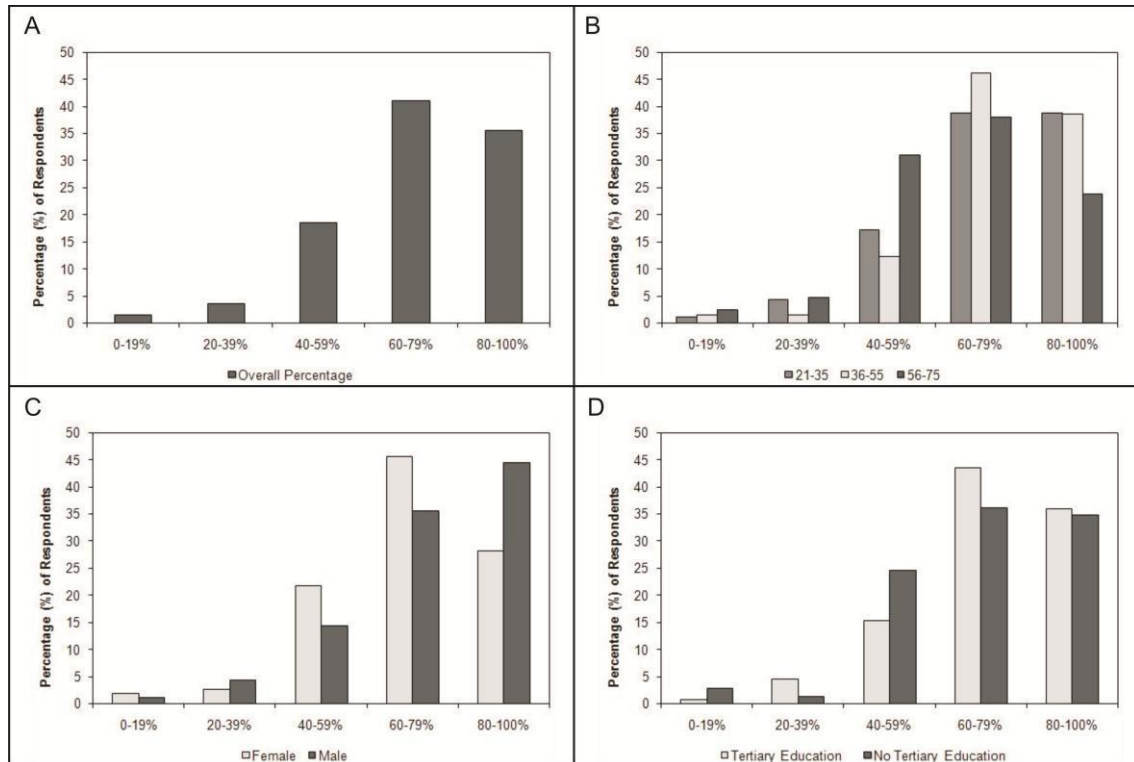


Figure 1. Results of the climate change quiz: A.) Overall results of climate change quiz, B.) Results of climate change quiz by comparing age groups, C.) Results of climate change quiz by comparing gender, D.) Results of climate change quiz by comparing tertiary education status.

Figure 1(C) compares the percentage scores of males to females. The majority of the female respondents (46%) obtained a percentage of between 60-79% whereas the majority of the male respondents (45%) obtained a percentage of between 80-100%. This indicates that both females and males have a good knowledge on climate change issues, with males having a slightly better knowledge than females. Figure 1(D) compares the

percentage scores of those respondents with tertiary education to those without. As expected, a higher percentage of respondents with tertiary education (80%) obtained scores of 60-79% and 80-100% than respondents without tertiary education (69%) with the majority of both groups obtaining scores of between 60-79%. This demonstrates that both groups have a good knowledge regarding climate change.

