Willingness to Pay for Sustainable Aviation Fuel: The Role of Psychological Drivers and Message Framing Among Scandinavian Leisure Travelers

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Bachelor Thesis in Retail Management
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May 20, 2025

Abstract

This thesis examines how communication strategies and psychological factors influence consumers' willingness to support sustainable aviation fuel (SAF) in the context of flight booking. Drawing on the Theory of Planned Behavior, the Value-Belief-Norm theory, and behavioral economics, the study explores the effects of message framing, individual attitudes, environmental concern, institutional trust, and structural barriers. A between-subjects experiment conducted in a flight booking context assessed both stated willingness to pay and behavioral selection of SAF across four message framings: neutral, nudging, social proof, and guilt-based. Results indicate that message framing did not significantly affect willingness to pay or SAF selection. However, descriptive trends suggested slightly higher SAF uptake in the nudging and guilt-based conditions. Environmental concern and verified certification emerged as the most consistent predictors of both willingness to pay and behavioral uptake, highlighting the role of moral norms and institutional credibility. In contrast, structural barriers such as perceived cost and frequent flyer habits limited sustainable choices. Demographic predictors, including gender and income, were not statistically significant, suggesting that attitudinal and structural factors play a more prominent role. The study contributes to research on sustainable consumer behavior by demonstrating the limited influence of communication framing in high-cost contexts and emphasizing the importance of structural enablers. It concludes that promoting SAF adoption requires an integrated approach that builds institutional trust, reduces financial friction, and embeds sustainable options into the decision-making environment of flight booking.

Keywords: willingness to pay, sustainable aviation fuel, message framing, consumer behavior

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Introduction

Background

The Sustainability Challenge in Aviation

Aviation has been seen as a significant contributor to global greenhouse gas emissions, totaling approximately 2-3% of worldwide CO_2 emissions (European Commission, n.d.). The International Civil Aviation Organization (ICAO) estimates that this figure could triple by 2050 (ICAO, 2022). This has intensified calls for the industry to adopt practices that reduce its environmental footprint while supporting continued growth. One key measure is the development and introduction of Sustainable Aviation Fuel (SAF), a renewable or waste-derived fuel meeting ICAO's sustainability criteria. SAF offers a potential lifecycle emissions reduction of up to 94% compared to fossil-based alternatives (Lohawala & Wen, 2024). However, several structural barriers remain, including high production costs (Kylie, 2024) and a lack of investment and infrastructure to scale output (Millard, 2025).

Despite SAF's promise, global supply remains far below what is required to meet regulatory targets. For instance, SAF currently costs two to four times more than conventional jet fuel, limiting its attractiveness for commercial airlines operating on thin margins (Plucinska et al., 2025). Airline executives have expressed skepticism about meeting EU-mandated SAF blend targets-2% by 2025 and 6% by 2030-without major advances in cost and scalability. In this context, consumer willingness to financially support SAF is increasingly viewed as a crucial demand-side enabler.

Importantly, aviation is structurally well-positioned to benefit from sustainability innovation. Aircraft are highly durable, modular, and operate with high efficiency over their lifespan. These attributes make aviation a practical context for long-term sustainability investments, particularly if public acceptance and contribution can be increased (Kumaar & Varkey, 2012).

Adoption Barriers and the Role of Consumer Support

Despite these opportunities, recent trends point in the opposite direction. Airline emissions in Europe now exceed pre-pandemic levels, reigniting concerns about the industry's progress toward climate targets (Georgiadis & Hancock, 2025). Initiatives such as ReFuelEU seek to increase SAF uptake, but their impact is undermined by high costs, low supply, and regulatory gaps. As a result, public willingness to pay (WTP) for SAF has become a crucial variable in achieving scale.

Many airlines have introduced voluntary sustainability options such as carbon offsetting and SAF surcharges. However, growing scrutiny has revealed inconsistencies in these offerings. In April 2024, the European Commission and national consumer protection agencies launched enforcement actions against 20 airlines for potentially misleading environmental claims (European Commission, 2024). Key issues included implying that fee-based options fully neutralize emissions and using vague terms like "green" or "sustainable" without verification. These findings suggest that consumer trust is fragile and may be undermined by greenwashing, jeopardizing voluntary engagement with SAF.

Behavioral Dimensions of SAF Adoption

The SAF research landscape has historically emphasized techno-economic analysis, while giving less attention to social and behavioral considerations. Anderson et al. (2022) argue that public trust, perceived legitimacy, and institutional credibility are essential to understanding whether SAF can gain societal acceptance, especially when consumer participation through voluntary payment is required. Emerging research has also begun to explore how psychological and contextual factors shape willingness to pay for sustainable fuel alternatives (Xu et al., 2022; Wendt et al., 2024; Hui et al., 2024; Rice et al., 2020). These studies highlight the importance of factors such as environmental concern, social norms, perceived risk, and institutional trust, but also reveal a persistent gap between environmental concern and actual consumer behavior. This underscores the need to further investigate the psychological and structural drivers that may influence SAF adoption decisions, particularly in real-world flight booking contexts.

Scandinavian Leadership and Leisure Travel Focus

Norway, Sweden, and Denmark are among Europe’s leaders in SAF adoption. Norway has implemented a national blending mandate requiring aviation fuel suppliers to include at least 0.5% advanced biofuel (IEA, 2024). Sweden has introduced a greenhouse gas reduction obligation for jet fuel suppliers, with blending ratios designed to increase gradually over time (Eurocontrol, 2022). Denmark is investing in Power-to-X (PtX) synthetic SAF production as part of its broader decarbonization strategy (Hussain, 2024). These national policies reflect both regulatory momentum and industrial capacity.

Yet progressive policy does not guarantee public engagement. Scandinavian travelers are among the most environmentally concerned in Europe, with 2020 survey data showing that Swedes consider sustainability a top factor in travel decisions (Koch, 2020). Still, the behavioral gap is striking. Only 1.5-2% of Scandinavian Airlines passengers opt to purchase

SAF, despite its availability and promotion under the "Conscious Traveler" initiative (Badola, 2025).

Leisure travel accounts for around 80% of European air travel, while business travel comprises about 20% (Eurocontrol, 2024). Unlike business travel, which is typically guided by corporate policy, leisure travel decisions reflect personal values and willingness to pay. As such, leisure travel provides a more accurate lens for measuring consumer engagement with SAF.

Taken together, these insights point to a key behavioral challenge: while Scandinavian travelers express strong environmental concern, actual uptake of sustainable options like SAF remains low. This thesis investigates whether different communication framings, psychological factors, and structural perceptions can help explain this gap in a population well-positioned for early adoption. Using an embedded experimental design within a simulated flight booking process, the study assesses both stated willingness to pay and behavioral selection of SAF. By integrating psychological theory with practical constraints, the thesis aims to contribute to a more holistic understanding of sustainable decision-making in aviation. The following sections present the theoretical models guiding this analysis.

Problem Statement

Sustainability has increasingly become a central factor influencing consumer behavior across various sectors. However, empirical evidence regarding the translation of sustainable values into consumer behavior remains limited, particularly within the aviation industry. In Scandinavia, where environmental awareness and progressive national policies strongly support the adoption of Sustainable Aviation Fuel, it is critical to understand how travelers respond to sustainable aviation options.

