The Relationship Between Air Traveller's Sustainable Awareness, Attitude and The Willingness to Mitigate – A Paradox?

Babette den Daas

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Erasmus University Rotterdam – Erasmus School of Economics

Supervisor: G. Mingardo

Second assessor: F. de Haan

Student number: 372393

Preface and Acknowledgments

The subject of this thesis came to light because I found it interesting to notice that many of my peers proclaimed to be worried about climate change and were trying to adapt their behaviour to live more sustainable. In contrast, they also often go on to places far away from home for holidays and city trips. This made me wonder whether awareness about climate change and sustainable behaviour in daily lives would affect the willingness to mitigate the negative effects of travel behaviour. With this thesis, I hope to provide insights in this relationship between awareness, attitude and behaviour.

This thesis could not have been written without the help of my supervisor, Mr. H. Mingardo. He not only helped me to get in contact with Rotterdam The Hague Airport, which made it possible to conduct my survey there, but I would like to thank him as well for his patience and support while writing the thesis. In addition, I would like to thank Rotterdam The Hague Airport for providing me with the opportunity to conduct the survey at their airport. Moreover, the suggestions from Mrs. Breedveld, Commercial Director of RTHA, for some of the questions in the survey were of great value, for which I would like to thank her very much.

Abstract

The aim of this thesis is to explore whether pro-environmental characteristics, awareness and attitude of air travellers have an impact on their willingness to mitigate the negative effects of their travel behaviour, by either participating in a voluntary carbon offset programme or changing their behaviour. Insights from previous research are considered, to investigate whether individuals experience the following gaps when it concerns travelling for leisure trips (i.e. holidays and city trips): 'Awareness – Attitude', 'Attitude – Behaviour', and 'Home – Away'. An additional aspect of the research is the effect of message design. It is assessed whether attitude and willingness to mitigate are (more) influenced by loss-framed information. The findings of the research are gathered from a survey conducted online and at Rotterdam The Hague Airport. The findings suggest that there is no direct positive effect of awareness on individuals' attitude, but there is a potential positive or negative (indirect) influence on the willingness to mitigate. A positive attitude towards voluntary carbon offset programmes has only partially a positive influence on the willingness to mitigate, and in case it has influence, it concerns attitudes that are internally reasoned. A further relevant conclusion is that loss-framed information has no significant effect on either attitude or willingness to mitigate. Nevertheless, sustainable behaviour in daily lives is an indicator for such behaviour 'away', and a gap between 'home' and 'away' is thus not visible. This could imply that strategies focussed on making individuals behave more sustainable in their daily lives would have an (in)direct effect on travel and tourism behaviour.

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1.   Introduction

For over more than 30 years, humanity has been warned about the problem of 'climate change' (Revkin, 2018). Since it has evolved from a 'problematic hypothesis' towards a 'problematic truth' (Brouwer et al., 2008), individuals became increasingly aware of their behavioural impact on the environment and the necessity to lower their environmental footprint (Gadenne et al., 2011; Kim et al., 2016). As a result, individuals are willing to switch to more sustainable behaviour (Gadenne et al., 2011), for example, by opting for green energy, using less plastic or lowering their meat consumption. It is, therefore, all the more contradictory that passenger travel by air has continued to increase, and it is not expected that this growth will end anytime soon. To illustrate, worldwide air travel demand grew by 6.5% in 2018 (IATA, 2019), and according to the International Air Transport Association (hereinafter: IATA) trends indicate that passenger numbers could double to 8.2 billion by 2037 (IATA, 2018).

Aviation may not be considered to be one of the primary drivers of global warming at the moment as it only accounts for around 2% of the CO_2 generated by human activities each year (ATAG, 2018b). Nevertheless, the substantial growth of the industry suggests that its contribution to emitted Greenhouse Gasses (hereinafter: GHG), including CO_2, will increase in the future. So, it could become a key factor (Davison et al., 2014; Jou & Chen, 2015), and by 2050 the industry may account for 15% up to 40% of global CO_2 emissions (Alcock et al., 2017; Gössling & Peeters, 2007). Such scenarios are inconsistent with global political ambitions and commitments laid down in, for example, the Paris Agreement (UNFCCC, 2018), or the European Unions' aim to be a climate-neutral economy by 2050 (European Commission, 2018).

It is, therefore, important that the negative impacts of aviation are reduced or neutralised to achieve such environmental goals and targets (Brouwer et al., 2008). Many arrows are aimed at technological developments and solutions. Nevertheless, it is unlikely that they will make a considerable distinction in the near future (Davison et al., 2014). As pointed out by Gossling et al. (2007), one of the most essential means in the process of reducing the aviation industries' impact on the environment will be behavioural change. This behavioural change focusses on 'mitigation', which are actions to minimize the magnitude of global warming by either reducing the sources of GHG or neutralising the emitted GHG by, for example, planting trees that will absorb the CO_2 (Chang & Martens, 2017; Semenza et al., 2011).

Opportunities for immediate action lie in increasing the voluntary mitigation of individuals by choosing for a more sustainable, low-carbon lifestyle (Semenza et al., 2008). When it concerns travelling by air, individuals have, among others, two choices which would lower the GHG emissions of their travelling activities: participate in a voluntary carbon offset (hereinafter: VCO) programme, and change their travel behaviour (e.g. make use of modes that emit less carbon).

Nevertheless, changing the behaviour of air passengers is also one of the greatest challenges. In order to change behaviour, it is often assumed necessary that individuals are aware of their negative or wrong behaviour, as well as a willingness to change this behaviour (Kollmuss & Agyeman, 2002). It could be argued that the awareness of the negative effects of flying has increased over the years, considering trends like 'flight shame' (Asquith, 2019). Additionally, recently flying is seen as one of the greatest carbon sins (Rosenthal, 2013), and in 2019 there was an of sustainability-related search terms in Google, such as 'CO2 compensation' (Travelandmobility.tech, 2020).

It is, however, questionable whether there exists a real willingness to 'mitigate' air travel behaviour, especially when it concerns travel for leisure purposes like holidays. Tourism nowadays could be labelled as hyper-mobility (Høyer, 2000), typified by various short (city)trips and longer holidays throughout the year (Hares et al., 2010). According to P. Corvo (2011), holidays are seen as the moment where individuals recapture the identity they lost during work. During holidays a vague but intense dream of happiness is chased, because of which holidays become something festive and privileged (Corvo, 2011).

Previous research has indicated there are so-called 'Awareness – Attitude' and 'Attitude – Behaviour' gaps when it comes to travelling by air (Davison et al., 2014; Hares et al., 2010). Additionally, there has been focussed on the motivation to mitigate the environmental impacts of flying (e.g., Mair, 2011), the considerations that influence the willingness to compensate and the effect of this willingness on the likelihood to compensate (e.g., Van Birgelen et al., 2011), and the importance of message designs (e.g., Lu & Wang, 2018). The aim of the thesis is to investigate whether certain pro-environmental characteristics, awareness and attitude of air travellers have an impact on their willingness to mitigate, by either participating in a VCO programme or changing their behaviour. There is focussed on travelling for leisure trips (e.g. city trips and holidays), as it is assumed that these are approached in a different way than trips

in general (i.e. both holiday and business trips). In this research, therefore, the following research question is central:

> *Do pro-environmental characteristics, awareness and attitude have a positive effect on air traveller's willingness to mitigate when it concerns leisure trips?*

One of the aspects of the research is the effect of the message design. There will be assessed whether an individual's attitude and willingness to mitigate are influenced by the way the information provided to them is framed, i.e. is there a different effect in case of gain or loss framing. The research is conducted by means of a survey, which is partially conducted at the Rotterdam The Hague Airport (hereinafter: RTHA) and partially distributed within my own network by means of 'snowball sampling'.

The outlook of the thesis is as follows. In Chapter 2, a literature review is conducted to determine what constitutes the 'Awareness – Attitude' gap and the 'Attitude – Behaviour' gap. Moreover, some of the barriers to behavioural change will be discussed. In addition, the effect of information on awareness, attitude and behaviour is investigated, in particular the effect of 'loss-framed' information. Furthermore, several mitigation possibilities will be briefly addressed. The chapter ends with the hypotheses that will be researched throughout this thesis, based on the insights of the literature review. Chapter 3 follows with a discussion of the research design and data collection. In this section, the structure of the survey will be discussed, along with the way the sample was obtained, and the data used will be described. In Chapter 4, there will be continued with the methodology used to generate the results of this thesis. Moreover, the findings of the research will be described. The thesis will end by presenting the conclusion of the research in Chapter 5, together with the discussion and limitations.

2. Theory

In the following chapter the relationship between awareness, attitude and behaviour will be discussed, and how a gap between a person's awareness and attitude or between a person's attitude and behaviour affects a person's choice, with a specific focus on environmental issues and travel behaviour. In addition, the effect of information is reviewed, particularly the effect of framed information on behaviour. The chapter ends by discussing several mitigation opportunities (air)travel passengers have, in order to understand the effects of these opportunities.

2.1. Relationship Between Awareness – Attitude – Behaviour

The existence of the relationships between an individual's awareness, attitude and behaviour have been acknowledged in several studies (Lu & Wang, 2018). The awareness of an individual reflects an individual's knowledge and understanding of a specific subject or behaviour. In contrast, the individual's attitude reflects the level of favourable or unfavourable appraisal of that subject or behaviour (Van Birgelen et al., 2011). Attitude is the preliminary evaluation before exhibiting that particular behaviour (Fazio, 1995).

This awareness – attitude – behaviour relationship was, for example, visible in the research of Nilson and Kuller (2000), which found that individual's awareness of the impact on the environment is positively correlated with their attitude towards the environment. Additionally, they found a positive correlation between awareness and attitude and the individual's pro-environmental travel behaviour.

When applying logic to the awareness – attitude – behaviour relationship, increased awareness and attitude towards the impact of behaviour on the environment should lead to a behavioural change. This reasoning can be either based on the rationalists 'Knowledge-Deficit' model, that suggests that there is a direct effect on behaviour, or the 'Theory of Reasoned Action', that assumes that behaviour is indirectly influenced due to the direct effect on behavioural intentions (Kollmuss & Agyeman, 2002).

Unfortunately, in real life, this relationship is inconsistent, and often a gap exists between the three components of the relationship (Arcury, 1990). Gössling et al.'s

research shows, for example, that despite 82% of the surveyed travellers agreed that flying does not support climate change, they are generally reluctant to change their behaviour (2009). The gaps between awareness, attitude and behaviour are linked to several personal and psychological barriers that limit a person to change to pro-environmental behaviour or are used as tools to justify the unchanged behaviour (Antimova et al., 2012).

2.l.l. Awareness – Attitude Gap

When it concerns the 'Awareness – Attitude' gap, it is assumed that awareness about the impact of specific behaviour does not translate into a changed attitude towards that behaviour, or that there is an inverse change. The research of Hares et al. (2010) suggests such an 'Awareness – Attitude' gap in the case of holidays and international travel. The participants of the conducted focus groups were aware that travelling by air has a substantial harmful impact on climate change. However, this awareness does not manifest itself in an environmentally conscious attitude towards holidays (Hares et al., 2010).

Knowledge could be seen as crucial to overcome mental obstacles, such as ignorance and misinformation (Kim et al., 2016). Therefore, it is often assumed and suggested that the knowledge, i.e. awareness, of individuals increases once they are provided with more information (Arcury, 1990). Nonetheless, gaps between a traveller's awareness and attitudes suggest that providing individuals with more information will not be an effective measure (Howarth et al., 2009). Following this reasoning, increasing their knowledge and understanding of the negative impacts of their (air) travel behaviour is unlikely to make any real difference.

A possible cause for the gap could be that the person has knowledge of the issue, i.e. the adverse effects of air travel behaviour on the environment, but that they lack knowledge of action strategies (Kollmuss & Agyeman, 2002). The gap could also exist because environmental awareness does not lead to the corresponding (pro-) environmental attitudes. However, it would be possible as well that the attitude is more affected by the individual's actual behaviour (Hares et al., 2010), especially when it comes to travelling by air for leisure purposes.

2.1.2. Attitude – Behaviour Gap

A gap between attitude and behaviour implies that pro-environmental attitudes are not reflected by the actual executed behaviour of individuals (Davison et al., 2014; Kollmuss & Agyeman, 2002). This dissonance is very dominant when focussing on behaviour related to environmental issues (Nickerson, 2009). The study conducted by Hares et al. (2010) indicates that, even though the participants see aviation as one of the top three causes of climate change, this does not ensure a behavioural shift in the transport modes used for holidays. Moreover, it is not considered as a factor when deciding on holiday plans.

