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**Is the flight shaming movement effective
in changing customers' behaviour?**

Travel mode preference for the Amsterdam-London-Amsterdam
route depending on flight shaming movement effect and price.

Name student:

Piotrowski, W.I.

Student ID number:

616123

Supervisor:

Bellet, CS

Second Assessor:

Scekic, A

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second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

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Abstract

Flight shaming (*flygskam*) lifestyle movement that gained traction around 2019 is an important element of conversation around limiting the environmental impact of traveling. Past research showed positive correlation between flight shaming movement and lower demand for air travel. This study aims to determine how flight shaming movement influence the consumer decision on a route with a viable rail connection alternative. Additionally, it seeks to investigate the effects of price and possibility to purchase carbon offsetting. Based on a review of literature on flight shaming movement and norm activation model an online experiment was conducted. Treatment group was exposed to the faux article inducing the flight shaming effect and later asked about the preferred ticket for purchase on different price levels. The results indicate that flight shaming movement is influencing the choice of ticket by changing the personal norms. Price was found to have a strong effect on the choice of ticket but to have no interaction effect with flight shaming movement effect. On this basis, the flight shaming movement and its techniques can be utilised in changing the consumer behaviour and achieving sustainability goals. Further research is needed to investigate the effects of carbon offsetting programs as well as study other purchase scenarios. Due to the complex nature of flight shaming movement the faux article is an imperfect treatment results in limited external validity of experiment. At the same time the results of the study can be highly relevant for e.g., online advertising.

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1. Introduction

1.1 Motivation and relevance

The looming climate crisis is a major concern for societies around the world. As many governments, scientists and activists are trying to find solutions for minimising the environmental impact of human activity; the air travel industry has been scrutinised for accounting for a significant share of greenhouse emissions. Around 2018 a social movement against flight shaming was born. By making people feel guilty about taking the plane, the movement is to deter people from flying altogether or choose more sustainable ways of transport. Understanding the impact and mechanism of the flight shaming movement (FSM) on customer behaviour is crucial in finding the right solutions for a more sustainable economy. By exploring the impact of the flight shame movement on purchase decisions, this research paper aims to contribute to more knowledge about travellers' behaviour. Such knowledge is relevant for travel industry executives, policymakers and climate activists who are all part of the discussion around FSM and its consequences.

While past research has managed to capture the large-scale effects of FSM and explored the factors that may increase the effects of FSM there are certain gaps in knowledge. The methods utilised in the past did not include the experiments with treatment exposed to FSM. Moreover, neither the effects of price of the substitute services nor of the carbon offsetting programs offered to purchase by airlines has been studied. This research paper tries to fill in this gap. By having more insight into the topics mentioned above managers, policy makers and activists will get useful knowledge in the everyday debates they face.

1.2. Research Questions

Does the flight shaming movement affect the consumers' choice of purchasing plane or train tickets on a particular route? What is the role of the price of the travel ticket? How does the flight shaming movement affect the consumer's decisions? Does the possibility to offset the carbon emissions cancel the flight shaming movement effect?

1.3. Structure overview

The structure of this paper is as follows. Chapter two, *Literature Review* summarizes all the research that has been done on the topics relevant for the research question of this thesis. It contains information about the FSM, its origins and nature of the movement. Emphasis is put on the past research on the impact of the

movement on the customer behaviour. Moreover, Norm Activation Model is described as a useful framework to understand the mechanisms of the impact of the FMS. Lastly, price elasticities of ethical goods are studied. Chapter three, *Conceptual Framework and Hypothesis* provides overview theoretical background of the experiment of this paper. Chapter 4, *Data and Experimental Design*, provides details about the process of conducting the experiment and the data collection. Chapter five, *Research Outcome* contains the data analysis and tests of the hypothesis. Chapter six, *Discussion* includes a discussion of the results presented in previous chapter as well as final conclusions and suggestions for further research.

2. Literature Review

Past research provides insight into lifestyle (environmental) movements, consumer's behaviour regarding "green goods", and the impact of shame and guilt. The topic of flight shaming was also studied with a focus on exploring its impact in countries like Sweden and Germany, where it was the strongest. Researchers used statistical data and surveys, and experiments to explore people's attitudes towards taking the plane. The FSM is an example of a lifestyle movement reflecting broader environmental trends and environmental movements emerging in the last years of reducing consumption, CO₂ emissions, and eco-cautiousness. The movement uses the mechanism of experiencing guilt and shame that were proven to impact consumers' behaviour. Taking the train instead of the plane can be considered an environmentally friendly, ethical choice. Therefore, I will have a closer look at studies on the price elasticities and reasons for purchase of such products.

2.1. Flight shame and flight shaming movement

Origins

The term *flight shame* derives from the aviation industry's impact on the climate crisis. In 2019 around 2.1% of global human CO₂ emissions came from airlines activities (IATA, 2020). Supporters of the flight shame reason that people should feel ashamed when personally adding up the CO₂ emissions with their plane trips contributing to global heating. The term originates from the Swedish word *flygskam*, first coined in 2017 by Swedish singer Staffan Lindberg (BBC, 2020). However, it was not until 2019 that the movement gained broader recognition outside Sweden. The popularisation of the term and concept of avoiding flying due to environmental concerns is attributed to climate activist Greta Thunberg (Hook, 2019) (Wilkes, 2020) (The Economist, 2019). She is one of the leaders of the social movement urging world leaders, companies, and individuals to take action to mitigate the climate crisis. Thunberg started the #FridaysForFuture – a weekly

protest of primarily young people demanding a cut in greenhouse emissions for the sake of (their) future. At its peak in March 2019, the protests gathered more than 1.6 million people worldwide. One of the research states that for 45% of students participating in the protests, Greta Thunberg was the factor that made them join the protest (Wahlström et al., 2019). The Google trends reports (2021) show that the Flight Shame term is most prevalent in Scandinavian countries, Western Europe, USA, and Australia (Google Trends, 2022).

Flight shaming movement initiatives

Flight shaming is closely related to another Swedish term: Tågskryt – “train brag”. While the exact emissions per mean of transport depend on many factors, rail and water transport emit less CO₂ per km (Gioni et al., 2009). Trains are also regarded as more sustainable transport among consumers (Engine Insights, 2020), (Europe on Rail, 2021). Taking a train or other type of transport (e.g. boat) is the desired form of travelling for flight shame movement supporters as it is less harmful to the environment. As actual emissions per passenger depend on many factors (source of energy, utilisation of infrastructure, type of vehicle and others), travelling by rail indeed generally means a much lower carbon footprint (M. Gioni, C Brand, P. Watkiss, 2009).

The name itself – Flight Shame, as well as the FSM, would suggest the movement is focusing on shaming, it is true, but the FSM functioning is much broader. Cambridge Dictionary (2022) defines shaming as publicly criticising and drawing attention to someone, especially on the internet. Indeed, people have been called out and exposed for taking the plane, but this is the case primarily for well-known figures who are relatively marginally represented in societies. A regular person is unlikely to face direct (online) shaming, and perhaps it is not the goal of the FSM. It seems crucial for the movement to aim that people would experience guilt or shame just by flying itself, not because of the (risk) of being publicly called out. FSM is using many ways to associate negative emotions of shame and guilt with flying, e.g. highlighting the damage of greenhouse gasses on the environment and linking air travel to high emissions. They do so by protesting on the streets or launching online campaigns. However, some FSM-related activities are much less focused on the shaming and negative emotions themselves instead of focusing on a more positive approach. Examples of such initiatives are the #WeStayOnTheGroud petition (signed by people and companies that promised to stop flying altogether), train brag - being proud of taking the train and other initiatives.



Figure 1 Greta Thunberg and other protesters at School Climate Strike in 2019 (Peoples Dispatch, 2019)

FSM is a complex phenomenon consisting of several elements. Having strong relation to the figure of Greta Thunberg and the Fridays for Future initiative, it is essential to note that the FSM is diffused, diverse and not centred around one organisation. Many different activist groups support the movement in various ways. The community is diffused, and the same as every movement includes people involved in different ways. Next to committed activists, there are less devoted kinds of support often crucial for the movement's overall success. For environmental movements, the widespread support of small commitments is vital for achieving the movement's goal.

Flight shaming movement as a lifestyle movement

A social movement can be defined as an *organised, change-oriented collective action aimed at the state or other authority structures* (Haenfler et al., 2012). While some of the elements of this definition match the FSM, it is not a perfect fit. FSM is loosely organised and structured; it is not directly and exclusively focused on the policy makers – instead prompting the individual change of behaviour. As Haenfler et al. (2012) suggest, a lifestyle movement is a better describing term for environmental movements that tend to be structurally diffuse and target cultural codes. Lifestyle movement is a *“conjuncture of the private and public forms of enacting and living the social change, based on shared lifestyles and identity that exist beyond or even aside political goals, challenging cultural and economic social practices, ultimately aiming for wider social, cultural or economic change”* (Haenfler et al., 2012). What distinguish it from trends is continuity and internal coherence.

Definition for the purpose of this study

The FSM is a broad term without a clear definition; therefore, it is necessary to clarify what is being discussed. FSM is closely related to other environmental movements, as well as research and educational efforts on global heating and sustainability. I will focus on the “core” of the movement – efforts to associate flying with the feeling of shame and guilt that became powerful in 2019. This approach allows for more clarity and insight on whether the “shaming” approach effectively changes consumers’ behaviour. I will focus on the following two elements of FSM:

1. Active support of the movement with the ultimate goal of reducing commercial air travel. (e.g., by taking part in public demonstrations, signing petitions, sharing information about flight shame online and other ways of active backing for)
2. Media coverage and public discussions about the environmental impact of air travel are rooted in the active support for FSM (e.g., news articles about the recent demonstrations leading to exposure with FSM-related information)

2.2. Does Flight Shaming have an impact on consumer behaviour?

Research overview

Researchers identified a positive correlation between the presence of flight shaming and lower willingness to choose plane as a mode of transport, and lower demand for air travel. However, the existing studies are limited. The precise answers about who, why and to what extent is affected by it are unknown. Some researchers point out that the flight shame movement is unlikely to become mainstream in the near future and directly impact actual demand for air travel. The reasons for this include the scarcity of attractive alternatives (cost, convenience, time spent on travelling), attitude-behaviour gap and strengths of habits (Mkono, 2020). At the same time, flight shaming is an ongoing topic among industry professionals and consumers alike. Swedish newspaper SvD reported (2019) that IATA considers flight shame the “most serious threat for aviation in Europe”. Researchers trying to discover the effectiveness of FSM also question if that is the best way to discourage people from air travel (Mkono, 2020). An alternative could be the more positive message approach highlighting the benefits of, e.g., taking the train, or a more scientific approach highlighting the data and facts of how CO₂ emissions harm the environment.

Research difficulties due to the COVID-19 pandemic

The FSM term itself is relatively new and has only gained global attention from 2019 onwards. There is limited research exploring its impact of it on consumer behaviour. Not only the movement is new, but also the COVID-19 pandemic heavily disrupted the travel and transport industries in 2020, 2021 and the current

year 2022. The overall air travel demand (measured in revenue passenger-kilometres) dropped by 65.9% in 2020 compared to the previous year (IATA, 2021). Some pandemic effects will likely prevail and cause a long-term change in consumer behaviour and the air travel industry. For example, as the world turned to remote work, managers saw the benefits of online meetings and did not plan to support business travel as much as in the past (Accenture, 2021). Simultaneously, some airlines rethought their business strategy (Bouwer et al., 2020), and significant investments in air travel infrastructure (e.g. Polish new mega-airport plans) were questioned by industry specialists (Tilles, 2022).