Despite favorable conditions, uncertainty remains regarding Scandinavian leisure travelers' willingness to pay for SAF, particularly given the significant influence of price sensitivity on airline choice for leisure travelers (Kopsch, 2012). Exploring consumers' stated willingness to pay provides valuable insights, recognizing the well-documented gap between consumer intentions and actual behavior (Carrington et al., 2010). Clarifying this relationship is essential for airlines and policymakers to design effective strategies for enhancing consumer engagement with SAF.

Purpose and Research Questions

The primary aim of this thesis is to explore how different communication message framings and psychological factors influence Scandinavian leisure travelers' willingness to

pay for SAF within an experimental context. This study contributes theoretical insights into sustainable consumer behavior and practical recommendations for effective communication strategies to enhance consumer engagement with sustainable aviation options.

The following research questions guide the study:

1. Does exposure to different communication message framings (neutral, nudging, social proof, guilt-based) influence willingness to pay for SAF among Scandinavian leisure travelers?
2. Which psychological and structural factors are associated with SAF selection in a flight booking context?

Structure of the Thesis

This thesis is organized into six main sections. The introduction presents the research topic, outlines the contextual background, defines the problem statement, and formulates the purpose and research questions. The theoretical framework section integrates psychological, behavioral, and economic theories to construct a conceptual model that underpins the empirical investigation. The methodology section describes the experimental design, sampling strategy, operationalization of variables, and data analysis approach. The results section reports key findings from the experiment, including descriptive statistics, inferential tests, and regression outcomes. The discussion section interprets the results in relation to the theoretical framework and highlights their implications for theory and practice. Finally, the conclusion synthesizes the main contributions, addresses study limitations, and suggests directions for future research.

Theoretical Framework

Theoretical introduction

An integrated theoretical framework is applied to investigate the drivers behind consumers' willingness to pay for Sustainable Aviation Fuel in the context of airline ticket purchases. The framework combines four interrelated components: the Theory of Planned Behavior, the Value-Belief-Norm theory, communication message framing, and behavioral economics. Together, these perspectives provide a comprehensive foundation for understanding both the formation of pro-environmental intentions and the conditions under which these intentions are translated into behavior.

The Theory of Planned Behavior explains how attitudes, perceived social norms, and perceived behavioral control shape behavioral intentions and actions. The Value-Belief-Norm

theory complements this by highlighting the role of personal values, moral norms, and a sense of responsibility in driving environmentally significant behavior. Communication message framing serves as a mechanism for influencing how sustainability-related information is perceived and processed in decision-making contexts. Behavioral economics provides insight into the cognitive biases and contextual factors that often contribute to the gap between stated intentions and actual behavior.

Together, these perspectives enable a nuanced understanding of the factors that influence whether consumers choose to support Sustainable Aviation Fuel when booking flights. The following section reviews key findings from recent research on sustainable consumer behavior in aviation to position the analysis within the broader literature.

Sustainable Consumer Behavior in Aviation

Research on sustainable consumer behavior in aviation has advanced in recent years, highlighting several psychological, contextual, and communication-related factors that shape willingness to pay for Sustainable Aviation Fuel and related carbon reduction schemes. Early work focused largely on techno-economic analyses of SAF viability, with limited attention to social and behavioral dimensions (Anderson et al., 2022). More recent studies underscore that consumer trust, perceived legitimacy, and institutional credibility are critical enablers of SAF adoption (Wendt et al., 2024; Xu et al., 2022).

Several factors consistently emerge as predictors of WTP for greener aviation options. Environmental concern, biospheric values, and moral norms are frequently associated with higher WTP (Hui et al., 2024; Jansson et al., 2010). Attitudinal and normative drivers, such as those articulated in the Theory of Planned Behavior and Value-Belief-Norm theory, are strong predictors of sustainable travel intentions (Han et al., 2010; Stern et al., 1999). Social norms and subjective perceptions of what others do or expect can also shape WTP, particularly in contexts where sustainable behaviors are visible or encouraged (Hui et al., 2024).

At the same time, significant barriers remain. Price sensitivity consistently limits WTP for sustainable flight options, especially when price premiums exceed 15–20% (Rice et al., 2020). Travelers often anchor to base ticket prices, which can suppress perceived value of sustainability surcharges. Institutional trust plays a moderating role: higher trust in SAF claims and certification schemes is associated with higher WTP (Wendt et al., 2024; Xu et al., 2022). Conversely, greenwashing concerns and lack of verified information can undermine consumer engagement (European Commission, 2024).

Message framing has been explored as a communication lever to activate pro-environmental motivations. Meta-analyses show mixed results: certain framings (e.g., loss-based or emotionally resonant messages) can heighten WTP when costs are low and trust is high, but effects often diminish in high-cost or complex decision contexts such as flight booking (Wendt et al., 2024; Chang & Wu, 2015). Emotional appeals such as guilt have shown potential to enhance engagement when combined with credible information and social reinforcement (Hong & Jeon, 2025).

An important gap in the literature concerns the intention–behavior gap: many travelers express willingness to support sustainable options but do not follow through when booking flights (Carrington et al., 2010; Kollmuss & Agyeman, 2002). This gap is influenced by structural barriers (e.g., price, availability), contextual factors (e.g., choice architecture), and psychological friction (Prothero et al., 2011). Addressing this gap requires not only persuasive communication but also structural enablers and trust-building mechanisms.

This study builds on these insights by integrating TPB, VBN theory, behavioral economics, and message framing within an experimental flight booking context. By combining stated and behavioral measures of WTP, and testing both psychological and structural predictors, the study aims to contribute to a more nuanced understanding of sustainable consumer behavior in aviation.

Integrating Multiple Perspectives on Sustainable Behavior

This study applies an integrated theoretical framework to investigate the drivers behind consumers' willingness to pay for Sustainable Aviation Fuel in the context of airline ticket purchases. The framework combines four interrelated components: the Theory of Planned Behavior , the Value-Belief-Norm theory, communication message framing, and behavioral economics. Together, these perspectives offer a comprehensive foundation for understanding both the formation of pro-environmental intentions and the conditions under which these intentions are translated into behavior.

Theory of Planned Behavior

The Theory of Planned Behavior provides a well-established model for analyzing how individual decisions are influenced by attitudes, perceived social norms, and perceived behavioral control (Ajzen, 1991). In the context of voluntary climate contributions, TPB is particularly relevant for explaining how individuals evaluate the desirability of sustainable choices, perceive normative expectations, and assess their ability to perform the behavior in

question. TPB enables the identification of key cognitive predictors that shape behavioral intentions related to environmental responsibility.

Value-Belief-Norm Theory

To complement this rational-intentional focus, the framework includes the VBN theory, which addresses the moral and normative dimensions of pro-environmental behavior (Stern et al., 1999). VBN posits that individuals act in environmentally responsible ways when their values align with environmental concern, when they are aware of the consequences of environmental degradation, and when they feel personally responsible for contributing to change. This process results in the activation of personal norms that guide behavior independently of external incentives. The inclusion of VBN strengthens the framework by capturing deeper motivational structures rooted in individual belief systems and moral obligation.