In contrast, it is found by Barr et al. (2010) that, when it concerns the choice of transport in daily life, there is no such 'Attitude – Behaviour' gap. When it comes to the latter, an environmental attitude can be seen as a significant factor. Another gap could explain this difference in the relationship between attitude and behaviour, the one between 'home' and 'away' (Higham et al., 2016). When engaging in tourism, individuals' climate concerns seem to become less rigid, suppressed or non-existent and tourism seems to be the scene for more environmentally damaging practices (Cohen et al., 2013). It has been labelled as an "a holiday is a holiday" problem by Barr et al. (2010), referring to the fact that individuals are less inclined to behave in an environmentally friendly way during holidays, even if they do so in their daily lives.

The discrepancy between home and away could be explained by the 'Low-Cost Hypothesis' (Diekmann & Preisendörfer, 2003). This theory assumes that an individual's ecological behaviour is influenced by his or her environmental concern in case the behaviour is connected to low costs and little inconvenience. According to Stern (1992), when it concerns an individual's action to save energy, attitudes, and personal norms seem to influence low-cost actions more. Such actions are considered 'easy' to execute and would be, for instance, switching off lights or regulating the room temperature. Following this reasoning, it is not surprising that these individuals will be more likely to change their environmental behaviour, e.g. cycling to work instead of driving or engaging in recycling activities, instead of changing their air travel behaviour. The latter is considered to be a high-cost and high-inconvenience domain (Hares et al., 2010). When behavioural change is linked to high-costs, they outweigh the effects of the individual's environmental attitude (Diekmann & Preisendörfer, 2003). So, the fact that an individual has a pro-environmental attitude may well not be

seen as a correct predictor of that individual's choice for a more sustainable way of travelling for holiday purposes (Juvan & Dolnicar, 2014).

If there is a gap between an individual's attitude and behaviour, it is proposed by the 'Cognitive Dissonance Theory' (Festinger, 1957) that the individual will experience feelings of discomfort. In order to experience cognitive dissonance, it is necessary that the individual is keen to achieve a certain outcome, and that outcome must be valued by the individual (Juvan & Dolnicar, 2014). According to this theory, the individual will adjust either its attitude or its behaviour in order to avoid the feeling of discomfort, i.e. the cognitive dissonance (Hares et al., 2010). When it comes to environmentally sustainable and responsible behaviour, this would indicate that individuals would exhibit consistent behaviour throughout the different areas in their life (Ram et al., 2013). Nonetheless, as described, there could be a possible difference between the behaviour individuals demonstrate at home and what they demonstrate when it comes to their holidays. It is suggested by Hares et al. (2010) that individuals might adjust their attitudes towards holidays and climate change to make the attitude in line with their holiday (travel) behaviour.

A possible explanation for this is Bem's 'Self-Perception Theory' (1967), which suggests that an individual's attitude can be (partially) inferred by observing their 'own' behaviour. Once the individual behaves inconsistent, the initial attitudes are considered to be no longer prominent (Bem & McConnell, 1970). On the contrary, the individual would derive its final attitude from the behaviour exhibited and the context in which this behaviour manifested. The individual would derive its final attitude like an observer would do. Thus, the individual is considered to be not aware of its initial attitude, and its final attitude is a logical conclusion from the exhibited behaviour (Ross & Shulman, 1973). The implicit self-selection rule is used: "What must my attitude be if I am willing to behave in this fashion, in this situation?" (Bem & McConnell, 1970). The Self-Perception Theory could be compatible with the suggestion that travelling by air for holidays became too embedded in the modern way of living and that, thus, changing the behaviour is regarded as impossible, even though they are aware of the negative environmental effects (Hares et al., 2010). Because individuals have become so used to the choice for air travel, their initial attitude would no longer have any influence and the final attitude is interpreted differently.

2.1.3. Barriers to Behavioural Change

Since the gaps in the awareness – attitude – behaviour relationship interfere with behavioural change and the climate change agendas (Anable et al., 2006), it is a crucial step to identify which barriers there could exist to this behavioural change (Hares et al., 2010). When it concerns air travel behaviour and the barriers that hinder behavioural change, this often has to do with denial mechanisms like the dismissal of alternative transport modes, putting the responsibility on others and the value of holidays (Hares et al., 2010; Stoll-Kleemann et al., 2001), or the denial of the climate change problem (Anable et al., 2006).

When it comes to air travel for holiday and leisure purposes, one of the most 'natural' denial and justification mechanisms is the dismissal of alternative (green) transport modes. The research of Randles and Mandler (2009) reveals that only under certain circumstances, other transport options are considered to be a feasible alternative for air travel. Other types of transport are considered to be too slow and too expensive and not part of the reference frame for international holidays (Hares et al., 2010). This shows how stuck individuals are in their thinking pattern by declaring that there are no alternatives to their current behaviour (Juvan & Dolnicar, 2014). In addition, an individual's frequent past behaviour can significantly determine their future behaviour (Ouellette & Wood, 1998).

Another suggested barrier is the one where individuals do not hold themselves responsible for climate change, or they feel that their individual behaviour is insignificant (Juvan & Dolnicar, 2014; Lorenzoni et al., 2007; Stoll-Kleemann et al., 2001). Individuals tend to consider governments, businesses and citizens of other countries as the leading causes of climate change (Hares et al., 2010), and especially the first two parties are also considered to have a greater responsibility to address the problem (Gössling et al., 2009). According to Stern et al. (1999), a sense of 'personal' responsibility is essential for carrying out pro-environmental behaviour. Besides the barrier that individuals tend not to hold themselves responsible, they also have a worry or fear about the 'free-rider' effect (Lorenzoni et al., 2007). They are reluctant to change their (air) travel behaviour, using the inaction of others as a justification mechanism (Anable et al., 2006; Randles & Mander, 2009).

When it comes to changing air travel behaviour for holidays and leisure trips, one of the most important barriers might be that individuals see holidays as something essential and necessary (Hares et al., 2010). The adverse effects on the environment are neglected, using relaxation and escaping everyday life as a justification (Juvan & Dolnicar, 2014). In modern-day and age, taking a holiday is considered to be embedded in an individual's lifestyle (Barr et al., 2010), and it will be the costs that keep individuals from travelling rather than their attitude towards climate change (Hares et al., 2010). Stoll-Kleeman et al. (2001) consider the unwillingness to sacrifice this habit and favoured lifestyle, to be the most powerful denial mechanism.

Many other possible denial and justification mechanisms can be found in previous research, like, among others, ignorance (Stoll-Kleemann et al., 2001). This lack of knowledge concerns not only knowledge on the consequences of travelling by air, but also a lack of knowledge on how climate change is caused, or which solutions there are (Lorenzoni et al., 2007). Another mechanism can be found in the argument that one does not have the information to choose a holiday or leisure trip that has a lower impact on the environment (Juvan & Dolnicar, 2014), or does not possess information on the advantages of alternative travel modes (Randles & Mander, 2009). Since the Knowledge-Deficit theory proposes that a lack of knowledge is related to a lower concern and less change of behaviour (Waygood & Avineri, 2016), providing individuals with the correct information would be essential in the fight against climate change.

2.2. The Gaps & Information

According to Anable et al. (2006), there are two distinct, conflicting views on how provided information affects the awareness – attitude – behaviour relationship. Based on the Knowledge-Deficit theory, individuals' behaviour would be aligned with their attitude once they are provided with the appropriate information. The information would increase an individual's knowledge level and that, in turn, would lead to increased concern, and research has shown that this is indeed the case considering actual knowledge (Cornforth, 2011).

The importance of credible information is also underlined by Baumeister (2017), in order to provide air passengers with easy-to-understand knowledge. This could, for example, be used by airlines to make it easier for passengers to choose flights with lower

emissions per passenger. In order to achieve the desired travel behaviour in case of holidays, passengers should be provided with understandable and reliable information regarding the effect of their tourism on the environment (Eijgelaar, 2011). Explaining to individuals what alternative options they have could eliminate internal barriers (Budeanu, 2007). So, the public should be provided with information regarding the (relative) effect of air travel on climate change, in an accessible and relevant manner (Hares et al., 2010). The research of O'Connor et al. (2002) supports the view that when individuals are presented with better information, they are more willing to change their previous behaviour.

On the other hand, there also exists the perception that information alone is not sufficient. Higham et al. (2016), for example, suggest that to stimulate pro-environmental behaviour, both informational strategies and structural strategies are needed. This view is supported by Randles and Mander (2009), as travelling by air is so socially embedded in modern life, demonstrated by the habit to choose for holidays either overseas or in other countries (Hares et al., 2010). In the research of Kellsedt et al. (2008) the assumption of the Knowledge-Deficit Theory is tested, and they found that with increased information provision, i.e. increased knowledge, the sense of responsibility and, indirectly, concern decreases. In addition, it is argued that increased knowledge may lead to curiosity in science and confidence that science will be the solution for climate change, known as the 'Environmental Knowledge Hypothesis' (Waygood & Avineri, 2016).

2.2.1. Framing

How information is presented, i.e. framed, is of great importance on how the individual interprets it. One of the key findings of Kahneman & Tversky's 'Prospect Theory' (1979) is that individuals are 'loss averse', which implies that they are more sensitive to negative effects (losses) than to positive effects (gains) (Avineri, 2012). When losses and gains are, thus, of equal size, more value is attributed to losses (van de Kaa, 2010). Within travel behaviour, the way of framing information could impact the way individuals react to travel choices (Avineri, 2012).

Framing the information as a loss could be used when information to promote travel behaviour change is designed (Avineri, 2012). In the research of Avineri and Waygood

(2013), it is analysed whether framed information, on CO2 emissions of alternative transport modes, will have an effect on an individual's attitude and behaviour towards sustainable choices. By framing information, individuals will be either focussed on the possibility to choose for environmental benefits (positive frame) or choose to reduce the environmental losses (negative frame). It is found that it is more effective to use negative framing and that, therefore, when it concerns travel-related choices based on CO2 emissions, individuals are loss averse (Avineri & Waygood, 2013).

2.3. Air Travel Mitigation Possibilities

In order to ensure that the impact of air travel behaviour on the environment is either reduced or neutralised, it is essential that travellers focus their behavioural change on the mitigation of the negative effects (Chang & Martens, 2017). When it concerns voluntary mitigation there lies a prospect for immediate action by individuals, whereas non-voluntary possibilities like 'Air Tax' policies are often not enforced or fulfilled due to a political absence of engagement (Semenza et al., 2008).

In this thesis, there will be focussed on the willingness to engage in voluntary mitigation options like carbon offsetting and opting for the alternative, in addition to the willingness to support an aviation tax policy. To determine where these mitigations options revolve around, they will we briefly discussed.

2.3.1. Voluntary Carbon Offsetting

In today's tourism, it is possible for travellers to participate in VCO programmes (Gössling et al., 2007). VCO programmes are focussed on offsetting the emissions that cannot be avoided by the traveller, i.e. to neutralise the emitted emissions, by supporting projects that reduce emissions in another way (UNFCCC, 2020). Hence, it is a way to indirectly reduce the harmful effects of one's behaviour by balancing out an individual's carbon footprint (Clark, 2011).

When it comes to offsetting emissions from flights, air travellers have many opportunities to calculate the emitted emissions from their flight and choose to pay a certain amount to compensate, i.e. offset, them (Jou & Chen, 2015). For example, VCO

programmes can be provided by the airline during the booking stage of a passenger's interaction with them. It is, however, often the case that such options are only available at later booking-stages or that they are somewhat hidden in all the 'extra' options when booking a flight.

The success of such programmes is heavily dependent on the degree of voluntary commitment by passengers to the VCO programme (Araghi et al., 2014). Unfortunately, often the participation rate is lacking (McLennan et al., 2014). The research of Jou & Chen (2015) shows that individuals are more willing to participate once they understand the purpose and content. This, therefore, suggest that individuals are more likely to participate in VCO programmes when they are more familiar with the meaning of such programmes, and that providing individuals with information on offsetting and these specific programmes could have a positive effect on their willingness to participate (hereinafter: WTP).

2.3.2. Opting for the Alternative

In addition, to neutralise emitted emissions, individuals also have the possibility to avoid these emissions entirely and thus reduce their carbon footprint. This means that individuals change their 'normal' behaviour and opt for the 'alternative'. When it concerns air travel behaviour, the alternative could be, for example, either an alternative (green) transport mode, avoiding flights, or opting for carbon-neutral fuel.

Choosing for an alternative (green) transport mode implies that a traveller avoids flights if there is a feasible alternative (Van de Ven et al., 2018). Green alternatives would be, for example, using either the train or bike when travelling for holidays. This does implicate that the considered holiday destinations cannot be the 'world' and that an individual might have to change its scope. Since the dismissal of alternative transport modes is one of the barriers to behavioural change and they are not in the reference framework for holidays (Hares et al., 2010), it is questionable whether individuals would be eager to stay more 'close to home'. On top of that, holidays and leisure trips with air travel involved are considered to be part of the 'aspirational' lifestyle (Hares et al., 2010).