Methodologies

Despite the relatively new nature of the movement and the massive impact of the COVID-19 pandemic, several researchers managed to explore the impact of the flight shame movement on consumers' willingness to fly and the whole air travel industry.

Three main methodology approaches have been utilized.

1. Analysis of the data from the market regarding the demand for air travel and other means of transport.
2. Analysis of consumers' viewpoints about air travel stated in the surveys.
3. Lab experiments measuring the impact of the flight shame on viewpoints about air travel.

Each of the research methods has its advantages as well as drawbacks. The analysis of demand for air travel gives an overview of the ultimate outcome – whether people choose to fly or not, which is highly reliable. Sadly, it fails to identify reasons for a change in demand and does not take into account other determinants of the demand. The change could result from FMS, but the demand for air travel is influenced by something else. GDP per capita, total consumption expenditure, population, airfares, level of service, laws regulating air travel, foreign direct investment, and tourism are listed among the determinants for air travel demand by Valdes (2015). Therefore, strictly relying on such data might be misleading. Methodology involving surveys with questions about future travel plans, familiarity with flight shame, views on protecting the environment etc. gives clues for the casual relations moderators in willingness to fly. However, this type of study is flawed because of the intention-behaviour gap (Sheeran, 2002). In the last type of methodology, lab experiments, researchers seek to measure the direct effect of flight shaming. In this case, the drawbacks include a lack of real-life relevance and, again, the existence of an intention-behaviour gap. Another major problem the researchers must face is how to imitate the influence of flight shame movement on experiment participants.

Market data analysis findings

Global demand (revenue passenger kilometres) for air travel in 2019 rose by 4.2% compared to the full year of 2018 (IATA, 2020). This was significantly less than the growth a year before - 7.3%. However, FMS is not believed to be a significant factor. An economic backdrop, weak trade activity, 737 MAX grounding, and global (geo)political tensions were to blame, according to IATA's CEO, de Juniac. Within the EU, where the flight shaming movement gained the most traction, most member countries observed an increase in demand (Eurostat, 2022). Among exceptions was Sweden, where the number of passengers dropped by 4% overall and a 9% decrease on domestic flights (Reuters, 2020). This decrease is attributed to the flight shaming movement. Also, in Germany, where the overall demand grew, a decrease in short-distance flights was observed (Gössling et al., 2020). A slower than in previous years increase in air traffic was also observed in other countries where FMS were prevalent – Finland, Norway, the UK, Belgium, and Iceland (Eurostat, 2022).

Consumer surveys research findings

Several studies explored the impact of flight shaming by asking people about their attitudes towards air travel. The main finding of the Gössling, S., Humpe, A. and Bausch study on the desirability of air travel in Germany (2020) reveals that, against a falling domestic air transport demand, respondents do not report a significant change in travel behaviour. However, a two-thirds majority of respondents indicated support for market-based measures increasing the cost of flying, as well as policies forcing airlines to reduce emissions and legislation abolishing subsidies. These findings point to an ongoing change in social norms, which could be reinforced if policymakers took advantage of public support for ambitious climate policies. Researchers conclude that the environmental movements successfully raised the topic of the impact of flying on climate; however, the exact impact, especially long-term, remains unclear. The researchers suggest that the panel conducted in August 2019 on the representative sample of German citizens on which the study was based too early to provide more determining insight. Little change in actual behaviours contrasts with higher support for policies like an additional tax for CO₂ emitted on a flight, air travel regulations, train ticket subsidies and other stimulating policies. The researchers did not study if there are any behavioural changes in precise situations when consumers have to travel somewhere and lack research regarding the impact of price.

Other research (Doran et al., 2020) suggests the feeling of flight shame is partially shaped by social norms and depends on the context of travel. Authors focus on what situations people might feel guilty about and what are the reasons. They discovered that social norms influence the feeling of flight shame, namely, expectations

of social approval among acquaintances (injunctive norm) and by observing the behaviours of other members of society (descriptive norm) people. On top of that, flight shame is also influenced by one's personal, moral norms and views on the importance of protecting the environment etc.

Authors compared work-related travelling, visiting friends and holiday types of travelling by conducting a survey on the representative sample of the Norwegian population, asking if participants would feel flight shame when choosing planes when going on holidays, business travel and visiting friends/family. Socio-demographic data were also gathered.

Results show that most vast majority of respondents would not feel shame in any situation (73.4%). The results slightly varied across the situations showing that travelling for holidays is most likely to bring the feeling of guilt. There was a strong correlation with personal norms – people claiming they feel obliged to reduce flying to tackle climate change are more prone to feeling ashamed. Social injunctive norms significantly correlated with the feeling of shame, while descriptive norms and age and gender did not play a role in feeling guilt. These conclusions, however, are missing to explain the relationship between social and personal norms. Social norms impact personal norms, so it is impossible to distinguish precisely what has the most impact (Bertoldoa, 2016). This study also fails to identify whether the feeling of shame impacts consumer behaviour, namely, purchase or plane tickets.

Change of attitude toward flying was researched by the UBS bank team (2019) in a survey of the USA, German, French and UK populations. 21% of respondents claimed to reduce flights in the coming year. Furthermore, UBS forecasts that by 2035 the annual growth rates in air travel will decrease from 4.5% to 1.5%. The change in trend is attributed to the FSM; however, the survey participants were not asked for the reason for the change in attitude. This means it is hard to come up with conclusions about the impact of flight shame as the results of the study might be impacted for other reasons.

Experiments findings

This research method aims to directly measure the effect of the flight shaming movement to determine if it can influence consumers' behaviour and attitude. Unlike survey studies on populations and market data about the demand for air travel, it allows for separating the flight shaming effect from all the other factors that influence the consumer's behaviour. On the other hand, this lab experiment method does not have high external validity.

In their experiment, Scott R. Winter, Tracy L. Lamb, Ryan J. Wallace and Carolina L. Anderson search for moderation factors for flight shaming. Three studies on a total number of 847 participants have shown a significant effect of the FSM and the moderating effect, namely: value with sustainability and willingness to pay for sustainability. Researchers used the "willingness to fly" scale to measure the impact of flight shame. Participants were asked to state how willing are they to fly on a commercial flight on a five-point Likert scale. In the experiment, several other questions were asked to determine the moderation effects - *familiarity with sustainability, value with sustainability, willingness to pay for sustainability, and environmental commitment*.

The study revealed a positive correlation between the type of article and willingness to fly with an article about protesting against air travel that was supposed to evoke the effect of the FSM. Moreover, *value with sustainability* and *willingness to pay for sustainability* were found to be significant moderators.

2.3. Norm Activation Model

Personal norms activation and impact on consumer behaviour

Researchers have identified the personal norm concept as crucial for understanding moral behaviours (Thøgersen, 2002). Initially used for the research of altruistic behaviours, have later been found as a useful explanatory concept in research on a range of topics such as shoplifting, exam-cheating, recycling, environmentally friendly buying and more (Thøgersen, 2002). Personal norms can be described as *self-expectations for specific action in particular situations that are constructed by the individual*. Activated personal norms are *experienced as feelings of moral obligation, not as intentions* (Schwartz, 1997). One's personal norms are primarily rooted in the values and social norms of family and close environment during the formative years of childhood and, to a lesser extent, throughout life. This means personal norms are either internalized social norms or derive from higher order values. The formation of the personal norm depends on the perceived self-agency, responsibility and expected moral consequences (Schwartz, 1977). While social norms (shared standards of socially acceptable behaviour) and personal norms may overlap in many contexts, what ultimately sets them apart is that the consequences/sanctions are tied to the self-concept for personal norms. The anticipated feeling of guilt or pride tied to a particular action is tied to the internal subjective self-expectations (Schwartz, 1977). This will be discussed more in detail later.

Activated personal norms will have an impact on consumer behaviour. Schwartz (1997) highlights four steps that lead to norm activation in the context of altruistic behaviour.

1. Awareness of the problem/state of need
2. Recognition of the ability to tackle the problem/provide relief
3. Recognition of the OWN ability to tackle the problem/provide relief
4. Concern about the issue and feeling of responsibility

Based on this theory, De Groot and Steg (2009) have presented the Norm Activation Model, which conceptualizes how a particular (moral) behaviour is achieved. As presented in Figure 2. *Awareness* of the problem/issue/state of need is the first step. It is followed by creating a sense of *Responsibility* for the problem/issue/state of need and one's ability to influence it. Then the *Personal Norm* is activated and later followed by the *Behaviour*.

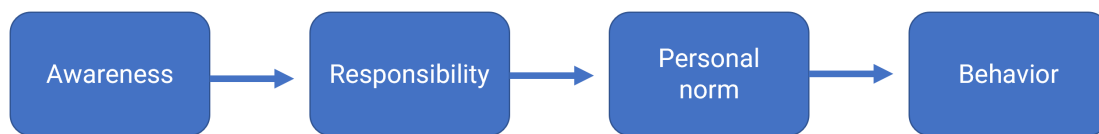


Figure 2 Norm Activation Model De Groot and Steg (2009)

Researchers have theorized and used in experimental studies the concept of *defence steps* – counter mechanisms for activating the personal norms which directly impact the final behaviour. Defence steps include the denial of the assessment of the situation, e.g. seriousness of the problem, own responsibility and suitability of activated norms. Moreover, once the personal norm is activated comes the evaluation of the cost and benefits of a particular behaviour. It happens on both moral and non-moral levels. When the moral benefits match the non-moral personal benefits, the behaviour can occur without resentment. The conflict occurs when strong non-moral costs occur, e.g., time or other assets investment, the physical effort needed or other unpleasantnesses Schwartz (1997). Such a situation occurs when there is a social dilemma, a situation when self-interest needs to be sacrificed for the interest of the collective. In the short term, in the context of environmental and social dilemmas, the immediate gain is always greater when acting in the individual interest instead of cooperation for the long term, common interest (Nordlund, 2003). The choice of not travelling by plane in some situations is indeed a social dilemma. Giving up on travelling altogether or choosing other means of transport and potentially losing the thrill of travelling by air or extending the time needed for travelling or will come with greater financial costs. These immediate personal costs contrast with a long-term, cooperative goal of sustainability. Studies on the choice between commuting by car and public transport have found that such a situation is seen as a social dilemma, with participants being aware and feeling responsible for the environmental harm that comes with using the car. However, the likely activated

personal norms countered the personal costs of losing flexibility and comfort – a prime example of the earlier discussed *defence steps* (Vugt&Meertens, 1995).

Guilt and shame and pride impact on consumer behaviour

In order to better understand how the environmental movements may affect the change of behaviour, some researchers have incorporated the impact of emotions: pride and guilt, into the Norm Activation Model. Figure 3 below presents the model. The *anticipated guilt or pride* in mediating the effects of *Personal Norm* on *Behaviour*.

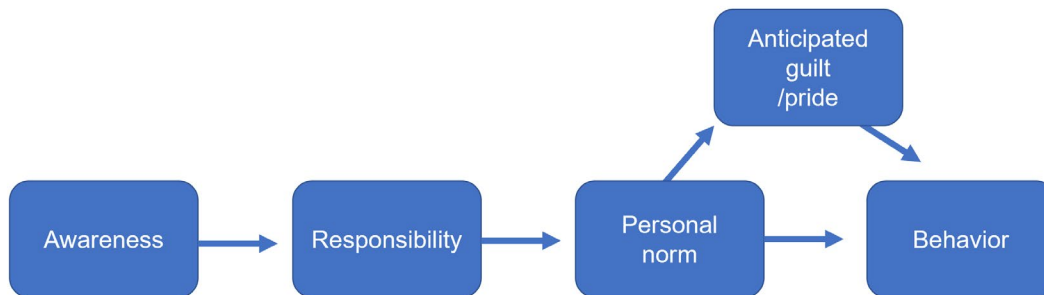


Figure 3 Norm Activation Model including the effect of Pride and Guilt

While there is a difference in definitions of guilt and shame both of them, they are examples of self-conscious emotions – emotions that are evoked by self-evaluation of one's actions based on personal or social (injunctive) norms (Tracy and Robins, 2004). Previous researchers had found that individuals experiencing guilt are more focused on the low construal level, meaning they are more likely to feel bad about a particular behaviour. In contrast, shame-experiencing individuals are more likely to link the adverse outcomes to their entire "self" – high construal level (Han et al., 2014). The same researcher also points out that in a particular situation, depending on the individual, either guilt or shame can experience.