Communication Message Framing

The third component, communication message framing, is conceptualized in this study as a mechanism for influencing how individuals cognitively and emotionally process sustainability-related information. While not a theory on its own, framing draws from environmental psychology and communication research to influence how individuals interpret and respond to information. Framing strategies are designed to align with the psychological constructs outlined in TPB and VBN, shaping the salience of attitudes, norms, and internalized responsibilities. This element of the framework allows for testing whether theoretically grounded variations in message design can influence WTP by activating specific cognitive or emotional pathways.

Behavioral Economics

Lastly, behavioral economics is included to account for the gap between intention and action. Traditional economic theory assumes rational agents, but behavioral economics emphasizes that decisions are often influenced by cognitive limitations, heuristics, and contextual factors (Thaler & Sunstein, 2021). Even when individuals express clear pro-environmental intentions, real-world constraints or decision-making frictions can prevent follow-through. By integrating this perspective, the framework acknowledges that actual behavior may diverge from stated preferences and provides insight into the situational and psychological barriers that inhibit sustainable action.

Summary of Framework Logics

In combination, TPB and VBN explain the formation of pro-environmental motivation, communication framing operationalizes these motivations at the point of choice, and behavioral economics accounts for the inconsistencies between intent and behavior. This comprehensive framework enables a more robust analysis of how psychological, normative, and contextual factors interact to shape willingness to pay for sustainable aviation solutions.

Theory of Planned Behavior

The theory of planned behavior is an extensive theoretical model developed by Ajzen (1991). TPB can be used to understand and predict behavioral intentions by examining three principal determinants: attitudes towards the behavior, subjective norms and perceived behavioral control.

Attitude Toward the Behavior

Attitude refers to an individual's positive or negative evaluation of performing a specific behavior. If the individual believes there will be a favorable outcome of a behavior they are more likely to be willing to perform the behavior since they will have a positive attitude towards it (Ajzen, 1991).

Subjective Norms and Social Pressure

Subjective norms relate to how social pressure will affect if a behavior will be performed or not. If there are perceived expectations from significant reference groups which could be family, close friends, peers or society, the behavior of an individual will be affected. This type of influence can be injunctive (what others think one should do) or descriptive (what others actually do) (Ajzen, 1991).

Perceived Behavioral Control

Perceived behavioral control is a derivative of the 1975 theory of reasoned action (Ajzen, 2002) where the theory has been developed to encompass how external factors can decide an outcome of a will and thus not always allow for a result that is wanted. This construct is often divided into two aspects: self-efficacy, which refers to an individual's confidence in their ability to perform the behavior, and controllability, which relates to the perceived availability of resources and opportunities needed to perform the behavior.

Relevance to Sustainable Aviation Fuel Behavior

The theory of planned behavior can be linked to how consumers choose sustainable choices as has been validated in several studies trying to link theoretical models to consumer behavior (Bamberg & Möser, 2007). Han, Hsu and Sheu (2010) demonstrated the

applicability of TPB to determine travelers' intentions to stay at environmentally responsible hotels ("green hotels").

Given the central role of individual decision-making in the context of voluntary contributions to sustainable aviation, TPB offers a highly relevant lens for this study. The purchase of Sustainable Aviation Fuel is a voluntary, value-driven choice that depends on personal attitudes toward environmental impact, perceived social expectations, and an individual's sense of control over making sustainable choices. For example, a passenger's willingness to pay extra for SAF may be influenced by their belief in the environmental benefits (attitude), the perceived behavior of peers or the airline industry (subjective norm), and their confidence in their financial ability or understanding of how to select the SAF option during booking (perceived behavioral control). Therefore, TPB is particularly well-suited to explain the psychological mechanisms behind consumer engagement with SAF, making it a crucial part of the theoretical foundation of this thesis.

Value-Belief Norm Theory

While the Theory of Planned Behavior focuses on rational evaluations of attitudes, norms, and control in shaping behavioral intentions, it does not fully capture the deeper motivational and moral dimensions of sustainable behavior. To address this gap, the Value-Belief-Norm theory introduces a complementary perspective that explains how internalized values and a sense of personal responsibility can activate moral norms, even in the absence of social or external incentives. Together, these frameworks offer a more complete understanding of why individuals may or may not choose to support pro-environmental actions such as paying for Sustainable Aviation Fuel.

Value Orientations: Egoistic, Altruistic, and Biospheric

The VBN Theory, developed by Stern et al (1999), provides a structured framework for understanding pro-environmental behavior. It explains how individuals' values, environmental beliefs, and personal norms influence their decision-making processes and actions related to environmental responsibility. According to the VBN theory, individuals engage in environmentally responsible behaviors when they recognize an environmental issue, feel personally responsible for addressing it, and develop a moral obligation to act. The theory proposes that pro-environmental behavior results from a sequence of cognitive and moral processes. It includes four key components: values, beliefs, personal norms, and behavior (Stern et al., 1999).

Values serve as the foundation for individuals' environmental attitudes and behaviors. Stern et al. (1999) categorize these into three primary types. Egoistic values focus on personal costs and benefits. Individuals with strong egoistic values tend to support pro-environmental actions only if such actions align with their self-interest, for example, when there are financial incentives or reputational gains. Altruistic values reflect concern for the welfare of others and society. People with altruistic values are more likely to support sustainability initiatives that benefit others, even in the absence of direct personal rewards. Biospheric values emphasize concern for the environment and the natural world. Individuals who hold biospheric values tend to act based on a desire to protect ecosystems from human harm.

Environmental Beliefs and Perceived Responsibility

Beliefs are situated between values and behavior. They shape individuals' perceptions of environmental problems and their roles in addressing them. Two specific beliefs are central to the VBN framework. Awareness of consequences refers to a person's understanding of how specific actions impact the environment. Individuals with high awareness of environmental consequences are more likely to perceive the relevance of sustainable behaviors. Ascription of responsibility refers to the degree to which individuals feel personally accountable for environmental degradation. Those who believe their actions contribute to environmental harm are more likely to change their behavior accordingly (Stern, 2000; Stern et al., 1999).

Activation of Personal Norms

Once awareness of environmental consequences and personal responsibility are established, individuals develop personal norms, which are moral obligations to engage in environmental behavior. These norms guide decisions independent of external rewards or punishments. Empirical research further supports this, demonstrating how personal norms significantly influence consumer acceptance of sustainability initiatives and willingness to adopt environmentally responsible purchasing behaviors (Jansson et al., 2010; Stern et al., 1999).

Ultimately, values, beliefs, and personal norms result in actual behavior. According to the VBN Theory, individuals who show strong biospheric or altruistic values, high awareness of environmental consequences, and a sense of personal responsibility are more likely to participate in environmentally responsible actions. These actions may include adopting sustainable consumption habits, reducing carbon footprints, supporting environmental policies, or engaging in activism (Stern, 2000; Stern et al., 1999).