Another alternative option is choosing for flights with 'no-carbon' fuel. This is a future option, and at RTHA the commercial feasibility of such a 'no-carbon' jet fuel is investigated by a group of business (Beard, 2019). The idea behind this is that renewable fuel is produced from CO_2 in the air, and by doing this, there is a focus on closing the carbon cycle (Climeworks, 2019). If this innovation is successful and will be used for commercial passenger flights, this would thus imply that air travellers will be able to fly 'carbon neutral'.

2.3.3. Aviation Tax Policies

When it concerns policies regarding changing behaviour and promoting sustainable behaviour, most of them focus on 'daily' behaviour and not on 'tourism' behaviour. In addition, individuals are seen as bearers of social change by many public policies (Barr et al., 2010). It is, however, questionable if all voluntary, choice focussed initiatives to change behaviour will bring about the change that is needed. One of the non-voluntary possibilities to change behaviour is using an aviation tax policy to discourage individuals from consuming. Increasing the tax on flights is based on the 'polluter-pays' principle, that ensures that those who cause the negative impact on the environment due to their behaviour also carry the costs (Brouwer et al., 2008). So, an aviation tax increases the price paid by the passenger in order to compensate for the negative effects caused by the emissions from that flight. When it comes to tax policies on flights, they are often not applauded by individuals, as the 'freedom to travel' is regarded as a great value (Becken, 2007).

In the European Union (hereinafter: EU) 10 member states did not impose some sort of aviation tax: Belgium, Bulgaria, Cyprus, Denmark, Estonia, Hungary, Ireland, Lithuania, Luxembourg, and the Netherlands (European Commission, 2019). In the Netherlands, the government wants to introduce such an aviation tax with effect from January 2021 onwards. There exists, however, a preference to start such a tax within the European Union, instead of each country implementing an individual tax (Rijksoverheid, 2019). Such an EU-wide tax on flying is supported by other countries as well, e.g. Germany, France and Sweden (Ekblom, 2019).

2.4. Hypotheses

The research question of this thesis was as follows:

> *Do pro-environmental characteristics, awareness and attitude have a positive effect on air traveller's willingness to mitigate when it concerns leisure trips?*

In order to answer this question, the following hypotheses are formulated, based on the reviewed theory:

Table 1. Hypotheses based on literature review.

Hypothesis	Research objective
H1: Individuals that are aware of the impact of aviation, have a positive attitude towards VCO programmes.	*Awareness – Attitude gap*
H2: Individuals that are aware of & have knowledge of VCO programmes, have a positive attitude towards VCO programmes.	*Awareness – Attitude gap*
H3: Individuals with a positive attitude towards VCO programmes, are (more) willing to participate in VCO programmes.	*Attitude – Behaviour gap (WTP)*
H4: Individuals with a positive attitude towards VCO programmes, are (more) willing to change their behaviour.	*Attitude – Behaviour gap (WTC)*
H5: Individuals with (self-)proclaimed sustainable behaviour in daily life are (more) willing to participate in VCO programmes.	*Home – Away gap (WTP)*
H6: Individuals with (self-)proclaimed sustainable behaviour in daily life are (more) willing to change their behaviour.	*Home – Away gap (WTC)*
H7: Individuals provided with loss-framed information have a (more) positive attitude towards VCO programmes.	*Framing effect (Attitude)*
H8: Individuals provided with loss-framed information are (more) willing to participate in VCO programmes.	*Framing effect (WTP)*
H9: Individuals provided with loss-framed information are (more) willing to change their behaviour.	*Framing effect (WTC)*

3. Research Design & Data Collection

In this chapter, the research design will be discussed. The structure of the survey and the way data is gathered will be described below. The aim of the survey is to provide measurements that can be used for empirical analyses, in order to investigate whether pro-environmental attributes, awareness and attitudes of air travellers have an impact on their willingness to engage in mitigation activities. The survey not only examines if individuals are willing to engage but also if particular circumstances influence this willingness to engage. Additionally, the survey aims to investigate whether the framing of information has a significant effect on the willingness to participate.

3.1. Survey Structure

The survey used for this thesis is partly based on the research of Lu & Wang (2018). Mr. Mingardo, thesis supervisor, and Mrs. Breedveld, Commercial Director of RTHA, were consulted to discuss the pre-designed survey, whereupon the final survey was designed (see Appendix A).

The survey starts with some questions regarding the general (air) travel behaviour (Q1 – Q5) and sustainable behaviour (Q6 – Q7) of the respondent. Concerning their air travel behaviour, respondents were asked to state their average annual number of flights for leisure trips (e.g. holidays, city trips, etc.) to two distinct geographic regions: within Europe and outside of Europe. Respondents could choose one out of the four options per region: < 1, 1 – 3, 4 – 5, or more than five flights per year. Even though this does not constitute any detailed information about the respondent's travel destinations and the exact distance they flew, the two regional classifications provide information on the respondent's focus area or reference frame when travelling for leisure (e.g. are they more focussed on European countries or not). Additionally, the respondents are asked whether they already use 'alternative' transport modes for leisure purposes, and if so which mode (i.e. car, train, bus/touring car, bike, or other).

The questions on sustainable behaviour are included to make a distinction between respondents based on pro-environmental characteristics. Later in the survey, the respondents are asked whether the sustainability aspects of an airport influence their choice for a specific airport (Q20). This question is included to see whether it would be

useful for an airport, like RTHA, to (actively) advertise or inform passengers about its sustainability aspects.

The survey is followed by several questions (Q8 – Q23) that measure distinct aspects needed for the empirical analysis, which will be discussed first. It is ended with some socio-demographic questions (Q24 – Q27), that focus on the respondent's characteristics like gender, age, nationality, and education level. Respondents are also requested to fill in whether the survey was taken at RTHA or not, in order to analyse whether there exists a distinction between the groups.

3.1.1. Measurements

In the survey, 15 measurements are defined to complete the empirical analysis, see Table 2. Measurements 1 - 3 are used to measure the respondent's awareness of the negative effects of flying, its awareness of VCO programmes and its knowledge on the latter concept. These measurements were asked before the respondent sees the framed information. All the subsequent measurements were only asked after the respondent read the information.

The first four measurements, after the framed information is provided, focus on the respondent's attitudes towards VCO programmes (M4 - M7). It is important to understand the respondent's attitude towards mitigation solutions since these are essential in closing the 'Attitude – Behaviour' gap (Eijgelaar, 2011). The fourth and fifth measurements are used to see if the respondent's attitudes are more externally influenced (i.e. benefits humankind/positive impact on the environment), whereas the sixth and seventh measurement focus on internally associated attitudes (i.e. fly more/feel less guilty).

Measurements 8 – 11 focus on the respondent's WTP in a VCO programme. Since it is generally believed that behavioural intention is a predictor of the actual behaviour (Ajzen, 1991), the respondent's willingness is assessed. The measurements differ on the amount of action that the respondent must take to participate in the VCO programme (i.e. self-research vs. information provided by an external factor), and the moment when the respondent chooses to participate (i.e. during vs. after booking, or at the airport). The willingness to support a CO_2 (aviation) tax policy is measured in M12.

Table 2. Measurements used in the survey

Measurements

Awareness/knowledge on aviation's effect on the climate and the concept of VCO
M1: I am aware of the negative effects of travelling by air on the environment.
M2: I have heard of voluntary carbon offset programmes.
M3: I know what a voluntary carbon offset programme entails.

Attitudes toward carbon offsetting programmes
M4: Participating in a voluntary carbon offset programme benefits humankind.
M5: Participating in a voluntary carbon offset programme has a positive impact on the environment.
M6: Participating in a voluntary carbon offset programme offsets my flying behaviour, so that I can use this transport mode more often.
M7: Participating in a voluntary carbon offset programme makes me feel less guilty about flying.

Willingness to offset, depending on action needed
M8: I am willing to pay for the voluntary carbon offset programme when I travel by plane, if this option is provided by the airline while booking my flight.
M9: I am willing to pay for the voluntary carbon offset programme when I travel by plane if this option is provided by the airline after I have booked my flight.
M10: I am willing to pay for the voluntary carbon offset programme when I travel by plane if I have to find a voluntary carbon offset programme myself.
M11: I am willing to pay for the voluntary carbon offset programme when I travel by plane, if this option is provided at the airport.
M12: I am willing to support a CO2 tax policy on passengers' duties.

Willingness to change travel behaviour
M13: I am willing to fly less for leisure, to reduce environmental impacts.
M14: I will plan my leisure trips to destinations whereto green transport is a feasible possibility, to avoid travelling by air and thus reduce the environmental impact of my leisure trip.
M15: I am willing to pay extra for my flight, if the plane uses synthetic fuel, making my flight CO2-neutral.

The last three measurements correspond to the respondent's 'willingness to change' (hereinafter: WTC) its travel behaviour, by focussing on either their willingness to fly less or their willingness to opt for green transport and their willingness to pay extra for a CO2 neutral flight. Measurement 15 was added to this survey to investigate whether respondents are willing to pay more for 'no carbon' flights.

For all measurements, a five-point Likert scale is used. For measurements 1 – 7, the common agree-disagree Likert scale is set from 'Strongly Agree' (=1) to 'Strongly disagree' (=5). The other measurements that all focus on the 'willingness' of the respondent make use of the following five-point Likert scale: 'Extremely willing' (=1), 'Willing' (=2), 'Neither willing nor unwilling' (=3), 'Unwilling' (=4), 'Extremely unwilling' (=5).

3.1.2. Framed information leaflet

As previously mentioned, measurements 4 – 15 are asked after the framed information is provided. Since briefing cards are commonly used within the aviation industry (Lu & Wang, 2018), this medium is used to inform the respondents about the environmental impacts of aviation in general and the potential effect of their flying behaviour. Additionally, the briefing card provides potential mitigation strategies: participate in VCO programmes, make use of green transport, or fly less.

The infographic leaflet is divided into two equal parts, where the left part focusses on the 'Environmental Impacts of Aviation', and on the right it is shown what a respondent could do themselves (see Figure 1). On the top left information is provided on the growth in the number of air travellers and what it could be in the future (IATA, 2018). In addition, information is provided on how much CO_2 was produced by flights in 2018, followed by information stating that the aviation industry accounts for 2% of the overall CO_2 emissions at the moment (ATAG, 2018a). On the lower left side, the respondent is also informed about its own 'annual CO_2 budget', which constitutes of 2300 kg CO_2 per year (Schellnhuber et al., 2009), and how much a return trip Amsterdam – Nice or Amsterdam – Bali by plane emits. This setup is chosen since information on CO_2 emissions, and some context around this topic could lead to behavioural change with the aim to reduce the effect on the environment (Waygood & Avineri, 2016). The amount of CO_2 per return trip is calculated using a carbon footprint calculator (Greentripper, 2019), and the results are either gain or loss-framed. In case of gain framing, the results are stated in such a way that a return trip Amsterdam – Nice emits less than Amsterdam – Bali (See Figure 1), i.e. there is an emphasis on the benefits for the environment. In case of loss framing the results are framed in such a way that the Amsterdam – Bali return trip emits more than the Amsterdam – Nice return trip (See Figure 2).

ENVIRONMENTAL IMPACTS OF AVIATION

Air travellers are continuously growing in **4-6% per annum**

Passenger numbers could **double to 8.2 billion in 2037**

To limit global warming to 2°C, a **person's annual budget** is

2300 kg CO2

Flights produced **895 million tons CO2** in 2018

2% of CO2 emissions is produced by the global aviation industry

Amsterdam – Nice (return trip) emits **336 kg CO2**

That is **2.596 kg less** than a return trip Amsterdam - Bali

WHAT CAN YOU DO!

Fly Neutral – Voluntary Carbon Offset Programmes

1. Information
Check CO2 emissions at the airline or NGO

2. Calculate & Pay
Calculate total CO2 emissions for your flight

3. Support
Projects reducing GHG emissions in the short- or long-term

AND

Choose Green transport

Amsterdam – Nice (return trip) by train produces **312 kg CO2 less**, than the same return trip by plane

Fly Less frequent

Figure 1. Gain-framed information leaflet

ENVIRONMENTAL IMPACTS OF AVIATION

Air travellers are continuously growing in **4-6% per annum**

Passenger numbers could **double to 8.2 billion in 2037**

To limit global warming to 2°C, a **person's annual budget** is

2300 kg CO2

Flights produced **895 million tons CO2** in 2018

2% of CO2 emissions is produced by the global aviation industry

Amsterdam – Bali (return trip) emits **2932 kg CO2**

That is **2.596 kg more** than a return trip Amsterdam - Nice

WHAT CAN YOU DO!