The emotions of shame or guilt were indeed associated with environmentally friendly/harmful decisions by researchers in the past (Harth, Leach, & Kessler, 2013), making it relevant to analyze in this study because we know that such emotions might be evoked concerning lifestyle environmental movements. Social norms were also found meaningful (together with personal norms) for consumer behaviour regarding environmentally friendly purchases in the experimental studies (Minton and Rose, 1997).

Some research was dedicated to evaluating the behavioural impact of shame and guilt. Perez-Trugliaa and Troiano (2016) aimed to measure the effectiveness of shaming policies in the US. The field experiment has

proven that shame (induced by exposing the identity of tax delinquents in the mail letter and on the online website) increased the payment rates of the owed amount. Another experimental study by Brocas and Carrillo (2021) looked into shaming as an incentive mechanism against stealing. Researchers proved that people are less likely to steal when faced with the possibility of shaming.

These studies are useful in approaching the analysis of the FSM effects. However, there are significant differences in the mechanism of FSM and of described experiments. 1. Flying is not wrongdoing by law 2. The FSM does not have tools and is not publicly exposing people that fly – it is only likely to happen when they expose themselves.

2.4. The demand for green and ethical goods and their price elasticity

Purchase decisions are usually influenced by the price of a product or service. The higher (lower) price compared to substitutes is among the personal costs (benefits) that come with a particular purchase decision. As mentioned before, evaluating these personal costs (benefits) is part of the process of decision-making when the personal norms are activated according to the Norm Activation Model. It is relevant to analyze the possible relation of price elasticities of train and plane tickets as this will likely impact the behaviour of consumers influenced by the FSM.

When someone chooses not to fly, they can either give up on the travel or choose the existing alternatives. Those include rail, road, or water transport options. So far, there is very limited research on the price elasticity of rail vs air transport. This is due to the environment's complexity, consumers' travelling choices and the services not being ideal substitutes. Therefore, it is impossible to tell how much extra the consumers who want to reduce air travel but do not want to give up travelling are willing to pay for the train ride. In the light of the lack of such studies, I think it is viable to compare the choice between plane and train to other green/ethical consumer products with less green/ethical alternatives with similar attributes. Examples of such goods are organic food and fair-trade coffee that were studied.

In their review of studies regarding organic food price elasticities, Manika Rödiger and Ulrich Hamm (2015) point out that the matter of price is debatable. The higher price is frequently mentioned by consumers to be a reason for not buying organic food. At the same time, some studies show that lowering the price does not increase the demand. Researchers examining different types of organic products in various locations came to opposing conclusions. Results of some studies suggest that the elasticity of organic products is high, while other studies suggest that it is low. This may be because of cultural and economic differences between studied

populations (Rödiger and Hamm, 2015). Another review of studies regarding organic food by Jessica Aschemann-Witzel and Stephan Zielke (2015) summarizes that the willingness to pay a premium is close to 30% and depends on the category of the product and consumer segment.

One of the few studies based on the real-life experiment was financed by the Dutch government willing to find out the price sensitivity of consumers for organic food. Consumer prices of selected organic products were reduced by up to 40% below current market levels. The price elasticity of the demand for organics was found to be low (Bunte et al., 2010). This implies that a reduction in the price gap gives a small boost to consumer demand and would not have a large impact on the budget share of organic products.

Another study based on revealed consumer behaviour measured price sensitivity of fair-trade coffee and regular coffee beans. Buyers of ethical fair-trade coffee were less price sensitive than those purchasing other coffee. Interestingly the experiment also revealed that the decrease in price does not increase the demand significantly (Arnot et al., 2006). This confirms the results of the studies of the stated preferences revealing that people are willing to pay a premium for ethical products (Pelsmecker et al., 2005).

Lack of price sensitivity of consumers choosing ethical/sustainable consumer products should not necessarily be useful while analyzing the plane/train ticket purchases. The overall price knowledge of organic/fair trade products available in the supermarket is low (Aschemann-Witzel and Zielke, 2015). This is not the case for the travel market with ubiquitous price comparison engines; moreover, the price ranges of the food and travel tickets are different.

3. Conceptual framework and hypotheses

The FSM managed to gain attention and support in at least a few countries worldwide. The movement made some people feel shame when taking the plane, especially for non-essential travel. The research is so far inconclusive as to what is the impact of flight shaming on consumers' behaviour and actual demand for air travel. The impact of the presence and price of air travel alternatives such as rail or water travel was not yet studied.

Norm Activation Model is a useful framework that can be used to research the impact of the FSM. FSM impact can be seen on could be seen on different levels of the Norm Activation Model:

1. Awareness and responsibility levels leading to activation of the personal norm

Media coverage of the FSM actions and information spread by the FSM leads to higher social knowledge of the air travel industry's impact on the environment. By highlighting the environmental impact of (individual) air travel, FSM aid in feeling responsible for the environmental harm air travel does. This leads to personal norm activation.

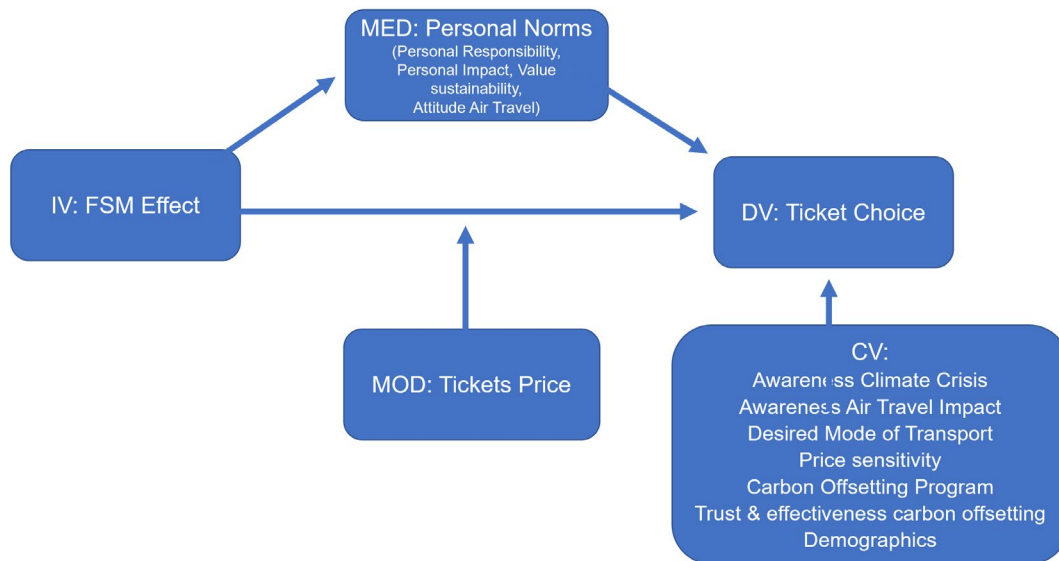
2 Changing the personal norm because of new social norm

One's personal norms are rooted in values and norms of a close environment during childhood but are evolving the entire life by social norms. By showcasing the number of people involved and supporting the reduction of air travel, the FSM is changing the (perceived) social norms.

3 Mediating the effects of Personal Norm by inducing and strengthening feelings of shame (or pride)

Shaming air travel by FSM (as well as praising travelling by train) leads to feelings of guilt (pride) and mediates the effect of the Personal Norm.

3.2. Conceptual framework



- IV FSM Effect (*FSME*) is affecting the DV Ticket Choice (*Choice*).
- MED Personal Norms (*PNorms*) is affected by FSM Effect (*FSME*) and by creating an anticipated feeling of pride/guilt is having an impact on the DV Ticket Choice (*Choice*)
- MOD Tickets Price (*Price*) is moderating the effect of IV FSM Effect (*FSME*).

- CVs Awareness Climate Crisis, Awareness Air Travel Impact, Desired Mode of Transport, and Price Sensitivity, Carbon Offsetting Program, Trust & Effectiveness Carbon Offsetting influence the DV Ticket Choice (*Choice*) but are not interact with IV FSM Effect (*FSME*).

3.3. Hypothesizes

Based on past research presented I propose following hypothesis for this thesis:

Hypothesis	Description
H1	FSM effect decreases the probability to choose air travel opposed to rail travel.
H2	FSM effect changes the personal norms
H3	Environment-oriented personal norms decrease the probability to choose air opposed to rail travel
H4	Higher price of rail travel substitute to air travel increases the probability of choosing air travel
H5	Awareness of climate crisis as big issue decrease the probability to choose air travel opposed to rail travel
H6	Awareness of air travel impact on the environment decrease the probability to choose air travel opposed to rail travel
H7	Perceived high personal benefits of air travel and high personal costs of rail travel increase the probability of purchase of the plane ticket
H8	There is an interaction effect between the Price of tickets and FSM Effect regarding ticket choice. Higher price will decrease the strength of FSM Effect.
H9	Chance to voluntary pay for offset of carbon footprint of flying increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket
H10	High trust and positive view of carbon offset programs increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket

4. Data and experimental design

Introduction

To answer the research question, I will carry out a between subject design experiment with a treatment group exposed to FSM effect. Additional manipulation will concern the price of the plane and train tickets. Experiment will be performed by the use of online survey, selected as a feasible and effective tool for this type of research. As the main part of the experiment discusses traveling from Amsterdam the sample for the study will be citizens of the Netherlands to ensure relevance and understanding of the survey questions. In this

chapter the flow and elements of the experiments as well as the conceptual framework of the experiment and variables will be discussed in detail.