Application to SAF Decision-Making

The inclusion of the Value-Belief-Norm Theory in this study is motivated by its strong relevance to voluntary, moral-driven behaviors such as choosing to pay extra for SAF. Unlike mandated policy or regulation, SAF purchases are discretionary and often appeal to an individual's intrinsic values and sense of environmental responsibility. VBN provides a framework to understand how consumers who hold strong biospheric or altruistic values, recognize the environmental consequences of air travel, and feel personally responsible for contributing to solutions may internalize a moral obligation to act. This moral norm can translate into higher willingness to pay for sustainable alternatives, even in the absence of direct personal benefit. As such, VBN theory complements the more intention-focused TPB by addressing the deeper, value-driven motivations that may underlie sustainable purchasing behaviors in the aviation sector.

VBN Theory has also been included in this study as supported by the strong influence of verified sustainability certification on SAF selection as observed in our findings. The significant impact that certification has as an enabler demonstrates the strong moral obligation that the theory explains. When a respondent perceives a claim of sustainability as trustworthy and validated, they may experience a greater sense of personal responsibility to act, this bridging the intention-behavior gap.

Communication Message Framing and Theoretical Integration

Theoretical Background and Relevance

Building on the psychological mechanisms identified in the Theory of Planned Behavior and the moral motivations emphasized in the Value-Belief-Norm theory, this study next considers how such factors can be activated through communication strategies. Specifically, message framing is explored as a way to make sustainability more salient at the point of decision-making. By designing messages that align with specific psychological constructs such as perceived control, social norms, and personal responsibility, framing can serve as a bridge between internal motivation and external action. This section connects the theoretical foundations to applied communication tactics in order to examine how message design might influence willingness to pay for sustainable aviation fuel.

How a message is framed plays a crucial role in shaping how individuals perceive and respond to information. In the context of sustainability and climate communication, framing can shift both attitudes and behaviors by highlighting either the benefits of action or the consequences of inaction (Levin et al., 1998). These effects are closely tied to the

psychological processes outlined in the Theory of Planned Behavior and the Value-Belief-Norm theory, which together help explain why certain communication strategies are more persuasive than others.

Research shows that emotional and norm-based messages, such as those that evoke guilt or emphasize what others are doing, can be particularly powerful in activating personal moral norms and shaping perceived behavioral control. For example, Chang and Wu (2015) found that individuals with high environmental motivation are more responsive to negatively framed messages that focus on the consequences of inaction. This connects directly to the VBN framework, where awareness of negative outcomes and a sense of responsibility trigger personal norms that drive pro-environmental action.

Similarly, Hong and Jeon (2025) demonstrated that guilt-based appeals can increase not only pro-environmental behavior but also the likelihood of seeking out climate-related information. In their study, guilt was found to moderate the relationship between communication exposure and behavioral response, suggesting that emotional resonance can help translate intention into action, something TPB often seeks to explain through subjective norms and perceived control.

Framing Types and Psychological Activation

Communication message framing is a critical mechanism through which psychological drivers of consumer behavior are activated. Drawing from behavioral economics and environmental psychology, different framing strategies can trigger distinct cognitive and emotional responses that affect willingness to pay and decision-making.

Nudging, a concept popularized by Thaler and Sunstein (2021), involves subtly guiding consumers toward more desirable behaviors without restricting their choices. Within the context of the Theory of Planned Behavior, nudging influences perceived behavioral control by simplifying or making sustainable options more salient and accessible. By reducing decision complexity or highlighting beneficial defaults, nudging addresses common behavioral barriers and helps translate intentions into action.

Social proof messaging builds on the subjective norm components of TPB. According to Cialdini and Goldstein (2004), people tend to align their behavior with perceived social expectations. Messaging that emphasizes what others are doing, for instance the proportion of travelers choosing SAF, can reinforce normative pressure and create a sense of behavioral momentum, encouraging individuals to conform with the environmentally responsible actions of others.

Guilt-based appeals are conceptually rooted in the Value-Belief-Norm theory. VBN posits that personal norms and a sense of moral obligation emerge when individuals recognize the consequences of their actions and feel responsible for them (Stern et al., 1999). Guilt-inducing messages aim to activate these moral norms by highlighting the discrepancy between a person's values and their behavior. When individuals are made aware of the negative environmental consequences of flying without choosing SAF, they may feel internal pressure to act in accordance with their values, resulting in an increased likelihood of choosing sustainable options.

Willingness to Pay and Behavioral Economics

Willingness to pay refers to the maximum amount a consumer is prepared to spend for a product or service (Carrington et al., 2010). In the context of sustainable aviation, WTP serves as a proxy for measuring the value individuals place on climate-conscious travel options such as Sustainable Aviation Fuel. While WTP is widely used in consumer behavior research, its translation into actual purchasing decisions is often complex and context dependent.

One major challenge is the well-documented discrepancy between stated intentions and observed behavior. This phenomenon, referred to as the intention–behavior gap, describes how consumers may express high willingness to act sustainably but ultimately do not follow through when faced with real-world decisions (Carrington et al., 2010; Kollmuss & Agyeman, 2002; White et al., 2019). Several mechanisms have been proposed to explain this gap. These include price sensitivity, lack of clear benefit perception, and social desirability bias, where individuals overstate pro-environmental intent in survey settings (Prothero et al., 2011).

Additionally, empirical work has shown that psychological and contextual barriers often interfere with sustainable behavior, even among environmentally motivated consumers. For instance, Prothero et al. (2011) discuss how consumers may avoid engaging with certain ethical dimensions of their purchases, a pattern described as “willful ignorance.” Carrington et al. (2010) also highlight the role of unrealistic self-assessments and competing priorities in undermining sustainable intentions.

Behavioral economics offers further insight into the disconnect between intention and action by emphasizing the role of cognitive biases, heuristics, and situational framing (Thaler & Sunstein, 2021). Unlike classical economic models that assume rational decision-making, behavioral economics suggests that consumers are often influenced by decision context,

default settings, and emotional cues. These factors can shape whether a theoretically acceptable price premium for sustainability is acted upon in practice.

In aviation, the decision to select SAF, particularly when it involves additional costs, may be affected by decision complexity, unfamiliarity with SAF offerings, or ambiguity around their environmental benefits. While some travelers may report a high willingness to pay in hypothetical contexts, actual uptake in booking environments may be lower due to these frictional factors.

Summary Theory

The preceding sections outlined the theoretical foundation guiding the analysis, drawing on the Theory of Planned Behavior, the Value-Belief-Norm theory, behavioral economics, and communication framing literature. The section on the Theory of Planned Behavior emphasized the role of attitudes, subjective norms, and perceived behavioral control in shaping behavioral intention. Subsequent sections focused on psychological and structural drivers of sustainable behavior, while the discussions on message framing and behavioral economics explored how communication strategies and contextual constraints relate to intention–behavior dynamics in pro-environmental decision-making.

The integration of TPB and VBN provides a comprehensive lens to understand consumer choices related to Sustainable Aviation Fuel. TPB captures how decision-making is influenced by perceived control, rational evaluation, and normative expectations. VBN adds an emotional and moral dimension by linking deeply held values and beliefs to personal norms that motivate behavior even when social or financial incentives are weak.