Table 2. Characteristics of domestic tourists interviewed at O.R. Tambo International airport, South Africa (n = 200).

| | Frequency | Percentage |
|---------------|-----------|------------|
| Gender | | |
| Male | 90 | 45% |
| Female | 110 | 55% |
| Age | | |
| 21-35 | 93 | 46% |
| 36-55 | 65 | 33% |

| | | |
|---------------------------|-----|-----|
| 56-75 | 42 | 21% |
| Tertiary Education | | |
| Yes | 131 | 65% |
| No | 69 | 35% |

Perceptions of Climate Change

The perceptions of climate change section of the questionnaire yielded strong results; with a clear consensus from the respondents for each question. An overwhelming majority (90%) of the respondents believe that global climate change has already started to take place and 95% of the sample group also believe that the effects of global climate change will have exceedingly significant (i.e. either catastrophic or major) effects. A significant number of respondents (88%) also indicated that the effects of climate change can be reduced or stopped through effective planning. Therefore, the majority of domestic tourists in South Africa believe that, even though the effects of global climate change will be on a catastrophic scale, there is still time for effective planning and action to reduce or stop these potentially catastrophic effects. At a local scale, two-thirds (66%) of the respondents felt that climate change is a serious issue in South Africa and 31% believed it to be an issue but not that serious. Again, a significant portion (90%) of the sample group indicated that climate change should receive particular attention from the South African government. The respondents who disagreed with this indicated that issues such as education, health, security, job creation, crime, unemployment, poverty, housing, less taxation, waste and sanitation, and alternative energy research should be priority areas instead. Of the respondents surveyed 80% were of the opinion that climate change is a significant threat to the current generation, and 98% of the respondents believed that climate change will be a significant threat to

future generations. Therefore, even though 20% of the respondents did not think that climate change is an issue facing the current generation, they did believe it to be an issue for future generations. Nearly the entire sample group (97%) felt that every individual can do something to limit the effects of climate change. This extremely high percentage could possibly be due to numerous campaigns on environmental issues such as climate change (e.g. the climate change awareness campaign initiated by the Department of Environmental Affairs), recycling (e.g. the Clean-up South Africa project), public transport (e.g. the „car fee day“ initiative) etc. that have occurred in South Africa recently.

With specific reference to climate change and the tourism industry, a significant percentage (84%) of the respondents agreed that air travel does contribute towards global climate change. This demonstrates that the majority of domestic tourists in South Africa are aware that aviation activities do have an effect on climate change. Respondents who agreed that air travel does contribute towards global climate change were then asked, in the form of an open-ended question, to indicate how they believe air travel to contribute towards climate change. Many respondents showed a degree of understanding that aviation contributes to carbon dioxide levels through emissions. This was indicated with the following phrases: „burning jet fuel“, „fumes“, „emission of fossil fuels“, „CO₂ emissions from planes are far higher than motor cars“, „fuel emissions“, „engine emissions“, „burning fossil fuels“, etc. Other respondents indicated that the increasing demand for air travel

contributes towards climate change. Respondents indicated this through using phrases such as „increasing global population“, „urbanisation“, „increase in air traffic“ and „everyday flying“. Some respondents indicated that the activities surrounding air travel also contributes towards climate change. These respondents used phrases such as „aircraft manufacturing“, „manufacturing of aircraft fuel“, „aircraft building“, „airports“, „transportation to and at airports“ and „resources used to manufacture planes and airports“. A few respondents astutely stated that air travel can cause an increase in cloud cover and vapour trails, thus contributing towards climate change. Other reasons for air travel contributing towards climate change included aviation „increasing our carbon footprint“, and aviation „damaging“ or „attacking“ the ozone layer. Therefore, it can be deduced that the average domestic tourist in South Africa has a moderate to good understanding regarding the reasons why aviation contributes towards global warming or climate change.