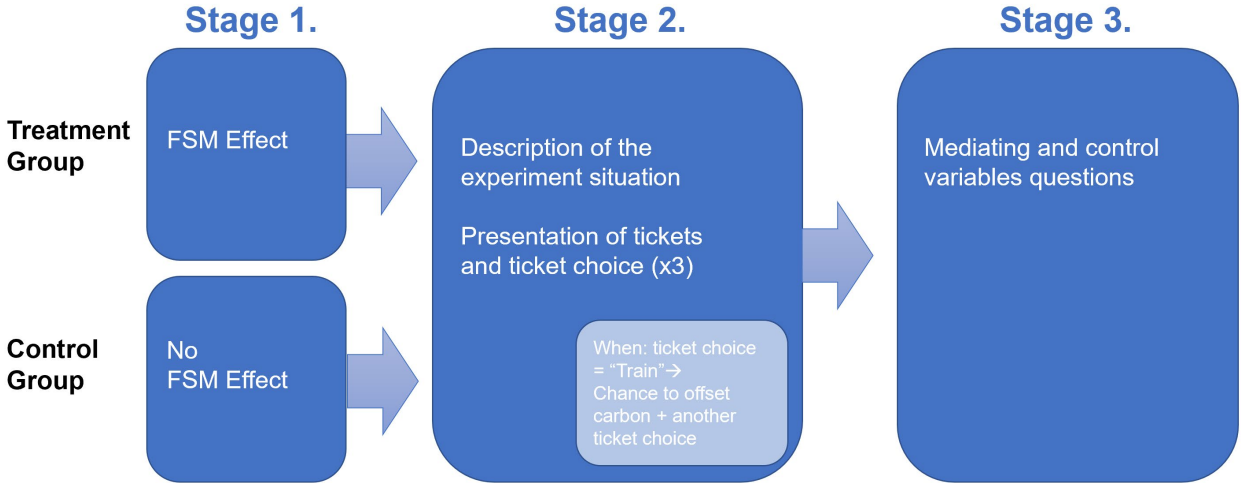
4.2. Experiment variables

For the experiment following variables will be measured:

Variable Short Name	Variable Name	Variable Type	Description
FSME	Flight Shaming Movement Effect	Independent	News-like article aimed to mimic the FSM Effect on reader
Choice	Choice of plane or train ticket to purchase	Dependent	Choice of ticket to purchase between plane and train ticket on the route Amsterdam-London-Amsterdam on Price level 1. Plane and train equal in price.
CChoice	Choice of ticket given the possibility to offset the carbon emissions	Dependent	Choice of ticket to purchase between plane and train ticket on the route Amsterdam-London-Amsterdam when given a chance to buy carbon offset on Price level 3
Price	Price level	Moderating	Price level for plane and train tickets.
PNorms	PNResp - Personal Responsibility	Mediating	Personal norm of perceived personal responsibility for environmental harm of air travel.
	PNPerImp - Personal Impact		Personal norm of perceived personal impact on mitigating the climate crisis.
	PNValSust - Value sustainability		Personal norm of the extend of valuing being sustainable and willingness to accept personal costs.
	PNAttAirTrvl - Attitude Air Travel		Personal norm of whether the traveling by plane is desirable and viewed example of conspicuous consumption.
TrustCarbOff	Trust carbon offsetting	Control	Trust in programs that claim to offset the carbon footprint
EffCarbOff	Effectiveness carbon offsetting		Perceived effectiveness and underlying sense of carbon offsetting programs
AAirTrvlImp	Awareness Air Travel Impact		Perceived responsibility of air travel industry for overall human environmental harm.
AHumImp	Awareness Human Impact		Perceived responsibility of human activity on climate crisis and perceived seriousness of climate crisis.
DesirModTrans	Desired Mode of Transport		Preference for particular mode of travel (air or rail) compared to another one.
PriceSensit	Price Sensitivity		Importance of price of the product/service when making a purchase decision.
Age	Age		Age of participant

Gender	Gender		Gender of participant
Employ	Employment status		Employment status over the last three months
Edu	Level of education		Highest level of education completed

4.3. Experiment flow



Treatment group, FSM Effect is in place (50% of sample)

Control group, no FSM Effect is in place (50% of sample)

4.4. Experiment survey details

Stage 1.

FSM Effect / No FSM Effect

The goal of the first stage of this experiment is to expose treatment group for the FSM Effect. FSM potentially influence people’s life’s and behavior’s in various direct and indirect ways. This naturally poses a problem of how to create the FSM Effect in the lab experiment. With the focus on creating a real-life experience I opted for presenting participants of the study an faux news article about flight shaming movement. Such article, with specific set of information, could be read by any news consumer in reality. At the same time, such article would only be created when there is an interest in society about the topic and there are things to write about e.g. demonstration – active support for FSM.

The faux article (included in Appendix 1) includes the following:

- Social norms: Not flying/flying less is a new social norm. Many people have joined the movement and think flying is not a good choice.
- Awareness: Information about the climate crisis and air travel industry contribution to it.
- Responsibility: Highlighting the individual contribution and significance
- Shaming: Emotional information about possible negative response of society/acquaintances when flying

Treatment Group

Participants are exposed for FSM Effect by being asked to read a faux news article.

Control Group

Nothing is presented to the participants

Stage 2.

Description of the experiment situation

In this stage, all participants are introduced to the topic of the experiment – choosing a ticket they would purchase for travelling. The route Amsterdam-London-Amsterdam was selected for two reasons: 1. For practical matters – the easiest to get a sample for the experiment was the Netherlands citizens; therefore, a relevant and familiar route from the Netherlands should be selected. 2. There is a relatively good substitution between rail and air travel on this route. Both modes of transport have comparable prices, time and comfort – this way, the number of other factors that could influence the Choice of Ticket is minimalized. A visit for a wedding was picked as a reason for the travel because of its high relevancy and neutrality as neither a business nor strictly leisure travel. Participants are presented information asking them to imagine that they decided to travel on the route Amsterdam-London-Amsterdam and that now they need to decide what tickets to buy for the transport.

Presentation of tickets and ticket choices

Later, participants are presented with three different sets of the plane and train ticket prices. The appearance order of the sets is random to avoid the anchoring effect. The prices of the tickets were selected to resemble the real-life prices of booking a ticket one month in advance. The Amsterdam-London roundtrip tickets are usually more expensive by train and cheaper by plane (Eurostar, 2022; Skyscanner, 2022); however, the exact price depends on the company, exact date and time of travel, class, and luggage. To simplify the experiment, only three pieces of information are provided on the presented tickets option: 1. Price; 2. Name of the origin and destination; 3. Time of travel. The detailed description of the travel options regarding luggage, the comfort of the seats, meals provided etc., would potentially create confusion and, at the same time, still not

provide full information about the service. The assumption is that participants of the survey have a general idea about international air and rail travel services. After being presented with the ticket options, participants are asked which ticket they would purchase.

For each price level, once the participant's ticket choice is train, an additional question is activated. The participant is asked to assume there is a possibility to buy carbon offset for 7 EUR for the flight and later again asked to choose between the plane and train ticket. This part is aimed to check whether the FSM Effect can be possibly compensated by carbon offsetting programs.

Stage 3.

Mediating and Control Variables Measurement

This survey stage is designed to research the personal norms – mediating variable. Additionally, it aims to measure the awareness of the air travel industry's environmental impact and the climate crisis in general, desired mode of transport, and price sensitivity – control variables. Participants are asked to state to what extent they agree with the statements regarding their personal values, norms, awareness, travel preferences, price sensitivity, opinion about carbon offsetting programs and demographics questions.

4.5. Data Collection

To conduct the research, an online survey tool Qualtrics was utilized. To collect the responses survey was distributed via the personal network on online channels as well as via the survey exchange SurveySwap tool. Over days (26.05.2022-31.05.2022), 245 responses were collected. As the situation presented to participants in the experiment is about travelling from Amsterdam, the main focus in the distribution process was targeting Dutch and internationals living in The Netherlands, particularly Amsterdam citizens. At the same time, the situation presented in the survey has a certain degree of universality. It does not require detailed knowledge about living in Amsterdam or transport options to London. Therefore, the survey was also distributed among people living outside Amsterdam and the Netherlands. Before taking the survey, participants did not know the experiment was part of the research about the flight shaming movement or the environmental impact of travelling so as not to influence their responses. Before participating in the experiment, participants were assured of the survey anonymity and asked to answer truthfully to maximize the chance of getting honest responses. Previous research analyzed in the Literature Review did not identify differences in the FSM Effect depending on the demographic data. Therefore, the experiment did not target

the specific demographic section and particular age/gender/education level/employment status was not required to participate.

4.6. Sample

The survey was completed by 245 respondents, and the median response time was 207 seconds. 15 participants completed the survey in below 120 seconds and therefore were excluded from the sample as it is not possible to answer the questions in shorter than 2 minutes carefully. Further, 8 participants did not answer all the questions and were excluded from the sample. 222 responses were taken into further analysis. Considering the nature of the experiment – one control and one treatment group A minimum of 100 responses were necessary according to the methodology presented by VanVoorhis and Morgan (2007), so the number of responses is enough to conclude.

Participants were randomly assigned to Control – No FSM Effect, and Treatment group – with FSM Effect in place. As a result, 120 participants (54,1%) were part of the control group and 102 (45,9%) treatment group. Each participant was asked to choose to purchase a plane or train ticket 3 times for different prices of train tickets. To minimize the effect anchoring on overall statistics, randomization was utilized – each participant was shown different price levels in random order. To check the success of the randomization between a treatment and control groups, a set of t-tests on demographic variables. None of the values is significant, meaning the randomization was adequate as presented in Table 1 below.

	FSME	N	Mean	Std. Deviation	T value (Equal variances assumed)	Two-Sided p value (Equal variances assumed)
Employ	Control	360	3.01	1.911	-1.458	.145
	Treatment	303	3.23	1.952		
Edu	Control	360	6.79	1.219	-1.115	.265
	Treatment	306	6.89	1.086		
Age	Control	360	2.59	.853	.516	.606
	Treatment	306	2.56	.776		
Gender	Control	357	.51	.501	-.700	.484
	Treatment	300	.54	.499		

Table 1 Demographic variables allocation between control and treatment groups

The majority of the sample (55%) was in the age group 18-24 years old. The second largest group – 25-34 years old constituted 33,8%, while the age group 35-44 years old equalled 8,6%. Other age groups were underrepresented. Only one respondent was below 18 years old and in the age group 55-64. No respondents were 45-64 years old, and two were above 65 years old. The largest group best describing the employment status is Students (44,6%). The second-largest group was working full time (36,6%), followed by working part-time (14,4%). The remaining 9 participants (4,2%) had other employment statuses. The majority of the sample (54,5%) had a bachelor's degree, and 24,8% had a graduate or professional degree. Distribution in age, employment status and education was expected due to the method of distribution of the survey. The sample was fairly equal when it comes to distribution between males (46,8%) and females (49,5%); the rest of the participants preferred not to reveal their gender or identify as non-binary/third gender. Complete information about the sample demographics can be found in Appendix 3.

Preparing the data set and coding of variables

Software utilized for the experiment survey – Qualtrics automatically codes variables and enables easy export of data in format suitable for use in statistical program used for the analysis – IBM SPSS. However, some adjustments were necessary. “Personal Norm, Attitude Air Travel”, “Desired Mode of Transport” and “Price Sensitivity” were re-coded in a inverted way so that they will have the same (expected) effect direction on *Choice* as other variables. New variables were added:

1. Binary *FSME* variable (FSM Effect/No FSM Effect) based on the randomization data from Qualtrics.
2. Scale *PNorms* variable, computed as a sum of 4 “Personal Norm ...” variables.
3. *Choice* based on the answers for 3 different Price Levels.
4. *CChoice* (Ticket Choice when given Carbon offsetting option) was added with the relevant answers. Missing variables (in case the respondent already selected plane ticket for *Choice*) were recoded to 1 (Plane ticket).
5. *Price* (Price level of train ticket) based on the presented Price Level in “Ticket Choice Price 1/2/3” and “Ticket Choice Carbon Price 1/2/3” questions.

In other words, the sample responses were multiplied by 3 to reflect the number of “Ticket Choice” responses (sum of “Ticket Choice Price 1/2/3” and sum of “Ticket Choice Carbon Price 1/2/3”). To keep the information about the Price level a variable “Price” was created. This means the sample for the analysis is equal triple the number of participants, 666. In Appendix 2 all the variables in the analysis and the coding values are presented

Reliability test

The Cronbach's Alpha for *PNorms* variable was conducted to check whether it will be useful for further analysis. A relatively low Alpha value of 0.524 is expected due to diversity between the 4 Personal Norm questions measuring different aspects of personal views. Nevertheless, all of the variables correlate positively. Taking into consideration low number of items on the scale (4) it is still possible to do the analysis. The inter item means is 3.214 and inter-item correlations is 0.215.