Fly Neutral – Voluntary Carbon Offset Programmes

1. Information
Check CO2 emissions at the airline or NGO

2. Calculate & Pay
Calculate total CO2 emissions for your flight

3. Support
Projects reducing GHG emissions in the short- or long-term

AND

Choose Green transport

Amsterdam – Nice (return trip) by plane produces **312 kg CO2 more**, than the same return trip by train

Fly Less frequent
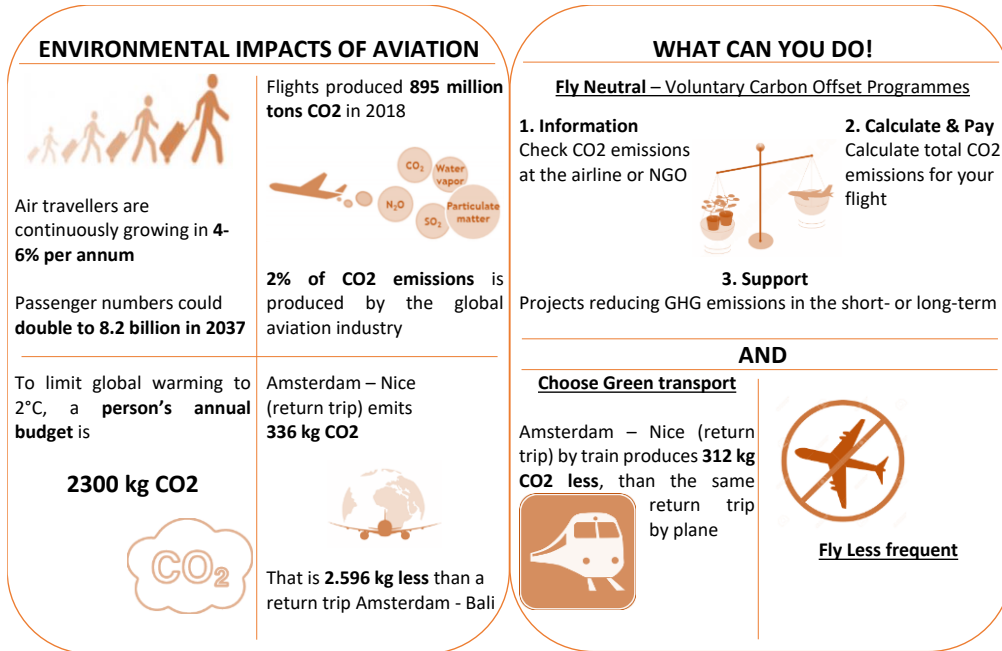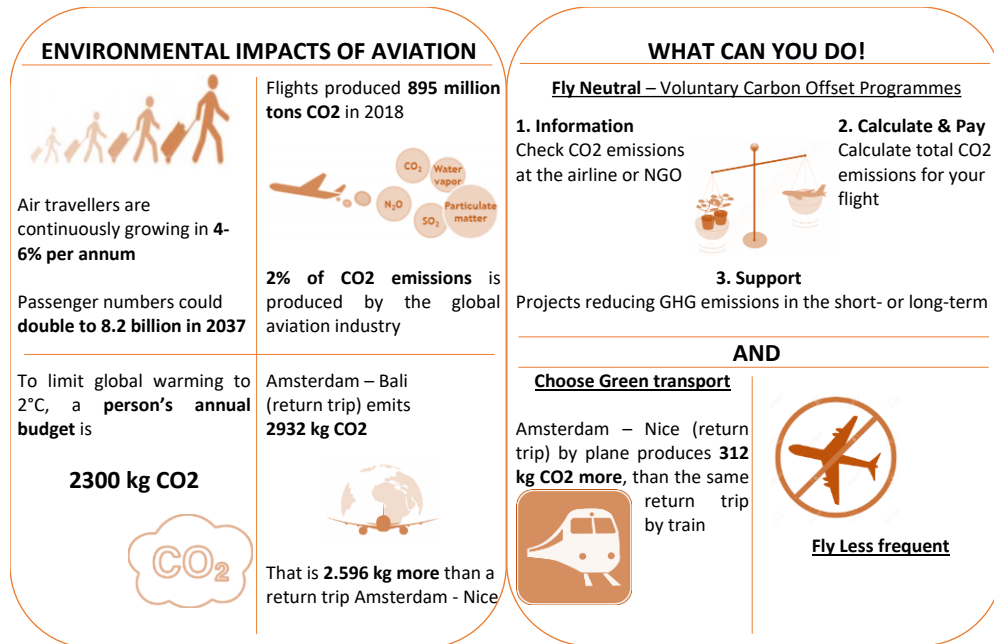
Figure 2. Loss-framed information leaflet

As stated earlier, on the right side of the infographic leaflet, information is provided which shows what a respondent can do in order to mitigate the negative impacts of their travel behaviour. At the top, 'VCO programmes' are mentioned, and it is briefly described how such a programme works. Moreover, changing travel behaviour is encouraged at the bottom by mentioning green transport and flying less. Concerning the information about the benefits of using green transport modes like the train, the results are again framed. When gain-framed, it is mentioned that a return trip Amsterdam – Nice by train emits less CO_2 compared to flying, and when loss-framed it is emphasised how much worse a plane is.

3.2.   Sample Obtained

The sample of the survey is obtained in two different ways. In coordination with RTHA, the survey was conducted among passengers and other individuals at the airport, during four days at the end of September and the beginning of October in 2019. Given that the survey was conducted outside the high season of the holiday period, it was expected that most respondents at the airport would be somewhat older or have young children, as they would not be bounded by, for example, school holidays.

Since research shows that older individuals are less likely to change their behaviour compared to younger individuals (Semenza et al., 2008), it was chosen to distribute the survey within my own network as well, to ensure that younger individuals would also be included in the survey sample. The network was kindly asked to distribute the survey to as many individuals, that by means of 'snowball-sampling' a greater sample could be obtained. To ensure that respondents would not give socially desirable answers, the survey is anonymised.

It was expected that most passengers at RTHA would be Dutch, so the survey was translated into Dutch. The survey was provided on an iPad to the respondents at RTHA, and this is essentially the same as the online distributed survey. It must, however, be noted that at RTHA there was a possibility for the respondents to ask questions in case something was unclear, which was not possible for the respondents of the online survey. It is assumed that such a possibility has not affected a difference in the answers, as the survey was clearly described and available in two languages.

As mentioned, the survey starts with questions that focus on the respondent's (air) travel behaviour, their sustainable behaviour, their awareness with regards to the negative impact of human and air travel behaviour, and the awareness and knowledge regarding VCO programmes. These questions are followed by one, and only one, of the infographic leaflets. The gain and loss-framed infographic leaflets are randomly assigned to the respondents, and the infographic leaflet is shown to the respondent for at least 40 seconds before they are able to go to the next question. This is done to assure that the respondents actually read and absorb the information provided in the leaflet before they answer the subsequent questions. After this, the attitude of the respondents towards VCO programmes is measured, followed by questions related to their WTP and WTC.

In total, 174 samples were obtained, 103 from the survey conducted at RTHA and 71 samples where filled in online. As five of the online surveys were not fully completed, they were retained from analysis, together with one sample where the respondent's age was outside the range (18+). Eventually, 168 samples were used for the analysis, distinguishable in 103 at RTHA and 65 online. The gain-framed infographic leaflet is shown to 85 of the respondents (50.60%) and 83 respondents were provided with the loss-framed infographic leaflet (49.40%). Of the respondents included in the sample, 51.79% is male and 48.21% female.

The respondents' age lies between 19 and 88 years old, with a mean of around 45 years. Note that the variable *Age* has been recoded to 5 different age groups for convenience, categorised as followed: 'Students' (18-25), 'Young Professionals & Families with young children' (26-40), 'Families with older children' (41-55), 'Families with children not living at home' (56-65), 'Retirees' (65+). This categorisation is based on the distinct stages of life, from where it can be expected that these individuals also have different travel behaviour. As expected, the respondents at RTHA would be somewhat older, with 69.9% of the respondents here above the age of 41. By comparison, 60% of the respondents from the online survey are 40 or younger.

Table 3. Profile of respondents and their travel behaviour (%).

Variable		At RTHA (N = 103)	Not at RTHA (N=65)
Gender	Male	49.52	55.28
	Female	50.48	44.62
Age category	19-25	7.77	32.31
	26-40	22.33	27.69
	41-55	36.89	7.69
	56-65	17.48	27.69
	65+	15.53	4.62
Education	Less than high school	0.97	0
	High school degree or equivalent	8.74	1.54
	Secondary vocational education	33.01	1.54
	Higher professional education	38.83	21.54
	University degree or higher	18.45	75.38
Frequent flyer Europe	Yes	20.39	29.24
	No	79.61	70.76
Frequent flyer World	Yes	4.85	4.62
	No	95.15	95.38
Green transport	Yes	13.59	20.00
	No	86.41	80.00
Choice airport	Yes	20.39	24.61
	No	79.61	75.38

Further information about the respondents, like their characteristics and travel behaviour, can be found in Table 3 and Table 4. The profile of the respondents shows that the male – female ratio is roughly equally divided, distributed for the way the survey is conducted (i.e. at RTHA or not). As mentioned, there is quite a difference between the age groups, and the same goes for the distribution of education. Regarding the latter, the percentage of respondents with a university degree or higher is proportionally larger for the online survey group (75.38%) compared to the survey group from RTHA (18.45%). Generally, at RTHA, the respondents' level of education was lower.

It should be noted that RTHA generally only offers flights within Europa and no distant flights such as from Amsterdam Airport Schiphol. This could imply that the sample group is somewhat distorted with regards to the number of flights outside of Europe. Nevertheless, as the online surveys are also included in the sample, such a bias is not taken into account in the sample.

Focussing on the different age categories, it can be established that the group 'Young Professionals & Families with young children' take fewer flights within Europa (i.e. 75.61% indicate that on average they take less than one flight annually). On the other hand, this is also the age group that in percentage terms take more flights outside of Europe. The opposite can be seen in the age groups 'Families with older children' and 'Retirees', they take more flights within Europe in percentage terms, but fewer flights are taken outside of Europe in these age groups.

Table 4. Travel behaviour per age category (%)

		Students (N=29)	YP & Families young children (N=41)	Families older children (N=43)	Families children with children not living at home (N=36)	Retirees (N=19)
Frequent flyer Europe	< 1	68.97	75.61	60.47	63.89	63.16
	1 – 3	6.90	9.76	6.98	13.89	10.53
	4 – 5	13.79	9.76	32.55	19.44	26.31
	> 5	10.34	4.88	0	2.78	0
Frequent flyer World	< 1	62.52	43.90	74.42	69.44	78.95
	1 – 3	31.03	48.78	16.78	30.56	21.05
	4 – 5	0	2.44	6.98	0	0
	> 5	3.45	4.88	2.32	0	0

3.3. Data

The variables used in the research are divided into different groups (see Table 5). A definition of the different variables used in this thesis is provided in Table 10 (see Appendix B). Questions from the survey that were measured with a 5-point Likert scale have been transformed into binary variables. So, there is a group that agrees with the question, or is willing to participate/change (i.e. point 1 – 3 on the scale), and there is a group that disagrees with the question or is unwilling to participate/change (i.e. point 4 – 5 on the scale). This involves all the measurements provided in Table 2 and the variables '*Awareness impact human behaviour*', '*Sustainable behaviour*', and '*Choice airport*'.

Table 5. Variables divided into different variable groups.

Variables group	
Awareness	Awareness impact aviation (M1)
	Awareness VCO (M2)
	Pre-knowledge VCO (M3)
Attitude	VCO Attitude – humankind (M4)
	VCO Attitude – environment (M5)
	VCO Attitude – fly more(M6)
	VCO Attitude – less guilty (M7)
WTP	WTP - booking (M8)
	WTP – after booking (M9)
	WTP – self-research (M10)
	WTP – at airport (M11)
	WTP – policy (M12)
WTC	WTC – fly less (M13)
	WTC – green transport (M14)
	WTC – pay extra (M15)
Sustainable behaviour characteristics	Awareness impact human behaviour (Q6)
	Sustainable behaviour (Q7)
	Choice airport (Q 20)
Travel behaviour characteristics	Frequent flyer Europe (Q1)
	Frequent flyer World (Q4)
	Green transport (Q2 – Q3)
Personal characteristics	Gender (Q24)
	Age categories (Q25)
	Education categories (Q27)

The questions regarding the annual flight behaviour in Europe and outside of Europe have been transformed as well, providing a group of frequent flyers (between 4 -5 or more than five flights per year) and a group of non-frequent flyers (less than one and between 1 – 3 flights per year). In addition, the binary variable *Green transport* is based on the respondents' answers on which type of alternative transport mode they use for holidays and leisure trips. The group that uses green transport consists out of the respondents that answered either 'bike' 'train' and 'other' to the question (since only one respondent answered with 'other – boat'). The zero value of this variable consists of the group that does not use alternative transport at all, or that uses either cars or the bus/touring cars. For the *Personal characteristic* variables *Age* and *Education* categories different category variables are made (dummy). The different age category dummies are based on the distinction made earlier. The education level dummies correspond to the education levels used in the survey (i.e. 'less than high school', 'high school degree or equivalent', 'Secondary vocational education (i.e. MBO)', 'Higher professional education (i.e. HBO)', 'University degree or higher').