The questionnaire also asked who respondents believed should be responsible for the reduction of air travel impacts on climate change. A small percentage of respondents (13%) felt that the responsibility lies with government only, another 13% believed that only the airlines should take responsibility, 5.5% reflected their answer to be both the government and the airlines, and only 1.5% believed the responsibility lay solely with travel passengers. Over half of the respondents (60.5%) believed that the responsibility lay with all of the above options listed above and 6.5% indicated none of the options. Therefore most respondents feel that everyone, including the air travel passengers, should be responsible for the reduction of air travel impacts on climate change. This observation demonstrates that the

majority of domestic tourists in South Africa support the concept of the polluters pay principle.

Attitudes toward the introduction of a carbon tax

Figure 2(A) displays that well over half (63%) of the respondents would indeed consider paying a carbon tax on a voluntary basis. In order to obtain a better understanding of the type of person that would consider paying this carbon tax, further analysis of age group, gender and tertiary education status was conducted. Figure 2(B) displays the results for voluntary payment of the carbon tax by age groups. For those respondents who fell in the age group 21-35, a significantly high portion (74%) of the respondents would consider paying the carbon tax. For those respondents who fell in the age group 36-55, a lower percentage of 58% would consider paying the carbon tax. Lastly, and very noteworthy, of the respondents who fell in the age group 56-75, only 45% would consider paying the carbon tax. This indicates a decreasing trend, where younger domestic tourists aged 21-35 would be more willing to pay a carbon tax than older domestic tourists aged 36-55 and 56-75.

When considering voluntary payment of a carbon tax by gender, Figure 2(C) depicts that, of the male respondents who participated in the survey, 61% would consider paying a carbon tax, whereas 64% of the the female respondents would consider paying the tax. Therefore, the majority of both men and women would consider paying a carbon tax. Figure 2(D) displays the results of voluntary payment of a carbon tax by tertiary education status and it indicates that of the respondents with tertiary education, 65% would consider paying a carbon tax whereas only 58% of the respondents with non-tertiary education would consider paying a carbon tax. Therefore, it can

be seen that respondents with tertiary education are more likely to pay the

carbon tax than respondents without.