5. Research outcome

At the beginning of the analysis, initial findings are summarised based on descriptive statistics. Later, two logistic regression models were employed. First, it focuses on measuring the effect of *FSME* on *Choice* and second, reflecting the conceptual framework of *Price* as a moderator and *PNorms* as a mediator of the effect of *FSME* on dependent variable *Choice*. Later, additional analysis and tests are done to check the rest of the hypotheses regarding the control variables and to understand how the carbon offsetting programs can change the initial ticket choice *CChoice*. All the statistical models and tests were done assuming a 95% confidence level.

5.1. Descriptive data

Results from the experiment show the difference in number of times plane ticket was chosen compared to train ticket between the treatment (*FSM Effect* in place) and control group (No *FSM Effect* in place). For all the price levels presented the average percent of people choosing plane ticket was higher for the control group. Considering all price levels, for Treatment group Plane ticket was a choice in 62% cases while for Control Group it was a choice in 70% of cases. As expected, highest percentage of participants chose plane ticket for *Price level 3*, lower for *Price level 2* and lowest for *Price level 1* – this is true both for Treatment (35%, 66%, 87%) and Control (44%, 74%, 93%) groups. A particularly strong incline was seen between the *Price level 1* (Price of train and plane ticket are equal) and *Price level 2* (Price of train ticket is slightly higher than plane ticket). When comparing the strength of impact the change in price has compared to *FSM Effect* it observed that price plays more important role. The mean values are summarised in the Table 2 below. A t test was run in order to check whether the difference in means of *Choice* and *CChoice* dependent variables are statistically significant in the population. The outcome shows that the difference in means of *Choice* variable is

significant (with the p value of .04) while the difference in means of *CChoice* is not significant (p value of .421).

		Choice Price 1	Choice Price 2	Choice Price 3	<i>Choice</i>
No FSM Effect, Control	Mean	.44	.74	.93	.70
FSM Effect, Treatment	Mean	.35	.66	.87	.63
Total	Mean	.40	.70	.90	.66

Table 2 Share of respondents that selected plane ticket

Regarding Control variables following observations can be made. 95,5% of sample Agreed or Strongly agreed with the statement “Human impact on the environment that leads to the climate crisis is a serious issue.” (*AHumImp*). Majority of the sample - 76.1% also Agreed or Strongly agreed that “Air travel industry is substantially responsible for overall negative human impact on environment.” (*AAirTrvlImp*). The answers for *DesirModTrans* (“I enjoy traveling by plane much more than traveling by train.”) were more balanced – with majority of the sample Disagreeing or Strongly disagreeing (50,5%). Sample turned out to be price sensitive, with 46,4% answering Agree and 28,5% Strongly agree to statement “Price is one of the most important aspects of the products /services I’m purchasing”. This value was expected as the most popular *Employ* category in the sample was Student. Variables measuring the trust and favorability towards carbon offsetting programs (*TrustCarbOff* and *EffCarbOff*) show that majority of sample does not have a strong opinion on them – answers in the middle of the scale were the most popular with the slight majority of the unfavorable opinions.

Having a look into mediator variable *PNorms* and the component variables, which are expected to negatively correlate with DV *Choice* it can be said, again, that the most popular responses were the middle ones. Respectively 61,3% and 60,4% of the sample Agreed or Strongly agree with statements about impact of personal decisions on the environment and willingness to put effort or money into limiting the environmental harm (*PNResp* and *PNValSust*). Regarding the attitude towards traveling by plane the most popular answer was Neither agree nor disagree - 36.0%. The answers for the relatively equally distributed for the statement “Those who travel by plane are responsible for negative human impact on environment.” Detailed results are shown in a Table 3 below.

	AHu mImp p	AAir TrvlI mp	Desir Mod Trans	Price Sensit	Trust Carb Off	EffCa rbOff	PNRe sp	PNPe rImp	PNVa lSust	PNAt tAirT rvl	PNor ms
Mean	4.53	3.89	3.34	2.12	2.58	2.57	2.87	3.56	3.55	2.88	12.86
Variance	.529	.728	1.334	1.054	1.020	1.147	1.097	1.041	.835	1.006	6.557
Strongly disagree	1.4%	1.4%	14.9%	2.3%	15.3%	17.6%	9.5%	4.5%	2.7%	7.2%	-
Disagree	1.4%	5.9%	35.6%	11.7%	33.8%	32.9%	29.7%	11.3%	10.8%	29.7%	
Neither agree nor..	1.8%	16.7%	27.0%	10.8%	30.2%	26.6%	29.3%	23.0%	26.1%	36.0%	
Agree	33.8%	54.5%	13.5%	46.4%	19.4%	20.7%	27.5%	46.4%	50.0%	21.6%	
Strongly agree	61.7%	21.6%	9.0%	28.8%	1.4%	2.3%	4.1%	14.9%	10.4%	5.4%	

Table 3 Sample details; share of responses for selected questions

5.2. Model 1; logit model measuring main effect

First, to measure the main effect and answer the main research question a logit model measuring only the main effect of *FSME* on *Choice* would be analysed. The relation is presented on the Diagram 1 below.



Diagram 1 Relations captured by Logit Model 1Main Effect

Y = 1 Plane Ticket

Y = 0 Train Ticket

$$P(Y = 1) = \frac{e^z}{1 + e^z} = p_i$$

$$z_i = Constant + \beta_1 \times FSME_i$$

P values results of the binary logistic regression and Omnibus tests show that the model (0.04), *FSME* (0.04) and *Constant* (<0.001) are significant for the population. Below, in Table 4 the variables in equation are shown. Overall, the model predicted correctly 66.8% of *Choice*.

	B	S.E.	Wald	df	Sig.	Exp(B)
FSME	-.339	.165	4.219	1	.040	.712
Constant	.861	.115	55.688	1	<.001	2.364

-2LL	ModelLL	df	p	McFadden	CoxSnell	Nagelkrk
666.7860	179.6579	4.0000	.0000	.2123	.2364	.3286

Table 6 Model Summary for outcome variable: Choice

Y = 1 Plane Ticket

Y = 0 Train Ticket

$$P(Y = 1) = \frac{e^z}{1 + e^z} = p_i$$

$$z_i = \text{Constant} + \beta_1 * FSME_i + \beta_2 * PNorms + \beta_3 * Price_i + \beta_4 * Price_i * FSME_i$$

	β	se	Z	p	LLCI	ULCI
constant	-2.1458	.9144	-2.3466	.0189	-3.9381	-.3535
FSME	.1861	1.1312	1645	.8693	-2.0310	2.4032
PNorms	-.2502	.0413	-6.0603	.0000	-.3312	-.1693
Price	.0301	.0041	7.4050	.0000	.0221	.0380
Int_1	-.0025	.0055	-.4462	.6554	-.0133	.0084

Table 7 Model for outcome variable: Choice. Coefficients expressed in the log odds ratio

Moderation

Interaction effect of *FSME* and *Price* (*Int_1*) is statistically insignificant with the p value =0.655 (Table 8).

Therefore, **H8 “There is an interaction effect between the price of tickets and FSM Effect regarding ticket choice”** is rejected.

The direct effect of *Price* on *Choice* is significant on their own and has a positive correlation with β coefficient equal 0.0301 (Table 7). **H4 “Higher price of rail travel substitute to air travel increases the probability of choosing air travel”** is therefore confirmed.

Mediation

Given the 0.95 confidence level the relationship of *FSME* on *PNorms* is statistically significant (p=0.0051).

The *FSME* has a positive effect on *PNorms* with β coefficient 0.5569 (Table 8). **H2 “FSM effect changes the personal norms”** is confirmed. The bootstrap test shows that the indirect effect of *FSME* on *Choice* is

statistically significant (BootLLCI=-0.269 and BootULCI=-0.038) (Table 9). The effect of *PNorms* on *Choice* is negative with a β coefficient -0.252 and is statistically significant ($p < 0.001$). **H3 “Environment-oriented personal norms decrease the probability to choose air travel opposed to rail travel” is confirmed.**

	β	se	t	p	LLCI	ULCI
constant	12.6000	.1343	93.8478	.0000	12.3364	12.8636
FSME	.5569	.1981	2.8114	.0051	.1679	.9458

Table 8 Model for outcome variable: *PNorms*. Coefficients expressed in the log odds ratio

	Effect	BootSE	BootLLCI	BootULCI
PNorms	-.1394	.0578	-.2684	-.0421

Table 9 Indirect effect(s) of X on Y:

Direct effect

Given the 0.95 confidence level the direct effect of *FSME* on *Choice* is statistically insignificant ($p = 0.3524$) (Table 7).

Model 2 including price sensitivity

Additional model was utilised to check if the moderation effect is significant when taking into account the control variable *PriSens* measuring price sensitivity. This relation is presented on the Diagram 3 below.

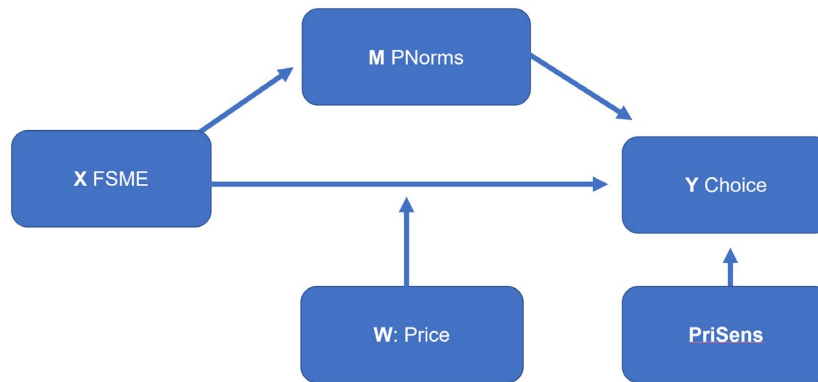


Diagram 3 Model relations

Model outcomes do not show the interaction effect of Price and FSME statistically significant. *PriSens*, as expected, correlates negatively with *Choice* (High value of *PriSens* mean low price sensitivity). The *PriSens* was also found to be correlating positively with the *PNorms*.

5.4. Control variables analysis and other results

Awareness of responsibility of human activity on climate crisis

First a Chi-Square test was run to check if the *AHumImp* and *Choice* are correlated with each other. The results of the Chi-Square show that the 30% of cells have expected count less than 5, which violates the test assumptions. Because of that I will use the likelihood ratio to determine the statistical significance of the correlation. As the p value is <.001 it can be said that there is statistically significant correlation.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.345 ^a	4	<.001
Likelihood Ratio		4	<.001

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 2.99.

Table 10 Chi-Square Tests *AHumImp* * *Choice*

To check the direction and strength of each value of the *AHumImp* a binary logistic regression model was analysed with *AHumImp* as an independent categorical dummy-coded variable and *Choice* as a dependent variable. While the whole model is statistically significant (Sig.<0.001), most of the variables (3 out of 5) and the *Constant* coefficient are insignificant (Table 11 below). Having this in mind it is not possible to interpret the model and come up with the answers about the correlation between *AHumImp* and *Choice* in population. H5 “Awareness of climate crisis as big issue decrease the probability to choose air travel opposed to rail travel” is inconclusive.

	β	S.E.	Wald	df	Sig.	Exp(β)
AHumImp			26.547	4	<.001	
AHumImp(1)	21.426	13397.657	.000	1	.999	2019343553.564
AHumImp(2)	.560	.890	.395	1	.530	1.750
AHumImp(3)	1.582	.691	5.242	1	.022	4.864
AHumImp(4)	.623	.678	.842	1	.359	1.864
Constant	-.223	.671	.111	1	.739	.800

Table 11 Variables in the Equation *AHumImp* on *Choice*; Variables in the Equation expressed in the log-odds ration

Awareness of air travel impact on environment

First a Chi-Square test was run to check if the *AAirTrvlImp* and *Choice* are correlated with each other. As the two-sided p value of Pearson Chi-Square is <0.001 for the alpha value of 5% the correlation between variables is statistically significant.