Communication message framing serves as the experimental mechanism through which these theoretical constructs are activated. Each message type operationalizes a psychological pathway identified in the framework: nudging enhances perceived behavioral control, social proof reinforces subjective norms, and guilt-based appeals activate personal moral norms. These framings allow for a direct examination of how communication strategies may shift willingness to pay and influence sustainable flight choice.

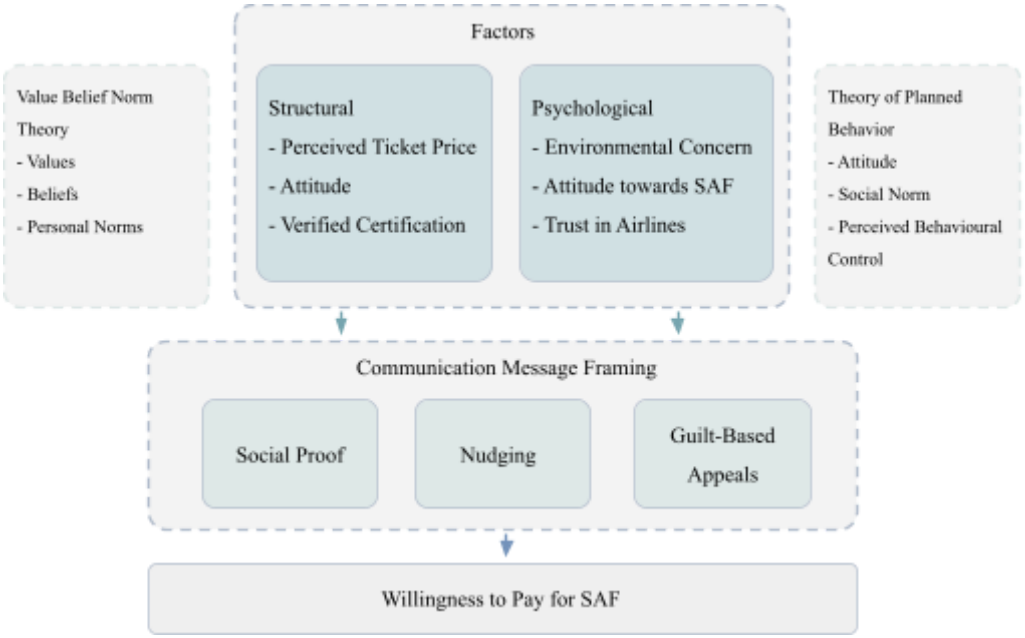
Psychological and structural factors that may influence willingness to pay for Sustainable Aviation Fuel and sustainable flight choices are also considered. Psychological factors include environmental concern, attitude toward Sustainable Aviation Fuel, and trust in airlines. Structural factors include perceived ticket price barriers, the enabling role of verified certification, and travel frequency. These variables were selected based on their theoretical

relevance and prior empirical findings and are tested as predictors of both stated willingness to pay and sustainable choice behavior.

Figure 1 summarizes the conceptual model tested in this thesis. It illustrates how the theoretical frameworks inform the design of the communication messages and the selection of key predictors, which together are hypothesized to influence willingness to pay and sustainable flight behavior.

Figure 1

Psychological, structural, and communication factors are hypothesized to influence willingness to pay for sustainable aviation fuel, integrating constructs from the Theory of Planned Behavior and Value-Belief-Norm theory.



Methodology

Research Design

The study was designed to address two core research questions. First, how do different communication message framings (neutral, nudging, social proof, guilt-based) influence willingness to pay for SAF among Scandinavian leisure travelers? Second, what psychological and structural factors significantly predict consumer choices of SAF in a flight booking context? By integrating experimental manipulation with survey-based measurement of attitudes, intentions, and behavior, the study employed a between-subjects randomized experimental design consistent with the framework outlined by Shadish et al. (2002). This design aligns with the study's dual focus on message framing effects and the determinants of sustainable consumer decision-making.

Experimental Design and Justification

In this design, each participant was randomly assigned to one of four message conditions and exposed to only one, thereby eliminating potential carry-over effects and response contamination. Random assignment enhances internal validity by minimizing systematic bias and allowing observed group differences to be causally attributed to the message framing intervention.

The use of message framing as the experimental manipulation is grounded in behavioral economics and environmental psychology, which suggest that the way choices are presented can significantly influence decision-making (Cialdini & Goldstein, 2004; Thaler & Sunstein, 2021). Each message was theoretically derived and operationalized to activate different psychological constructs: the nudging message was designed to enhance perceived behavioral control (TPB), the social proof message to reinforce subjective norms (TPB), and the guilt-based message to activate personal moral norms (VBN).

The inclusion of a neutral message served as a control group to establish a baseline for comparison. This allowed for direct assessment of whether any of the three theoretically informed framings led to statistically and practically significant differences in WTP and SAF selection. By integrating theoretical constructs into the design of message framings and using a randomized experimental approach, this study aimed to evaluate not only the effectiveness of communication strategies, but also their alignment with established psychological theories of pro-environmental behavior.

Target Population and Sampling

The target population for this study comprised leisure travelers residing in Denmark, Norway, and Sweden. A non-probability convenience sampling technique was utilized due to practical considerations, with the aim of reaching approximately 200 respondents to enable robust statistical analysis and support meaningful comparisons within the experimental section of the survey.

Data Collection Procedure

Data collection was carried out using an online survey distribution platform targeting geo-demographically appropriate leisure travelers. The survey was designed in Qualtrics and distributed via the Prolific research platform. This approach offered several advantages, including efficient access to a diverse and screened respondent pool, as well as the flexibility to implement advanced survey features such as randomization, embedded experimental conditions, and research-specific visuals.

Survey Structure and Methodological Design

The survey consisted of eleven structured blocks, each targeting specific variables aligned with the research objectives and theoretical framework. These included: an embedded experiment, demographic information, travel behavior, direct WTP, awareness and attitudes toward SAF, trust in institutions and airlines, environmental concern, perceived barriers to sustainable flight choices, valuation scenarios using the Contingent Valuation Method (CVM) and Choice-Based Conjoint (CBC), and an attention check.

Valuation Techniques: CVM and CBC

The Contingent Valuation Method, grounded in stated preference theory (Portney, 1994), was used to directly measure respondents' explicit willingness to pay for flights powered by SAF. Given that SAF purchasing is a relatively new and emerging consumer behavior without established market pricing, CVM was particularly suitable for capturing hypothetical WTP. By presenting participants with structured scenarios and directly asking for their maximum willingness to pay, CVM provided baseline insights into consumers' sustainability intentions.

The Choice-Based Conjoint analysis, based on random utility theory (Green & Srinivasan, 1990), was employed to simulate realistic consumer decision-making by presenting respondents with a series of flight alternatives that varied systematically in attributes such as ticket price, carbon emissions, fuel type, and flight duration. CBC indirectly inferred preferences by observing actual choice behavior rather than relying on direct

questioning, thereby reflecting the trade-offs consumers typically face in real purchasing contexts.