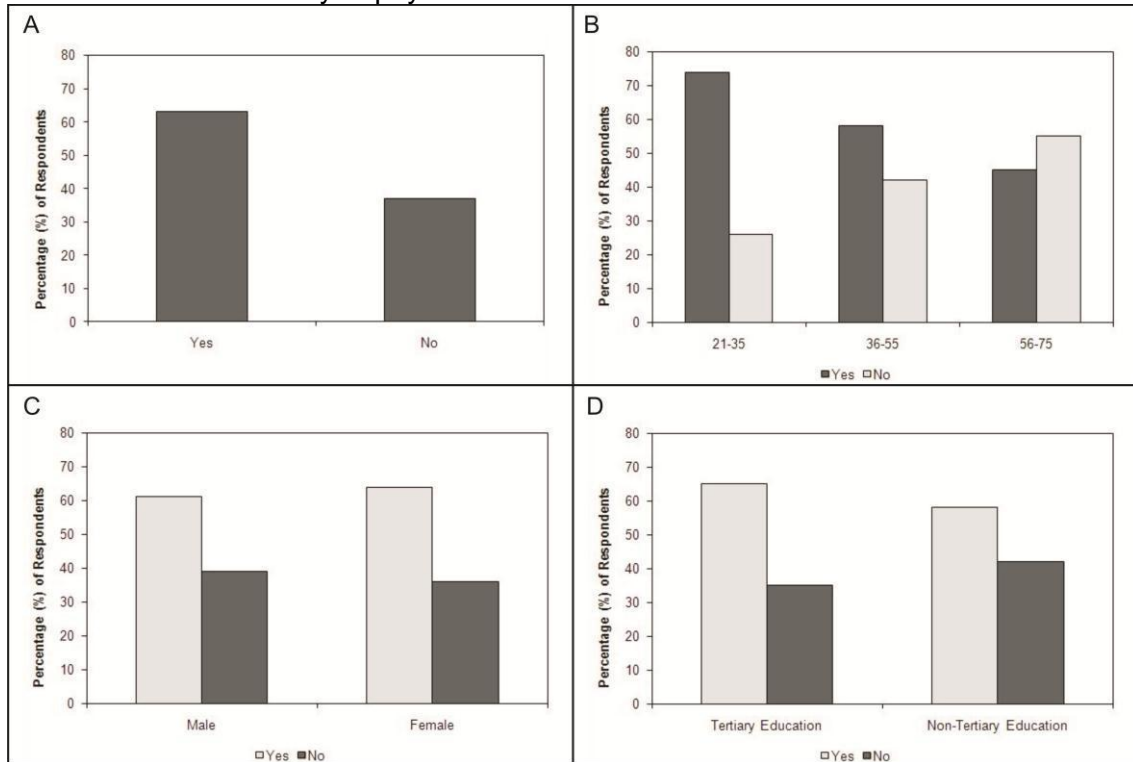


Figure 2. Voluntary payment of carbon tax results: A.) Overall results of voluntary payment of carbon tax, B.) Results according to age groups of voluntary payment of carbon tax, C.) Results according to gender of voluntary payment of carbon tax, D.) Results according to tertiary education status of voluntary payment of carbon tax.

The questionnaire further evaluated if those respondents who would consider paying the carbon tax on a voluntary basis would still consider paying it if the South African government controlled such a tax. The results showed that only 40% of those respondents willing to pay a voluntary carbon tax would still be willing to pay the tax if the South African government controlled it. This represents a significant drop in the number of respondents who were initially willing to pay a carbon tax. The

questionnaire also investigated whether a compulsory carbon tax for airfare would prevent the traveller from flying. The results showed that only 15% of the sample group believed that a compulsory carbon tax would prevent them from flying. Therefore if such a compulsory carbon tax were introduced, the demand for domestic air travel could possibly drop by 15% or less, however, it is believed that this figure would vary in different economic circumstances.

Effectiveness of a carbon tax

The last part of the questionnaire examined if respondents believe that a carbon tax would be effective in offsetting aviation's emissions. Figure 3(A) shows that 57% of the respondents believed that a carbon tax would be effective. Figure 3(B) shows that a high portion (67%) of the respondents in the age group 21-35 believed that a carbon tax would be effective, only 45% of the respondents

from the age group 36-55 believe that a carbon tax would be effective and 55% of the respondents in the age group 56-75 believe that the carbon tax would be effective. The analysis also showed that 54% of the male respondents and 59% of the female respondents believe that a carbon tax would be effective. Lastly, 56% of those with tertiary education and 58% of those without tertiary education believed that the carbon tax would be effective.

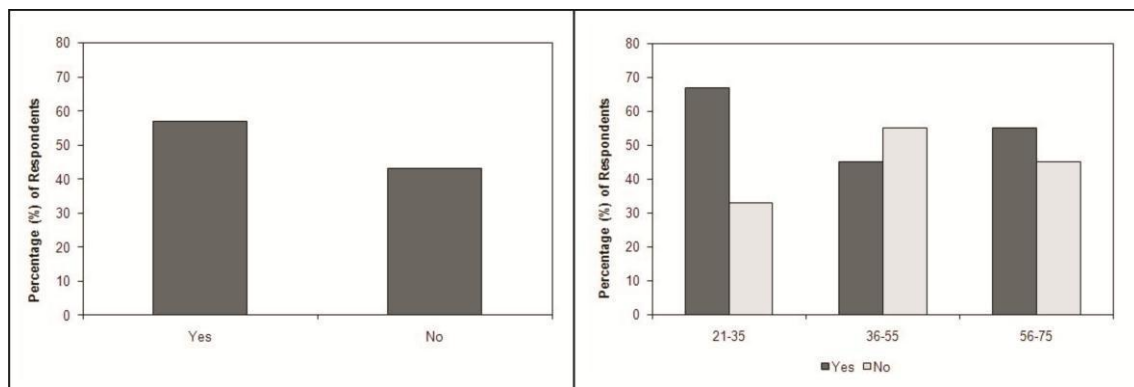


Figure 3. Opinions on the effectiveness of a carbon tax: A.) Overall results of the opinions on the effectiveness of a carbon tax, B.) Results of the opinions on the effectiveness of a carbon tax by age group.