The Cramer's V value is equal to 0.259, which means, considering the 4 degrees of freedom a large effect. Interestingly, when looking at the Crosstabulation Table 12 it is observed that there is no consistency between the Count and Expected Count regarding moving from the Strongly disagree to Strongly agree answers.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.672 ^a	4	<.001
Likelihood Ratio	43.283	4	<.001

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 2.99.

Table 12 Chi-Square Tests *AAirTrvlImp* * *Choice*

This observation was further confirmed by the logit binary regression model for *AAirTrvlImp* and *Choice*. To do it first *AAirTrvlImp* was converted into a dummy variable. A logit binary regression model was run. Overall, the model is significant for the significance level of 5%. The highest increase in odd for choosing *Choice*=1 (plane ticket) was observed for the "Neither agree nor disagree" answer (exp. β =13.391). For answer "Strongly agree" the variable was not significant. The odds for *Choice*=1 was actually higher for the answer "Disagree" compared to "Agree" (exp. β =7.875 for Disagree and exp. β =8.835 for Agree). All the model values can be seen in Table 13.

	β	S.E.	Wald	df	Sig.	Exp(β)
AAirTrvlImp			40.871	4	<.001	
AAirTrvlImp(1)	2.064	.874	5.580	1	.018	7.875
AAirTrvlImp(2)	2.595	.835	9.649	1	.002	13.391
AAirTrvlImp(3)	2.179	.810	7.231	1	.007	8.835
AAirTrvlImp(4)	1.142	.819	1.943	1	.163	3.132
Constant	-1.253	.802	2.441	1	.118	.286

Table 13 Variables in the Equation *AAirrvlImp* on *Choice*; Variables in the Equation expressed in the log-odds ration

As a conclusion it is seen that as long as *AAirTrvlImp* correlates with *Choice* the H6 “Awareness of air travel impact on the environment decrease the probability to choose air travel opposed to rail travel” is rejected. It is not possible to point negative correlation between *Choice* and increase in the *AAirTrvlImp* values.

Desired mode of transport effect

A question “Do you agree? I enjoy travelling by plane much more than travelling by train.” was asked to measure the desired mode of transport – preference for either plane or train. First a Chi-Square test was run to check if the *DesirModTrans* and *Choice* are correlated with each other. As the two-sided p value of Pearson Chi-Square is <0.001 the correlation between variables is statistically significant (Table 14).

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	52.292 ^a	4	<.001
Likelihood Ratio	53.412	4	<.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.91.

Table 14 Chi-Square Tests *DesirModTrans* * *Choice*

The Cramer’s V value is equal to 0.280, which means, considering the 4 degrees of freedom a large effect (Table 14).

	Train	Plane	Total
Strongly agree	9	51	60
Agree	17	73	90
Neither agree nor disagree	42	138	180
Disagree	100	137	237
Strongly disagree	53	46	99

Table 15 *DesirModTrans* * *Choice* Crosstabulation

Interestingly, when looking at the crosstabulation table (Table 15) it is observed that there is no clear trend in *Choice* for moving from the Strongly disagree to Strongly agree answers. This observation was further confirmed by the logit binary regression model for *DesirModTrans* and *Choice*. To do it, first *DesirModTrans* was converted into a dummy variable. A logit binary regression model was run. Overall, the model is significant, but dummy variables *DesirModTrans*(1)- “Disagree” and *DesirModTrans*(2)-“Neither agree nor disagree” were found insignificant. The highest decrease in odd for choosing *Choice*=1 (Plane) was

observed for the “Disagree” answer (exp. β =.758 with “Strongly disagree” answer being a reference category). All the model values can be seen in Table 16 below.

	β	S.E.	Wald	df	Sig.	Exp(β)
DesirModTrans			49.256	4	<.001	
DesirModTrans(1)	-.277	.451	.378	1	.538	.758
DesirModTrans(2)	-.545	.402	1.836	1	.175	.580
DesirModTrans(3)	-1.420	.385	13.619	1	<.001	.242
DesirModTrans(4)	-1.876	.414	20.547	1	<.001	.153
Constant	1.735	.362	23.018	1	<.001	5.667

Table 16 Variables in the Equation DesirModTrans on Choice; Variables in the Equation expressed in the log-odds ration

FSME effect on control variables

A series of T-tests was performed to check if the *FSME* has an effect on the control variables of the experiment (which were measured after showing the faux article to treatment group). The mean values for *AAirTrvlImp* and *DesirModTrans* have been found statistically different for Treatment and Control groups as presented in the Table 17 below.

	Group	Mean	Std. Deviation	Variance	One-Sided p	Two-Sided p
AHumImp	Total	4.53	.727	.528	-	-
	Control	4.52	.708	.037	.284	.568
	Treatment	4.55	.750	.043		
AAirTrvlImp	Total	3.89	.853	.727	-	-
	Control	3.81	.860	.045	.003	.006
	Treatment	3.99	.836	.048		
DesirModTrans	Total	3.34	1.154	1.332	-	-
	Control	3.24	1.163	.061	.010	.020
	Treatment	3.45	1.136	.065		
PriceSensit	Total	2.12	1.026	1.053	-	-
	Control	2.18	1.050	.055	.046	.093
	Treatment	2.05	.996	.057		

Table 17 Mean values, variances and T-test p values for selected control variables and FSME

Carbon offsetting impact

In this study I will measure the impact of the possibility of purchase a carbon offset from the two perspectives. First, to analyse the effect of being carbon offset option on the overall choice of mean of transport for all the study participants. Second, whether there is an interaction effect between the FSME and being shown the carbon offset – checking if the treatment and control group reacts differently and is more likely to switch from choosing plane to train when given a chance to purchase the carbon offset.

The information about the possible purchase of the carbon offset and the question to (again) answer what ticket to choose was shown to all the respondents that selected the train ticket for *Choice* for each *Price*. This is in total 221 times. Tables 18 and 19 below show the frequencies of the answers. 15.4% of respondents changed their mind after being able to carbon offset their plane travel and chose the Plane ticket. The rest, 84.6% chose, again, the train ticket.

		Frequency	Percent
Valid	0 (Train)	187	28.1
	1 (Plane)	34	5.1
Missing		445	66.8

Table 18 *CChoiceOld* statistics (before re-coding missing variables to 1)

When analysing choosing the mean of transport from the perspective of the final-last decision it makes sense to recode the missing values – for the respondents that previously chose the plane (*Choice*=1) – were coded as 1 (Plane). Following outcomes for *CChoice* were obtained: 28% of respondents selected train ticket and 72% plane ticket. Comparing this to *Choice*: 37% selected train while 67% plane ticket.

	Mean	Std. Deviation	Std. Error Mean
Choice	.67	.471	.018
CChoice	.72	.450	.017

Table 19 *Sample* statistics

To check the impact on the choice of ticket of the possibility to buy the carbon offset first I will compare the mean values of variables *Choice* and *CChoice*. To check if this difference in means is statistically significant for the population a paired-sample t-test was performed. The H0 of the groups having the same mean value was rejected with one sided p value <0.001. Concluding the above results, it can be said that presenting and giving an option of carbon offset results in lower chance of choosing the train ticket. **H9 “Chance to voluntary**

pay for offset of carbon footprint of flying increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket” is supported.

Descriptive statistics show that 7% less of respondents chose the plane ticket from the control group (63%) compared to the treatment group (70%) for *Choice*. Looking then at the statistics for *CChoice* there is a 7% difference with 75% of the control group choosing plane compared to 68% of the treatment group. That means that for the treatment group presenting the information about the carbon offsetting resulted in the 5% points increase in choosing plane, bringing it up to 68% - which is only 2% points lower than the Control group *Choice* mean value (Table 20). But this is insignificant for the population as seen on this t-test. The p value from the independent sample t-test of *CChoice* for Treatment and Control group is >0.05.

	FSME	Mean	Std. Deviation	Std. Error Mean
Choice	Control	.70	.458	.024
	Treatment	.63	.484	.028
CChoice	Control	.75	.434	.023
	Treatment	.68	.466	.027

Table 20 Sample statistics for *Choice* and *CChoice* grouped by *FSME*

To check if there is a difference in the carbon offset impact between the treatment and control group a binary logistic regression model could be utilized with dependent variable *CChoiceOld* – choice of mode of transport for participants that were shown the carbon offsetting information (Y=1 for Plane Ticket, Y=0 for Train Ticket). Independent variable in the equation is the *FSME*. The obtained model was found to be not significant as well as the variable *FSME*, respectively Sig=0.841 and 0.841 (Table 21). Statistical insignificance of the interaction effect with *FSME* was also compared with independent sample the t-test for treatment and control group comparing the means of *CChoiceOld*. Two-sided p value equalled 0.842 showing statistical insignificance of the difference in means.

	β	S.E.	Wald	df	Sig.	Exp(β)
FSME	-.075	.373	.040	1	.841	.928
Constant	-1.667	.264	39.716	1	<.001	.189

Table 21 Variables in the binary logistic regression model of *CChoiceOld*

Trust in carbon offsetting programs effect

Looking into variables *EffCarbOff* and *TrustCarbOff* that were based on the likert scale answers to the “Do you trust the carbon offsetting programs?” and “Do you trust the carbon offsetting programs?” can give us insight whether the opinion about the carbon offsetting programs can influence the purchase decisions involving significant carbon emissions. For both questions the most popular answer was “I don’t know” and “Mostly not” showing the general lack of strong opinions/slightly negative attitude towards the carbon offsetting programs of the sample. Interestingly, for all the “Definitely yes” answers for both questions came from the respondents with *Choice*=1 for all *Price* values. This means that they were not shown in the carbon offsetting program information. For the “Definitely not” answers the share of those to choose the plane ticket is very low – 1.8% for *TrustCarbOff* and 4,7% for *EffCarbOff*. For “Mostly not” it is 13,3% for *TrustCarbOff* and 4,2% for *EffCarbOff* (Table 25, Appendix 4).

A Chi-square test was performed to check if the difference in the mean percentage of *CChoiceOld* is statistically significant. For both variables, the p value is <0.001 meaning there is a difference in means in the population. To check the impact of the particular values of the *TrustCarbOff* and *EffCarbOff* a binary logistic regression using the dummy coding for the mentioned variables and *CChoiceOld* being a dependent variable. The model is statistically significant, however the variables in it are not, meaning the coefficients cannot be projected on the whole population. The **H10 “High trust and positive view of carbon offset programs increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket”** is therefore deemed inconclusive

Overview of the findings

Hypothesis	Description	Supported/Rejected
H1	FSM Effect decreases the probability to choose air travel opposed to rail travel.	Supported
H2	FSM effect changes the personal norms	Supported
H3	Environment-oriented personal norms decrease the probability to choose air travel opposed to rail travel	Supported
H4	Higher price of rail travel substitute to air travel increases the probability of choosing air travel	Supported
H5	Awareness of climate crisis as big issue decrease the probability to choose air travel opposed to rail travel	Inconclusive
H6	Awareness of air travel impact on the environment decrease the probability to choose air travel opposed to rail travel	Rejected

H7	Perceived high personal benefits of air travel and high personal costs of rail travel increase the probability of purchase of the plane ticket	Inconclusive
H8	There is an interaction effect between the Price of tickets and FSM Effect regarding ticket choice. Higher price will decrease the strength of FSM Effect.	Rejected
H9	Possibility to voluntarily pay for offset of carbon footprint of flying increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket	Supported
H10	High trust and positive view of carbon offset programs increase the chance of switch from initial decision of purchasing train ticket on buying a plane ticket	Inconclusive

6. Discussion

6.1. Findings

The main effect of the flight shaming movement

The main research question of this paper was to find out if FSM is effective in changing customer behaviour regarding choosing the mode of transport on the particular route. Experiment results presented above suggest that indeed, FSM can influence the (stated) purchase decision and make people choose more sustainable travel option – train. The FSM effect in the experiment decreased the probability of choosing a plane ticket by 28,8%. As long as this experiment comes with its limitations (discussed more in detail in Research Limitations section) and does not give direct insight about the possible strength of FSM in real-life situations it confirms the results presented in previous studies and gives general idea about potential importance of the FSM.