Combining CVM and CBC

Combining CVM and CBC methodologies strengthened the validity and comprehensiveness of the findings. While CVM captured stated preferences and explicit WTP, CBC revealed implicit valuation and attribute prioritization through behavioral trade-offs. This dual-method approach effectively addressed the well-documented intention-behavior gap in sustainable consumption (Carrington et al., 2010; Kollmuss & Agyeman, 2002), allowing for a richer and more accurate understanding of consumer motivations and decision-making in the context of sustainable aviation.

The survey was designed to identify the key drivers influencing respondents' WTP for SAF. The experiment section included visual message framings presented upon entry, with random assignment to one of four conditions. Following the experimental prompt, respondents completed the same core set of questions. The survey structure supported cross-group comparisons and hypothesis testing.

Variables and Operationalization

This study investigates a set of psychological and structural factors that may influence willingness to pay for SAF and sustainable flight choices among Scandinavian leisure travelers. Psychological factors include environmental concern, attitude toward SAF, and trust in airlines. Structural factors include perceived ticket price barriers, enabling the role of verified certification, and travel frequency. These variables were selected based on their theoretical relevance in the frameworks of the Theory of Planned Behavior, Value-Belief-Norm theory, and behavioral economics, as well as prior empirical findings on sustainable consumer behavior in aviation. The following section describes how these constructs were operationalized and measured in the experimental survey.

The experimental manipulation was implemented through randomized assignment to one of four message framing conditions: neutral, nudging, social proof, or guilt-based. This independent variable was used to evaluate framing effects on both WTP and SAF selection.

Dependent variables included both WTP and SAF selection. WTP was assessed through open-ended and bracketed scenario-based questions, allowing for both continuous and categorical evaluation. SAF choice was operationalized as a binary outcome based on whether participants selected SAF as their preferred free flight extra in a flight booking context?

Independent variables included multiple psychological and demographic constructs. Environmental concern, attitudes toward SAF, and trust in airlines were measured using multi-item Likert scales adapted from validated behavioral frameworks. Travel behavior was assessed through self-reported travel frequency, purpose of travel, and booking criteria. Demographic variables included gender, age, education, income, and country of residence.

Contextual predictors were also assessed. Barriers and enablers to SAF adoption were measured using predefined multiple-choice questions and open-ended responses. Key items included ticket price sensitivity, desire for verified certification, and preference for default SAF offerings. These variables were dummy coded for inclusion in regression analyses.

Data Analysis Strategy

The data analysis plan was structured around two refined research questions. The first research question explored how communication message framing influences willingness to pay for SAF, which was tested through between-group comparisons and regression models. The second research question examined the psychological and structural predictors of sustainable consumer behavior, particularly the selection of SAF in a flight booking context. This was evaluated through logistic regression incorporating theoretical constructs and contextual barriers and enablers.

Analytical Tools and Processing

All quantitative analyses were conducted using IBM SPSS Statistics Version 30.0. Descriptive statistics were computed to summarize the sample's demographic characteristics, travel behavior, attitudinal constructs, and WTP for SAF. Measures of central tendency, dispersion, and frequency distributions were reported where appropriate. Internal consistency of psychographic constructs, including Attitude toward SAF, Environmental Concern, and Airline Trust, was assessed using Cronbach's alpha. All retained constructs exceeded the minimum reliability threshold of $\alpha = .70$.

To prepare the data for analysis, multi-item constructs were computed as mean indices by averaging the values of each constituent Likert-scale item. Categorical predictors, such as perceived barriers and enabling factors, were re-coded into binary dummy variables using SPSS's RECODE function. For example, respondents who selected "high ticket price" as a barrier to SAF adoption were coded as 1 (present), and those who did not were coded as 0 (absent). This approach was applied consistently across all barrier and enabler items included in the regressions.

Inferential Analyses

Experimental group assignment was recorded through Qualtrics' randomization logic and imported into SPSS as a nominal variable representing the four message conditions: neutral, nudging, social proof, and guilt-based. Dummy variables were generated to enable regression analysis, with the neutral message serving as the reference category.

Inferential analyses were conducted to address each research question. A one-way analysis of variance (ANOVA) was used to assess whether message framing significantly influenced immediate willingness to pay. To evaluate the short-term effect of message exposure, a paired-samples t-test was conducted comparing immediate WTP to the value reported later in the survey. Associations between message condition and SAF selection were tested using a chi-square test of independence. Predictors of SAF selection were assessed using binary logistic regression models. The first model included psychological constructs such as attitude, concern, and trust. The second model added structural predictors, including selected barriers and enablers. A linear regression model was used to assess continuous predictors of WTP in kronor. Finally, a logistic regression model was used to examine predictors of sustainable flight selection in the conjoint-based booking task.

Valuation Techniques and Dependent Measures

To measure both stated and revealed preferences, two complementary valuation techniques were applied. The Contingent Valuation Method was used to assess explicit willingness to pay based on a scenario in which respondents directly entered the amount they would pay for a SAF-powered flight. The Choice-Based Conjoint task simulated real-world trade-offs, with participants selecting from flight options that varied systematically in price, fuel type, and emissions. Responses to the CBC task were re-coded into a binary variable indicating whether the respondent selected a sustainable option (selection of any SAF-powered or carbon-neutral flight option, coded as 1) versus a conventional jet fuel option (coded as 0). This binary outcome served as the dependent variable in the logistic regression models examining sustainable choice behavior.

All hypothesis tests were evaluated at a significance threshold of $p < .05$. Where applicable, effect sizes such as odds ratios (OR), standardized beta coefficients (β), R-squared (R^2 or Nagelkerke R^2), and Cohen's d were reported to convey the practical importance of the results.

Validity and Reliability Considerations

The survey instrument was pilot tested with 25 participants to refine clarity and structure. Items were grounded in established literature, including TPB and VBN frameworks. Ecological validity was strengthened by using real-world messaging formats and booking scenarios. Cronbach's alpha was used to confirm scale reliability, and attention checks ensured the data quality. No formal manipulation check was included in the survey to confirm whether participants perceived the message framings (nudging, social proof, guilt-based) as intended. This represents a limitation when interpreting framing effects.

Internal Validity

Internal validity was supported through several design choices, including random assignment to message conditions, consistent survey formatting, and the use of an online platform that ensured standardized exposure across participants. Scale reliability was confirmed using Cronbach's alpha, supporting the internal consistency of the measured constructs.

Maturation effects may have occurred as participants progressed through the survey, especially during later sections. Fatigue or reduced attention could have influenced response quality. To mitigate this, the overall survey was kept concise, and an attention check was embedded to screen out low-quality responses. On average, the survey required less than 6 minutes to complete.

Testing effects are also relevant, as earlier blocks measuring environmental attitudes and concern may have primed participants to respond more favorably toward sustainable options later in the survey. While this sequencing could influence outcomes, the random assignment of message framings and the use of embedded scenarios help isolate treatment effects from order-related bias.

Finally, participant selection bias could arise due to the use of a non-probability sample from Prolific. While randomization helped ensure internal comparability across treatment groups, the potential influence of platform-specific traits such as higher digital literacy or prior survey experience remains a consideration (Shadish et al., 2002).

External Validity

External validity refers to the generalizability of the study's findings beyond the sampled participants and experimental setting. First, the use of a non-probability sample via Prolific introduces potential sampling bias. Respondents may be more digitally literate,

educated, and environmentally aware than the broader Scandinavian leisure travel population, which could limit representativeness as the platform respondents have already been screened and approved to a set standard.