Discussion

Many of the perceptions of climate change and attitudes toward the introduction of a carbon tax expressed by domestic tourists in South Africa are similar to the findings to the previous international studies (Leiserowitz, 2005; Kempton, 1991; Becken, 2004; Becken, 2007; Brouwer, Brander & Van Beukering, 2008; Hares, Dickinson & Wilkes, 2010; Cohen & Higham, 2011; Higham & Cohen, 2011; Lu & Shon, 2012; Ryley, Davison, Bristow & Pridmore, 2010). However, some alternative findings were observed in this study which presents an interesting perspective of domestic tourists in a developing country. Becken (2004) found that tourists and tourism experts in New Zealand and Australia respectively are moderately educated about climate change, with some misunderstandings. The large majority of domestic tourists in South Africa

(77%) exhibit a moderate level of knowledge on climate change and 74% understand the meaning of the greenhouse effect. Kempton (1991) determined that although residents in the United States have typically heard of the greenhouse effect, a significant proportion have a poor understanding of the impacts of greenhouse gases; similar to the findings in this study. Brouwer, Brander & Van Beukering (2008) established that three quarters (75%) of the international travelers interviewed at Amsterdam Schiphol airport were willing to pay a carbon travel tax, whereas only 63% of the domestic tourists travelling from O.R. Tambo International Airport, South Africa were willing to pay a carbon tax. Brouwer, Brander & Van Beukering (2008) indicates that the greater the awareness of the impact of flying on climate change, the greater the willingness to pay to offset such impacts, but this study did not establish

the same link. In fact, although 84% of the participants acknowledged that air travel contributes towards global climate change, only 63% were willing to pay a carbon tax for air travel.

Awareness regarding climate change issues is at an all-time high, with more than 90% of respondents from 30 countries agreeing that it is a serious problem (McKercher, Prideaux, Cheung & Law, 2010). A significant majority of respondents (95%) believe that climate change will have exceedingly significant effects, which is most likely due to better awareness campaigns and greater media coverage over the past decade. However, McKercher, Prideaux, Cheung & Law (2010) indicate that these concerns do not yet influence purchase decisions in general, and travel decisions in particular. Hares, Dickinson & Wilkes (2010) suggests that many tourists still do not consider climate change when planning their holidays since tourists typically believe climate change to only be a moderate risk (Leiserowitz, 2005). A similar trend can be established from this study whereby, even though 84% of the participants believe that air travel contributes towards climate change, and 95% believe that the consequences of climate change would be either catastrophic or major, only 63% would consider paying a carbon tax. Of the 63% of the respondents who indicated that they would voluntarily consider paying a carbon tax, only 40% would still be willing if the South African government controlled such a tax. This sentiment from domestic tourists in a developing country is consistent with attitudes of tourists toward the introduction of a carbon tax in the United Kingdom (Ryley, Davison, Bristow & Pridmore, 2010). Ryley, Davison, Bristow & Pridmore (2010) highlight that a voluntary carbon tax would only be successful if purchasers trust the institute controlling such a tax, and where sufficient evidence demonstrates that the revenue raised will

be spent on measures to reduce the impact of aviation on climate change. Furthermore, Ryley, Davison, Bristow, & Pridmore (2010) indicate that respondents believed that such measures could possibly be invested in „green energy“ such as wind farms, solar panels, be used to improve aircraft and aviation technology, and invested in transport infrastructure in the United Kingdom, such as improvements in the railway system. Gaining such credibility would require monitored emission calculation processes, prices charged and verification processes.