4.   Findings

In this section, the findings of the thesis will be discussed in three separate subsections. The first subsection will discuss the model used for obtaining the findings, describing the different relationships between the variables. In the second subsection, the findings on the 'Awareness – Attitude' gap (*Hypothesis 1– 2*) will be discussed, and whether these are influenced by the framed information (*Hypothesis 7*). There will be continued with the hypothesis on the 'Attitude – Behaviour' gap (*Hypothesis 3 – 4)* in the third subsection. This final section will also discuss the 'Home – Away' gap (*Hypothesis 5 - 6*) and the effect of framed information on the willingness to participate or change behaviour (*Hypothesis 8 – 9).*

4.1.   Relationship Model

The hypotheses used in this thesis focus on the relationship between awareness, attitude and behaviour, the difference between sustainable behaviour at 'home' and 'away', as well as the effect of framed information (see Table 1). Based on the literature review, the following relationships between the different variables are considered (see Table 5 for the variable groups) (Lu & Wang, 2018):
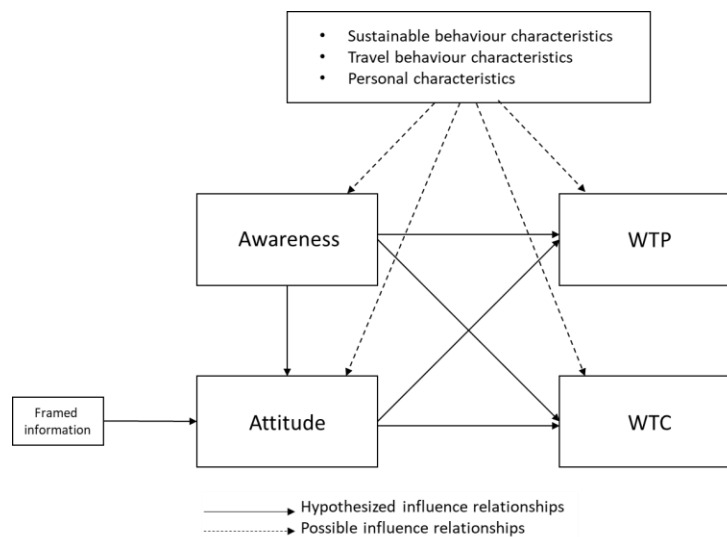

Figure 3. Proposed relationships between the variables.

The dependent variables in the analyses are the variables in the *Attitude*, *WTP* and *WTC* variable groups. As all these variables are binary, a logit regression is used to analyse the effect of de independent variables.

$$Log\left(odds = \frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_1 x_2 + \ldots + \beta_k x_k$$

This formula is the natural logarithm of the '*odds*', i.e. the ratio between something happening (p) and something not happening. β_0 denotes the constant of the regression, i.e. the base of the logarithm, β_k denotes the coefficients of the independent variables. This binary response model will make sure that the response probabilities are between zero and one (Wooldridge, 2014). In addition to the logistic model, a classification is run on the estimates of the models to provide information about what percentage of the estimates is correctly classified.

4.2.   Awareness – Attitude Relation

In this subsection, the findings on the relationship between awareness and attitude are analysed. Measurements 4 – 7 will be used as the dependent variables (*Attitude* variables), and the influence of measurements 1 – 3 (*Awareness* variables) and *Framing* are analysed by using logistic regression. The influence of the *Sustainable behaviour characteristics*, *Travel behaviour characteristics*, and *Personal characteristics* are used as independent variables in the model as well. Note that *Age* category 'Students' and *Education* level 'University Degree or higher' are not used in the logistic analysis, as they are the reference variable for their respective dummy categories.

Table 6 shows the logit model's output. It must be noted that the main objective of such models is to assess the effects of the independent variables on the probability of 'participating' in the dependent variable. Therefore, the magnitude of the coefficients does not have explanatory value on itself (Wooldridge, 2014). Furthermore, when the significant effect of an independent variable on the dependent variable is assessed, the 'ceteris paribus' assumption is applied. In addition, it is important to observe that the first, third and fourth analysis only have 167 observations, even though the sample size contains 168 respondents. This is due to the fact that the first *Education* level ('Less than high school') predicted the log-odds perfectly, and it was thus dropped from the

analysis. In the analysis on *VCO Attitude – Environment* even more observations are not included since *Frequent Flyer World* and *Education* levels one ('Less than high school') and two ('High school degree or equivalent') all predicted success perfectly and were dropped.

One of the first findings to be noticed in Table 6 is that none of the independent variables has a significant log-odds across the four different regressions. Looking at the *Awareness* variable group, it shows that only one of the variables has a significant effect.

Table 6. Logistics regression on the effect of Awareness & Framing on Attitude towards VCO programmes

Dep. Variable	VCO Attitude - humankind		VCO Attitude – environment		VCO Attitude – fly more		VCO Attitude - less guilty	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Constant	18.589	3932.255	18.993	1530.429	0.076	1.169	-0.462	1.212
Awareness VCO	- 1.664*	0.898						
Awareness impact human behaviour			3.82*	2.078				
Sustainable behaviour					-0.958*	0.52		
Choice airport					1.273***	0.465		
Green transport			-2.182*	1.283				
Gender					-0.763**	0.371		
Age 3					-1.453**	0.611	-1.15*	0.621
Age 4					-1.055*	0.595		
Edu 4	-1.39**	0.693	-1.984**	0.984				
Observations	167		150		167		167	
Prob > chi ^{2}	0.063*		0.025**		0.056*		0.009***	
Pseudo R^2	0.203		0.310		0.123		0.155	
Log-likelihood	- 54.773		- 32.119		- 101.6		- 95.989	
Correctly classified	85.63%		91.33%		69.46%		70.66%	

Note: This table provides only the dependent variables that have a significant coefficient. The entire output of the logit model can be found in Table 11 (see Appendix C).

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval

The likelihood that individuals with increased 'awareness' on VCO programmes will have a positive attitude towards such programmes is significantly lower when it concerns the external reasoning 'better for humankind'. None of the *Awareness* variables has a significant positive or negative effect on *Attitude* variables where the reasoning is more internal motivated (i.e. 'fly more' or 'feel less guilty').

Using green transport as an alternative transport mode for holidays or city trips has a significant negative effect on the likelihood that an individual will have a positive *VCO Attitude – environment*. Even though respondents were not asked what the reasoning is behind their use of green transport as an alternative to flying, it could be that they feel using green transport as an alternative mode is better to reduce the impact on the environment compared to VCO programmes.

Of the *Sustainable behaviour characteristics*, increased awareness about the impact of human behaviour has a significant positive effect on the likelihood of having a positive attitude towards VCO programmes, with the reasoning that it is 'better for the environment'. The two other variables in the *Sustainable behaviour characteristics* group have a significant effect on the likelihood of having a positive 'attitude' towards VCO programmes, with the reasoning 'fly more'. Respondents who either adapt or change their daily behaviour for sustainability reasons are significantly less likely to have a positive attitude towards VCO programmes based on the reasoning that this would be a reason to fly more. The more interesting it is that based on the results, the likelihood of having a positive attitude is positively influenced by the variable *Choice Airport*.

Out of the *Personal characteristics* variable group, *Age* categories could have a significant effect on both the more internally influenced *VCO Attitudes*. When it concerns the 'fly more' reasoning, respondents within both the 'Young Professionals & Families with young children' and 'Families with older children' categories are less likely to have a positive attitude compared to 'Students'. When it comes to the *Age* category 'Young Professionals & Families with young children', the same negative effect on a postivie attitude towards VCO programmes is indicated when focussing on the reasoning that participating would make an individual feel less guilty about flying. In contrast, the externally influenced *VCO Attitudes* are negatively effected by *Education* level 'Higher professional education (i.e. HBO)'. So, the likelihood that respondents within this education level will have a positive attitude is significantly

lower than the likelihood that individuals with education level 'University degree or higher' will have a positive attitude.

From the four logistic regressions run on the relationship between *Awareness* and *Attitude*, the dependent variable *VCO Attitude – fly more* is significantly affected by the most independent variables. However, when comparing the 'Pseudo R^2', 'Log-likelihood', and 'Correctly classified' outcomes, this regression has the lowest goodness-of-fit.

4.3.   Attitude – Behaviour Relation

This subsection will primarily focus on the relationship between attitude and behaviour. Since the survey has measurements for both willingness to participate in a VCO programme (*WTP*) and willingness to change travel behaviour (*WTC*), this subsection is further divided on the basis of these measurements.

4.3.1.   Willingness to Participate

To analyse the relationship between attitude and the WTP, measurements 8 - 12 have been used as the dependent variables (*WTP* variables). In order to provide an answer on *Hypothesis 3*, *5* and *8*, the *Attitude* variables are used in the model as independent variables together with the *Awareness* variables, the *Sustainable behaviour characteristics*, *Travel behaviour characteristics*, *Personal characteristics* and *Framing*. Just as in the previous logit model, *Age* category 'Students' and *Education* level 'University Degree or higher' are used as a reference for their respective dummy categories and are therefore not included in the model. The output of the logit models can be found in Table 7. In all five analyses, only 167 observations have been used in the model, as the first *Education* level ('Less than high school') was dropped once more due to perfect predictions.

From the four *Attitude* measurements, only the internally reasoned *VCO Attitude* seems to have a significant effect on the likelihood of *WTP*. It must be noted that this is only true for the *WTP* variables that focussed on the settings 'self-research' 'at the airport' and 'supporting a tax policy'. So, none of the *Attitude* variables has a significant

effect on the likelihood of willingness to participate in a VCO programme if this option is provided by the airline, either while booking or after booking. This could indicate that individuals have trust issues when the VCO is provided by the airline. Such a suggestion was made by several respondents of the survey conducted at RTHA, explaining that there is "the feeling that airlines try to make extra money".

The results further show that respondents, who are more aware of the impact of flying on the environment, are more likely to have the intention to participate in a VCO programme when it is provided either while booking or at the airport. A possible rationale for this could be that people become more aware of this impact if they are doing something that is linked to flying, i.e. while booking the flight or waiting on their flight. It is interesting to note that the awareness of VCO programmes has a significant negative effect on *WTP – after booking*, which at first glance seems contradictory.

Furthermore, changing or adapting one's behaviour in daily life, because of sustainability reasons, has a significant positive influence on three of the *WTP* variables. So, respondents with increasing (self-)proclaimed sustainable behaviour are likely to have more intention to participate in a VCO programme, but this is only true for the situations where the intention is further away from the flying behaviour (i.e. *WTP – after booking*, *WTP – self-research*, *WTP – policy*). This could imply that there is consistency between the 'sustainable' behaviour 'home' and 'away'. Besides *Sustainable behaviour*, *Choice airport* also had a significant positive effect on three out of the five *WTP* dependent variables. So, out of all *Sustainable behaviour characteristics* variables, only *Awareness impact human behaviour* did not have a significant effect. Noteworthy is, however, that none of the *Sustainable behaviour characteristics* variables had a significant effect on the *WTP – booking*.

From the *Travel behaviour characteristics* variables, *Frequent flyer world* has a significant effect on *WTP – policy*. So, respondents that travel by air more than four times per year are less likely to support an aviation tax policy. This could be related to the assumption that such a policy will most likely hit these respondents the most, due to the 'polluter-pays' principle and longer flights being more polluting than shorter flights (within Europe).