Second, the study was conducted in a hypothetical setting, meaning that willingness to pay and SAF choices were not tied to real financial decisions. This limits ecological validity, as actual behavior may differ under real-world constraints.

Lastly, both the regional focus and communication effects limit broader generalizability. The study is designed specifically for a Scandinavian context, where environmental concern and policy support for SAF are relatively high. While appropriate for this setting, the results, particularly the effectiveness of guilt-based or normative messaging may not apply in countries with different cultural norms or levels of climate engagement.

Ethical Considerations

Participants were informed of the study's purpose and their rights before beginning the survey. Consent was obtained, participation was anonymous and voluntary, and no identifying data were collected. All responses were stored securely and used exclusively for academic research.

Results

Sample Characteristics

The final sample consisted of 190 respondents from Sweden, Norway, and Denmark. The age distribution was skewed toward younger respondents, with the largest share (42.6%) in the 25–34 age bracket. The gender breakdown was 60.0% male, 39.5% female, and 0.5% identifying as other. In terms of educational attainment, 36.3% held a bachelor's degree and 34.7% had completed a master's degree or higher. Most participants were Swedish (62.1%), followed by Norwegian (19.5%) and Danish (18.4%).

Travel Behavior and Booking Priorities

Among respondents, 36.8% reported flying two to three times per year for leisure purposes. A majority (72.6%) indicated that they planned to fly within the coming 12 months. When asked about priorities during flight booking, 94.1% of participants identified ticket price as a primary factor. Flight duration and convenience were selected by 80.7%, while 15.5% indicated that sustainability played a role in their decision-making.

Reliability of Constructs

Cronbach's alpha was used to assess the internal consistency of multi-item constructs. Attitude toward SAF yielded an alpha of .764, environmental concern .784, airline trust .877, and WTP intention .841, all indicating acceptable to excellent internal consistency. Institutional trust was below the recommended threshold (α = .521) and therefore excluded from subsequent analysis.

Message Framing and Willingness to Pay

A one-way ANOVA was conducted to examine whether message conditions influenced immediate WTP. The analysis revealed no statistically significant differences across message groups, $F(3, 186) = 0.431$, $p = .731$. Mean immediate WTP ranged from 278.1 kr (social proof) to 312.5 kr (nudging).

A paired-samples t-test comparing immediate WTP to the WTP reported later in the survey showed a statistically significant decline, $t(189) = 4.26$, $p < .001$, suggesting a short-term priming effect of the message exposure that faded over time.

Message Framing and SAF Selection

A chi-square test of independence examined the relationship between message condition and SAF selection as a free booking extra. The result was not statistically significant, $\chi^2(3, N = 190) = 4.981$, $p = .173$. Selection rates were highest in the nudging and guilt-based conditions (54.2%), followed by social proof (40.4%) and neutral (36.2%).

Regression Model Results

Model 1 assessed the impact of psychological predictors on SAF selection via binary logistic regression. The model was significant, $\chi^2(3, N = 190) = 37.70$, $p < .001$, with Nagelkerke $R^2 = .240$. Environmental concern ($p = .002$, OR = 2.05) and attitude toward SAF ($p = .024$, OR = 1.90) were significant predictors. Airline trust was not significant ($p = .977$).

Model 2 added structural predictors (barriers and enablers). The model remained significant, $\chi^2(9, N = 190) = 62.86$, $p < .001$, Nagelkerke $R^2 = .376$. Certification as an enabler ($p < .001$, OR = 6.01) and environmental concern ($p = .048$, OR = 1.63) were significant. Higher ticket price as a barrier was also significant ($p = .023$, OR = 0.363), while other predictors were not.

Model 3, a linear regression predicting WTP in kronor, was significant, $F(6, 183) = 10.16$, $p < .001$, with $R^2 = .250$ and adjusted $R^2 = .225$. Significant predictors included environmental concern ($\beta = .298$, $p < .001$), airline trust ($\beta = .138$, $p = .039$), age ($\beta = .145$, $p = .028$), and travel frequency ($\beta = –.139$, p = .035). The negative coefficient for travel

frequency indicates that respondents who flew more often reported lower willingness to pay for SAF, even after controlling for psychological attitudes. Attitude toward SAF was marginal ($\beta = .146$, $p = .082$); income was not significant ($\beta = –.094$, $p = .153$).

Model 4 examined predictors of choosing a sustainable option in the CBC scenario using logistic regression. In this model, the dependent variable represents selection of a sustainable option in the CBC scenario (binary coded). The model was significant, $\chi^2(5, N = 190) = 76.03$, $p < .001$, Nagelkerke $R^2 = .443$, with 76.3% correct classification. Significant predictors were environmental concern (p = .004, OR = 2.05), attitude (p = .014, OR = 2.19), airline trust (p = .045, OR = 1.41), and certification (p = .002, OR = 4.77). Price sensitivity was not significant (p = .276).

Summary of Key Results

The experimental manipulation did not produce statistically significant differences in WTP or SAF selection across message conditions, though a priming effect was observed immediately after message exposure. Environmental concern emerged as the most consistent predictor across all models. Certification as an enabling factor significantly increased the likelihood of SAF selection, and price sensitivity functioned as a barrier in the extended model. Airline trust and age also played a role in shaping WTP. In the conjoint booking scenario, psychological and structural variables jointly predicted the sustainable choice, affirming the combined influence of values, attitudes, and contextual enablers. A summary of the results from the data collection can be found in Appendix B.

Discussion

Interpretation of Findings and Theoretical Implications

This section interprets the study's key empirical findings in relation to the theoretical frameworks presented earlier and the research questions outlined in the introduction. It also discusses how the findings relate to previous research on sustainable consumer behavior.

Message Framing and Priming Effects

Message framing did not significantly influence willingness to pay or SAF selection. Neither nudging, social proof, nor guilt-based messages produced statistically significant effects compared to the neutral control group. A significant decline in willingness to pay over time, from immediately after message exposure to later in the survey, indicates a short-term priming effect. This suggests that framing may temporarily have heightened sustainability

salience, but was insufficient to produce lasting behavioral change without structural reinforcements.

Several factors may explain this null finding. First, flight booking represents a high-cost and highly considered decision domain, where deeply held preferences and structural barriers such as price may override subtle communication effects. Second, Scandinavian travelers typically display strong pre-existing environmental attitudes, which may reduce sensitivity to external message framing. Third, without validated manipulation checks, it is unclear whether the messages were cognitively or emotionally processed as intended. Finally, message fatigue or resistance to guilt-based appeals in highly sustainability-aware populations may have dampened framing effects. These dynamics underscore the importance of aligning message design with both audience characteristics and decision context.