The mediating role of Personal Norms

A theory of Norm Activation Model De Groot and Steg (2009) was proven useful in explaining the mechanism behind the influence of FSM on consumer behaviour. The effect of the flight shaming (*FSME* variable) on ticket choice (*Choice*) turned out to be statistically insignificant on a 95% confidence level. Instead, it influenced the mediating variable – personal norms (*PNorms*) which had a statistically significant an effect on ticket choice (*Choice*).

The moderating role of price

One of the hypotheses of this research paper – H8 – assumed the interaction effect of price of the ticket (*Price*) and the flight shaming treatment (*FSME*). This hypothesis was rejected based on the statistical insignificance of the effect. Moreover, the β coefficient of the interaction effect (*Int_1*) of -.0025 suggest

a small effect. This implies the strength of the FSM effect on customer behaviour does not depend on the price of the ticket. Consumers are as likely to change their preference from plane to train ticket in scenario of equal train and plane ticket price as in scenario when the train ticket is significantly more expensive. This means that the personal cost of paying more does not influence the effect of FSM on purchase decision.

Other factors influencing the FSM Effect

The price of the train ticket has been found to have a strong effect on choice of the mode of transport both for treatment and control groups. This is contradictory to the inconclusive findings regarding the price elasticity of ethical consumption goods (Manika Rödiger and Ulrich Hamm, 2015). On the other hand, considering the nature of the air travel and rail travel sector experiencing commoditization (Nairn, 2005) and wide access to price information thanks to price comparison websites it is not surprising.

Analysis of the impact of the control variables measuring the correlation of the awareness of climate crisis, awareness of air travel impact on the environment and the preference of the mode of transport has brought inconclusive results. The correlations with choice of the ticket have been found statistically insignificant or not aligned with the expected direction of the correlation. More in-depth study is needed to get insight into those relations. Descriptive statistics show the imperfections of the experimental design with responses to a statement “Human impact on the environment leads to the climate crisis.” being unequally distributed heavily gravitating towards answers “strongly agree”. Additionally, the statement “Air travel industry is substantially responsible for negative human impact on the environment.” could possibly be interpreted in two ways 1. *Air travel is one of the industries we should blame for negative environmental impact* or 2. *Air travel should be the main focus when discussing the environmental impact* which have different meanings and could result in different answers. Full overview of the data can be found in Appendix 4.

Carbon offsetting programs effect

Results of this research paper confirm the effect of the possibility of purchasing carbon offset on the ticket purchase decision. The FSM effect treatment resulted in 7% points less of respondents choosing the plane ticket and only 2% points less after showing information about the carbon offsetting program in the sample. As these results have been found not significant for the population on a 95% confidence level, additional study is necessary to get insight into the impact of such programs. Nevertheless, it is a strong signal of how significant they are in the conversation about FSM effects and environmental concerns. The result of the study also shows the prevalence of a lack of strong opinions about carbon offsetting programs which could mean an open ground for a discussion about how appropriate they are in minimizing the environmental

impact of human activity. No interaction effect between the *FSME* and carbon offsetting programs was detected.

6.2. Theoretical and Managerial Implications

Results presented in this research paper confirm the theories and insight of the previous studies as well as bring new information that shed light on so far not explored aspects of effects of FSM. In the past, FSM has been found to have an effect on the consumer behaviour; however, the studies were only relying on the market data or survey questions – having high relevance but also being highly prone to be influenced by other factors e.g., economic situation, trends, events affecting travel industry. By utilising the experimental design this research paper confirms the existence of the effect of FSM on purchase decisions against the control group. Other insight from the study is the clear effect of the price of the ethical substitute on final purchase decision – result that has not been clear for other types of ethical products (e.g., fair trade coffee) in the past research. With no moderating effect of price being detected it implies that the FSM effort can be effective even in the situation of significantly higher costs of train tickets on a particular route. This research paper also touched upon the topic of carbon offsetting programs offered at the checkout of plane ticket sellers. With statistically insignificant results it is not possible to draw conclusions about the strength of the effect of availability of carbon offset option and presence of FSM effect. Yet, the experiment proves that more people chose to purchase plane ticket when presented the option of carbon offset.

While in general the experimental results of this research paper have limited external validity, they may be well applied to some areas. The treatment used in the experiment is similar to sponsored highly targeted online advertising giving insight into potential effectiveness of marketing efforts aimed to deter people from flying and choose other travel options. The study can be also a starting point in discussion about possible regulations obliging plane tickets sellers to e.g., present the information about the environmental impact of the flight or available alternatives on the same route.

6.3. Research limitations

Trying to answer the main question of this thesis – whether the FSM is successful in changing the behaviours of travellers – the author was faced with a problem of how to define what the FSM effect is and how to capture it in the experiment. As the FSM is a broad spectrum of organizations, events, people and initiatives interdependent with other environmental movements and other trends it is hard to measure its impact in lab

experiments. Some studies mentioned in the Literature review part by Gössling et.al., (2020) tried to capture the effects of the flight shame movement on the national level by analysing the demand but they are limited as they did not take into account other factors that change over the years and influence the demand.

As the author opted for lab experiment design the outcome of the research comes with the usual limitations for this type of study potentially having low external validity. These weaknesses come from the following:

Unrealistic placement in time of the fictitious news article containing FMS content (FSM Effect)

While the discussion about what is the impact of the timing of the particular information or advertisement on customer behaviour falls outside the scope of this thesis it does play an important role in how effective it is (Ying Ho et.al., 2010). The experiment scenario included the FSME placement right before the question about the purchase decision. Such a situation is unlikely to happen in real-life where exposure to FSM Effect can happen days or months before the purchase decision.

Limited information about the services and fixed travel scenario.

To keep the experiment easy to understand and possibly universal only information about the price and time of traveling and a specific reason for traveling was presented. No information about the exact departure times, additional services, allowed luggage, carrier, transfer time and costs nor mandatory arrival time before departure was provided. All this information can influence the customer decisions. Additionally, FSM effect might be moderated depending on the purpose or length of the trip (Doran et.al., 2020). Response in the survey \neq actual ticket purchase process

In the experiment design the tickets for plane and train were clearly compared in on place and the “purchase” process was a simple, one-step selection. In real-life situations travel tickets purchase might be a habitual decision meaning e.g. going to the flight comparison website. This way a customer might not be even aware of a train option. Additionally, with dynamic pricing and multiple fees (common for low-fare carriers) the final price might not be clear up front the purchase process which might influence the decision.

Social desirability bias

Participants were asked to answer thoughtfully to the questions, but this experiment falls in risk for the social desirability bias (Grimm, 2010). Participants of the study may have sensed the topic of the study or wanted to maintain a good picture of themselves and selected train ticket. With no actual impact on the budget of the participants it is hard to tell whether the same decision would be made in a real-life situation.

Sampling bias

Majority of the sample is students that do not work full time. This was reflected in the responses to the question asking for how important the price is while making a purchase decision – variable *PriceSensit*. 75.2% of the sample answered to Agree or Strongly agree to a statement that price is usually a key factor when making purchase decisions. A more affluent, less price sensitive sample could bring different results and potentially show a moderation effect of *Price* on *FSME*, which was not seen in this study.

6.4. Recommendations for future research

This thesis shed light on the effectiveness of FSM attempts regarding stated purchase decisions of travel tickets. Considering outcomes and method of the experiment the future research on FSM could focus on one of the following areas:

Effectiveness of FSM attempts depending on the type of traveling or other routes.

As previous research has shown, depending on the purpose of travel the feelings of climate guilt might be of a different strength. A length of stay/interval between subsequent trips may also influence the feelings of guilt. An Amsterdam-London route was chosen because of the relative substitution between rail and air travel options there. Outcomes for the different route – e.g., with different standards of rail travel or different time of travel could bring different results bringing light to the importance of factors not measured in the experiment in this thesis. Time of travel or convenience could be a moderating variable for FSME.

Interaction effect between price of the tickets and presence of FSM effect.

Analysed experiment gave statistically insignificant results regarding the presence of the moderating effect of *Price* on *Choice*. Future research could again test this interaction to check the validity of the results obtained in this thesis. An experiment that would measure the actual purchases of tickets or market data would give more reliable data than the stated preference that was measured in the experiment of this thesis.

Carbon offsetting options offered by airlines

Increasingly popular option carbon offsetting during checkout on airlines websites that allow customers to purchase a could be important factor that limits the feelings of climate guilt. Some researchers have pointed out that such programs mislead people and make them think it solves the problem of greenhouse gases emissions (Anderson, 2012) countering the efforts of FSM. In the experiment, the chance to offset the plane travel resulted in almost complete diminish of the *FSME* on the sample, however the effect was statistically insignificant opening space for further research.

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8. Appendixes

Appendix 1. Experiment survey design Survey Flow

Block: Intro (1 Question)

BlockRandomizer: 1 - Evenly Present 1 Element

- a) Block: Control Group (0 Questions)
- b) Block: Treatment - FSM Effect yes (1 Question)

Block: Description of the situation (1 Question)

BlockRandomizer: 3 - Evenly Present 3 Elements

- a) Block: Price level 1 (3 Questions)
- b) Block: Price level 2 (3 Questions)
- c) Block: Price level 3 (3 Questions)

Block: Ticket choice, travel behaviour and personal norms, end questions (4 Questions)

Block: Control Demographic Variables (5 Questions)

Start of Survey

Start of Block: Intro

Q0

Dear participant,

My name is Wojtek Piotrowski and this anonymous survey is part of research needed to complete my master's degree in Marketing on Erasmus University Rotterdam.

The survey should take about 3-7 min to complete. Please read the instructions carefully and answer as truthfully as possible.

Don't hesitate to contact me if you have any questions:

616123wp@eur.nl

Thank you!

P.S.: This survey contains a completion code for SurveySwap.io

End of Block: Intro

Start of Block: Control Group

End of Block: Control Group

Start of Block: Treatment - FSM Effect yes

Please read the following article:

Time to give up flying?



Many Europeans feel guilty about taking the plane as they want to reduce their carbon footprint and avoid being judged by others.

Flight shame is the feeling of climate guilt associated with air travel. The term originates in Sweden and was popularized by climate strikes in 2019. While there is no technology that can replace the fuel plane engines the supporters of

the flight shaming movement urge to give up flying altogether or choose more sustainable means of transport – water or rail travel.

Carbon dioxide emissions of aircrafts account for about 2 % of global annual man-made emissions. But the impact on global warming is much bigger, because planes emit other gases that have a warming effect, including nitrogen oxide and contrails. Giving up one short-distance round trip is estimated to reduce more CO² than switching from traditional to vegan diet for a year.

Specialists see the flight shaming movement as serious challenge for the air travel industry. The chief executive of SAS called it an “existential question” for the company, while the Alan Joyce, head of Qantas admitted that “(some) people have got to this decision: is it protecting the environment or is a flying?”.

Whether you like it or not, next time you will post a picture taken from the window on the plane you took you might find yourself shamed by those who think everyone should be responsible for mitigating climate crisis.