Table 7. Logistics regression on the effect of Attitude & Framing on the WTP

Dep. Variable	WTP booking		WTP after booking		WTP self-research		WTP at airport		WTP policy	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Constant	-5.98***	2.011			-4.201**	1.869	-3.681**	1.56	-2.688	1.997
VCO Attitude – fly more									2.031**	0.913
VCO Attitude - less guilty					1.923***	0.504	0.99**	0.429		
Awareness impact aviation	2.827**	1.352					3.4*	1.825		
Awareness VCO			-1.313*	0.716						
Sustainable behaviour			0.922*	0.532	1.778***	0.653			1.811**	0.907
Choice airport			1.349***	0.509	1.141**	0.541	0.921*	0.494		
Frequent flyer World									-3.35**	1.402
Age 2	-0.424	0.731	-1.202**	0.612	-0.896	0.642	-1.031*	0.599	-0.541	1.18
Age 3			-1.113*	0.672						
Age 5									-2.591*	1.441
Edu 2									-3.121**	1.389
Edu 3									-2.103*	1.132
Edu 4									-1.78*	1.008
Observations	167		167		167		167		167	
Prob > chi²	0.000***		0.004**		0.000***		0.007***		0.000***	
Pseudo R²	0.267		0.188		0.278		0.179		0.478	
Log-likelihood	- 69.713		- 93.969		- 82.160		- 95.042		- 40.277	
Correctly classified	80.84%		73.65%		78.44%		69.46%		91.02%	

Note: This table only provides the variables that have a significant coefficient. The entire output of the logit model can be found in Table 12 (see Appendix C).

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval

It is interesting to see that the *Age* category 'Young Professionals & Families with young children' in all five sketched *WTP* scenarios has a significant effect. So, respondents in this *Age* category are less likely to participate in a VCO programme compared to 'Students'. It is interesting that the younger respondents are more willing to participate, given the fact that they often have fewer financials to participate in such programmes. In addition, respondents in the category 'Retirees' are less likely to support a tax policy. A possible explanation could be that younger individuals are more eager to solve the climate problem, while older individuals do not want to pay for something that will benefit them 'less'.

Another sticking result is that all *Education* levels are less likely to participate in supporting a tax policy compared to respondents with a 'University degree or higher'. This could have something do to with the fact that individuals with a higher education level have a higher income, and they are less worried that they will not be able to fly any more or less due to a tax on aviation (Becken, 2007).

From all logit models on the relationship between *Awareness* and *WTP*, the dependent variable *WTP policy* is significantly influenced by the highest number of independent variables. In this case, this model also has the highest goodness-of-fit when the 'Pseudo R^2', 'Log-likelihood', and 'Correctly classified' outcomes are compared.

4.3.2. Willingness to Change

The analyses of *WTC* variables are similar to the analyses of *WTP*. The same independent variables are used in the logistics model to provide an answer to *Hypothesis 4*, *6* and *8,* and for these analyses, the dependent variables are now measurements 13 – 15. Once again, the reference variables for *Age* and *Education* are, respectively, the category 'Students' and level 'University Degree or higher'. The output can be found in Table 8. Similarly, in all analyses, only 167 observations have been used in the model, as the model dropped the first *Education* level ('Less than high school') due to perfect predictions.

In contrast to *WTP*, not only the internally reasoned attitudes towards VCO programmes have an influence on *WTC*. Respondents that have a positive attitude towards VCO programmes because they feel that this will benefit the environment, are more likely to pay extra for flights that use 'carbon neutral' fuel. In addition, the

willingness to change travel behaviour by opting for alternative green transport is positively influenced by *VCO – less guilty*. It could be assumed that this is a logical consequence, as opting for green transport will take away the feeling of guilt as well.

From the *Awareness* variables, only *Pre-knowledge VCO* has a significant effect on the *WTC* and only a positive influence on the willingness to pay extra for 'carbon neutral' flights. It must be noted that prior knowledge on VCO programmes did not have a significant effect on any of the other dependent variables (i.e. *Attitude*, *WTP*).

Table 8. Logistics regression on the effect of Attitude & Framing on the WTC

Dep. Variable	WTC fly less		WTC Green transport		WTC pay extra	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err
Constant			-4.041**	2.026		
VCO Attitude –environment					3.116***	1.187
VCO Attitude - less guilty			0.276**	0.496		
Pre-knowledge VCO					1.734*	0.903
Awareness impact human behaviour	-3.538**	1.645				
Sustainable behaviour	2.653***	0.659	1.457**	0.569	1.181*	0.716
Choice airport	1.314**	0.625			1.876*	1.056
Frequent flyer Europe	1.221**	0.564	0.949*	0.57		
Edu 2					-2.411**	1.113
Edu 3	-2.383***	0.677	-1.408**	0.614		
Edu 4	-0.993*	0.552			1.71*	0.889
Observations	167		167		167	
Prob > chi²	0.000***		0.007**		0.000***	
Pseudo R²	0.305		0.233		0.441	
Log-likelihood	- 77.226		- 81.165		- 44.776	
Correctly classified	77.84%		79.64%		88.02%	

Note: This table only provides the variables that have a significant coefficient. The entire output of the logit regression can be found in Table 13 (see Appendix C).

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval

One of the interesting findings for the *WTC* variables is that all *Sustainable behaviour characteristics* have a significant effect on one of the *WTC* options. To be more specific, all three variables have an effect on the willingness to change travel behaviour by flying less. It is, however, striking that increasing awareness about the impact of human behaviour on the environment has a negative effect on this willingness to change. It is, furthermore, noteworthy that (self-)proclaimed sustainable behaviour in daily lives has a positive effect on all *WTC* variables. This, thus, seems to suggest that respondents that exhibit sustainable behaviour at home would also show such behaviour when travelling.

The most contradicting that can be found from the outcomes in Table 8 is that *Frequent flyer Europe*, i.e. respondents that annually fly more than four times within Europe, are more likely to have the intention to change their travel behaviour by either flying less or using alternative transport modes. It seems that they are willing to choose the direct opposite behaviour of what they are actually showing, which could be caused by trends like 'flight shame'.

It also becomes clear that *Age* has no significant effect on the *WTC* variables, although for the other dependent variables categories there was often a difference between the *Age* categories. Finally, the last finding is that for *WTC pay extra* respondents in the fourth level of *Education* ('Higher professional education (i.e. HBO)') are more likely to engage in this willingness to change compared to respondents with *Education* level 'University degree or higher'. This is the only time the likelihood increases at a lower *Education* level.

As regards to the relationship between *Awareness* and *WTC*, both *WTC fly less,* and *WTC pay extra* are significantly influenced by the same number of independent variables. When the 'Pseudo R^2', 'Log-likelihood', and 'Correctly classified' outcomes are compared, *WTC pay extra* eventually has the highest goodness-of-fit.

5. Conclusion & Discussion

In this section, a conclusion will follow on the research question central to the thesis, based on the results of the conducted analysis. There will be followed with a discussion of the results and conclusion, and finally, the limitations of the research will be addressed.

5.1. Conclusion

The central research question of the thesis was as follows:

> *Do pro-environmental characteristics, awareness and attitude have a positive effect on air traveller's willingness to mitigate when it concerns leisure trips?*

To provide an answer to the research question, nine hypotheses were formulated based on the literature review conducted, each focussing on a specific part of the central research question. The hypotheses are stated once again in Table 9, as well as whether they are rejected or accepted.

Hypotheses 1 – 2 focus on the relationship between awareness and attitude. The literature provides evidence that in some cases, there is a flaw in this relationship. So, if the first and second hypotheses are rejected, this indicates that awareness does not have a (positive) influence on an individual's attitude and there is thus an 'Awareness – Attitude' gap. The findings of this thesis on the relationship between awareness and attitude showcase that of the *Awareness* variable group only *Awareness VCO* has a significant effect on one of the *Attitude* variables (i.e. *VCO Attitude – Humankind*). So, being aware of the impact of aviation on the environment did not have a significant effect on any of the attitudes towards VCO programmes, which thus means that hypothesis *H1* is rejected. *Hypothesis 2* focusses on the other two variables of the *Awareness* variable group, and as said only the awareness of VCO programmes had a significant effect in this thesis. However, since this constituted a negative effect, and increased awareness thus lowers the likelihood of having a positive attitude, this implies that this hypothesis is rejected as well. Thus, just like in the research of Hares et al. (2010), the respondents of the survey are experiencing an 'Awareness – Attitude' gap when it concerns VCO programmes.

Table 9. Matrix of hypotheses and their conclusion

Hypothesis	Conclusion	Research objective
H1: Individuals that are aware of the impact of aviation, have a positive attitude towards VCO programmes.	*Rejected*	*Awareness – Attitude gap*
H2: Individuals that are aware of & have knowledge of VCO programmes, have a positive attitude towards VCO programmes.	*Rejected*	*Awareness – Attitude gap*
H3: Individuals with a positive attitude towards VCO programmes, are (more) willing to participate in VCO programmes.	*Partially rejected*	*Attitude – Behaviour gap (WTP)*
H4: Individuals with a positive attitude towards VCO programmes, are (more) willing to change their behaviour.	*Partially rejected*	*Attitude – Behaviour gap (WTC)*
H5: Individuals with (self-)proclaimed sustainable behaviour in daily life are (more) willing to participate in VCO programmes.	*Partially rejected*	*Home – Away gap (WTP)*
H6: Individuals with (self-)proclaimed sustainable behaviour in daily life are (more) willing to change their behaviour.	*Accepted*	*Home – Away gap (WTC)*
H7: Individuals that provided with loss-framed information have a (more) positive attitude towards VCO programmes.	*Rejected*	*Framing effect (Attitude)*
H8: Individuals that provided with loss-framed information are (more) willing to participate in VCO programmes.	*Rejected*	*Framing effect (WTP)*
H9: Individuals that provided with loss-framed information are (more) willing to change their behaviour.	*Rejected*	*Framing effect (WTC)*

The relationship between attitude and behaviour is included in *Hypotheses 3 – 4. Hypothesis 3* focusses on the *WTP* variable group as the dependent variable and based on the findings it becomes clear that the externally reasoned *VCO Attitude* variables did not have a significant effect on any of the *WTP* scenarios. Nevertheless, a positive attitude towards VCO programmes because it 'allows' an individual to fly more or feel less guilty about his flying behaviour does have a significant effect on some of the *WTP* scenarios. As it only concerns the scenarios in which individuals are willing to participate in a VCO programme when they have to do self-research, or it is provided at the airport (for *VCO Attitude – less guilty*), and the willingness to support an aviation tax policy (for *VCO Attitude – fly more*), *Hypothesis 3* will be partially rejected. The fourth hypothesis also focusses on the relationship between attitude and awareness, but in this case on the *WTC*. The findings provide that none of the *Attitude* variables had a significant effect on the willingness to change travel behaviour by flying less.

Additionally, *Attitude* variables *VCO Attitude – humankind* and *VCO Attitude – fly more* did not have a significant effect on the other two willingness to change options. Even more, the willingness to change travel behaviour by using alternative, green transport is only positively influenced by a positive attitude towards VCO programmes, if individuals have that positive attitude because they feel less guilty about flying. The last willingness to change scenario, *WTC – pay extra*, is the only *WTC* variable that is significantly positive influenced by an internally reasoned positive *VCO Attitude*, namely that it would be better for the environment. Likewise, only a few of the *Attitude* variables have a significant positive effect, and often there was no effect at all. Thus, *Hypothesis 4* is partially rejected as well. This implies that, for both *WTP* and *WTC,* there is a slight 'Attitude – Behaviour' gap.

The effect of pro-environmental characteristics on willingness to mitigate is the focus of *Hypotheses 5 – 6*. The objective of these hypotheses is to analyse whether there is a difference in (self-)proclaimed sustainable behaviour at 'home' and 'away'. The variable group *Sustainable behaviour characteristics* contains three variables, *Awareness impact human behaviour*, *Sustainable behaviour*, and *Choice airport*. When it concerns the willingness to participate in a VCO programme, only being aware of the impact of human behaviour on the environment did not have a significant effect on any of the *WTP* scenarios. The other two variables were both significant in three of the *WTP* scenarios. To reject or accept the hypothesis that '*Individuals with (self-) proclaimed sustainable behaviour in daily life are (more) willing to participate in VCO programmes'*, especially the *Sustainable behaviour* variable is of great importance. Since this variable has a significant positive effect in three of the *WTP scenario's*, this implies that sustainable behaviour in daily life increases the likelihood of having the intention to participate in a VCO programme, when this is provided after booking or by self-research, or when supporting an aviation tax policy. So, *Hypothesis 5* is only partially rejected. *Hypothesis 6* focusses on the same relationship between sustainable behaviour at 'home' and 'away', but then for the *WTC* variables. The findings in subsection 4.3.2 indicate that all three variables in the *Sustainable behaviour characteristics* variable group have a significant effect on at least one of the *WTC* dependent variables. The willingness to change travel behaviour by flying less is significantly positively influenced by all three *Sustainable behaviour characteristics*. Focussing only on *Sustainable behaviour*, all three willingness to change travel behaviour scenarios are significantly positively affected. Thus, respondents that behave

in a sustainable matter in their daily lives are significantly more likely to have the intention to change their travel behaviour, by either flying less, using alternative green transport or paying extra for a flight that uses 'carbon-neutral' fuel. As the variable that is most important to answer *Hypothesis 6* is significantly positive in all three scenarios, it is therefore accepted that no 'Home – Away' gap becomes apparent and '*Individuals with (self-) proclaimed sustainable behaviour in daily life are (more) willing to change their behaviour*'.