Hares, Dickinson & Wilkes (2010), Becken (2007) and Lu & Shon (2012) have all established that most tourists believe that the responsibility towards climate change belongs to collective groups such as the government or the airlines, and only a few respondents believed that it should be an individual's responsibility. In contrast, this study showed that 61% of the domestic tourists interviewed in South Africa believed that the reduction of air travel impacts should be the responsibility of the government, the airlines and the air travel passengers. This observation emphasises the belief that the responsibility also lies with the individual. From the analysis, a female between 21-35 years of age, with tertiary education is the most likely to pay a voluntary carbon tax. It is interesting to note that, although 63% of the respondents would consider paying the carbon tax on a voluntary basis, only 57% believe that the carbon tax would be effective. This could show that individuals feel responsible for their personal contribution towards climate change and would, therefore, pay a carbon tax. However in the broader scheme, respondents believe that many individuals would simply not pay the tax and, therefore, it would be less effective which echoes the findings of Hares, Dickinson & Wilkes (2010) who indicates that participants typically

shared the view that the actions of one person cannot make a difference.

Hares, Dickinson & Wilkes (2010) highlight that some respondents feel that they have earned the right to fly and take holidays and all of the participants held a strong reluctance to consider changing their tourism behaviour. Hares, Dickinson & Wilkes (2010) also explored the possibility of quotas limiting the number of flights individuals could take in a year, and all of the participants in the research strongly disapproved of the notion. The loss of freedom of choice was identified as a reason why governments should not restrict their ability to fly (Hares, Dickinson & Wilkes, 2010). Becken (2007) also found that the value of freedom to travel is firmly entrenched in the minds of many tourists and that restricting travel is considered unacceptable. This may explain why 85% of the respondents stated that they would continue to fly regardless of the introduction of a carbon tax. Therefore, a mandatory tax would not ultimately change a tourist's travel behaviour, and those tourists who can incur the extra expense will continue to fly.

Even though participants clearly perceived climate change as a significant threat and that most of the participants would consider paying the carbon tax, this does not necessarily mean that tourists' travel behaviour will change due to these perceptions, or that they actually would pay the carbon tax. Therefore, further education is needed to encourage behavioural change and a carbon tax should only be considered as one initiative out of many in a carbon offsetting scheme. Approaches for implementing a carbon tax could either be voluntary or mandatory and each would have their own advantages and disadvantages in terms of potential revenues, the cost of implementation, impacts on passengers, airlines and other industries such as tourism (Chambwera

& Muller, 2008). There are many airlines around the world that already offer the purchase of voluntary carbon offsets at the click of a button during the online purchase process (e.g. Qantas and British Airways) (Mair, 2011). Ryley, Davison, Bristow & Pridmore (2010) investigated the response to the proposal of a frequent flyer tax. The majority of the respondents disagreed with such a proposal, reasoning that frequent flyers are taxed more anyway. Those respondents who were in favour of a frequent flyer tax indicated that the tax should apply to those with holiday homes or those who „fly too frequently“ (Ryley, Davison, Bristow & Pridmore, 2010).

Carbon offsets are environmentally risky as they do not directly reduce emissions (Gössling, Broderick, Upham, Ceron, Dubois, Peeters & Strasdass, 2007) and they carry the risk of encouraging respondents to believe that they need not change their behaviour as they can pay their way through current consumption and production patterns. According to Hares, Dickinson & Wilkes (2010), many studies have investigated an inconsistency between respondent's attitudes and behaviour (Barr, 2004; Blake, 1999; Kollmuss & Agyeman, 2002). This inconsistency is commonly referred to as the attitude-behaviour gap, and is particularly prevalent in environmental issues (Hares, Dickinson & Wilkes, 2010) and has prompted Gössling & Hall (2006) to warn against the assumed linearity between climate change perceptions and travel behaviour. Anable, Lane & Kelay, (2006) note that the attitude-behaviour gap is one of the greatest challenges facing the climate change dilemma and that identifying such barriers when implementing climate change strategies is critical. In addition, Lawrence (2009) notes that rules and systems, such as the introduction of a carbon tax, used to protect the environment from the effects of aviation also carry the risk of creating

undesirable latent consequences. Thus if green taxes and emissions trading costs lower airline profits they may slow down the process of fleet replacement and the move to newer, more environmentally friendly aircraft (Lawrence, 2009).