End of Block: Treatment - FSM Effect yes

Start of Block: Description of the situation

Q1 Imagine you find yourself in the following situation:

You live in Amsterdam and were asked by a friend that lives in London to come for a wedding ceremony. You decided to go and are evaluating the existing options for travel on the route Amsterdam-London-Amsterdam. As the event is getting closer you think now is the best time to buy tickets. Here are the options in the economy class you've found out about:

End of Block: Description of the situation

Start of Block: Price level 1

Q3.1.1 Tickets options:



Q3.1.2 What ticket would you purchase given the characteristics above?

Plane ticket (1)

Train ticket (2)

Display This Question: If What ticket would you purchase given the characteristics above? = Train ticket

Q3.1.3 Assume you had the possibility to buy the carbon offsetting of your flight for €7. What ticket would you purchase?

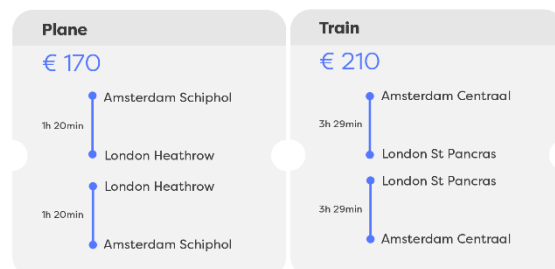
Plane ticket (1)

Train ticket (2)

End of Block: Price level 1

Start of Block: Price level 2

Q3.2.1 Tickets options:



Q3.2.2 *What ticket would you purchase given the characteristics above?*

Plane ticket (1)

Train ticket (2)

Display This Question: If What ticket would you purchase given the characteristics above? = Train ticket

Q3.2.3 *Assume you had the possibility to buy the carbon offsetting of your flight for €7. What ticket would you purchase?*

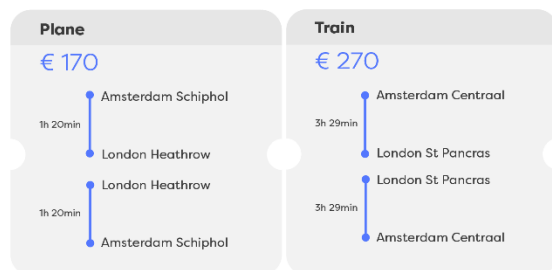
Plane ticket (1)

Train ticket (2)

End of Block: Price level 2

Start of Block: Price level 3

Q3.3.1 *Tickets options:*



Q3.3.2 *What ticket would you purchase given the characteristics above?*

Plane ticket (1)

Train ticket (2)

Display This Question: If What ticket would you purchase given the characteristics above? = Train ticket

Q3.3.3 *Assume you had the possibility to buy the carbon offsetting of your flight for €7. What ticket would you purchase?*

Plane ticket (1)

Train ticket (2)

End of Block: Price level 3

Start of Block: Ticket choice, travel behaviour and personal norms, end questions

Q4 *To what extent do you disagree/agree with the following statements?*

Strongly disagree (1) /Disagree (2) /Neither agree nor disagree (3) /Agree (4) /Strongly agree (5)

Human impact on the environment leads to the climate crisis. (1)

Air travel industry is substantially responsible for negative human impact on the environment. (2)

Those who travel by plane are personally responsible for negative impact on the environment. (3)

My personal actions have an important impact on the climate crisis. (4)

Q5 *To what extent do you disagree/agree with the following statements?*

Strongly disagree (1) /Disagree (2) /Neither agree nor disagree (3) /Agree (4) /Strongly agree (5)

I am willing to spend money or other resources in order to minimize the human impact on climate. (1)

I consider traveling by plane as something positive and worth sharing with my friends or family. (2)

I enjoy traveling by plane much more than traveling by train. (3)

Price is usually the most important aspect of the products or services I am purchasing. (4)

Q6 *Do you trust the carbon offsetting programs?*

(Carbon offsetting programs give the opportunity to pay for offset of the same amount of carbon emissions you release into the atmosphere by e.g. taking a plane. The offset is created either by supporting a renewable energy source such as wind and solar, or by funding activities like planting a tree.)

Definitely not (1)

Mostly not (2)

I don't know (3)

Mostly yes (4)

Definitely yes (5)

Q7 *Do you consider carbon offsetting programs as a good and effective way to minimize the human impact on the environment?*

Definitely not (1)

Mostly not (2)

I don't know (3)

Mostly yes (4)

Definitely yes (5)

End of Block: Ticket choice, travel behaviour and personal norms, end questions

Start of Block: Control Demographic Variables

Q9 *How old are you?*

Under 18 (1)

18-24 years old (2)

25-34 years old (3)

35-44 years old (4)

45-54 years old (5)

55-64 years old (6)

65+ years old (7)

Q10 *How do you describe yourself?*

Male (1)

Female (2)

Non-binary / third gender (3)

Prefer to self-describe (4)

Prefer not to say (5)

Q11 *What best describes your employment status over the last three months?*

Working full-time (1)

Working part-time (2)

Unemployed and looking for work (3)

A homemaker or stay-at-home parent (4)

Student (5)

Retired (6)

Other (7)

Q12 *What is the highest level of education you have completed?*

Less than Primary (10)

Primary (11)

Some Secondary (12)

Secondary (13)

Vocational or Similar (14)

Some University but no degree (15)

University - Bachelor's Degree (16)

*Graduate or professional degree (MA, MS, MBA, PhD,
Law Degree, Medical Degree etc) (17)*

Prefer not to say (18)

End of Block: Control Demographic Variables

Appendix 2. Experiment variables coding

Variable short name	Question/element in the survey	Variable type	Coding Values
FSME	Faux news article containing FSM information	Binary	0=no, Control group 1=yes, Treatment group
Choice	What ticket would you choose?	Binary	0="Train ticket" 1="Plane ticket"
CChoice	What ticket would you choose?	Binary	0="Train ticket" 1="Plane ticket" Missing → 1="Plane ticket"
Price	Plane: 170/170/170 Train: 170/210/270	Discrete	170=Price level 1 210=Price level 2 270=Price level 3
PNResp	Do you agree? Those who travel by plane are responsible for negative human impact on environment.	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
PNPerImp	Do you agree? My personal actions have an impact on the scale of climate crisis	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
PNValSust	Do you agree? I am willing to spend money or other resources in order to minimize the human impact on climate.	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
PNAttAirTrvl	Do you agree? I consider taking a plane as something positive and worth sharing with my friends	Ordinal	5="Strongly disagree" 4="Disagree" 3="Neither agree nor disagree" 2="Agree" 1="Strongly agree"
TrustCarbOff	Do you trust the carbon offsetting programs?	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"

EffCarbOff	Do you consider carbon offsetting programs as a good and effective way to minimize the human impact on the environment?	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
AAirTrvlImp	Do you agree? Air travel industry is substantially responsible for overall negative human impact on environment.	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
AHumImp	Do you agree? Human impact on the environment that leads to the climate crisis is a serious issue.	Ordinal	1="Strongly disagree" 2="Disagree" 3="Neither agree nor disagree" 4="Agree" 5="Strongly agree"
DesirMod- -Trans	Do you agree? I enjoy traveling by plane much more than traveling by train.	Ordinal	5="Strongly disagree" 4="Disagree" 3="Neither agree nor disagree" 2="Agree" 1="Strongly agree"
PriceSensit	Do you agree? Price is one of the most important aspects of the products /services I'm purchasing.	Ordinal	5="Strongly disagree" 4="Disagree" 3="Neither agree nor disagree" 2="Agree" 1="Strongly agree"
Age	How old are you?	Nominal	1="Under 18" 2="18-24 years old" 3="25-34 years old" 4="35-44 years old" 5="45-54 years old" 6="55-64 years old" 7="65+ years old"
Gender	How do you describe yourself?	Nominal	1="Male" 2="Female" 3="Non-binary/third gender" 4="Prefer to self-describe" 5="Prefer not to say"
Employ	What best describes your employment status over the last three months?	Nominal	1="Working full-time" 2="Working part-time" 3="Unemployed" 4="A homemaker or stay-at-home parent" 5="Student" 6="Retired" 7="Other"
Edu	What is the highest level of education you have completed?	Nominal	1="Less than Primary" 2="Primary" 3="Some Secondary" 4="Secondary" 5="Vocational or Similar" 6="Some University but no degree" 7="University - Bachelors Degree" 8="Graduate or professional degree (MA, MS, MBA, PhD, etc)" 9="Prefer not to say"

PNorms	-	Scale	PNResp+ PNPerImp+ PNValSust+ PNAttAirTrvl
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Table 22 Variables coding

Appendix 3. Sample Characteristics

	N	%
Male	104	46.8%
Female	110	49.5%
Non-binary / third gender	3	1.4%
Prefer not to say	5	2.3%

Table 23 Gender of the sample

	N	%
Under 18	1	0.5%
18-24 years old	122	55.0%
25-34 years old	75	33.8%
35-44 years old	19	8.6%
55-64 years old	1	0.5%
65+ years old	2	0.9%

Table 24 Age category of the sample

	N	%
Working full-time	81	36.5%
Working part-time	32	14.4%
Unemployed and looking for work	3	1.4%
A homemaker or stay-at-home parent	1	0.5%
Student	99	44.6%

Retired	1	0.5%
Other	4	1.8%

Table 25 Employment Status of the sample

	N	%
Less than Primary	1	0.5%
Primary	1	0.5%
Some Secondary	1	0.5%
Secondary	15	6.8%
Vocational or Similar	3	1.4%
Some University but no degree	25	11.3%
University - Bachelors Degree	121	54.5%
Graduate or professional degree (MA, MS, MBA, PhD, Law Degree, Medical Degree etc)	55	24.8%

Table 26 Highest education obtained of the sample

Appendix 4. Descriptive statistics overview

Likert scale variables and FSME * Price comparison * Choice

Control (No FSM Effect)

	Price level 1	Price level 2	Price level 3
Train Ticket	59.9%	26%	93%
Plane Ticket	44%	74%	7%

Treatment (FSM Effect)

	Price 1	Price 2	Price 3
Train Ticket	65%	34%	87%
Plane Ticket	35%	66%	13%

Total (all Price Levels)

	Treatment	Control
Train Ticket	38%	30%
Plane Ticket	62%	70%

Total (Treatment + Control Group)

	Price 1	Price 2	Price 3
Train Ticket	60%	29.7%	10%
Plane Ticket	40%	70.3%	90%

	AHum Imp	AAirTrv Imp	PNRes p	PNPer Imp	PNVal Sust	PNAtt AirTrvl	Desir ModTrans	Price Sensit	TrustCar bOff	EffCar bOff	PNorms
Mean	4.53	3.89	2.87	3.56	3.55	2.88	3.34	2.12	2.58	2.57	12.86
Variance	.529	.728	1.097	1.041	.835	1.006	1.334	1.054	1.020	1.147	6.557
Strongly disagree	1.4%	1.4%	9.5%	4.5%	2.7%	7.2%	9.0%	28.8%	15.3%	17.6%	
Disagree	1.4%	5.9%	29.7%	11.3%	10.8%	29.7%	13.5%	46.4%	33.8%	32.9%	
Neither agree nor disagree	1.8%	16.7%	29.3%	23.0%	26.1%	36.0%	27.0%	10.8%	30.2%	26.6%	
Agree	33.8%	54.5%	27.5%	46.4%	50.0%	21.6%	35.6%	11.7%	19.4%	20.7%	
Strongly agree	61.7%	21.6%	4.1%	14.9%	10.4%	5.4%	14.9%	2.3%	1.4%	2.3%	

Table 24 Descriptive statistics of likert scale variables