As mentioned in the introduction of this thesis, another aspect of the research was to analyse whether attitude and willingness to mitigate are influenced by the message design of information provided to them. From the results analysed in section 4, in none of the models the variable *Framing* has a significant effect on the dependent variables. Based on this, *Hypotheses 7 – 9* are all rejected, and, contrary to what is suggested by Avineri and Waygood (2013), providing the respondents with information was not more effective when loss-framed compared to gain-framed.

The answer to the main research question of this thesis is that pro-environmental characteristics, like sustainable behaviour in daily lives, do have a significant positive effect on the air traveller's willingness to mitigate when it concerns leisure trips. In contrast, awareness does not have a direct positive effect on attitudes, but they could have a significant effect on the willingness to mitigate. This effect is, however, not only positive. Finally, the willingness to mitigate is only partially affected by a positive attitude and it mostly concerns the internally reasoned attitudes. So, it could be said that there may be a paradox between air traveller's awareness, attitude and willingness to mitigate.

5.2. Discussion

As becomes clear from the conclusion, the respondents in this research appear to experience the so-called 'Awareness – Attitude' gap. This would, thus, imply that providing them with more knowledge and information will not be an effective measure to alter their attitudes (Howarth et al., 2009). Kollmuss and Agyeman (2002) suggested that this problem could be overcome by providing individuals with information on action strategies. In this thesis, respondents were provided with such information, but it can only be established that framing of this information makes no significant

difference. For further research, it could therefore be interesting to investigate whether there is a difference in the relationship between awareness and attitude if only part of the respondents is provided with information about action strategies.

Respondents also suffer from a (partial) 'Attitude – Behaviour' gap, since only some of the attitudes towards VCO programmes has a significant positive effect on the willingness to mitigate. Especially the more external reasoned attitudes had a significant effect, i.e. respondents have a positive attitude towards VCO programmes because it either gives them a justification to fly more or they feel less guilty about their current flying behaviour. These justification mechanisms could indicate that respondents make use of the implicit 'self-perception' rule that was suggested by Bem (1967). So, then, the relationship between the respondent's attitude and behaviour is inverse, and the positive attitude is there because of the fact that they fly. It is also interesting to note that the 'feel less guilty' reasoned positive attitude towards VCO programmes had a positive effect on several 'willingness to mitigate' variables. An explanation for this could be that the public opinion towards flying has changed in recent years and that due to trends like 'flight shame' the social norm towards flying has altered. The willingness and intention of an individual are highly influenced by such norms (Gadenne et al., 2011).

The literature review further revealed that besides an 'Attitude – Behaviour' gap, often a 'Home – Away' gap exists as well. This implies that individuals who exhibit sustainable behaviour in their daily life do not 'consider' such sustainable behaviour when it comes to their holidays. Nonetheless, this research suggests that there is no such discrepancy. One of the explanations could be that the previous studies are somewhat dated and that the gap is 'tightened' because individuals have altered there believes and attitude towards sustainability and travel behaviour. Since sustainable behaviour in daily lives positively influences the willingness to mitigate, this could imply that strategies focussed on making individuals behave more sustainable in their daily lives have an indirect effect on travel and tourism behaviour.

The findings further suggest that individuals, who agree that the sustainability aspects of an airport affect their choice for the airport, are more likely to participate in several mitigation actions. Especially the fact that the willingness to participate in VCO programmes, when this option is available at the airport, and the willingness to pay extra for 'carbon-neutral' flights are positively influenced by this, could be interesting

for airports. If airports, such as RTHA, would like to be part of the 'energy transition' advertising the sustainability aspects of the airport could possibly help in getting travellers on board with mitigation actions.

Perhaps one of the most remarkable findings of this thesis is that being a frequent flyer in Europe has a positive influence on the willingness to change travel behaviour by either flying less or using alternative green transport. It is interesting that people who often use the airplane for their holidays and city trips within Europe (i.e. more than four times annually) have this intention. This could be because people are becoming more and more 'ashamed' of the fact that they are flying, and that therefore the reference framework of transportation modes for leisure trips in Europe is changing. When it comes to the intention to use green transport, it seems logical that the frequent flyers within Europe would like to alter their transportation mode, instead of the frequent flyers for destinations outside Europe. For destinations within Europe, alternative transport is a (more) feasible option, compared to destinations outside Europe. What did become clear from the conversations with respondents at RTHA is, that often the price and duration of the alternative mode makes them choose for flying again.

5.3. Limitations of the research

The research performed in this thesis has some limitations. For example, the manner in which the sample was obtained may affect the findings and conclusion. First of all, there could be a difference between answers from the surveys conducted at RTHA and the online gathered surveys. The fact that respondents at RTHA were immediately confronted with their 'wrong or negative' behaviour and its impact could have had an influence. As a result, they may have responded differently, e.g. less honestly or more consciously, than the respondents of the online survey. It could even be the case that they unconsciously felt more pressured to respond in a certain way, the so-called 'social-desirability' bias (Fisher, 1993), given that 'someone from the interview was present' and they may have felt less anonymous compared to the online survey group. It was, however, decided to combine both samples and consider them as one group, primarily because of the difference in the age groups. By combining them, all age groups were represented in the sample. Furthermore, the sample could suffer from the issue of selection bias (Jou & Chen, 2015), which could indicate that individuals who

have no interest in climate change and sustainability are less eager to participate in the survey.

The findings of the research revealed that framed information would not have a significant effect on either the attitude or willingness to mitigate. It must, however, be noted that it is assumed that all respondents absorbed the information as intended. Even though the information was provided to the respondents for at least 40 seconds, it is still possible that respondents only scanned the information briefly or have not absorbed it all.

Another limitation of the research is that the gathered sample is relatively small (N = 168). In addition, it is important to take into account the aspects of RTHA as an airport. RTHA has mainly flights within Europe, so it is possible that if this same survey would have been conducted at, for example, Amsterdam Airport Schiphol, it could have led to different findings and conclusions since at Schiphol there are more flights to destinations outside Europe.

The moment at which the survey was conducted is also an aspect that is important to mention. First of all, the fact that it was conducted right after high season could make people think differently about their travel behaviour than if they were asked later in time, for example, in December. Moreover, in 2019 the Netherlands was under the spell of the 'stikstof crisis' (i.e. 'nitrogen crisis'). This lead to several protests from, for example, farmers against the plans of the Dutch Government because they were considered to be responsible for a large part of the problem (Nagtzaam, 2019). According to the Dutch National Institute for Public Health and the Environment, the aviation industry is only responsible for 1% of the total emission of nitrogen oxides (Hermanides, 2019), but this 'crisis' could still have an effect on how individuals perceive flying, the aviation industry and also the effectiveness of policies. Furthermore, it is important to realise that at the moment this thesis was finalised the entire world is at a 'stand still' due to the COVID-19 virus. Even though this was not relevant at the moment the survey was conducted, it is plausible that the travel behaviour after this pandemic crisis will alter. There are, for example, indications that individuals might choose for destinations closer to home (Glusac, 2020).

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Appendix A

Survey structure (EN)

Questions on (air) travel behaviour

Q1 On average, how often do you fly in a year for leisure purposes (i.e. city trips, holidays, etc.) within Europe?

- < 1
- 1 - 3
- 4 - 5
- More than 5

Q2 Normally speaking, do you travel for leisure purposes (i.e. city trips, holidays, etc.) in Europe with other modes of transport (e.g. car, train, bus, etc.)?

- Yes
- No

If answer Q2 is Yes:

Q3 Which alternative transport mode do you use the most, on average, for leisure (i.e. city trips, holidays, etc.)?

- Car
- Train
- Bus/Touring Cars
- Bike
- Others (please specify)

Q4 On average, how often do you fly in a year for leisure purposes (i.e. city trips, holidays, etc.) outside of Europe?

- < 1
- 1 - 3
- 4 - 5
- More than 5

Q5 Are you a member of a frequent flyer programme?

- Yes
- No

Questions on sustainable behaviour

(5-point Likert scale: strongly agree up till strongly disagree)

For the following statements, indicate how well you agree/disagree with the statements:

Q6 Generally speaking, I am aware of the negative effects of human behaviour on the environment.

Q7 Generally speaking, I change/adapt my behaviour due to these negative effects, by making more sustainable choices.

Measurements on Awareness/knowledge on aviation's effect on the climate and the concept of VCO

(5-point Likert scale: strongly agree up till strongly disagree)

For the following statements, indicate how well you agree/disagree with the statements:
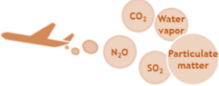
Q8 I am aware of the negative effects of travelling by air on the environment.

Q9 I have heard of voluntary carbon offset programmes.

Q10 I know what a voluntary carbon offset programme entails.

Information

Gain Framing

ENVIRONMENTAL IMPACTS OF AVIATION

Air travellers are continuously growing in **4-6% per annum**

Passenger numbers could **double to 8.2 billion in 2037**

To limit global warming to 2°C, a **person's annual budget** is

2300 kg CO2

Flights produced **895 million tons CO2** in 2018

2% of CO2 emissions is produced by the global aviation industry

Amsterdam – Nice (return trip) emits **336 kg CO2**

That is **2.596 kg less** than a return trip Amsterdam - Bali

WHAT CAN YOU DO!

Fly Neutral – Voluntary Carbon Offset Programmes

1. Information
Check CO2 emissions at the airline or NGO

2. Calculate & Pay
Calculate total CO2 emissions for your flight

3. Support
Projects reducing GHG emissions in the short- or long-term

AND

Choose Green transport

Amsterdam – Nice (return trip) by train produces **312 kg CO2 less**, than the same return trip by plane

Fly Less frequent

Loss Framing

ENVIRONMENTAL IMPACTS OF AVIATION

Air travellers are continuously growing in **4-6% per annum**

Passenger numbers could **double to 8.2 billion in 2037**

To limit global warming to 2°C, a **person's annual budget** is

2300 kg CO2

Flights produced **895 million tons CO2** in 2018

2% of CO2 emissions is produced by the global aviation industry

Amsterdam – Bali (return trip) emits **2932 kg CO2**

That is **2.596 kg more** than a return trip Amsterdam - Nice

WHAT CAN YOU DO!

Fly Neutral – Voluntary Carbon Offset Programmes

1. Information
Check CO2 emissions at the airline or NGO

2. Calculate & Pay
Calculate total CO2 emissions for your flight

3. Support
Projects reducing GHG emissions in the short- or long-term

AND

Choose Green transport

Amsterdam – Nice (return trip) by plane produces **312 kg CO2 more**, than the same return trip by train

Fly Less frequent

Measurements on Attitudes toward carbon offsetting programmes

(5-point Likert scale: strongly agree up till strongly disagree)

For the following statements, indicate how well you agree/disagree with the statements:

Q11 Participating in a voluntary carbon offset programme benefits humankind.

Q12 Participating in a voluntary carbon offset programme has a positive impact on the environment.

Q13 Participating in a voluntary carbon offset programme offsets my flying behaviour, so that I can use this transport mode more often.

Q14 Participating in a voluntary carbon offset programme makes me feel less guilty about flying.

Measurements on Willingness to offset, depending on action needed

(5-point Likert scale: extremely willing up till extremely unwilling)

For the following statements, indicate how willing/unwilling you are to undertake these actions:

Q15 I am willing to pay for the voluntary carbon offset programme when I travel by plane if this option is provided by the airline while booking my flight.

Q16 I am willing to pay for the voluntary carbon offset programme when I travel by plane if this option is provided by the airline after I have booked my flight.

Q17 I am willing to pay for the voluntary carbon offset programme when I travel by plane if I have to find a voluntary carbon offset programme myself.

Q18 I am willing to pay for the voluntary carbon offset programme when I travel by plane if this option is provided at the airport.

Q19 I am willing to support a CO2 tax policy on passengers' duties.

Sustainability influence on airport choice

(5-point Likert scale: strongly agree up till strongly disagree)

For the following statement, indicate how well you agree/disagree with the statement:

Q20 My choice for an airport is influenced by the sustainability aspects of that airport.

Measurement on willingness to change travel behaviour

(5-point Likert scale: extremely willing up till extremely unwilling)

For the following statements, indicate how willing/unwilling you are to undertake these actions:

Q21 I am willing to fly less for leisure, to reduce environmental impacts.

Q22 I will plan my leisure trips to destinations whereto green transport is a feasible possibility, to avoid travelling by air and thus reduce the environmental impact of my leisure trip.