In summary, the findings presented here is that a carbon tax could work in South Africa even though it is a developing country which is currently experiencing economic hardships. Domestic tourists in South Africa have a relatively good knowledge of climate change and feel strongly that it is a significant problem. The majority of the respondents also believe that the reduction of air travel impacts should be the responsibility for everyone (i.e. the government, the airlines, and the individual travellers). This signifies that domestic tourists in South Africa are supportive of the polluters pay principle. Policy makers could, therefore, use this information to design effective policies that would ultimately be directed at younger (21-35 years of age) females, with tertiary education, as this is the most likely persona who would consider purchasing a carbon tax. Respondents also indicated that a carbon tax should be privately and internationally regulated to be effective and ensure transparency.

Conclusions

Globally, environmental concerns have escalated over the last decade, yet in spite of this, global demand for air travel continues to grow (McKercher, Prideaux, Cheung & Law, 2010). Travel is now firmly embedded as an essential part of the lifestyle of the developed world and, since the late 1990s, has also become increasingly popular among residents of rapidly developing nations (McKercher, Prideaux, Cheung & Law, 2010), such as South Africa. Various measures are currently being reviewed to reduce the contribution of the transport sector, and aviation in

particular, to climate change. These include control measures and behavioural change such as emission trading schemes and carbon taxes, technological changes such as improved fuel efficiency and alternative fuels, and structural changes such as restructuring public transport and air traffic management (Gössling, Broderick, Upham, Ceron, Dubois, Peeters & Strasdas, 2007). Each and every measure has its own strengths and weaknesses, and it is only through a combination of these measures that the problem of climate change can be confronted. In view of the strong growth in the aviation sector; technological, structural and behavioural changes will be necessary to bring aviation onto a sustainable emissions path (Gössling, Broderick, Upham, Ceron, Dubois, Peeters & Strasdas, 2007). An optimal approach in terms of control measures might be to combine a compulsory, non-tradable cap on aviation-related emissions together with voluntary carbon taxes. A non-tradable cap would guarantee the primary goal that emissions from the sector essentially would stabilise, and voluntary offsets could then contribute to further emission reductions in the sector (Gössling, Broderick, Upham, Ceron, Dubois, Peeters & Strasdas, 2007).

Domestic tourists interviewed at O.R. Tambo International Airport in South Africa have a good basic understanding of climate change, but they generally lack a more in-depth knowledge on the natural causes of climate change and greenhouse gases. Nonetheless, domestic tourists view climate change as a serious problem, and flying is widely believed to be a major contributor to climate change. Importantly, the majority of the sample group indicated that they would consider paying a voluntary carbon tax, and a young female with tertiary education is the most likely to pay such a tax. There are, however, significant trust concerns regarding the

government controlling the carbon tax which could create a considerable barrier if such a tax were implemented in the future. The majority of respondents (63%), which ideally represent the average domestic tourist within South African, would consider paying the carbon tax, but due to the concept of the attitude-behaviour gap, this percentage would most likely be less in reality. This observation illustrates that while some tourists are beginning to realise that they are part of the problem, most have not begun to engage in actions that will make them part of the solution (McKercher, Prideaux, Cheung & Law, 2010). Solution orientated change will require a range of actions to educate consumers, to increase awareness and, importantly, to convince respondents that their own actions can make a meaningful contribution (McKercher, Prideaux, Cheung & Law, 2010). Therefore, even though the introduction of a carbon tax may have many merits and would most likely be a successful initiative in South Africa, it should be viewed as part of a package of mitigation schemes, and should not be relied on solely.

Acknowledgements

The authors would like to thank the Airports Company of South Africa (ACSA) for allowing the study to take place at O.R. Tambo International Airport in Johannesburg, South Africa.

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