Q23 I am willing to pay extra for my flight, if the plane uses synthetic fuel, making my flight CO2-neutral.

Socio-economic questions

The survey is almost complete. A few short questions will follow to finalise the survey.

Q24 Gender

- Female
- Male
- I prefer not to say

Q25 Age: (above 18)

Q26 Nationality

- British
- Dutch
- Spanish
- Italian
- Other (please specify)

Q27 What is the highest level of education you have completed?

If you are currently enrolled, please indicate the highest degree you have received.

- Less than high school
- High school degree or equivalent
- Secondary vocational education (i.e. MBO)
- Higher professional education (i.e. HBO)
- University degree or higher

Q28 This survey was taken at Rotterdam The Hague Airport

- Yes
- No

Appendix B

Table 10. Definition of variables.

Variables (N = 168)	Mean	Std.
Awareness impact aviation (M1)	.935	.248
Awareness VCO (M2)	.607	.490
= 1 if the individual is aware		
= 0 if the individual is unaware		
Pre-knowledge VCO (M3)	.512	.501
= 1 if the individual has knowledge prior to framed information		
= 0 if the individual has no knowledge prior to framed information		
VCO Attitude – humankind (M4)	.857	.351
VCO Attitude – environment (M5)	.917	.277
VCO Attitude – fly more(M6)	.494	.501
VCO Attitude – less guilty (M7)	.577	.495
= 1 if the individual has a positive attitude towards VCO		
= 0 if the individual has a negative attitude towards VCO		
WTP - booking (M8)	.732	.444
WTP – after booking (M9)	.512	.501
WTP – self research (M10)	.423	.495
WTP – at airport (M11)	.488	.501
WTP – policy (M12)	.821	.384
= 1 if the individual is willing to participate		
= 0 if the individual is unwilling to participate		
WTC – fly less (M13)	.613	.488
WTC – green transport (M14)	.667	.473
WTC – pay extra (M15)	.810	.394
= 1 if the individual is willing to change		
= 0 if the individual is unwilling to change		
Awareness impact human behaviour	.958	.200
= 1 if the individual is aware		
= 0 if the individual is unaware		
Sustainable behaviour	.815	.389
= 1 if the individual in daily lives acts sustainable		
= 0 otherwise		
Choice airport	.220	.416
= 1 if influenced by sustainability aspects of the airport		
= 0 otherwise		
Frequent flyer World	.048	.214
= 1 if # flights outside of Europe is 4-5 or above 5		
= 0 if # flights outside of Europe is less 1 or 1 – 3		

Variables (N = 168)	Mean	Std.
Green transport	.161	.368
= 1 if alternative transport is green (bike, train)		
= 0 if no alternative transport or not green (car, bus/touring car)		
Gender	.482	.501
= 1 if female		
= 0 if male		
Age 1: Students	.173	.379
= 1 if age is between 19-25		
= 0 otherwise		
Age 2: Families with young children & Young Professionals	.244	.431
= 1 if age is between 26 – 40		
= 0 otherwise		
Age 3: Families with older children	.256	.438
= 1 if age is between 41 - 55		
= 0 otherwise		
Age 4: Families with children out house	.214	.412
= 1 if age is between 56 - 65		
= 0 otherwise		
Age 5: Retirees	.113	.318
= 1 if age is between 65 +		
= 0 otherwise		
Edu 1: Less than high school	.006	.077
Edu 2: High school degree or equivalent	.060	.237
Edu 3: Secondary vocational education (i.e. MBO)	.208	.407
Edu 4: Higher professional education (i.e. HBO)	.321	.468
Edu 5: University degree or higher	.405	.492
= 1 if yes		
= 0 otherwise		
Framing	.494	.501
= 1 if loss framing		
= 0 if gain framing		

Appendix C

Table 11. Addendum to Table 6. Logistics regression on the effect of Awareness & Framing on Attitude towards VCO programmes

Dep. Variable	VCO Attitude: Humankind		VCO Attitude – Environment		VCO Attitude – fly more		VCO Attitude - less guilty	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Constant	18.589	3932.255	18.993	1530.429	0.076	1.169	-0.462	1.212
Awareness impact aviation	0.574	1.271	-3.121	3.122	0.763	0.954	0.922	1.057
Awareness VCO	- 1.664*	0.898	-0.903	1.284	-0.58	0.66	0.506	0.664
Pre-knowledge VCO	0.494	0.762	-0.717	1.142	0.339	0.634	-0.273	0.643
Awareness impact human behaviour	0.899	1.402	3.82*	2.078	0.617	1.136	0.686	1.126
Sustainable behaviour	0.933	0.773	0.761	1.194	-0.958*	0.52	-0.031	0.537
Choice airport	1.109	0.749	1.519	0.957	1.273***	0.465	0.709	0.471
Frequent flyer Europe	0.793	0.714	-0.579	0.843	0.149	0.419	-0.102	0.419
Frequent flyer World	- 0.367	1.213	0	omitted	0.159	0.889	-0.746	0.97
Green transport	- 0.735	0.713	-2.182*	1.283	-0.386	0.486	0.813	0.584
Gender	0.625	0.545	1.039	0.775	-0.763**	0.371	-0.043	0.382
Age 2	- 17.768	3932.255	-13.379	1530.426	-0.513	0.565	0.258	0.621
Age 3	- 18.088	3932.255	-16.821	1530.426	-1.453**	0.611	-1.15*	0.621
Age 4	- 17.546	3932.255	-15.32	1530.426	-1.055*	0.595	-0.875	0.611
Age 5	- 17.905	3932.255	-16.134	1530.426	0.125	0.797	-0.642	0.782
Edu 1	0	omitted	0	omitted	0	omitted	0	omitted
Edu 2	- 1.918	1.224	0	omitted	0.69	0.824	-0.648	0.85
Edu 3	- 0.936	0.842	0.071	1.16	0.737	0.528	-0.775	0.521
Edu 4	-1.39**	0.693	-1.984**	0.984	0.119	0.443	-0.733	0.457
Framing	- 0.092	0.524	-0.931	0.736	0.356	0.36	-0.161	0.373
Observations	167		150		167		167	
Prob > chi²	0.063*		0.252**		0.056*		0.009***	
Pseudo R2	0.203		0.310		0.123		0.155	
Log-likelihood	- 54.773		- 32.119		- 101.6		- 95.989	
Correctly classified	85.63%		91.33%		69.46%		69.46%	

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval

Table 12. Addendum to Table 7. Logistics regression on the effect of Attitude & Framing on the WTP

Dep. Variable	WTP booking		WTP after booking		WTP self-research		WTP at airport		WTP policy	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Constant	-5.98***	2.011	-2.2	1.442	-4.201**	1.869	-3.681**	1.56	-2.688	1.997
VCO Attitude - humankind	0.871	0.675	0.729	0.691	-0.226	0.752	0.231	0.654	-0.178	0.916
VCO Attitude – environment	1.141	0.857	0.295	0.905	1.677	1.079	0.895	0.882	1.253	0.983
VCO Attitude – fly more	0.754	0.548	0.67	0.439	-0.256	0.474	0.573	0.427	2.031**	0.913
VCO Attitude - less guilty	0.809	0.521	0.357	0.427	1.923***	0.504	0.99**	0.429	1.078	0.845
Awareness impact aviation	2.827**	1.352	1.693	1.208	-1.06	1.24	3.4*	1.825	1.764	1.469
Awareness VCO	-1.196	0.783	-1.313*	0.716	1.021	0.737	0.608	0.684	-0.852	0.988
Pre-knowledge VCO	0.515	0.74	0.866	0.669	-0.546	0.7	-0.035	0.643	1.151	1.026
Awareness impact human behaviour	1.939	1.716	-0.471	1.335	-0.028	1.658	-2.077	1.642	1.482	1.555
Sustainable behaviour	0.804	0.642	0.922*	0.532	1.778***	0.653	0.537	0.532	1.811**	0.907
Choice airport	0.907	0.654	1.349***	0.509	1.141**	0.541	0.921*	0.494	1.352	1.063
Frequent flyer Europe	-0.569	0.539	0.095	0.445	0.438	0.5	-0.65	0.444	0.901	0.863
Frequent flyer World	-0.554	1.093	0.896	0.997	-1.288	1.019	-0.328	1.058	-3.35**	1.402
Green transport	-0.497	0.615	-0.215	0.525	1.178	0.568	-0.104	0.5	-1.329	0.967
Gender	-0.244	0.483	-0.088	0.4	0.057	0.434	-0.23	0.402	-0.213	0.677
Age 2	-0.424	0.731	-1.202**	0.612	-0.896	0.642	-1.031*	0.599	-0.541	1.18
Age 3	0.285	0.814	-1.113*	0.672	1.037	0.693	-0.869	0.663	-0.178	1.156
Age 4	0.037	0.794	-0.352	0.647	0.092	0.683	-0.77	0.632	-0.14	1.199
Age 5	0.635	1.139	-1.236	0.865	0.028	0.954	-1.059	0.844	-2.591*	1.441
Edu 1	0	*Omitted*	0	*Omitted*	0	*Omitted*	0	*Omitted*	0	*omitted*
Edu 2	-1.55	1.015	-1.48	0.966	-0.711	0.979	0.489	0.952	-3.121**	1.389
Edu 3	-0.476	0.694	-0.286	0.575	-0.93	0.629	0.615	0.569	-2.103*	1.132

Dep. Variable	WTP booking		WTP after booking		WTP self-research		WTP at airport		WTP policy	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err	Coeff	Std. Err
Edu 4	-0.002	0.588	-0.442	0.47	-0.165	0.51	0.69	0.469	-1.78**	1.008
Framing	0.534	0.477	0.142	0.388	0.618	0.428	0.311	0.379	-0.025	0.682
Observations	167		167		167		167		167	
Prob > chi²	0.000***		0.004**		0.000***		0.007***		0.000***	
Prob > chi²	0.267		0.188		0.278		0.179		0.478	
Log-likelihood	- 69.713		- 93.969		- 82.160		- 95.042		- 40.277	
Correctly classified	80.84%		73.65%		78.44%		69.46%		91.02%	

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval

Table 13. Addendum to Table 8. Logistics regression on the effect of Attitude & Framing on the WTC

Dep. Variable	WTC fly less		WTC Green transport		WTC pay extra	
	Coeff	Std. Err.	Coeff	Std. Err	Coeff	Std. Err
Constant	0.521	1.465	-4.041**	2.026	-20.702	1171.412
VCO Attitude -humankind	-0.293	0.702	0.062	0.65	0.436	0.929
VCO Attitude –environment	-0.005	0.911	-0.013	0.837	3.116***	1.187
VCO Attitude – fly more	0.750	0.521	1.216	0.513	-0.999	0.809
VCO Attitude - less guilty	0.062	0.511	0.276**	0.496	0.891	0.714
Awareness impact aviation	1.850	1.49	0.688	1.253	18.175	1171.411
Awareness VCO	0.128	0.736	-0.329	0.725	-1.09	0.912
Pre-knowledge VCO	0.332	0.718	0.2	0.697	1.734*	0.903
Awareness impact human behaviour	-3.538**	1.645	2.49	1.616	-0.588	1.643
Sustainable behaviour	2.653***	0.659	1.457**	0.569	1.181*	0.716
Choice airport	1.314**	0.625	0.69	0.598	1.876*	1.056
Frequent flyer Europe	1.221**	0.564	0.949*	0.57	0.312	0.748
Frequent flyer World	-0.740	1.102	-0.302	0.979	16.008	1171.415
Green transport	0.237	0.587	0.474	0.61	-0.386	0.767
Gender	-0.307	0.447	0.262	0.428	0.664	0.688
Age 2	-0.655	0.673	-0.491	0.637	-0.574	0.967
Age 3	-0.602	0.744	0.099	0.7	0.628	1.121
Age 4	-0.048	0.735	0.765	0.725	-0.13	0.969
Age 5	-1.500	0.94	0.89	1.122	-0.909	1.301
Edu 1	0	*Omitted*	0	*Omitted*	0	*Omitted*
Edu 2	-1.045	1.019	0.027	1.106	-2.411**	1.113
Edu 3	-2.383***	0.677	-1.408**	0.614	-0.503	0.844
Edu 4	-0.993*	0.552	-0.859	0.527	1.71*	0.889
Framing	0.269	0.439	-0.185	0.419	0.525	0.64
Observations	167		167		167	
Prob > chi²	0.000***		0.007**		0.000***	
Prob > chi²	0.305		0.233		0.441	
Log-likelihood	- 77.226		- 81.165		- 44.776	
Correctly classified	77.84%		79.64%		88.02%	

* 90% confidence interval ** 95% confidence interval *** 99% confidence interval