These limitations reflect broader findings in the literature on emotional appeals and behavioral friction. For instance, Chang and Wu (2015) found that emotionally framed messages can increase sustainable behavior when cost barriers are low, whereas our findings suggest that such effects may diminish in high-cost or high-involvement domains like air travel. Similarly, Thaler and Sunstein (2021) point out that even minor decision frictions can deter action. In our case, factors such as perceived cost sensitivity and booking effort may have introduced psychological resistance that limited the effectiveness of framing strategies. These results align with findings from Hong and Jeon (2025), who showed that guilt significantly predicted eco-friendly purchase intentions, particularly when accompanied by interpersonal communication and information seeking. Their study emphasized that these forms of engagement can amplify the influence of guilt and crisis salience on pro-environmental behavior. While their work focused on broader environmental contexts rather than aviation, the observed role of emotional drivers and social reinforcement offers relevant insight into why guilt-based messages may be less effective when cost sensitivity is high, as in the case of SAF adoption. The findings emphasize that emotionally framed messages may not be sufficient to alter economic preferences in isolation, highlighting the need to consider contextual constraints such as pricing and trust when designing interventions.

Psychological Predictors

Environmental concern emerged as the most consistent and robust predictor across all models. This aligns with the Value-Belief-Norm theory, which posits that personal norms

rooted in biospheric values and environmental awareness are key drivers of pro-environmental behavior. The findings support prior research indicating that individuals with strong environmental concern are more likely to engage in sustainable travel choices.

Attitude toward SAF was also a meaningful factor, particularly in the conjoint and logistic models where it significantly predicted sustainable flight selection. This result reinforces the Theory of Planned Behavior's premise that attitudes toward the behavior are important predictors of behavioral intention and action. The finding also aligns with previous studies showing that positive attitudes toward SAF or sustainable aviation are linked to higher adoption likelihood.

Enabling Role of Certification and Institutional Trust

Verified certification had a strong enabling effect on sustainable flight choice. Respondents perceiving SAF offerings as certified and credible were significantly more likely to select them. This finding highlights the importance of institutional trust in shaping consumer behavior, as emphasized in both the Value-Belief-Norm framework and the broader literature on sustainable consumption. Trust in the source and verification of sustainability claims appears to play a critical role in activating personal norms and reducing perceived risk, thereby facilitating sustainable choices.

Structural Barriers

Price sensitivity functioned as a key structural barrier, with respondents citing ticket cost as a barrier being significantly less likely to select SAF. This reinforces previous findings that cost remains one of the most substantial obstacles to sustainable consumption, particularly in high-cost categories like air travel. Travel frequency was negatively associated with willingness to pay for SAF. Respondents who flew more frequently reported lower willingness to pay for SAF, which may reflect habituation to low-cost travel, budget awareness among frequent flyers, or environmental fatigue. This result resonates with the intention-behavior gap discussed by Carrington et al. (2010), where stated values do not always translate into consistent pro-environmental actions.

Demographic variables showed weaker and more variable effects. While prior research, including Xu et al. (2022) and Rice (2020), has found that younger individuals and women are generally more willing to pay for SAF, the present study did not replicate these patterns. Age was positively associated with willingness to pay, whereas gender and income were not significant predictors. These findings suggest that demographic influences on

sustainable travel choices may be highly context-dependent and shaped by how sustainability options are framed and presented during the booking process.

Implications for Practice

Emphasizing the Certification and Institutional Trust

One of the clearest takeaways is the central importance of credibility and trust. Verified certification was the most influential predictor of SAF selection, indicating that consumers respond more favorably to sustainability options that are perceived as legitimate and independently validated. For airlines, this suggests that transparent and verifiable messaging can build the institutional trust needed to encourage behavioral uptake.

Emotional Communication in Context

Another area of interest is the role of emotional communication. Although message framing did not influence willingness to pay, the guilt-based message prompted slightly higher SAF selection rates in the booking scenario. While these effects were modest, they imply that emotional appeals may be effective in shaping short-term behavior when they are embedded within specific decision contexts.

Addressing Cost Barriers

Cost barriers remain a persistent challenge. Participants who viewed SAF as too expensive were less likely to choose it, reinforcing the need for economic interventions. Practical steps such as price bundling, subsidies, or default options could be necessary to make sustainable alternatives more accessible to consumers.

Targeting Psychographics over Demographics

With regard to segmentation, demographic patterns were relatively weak. Age showed a positive association with willingness to pay, but gender and income had no significant influence. Instead, psychographic factors like environmental concern and trust in airlines appear to be more meaningful indicators of sustainable behavior. This suggests that targeted communication strategies should prioritize attitudinal profiles rather than relying on age or gender.

Integrating Motivation and Structural Supports

Finally, the results underscore the need to support psychological motivation with structural enablers. While attitudes and environmental concern were important, they did not consistently translate into behavior without the presence of trust-building and pricing mechanisms. For practice, this means sustainability initiatives should combine internal motivation with external clarity and institutional credibility.

Summary

Advancing SAF adoption depends on a multi-faceted approach that integrates certified trust signals, behaviorally informed communication, and pricing strategies that lower adoption barriers within the booking process.

Limitations and Future Research

This thesis was designed to offer a methodologically sound and transparent contribution to the study of sustainable aviation behavior. As with any experimental study, considerations should be acknowledged to contextualize the findings and guide future work.

To begin with, the study was conducted within a simulated flight booking process. Although the interface and decision environment were designed to reflect realistic trade-offs, the outcomes remain based on stated preferences rather than real financial commitments. The use of conjoint analysis helped mitigate this limitation by requiring participants to make structured decisions among competing options, but future research conducted within real or incentive-aligned booking platforms would offer greater ecological validity.

Another consideration is the role of message framing. While the communication treatments were grounded in established theories, they did not yield significant effects on willingness to pay or selection behavior. This may reflect the limitations of framing strategies in high-cost or complex decisions, where structural cues such as price and certification may exert stronger influence. Future work could explore whether combining framing with default mechanisms or other behavioral nudges results in more substantial effects.

A procedural adjustment was made during the data collection process. An initial version of the guilt-based message included an image element that was not present in the other experimental conditions, which introduced an unintended inconsistency. Upon identification, the material was revised to ensure alignment across all message conditions, and only responses collected after this adjustment were included in the final dataset. This issue was addressed transparently and is not considered to compromise internal validity.

The sample, drawn from a digital research platform, enabled access to a diverse and attentive participant pool. However, platform users tend to be more digitally literate and familiar with survey formats than the general leisure traveler population. This introduces a potential limitation for generalizability, particularly with respect to decision-making habits or levels of trust in digital environments.

Responses in this study were also self-reported, which can introduce bias, especially in areas linked to moral identity or social expectations. Nonetheless, the use of anonymized

responses and random assignment helps reduce this risk and supports the reliability of the findings.

Demographic predictors such as age, gender, and income showed limited explanatory power. While age had a positive relationship with willingness to pay, neither gender nor income significantly influenced behavior in our models. This suggests that demographic effects may be highly context-dependent and less predictive than psychographic factors like trust and environmental concern. Further investigation into how demographic traits interact with structural or motivational elements would be valuable.

Looking ahead, future research should build on this work by embedding sustainability prompts in actual booking platforms, testing personalized communication strategies, and tracking behavior over time. Mixed-method approaches could also offer richer insight into how trust, responsibility, and perceived efficacy influence decisions in sustainable aviation.

Conclusion

This thesis contributes to the understanding of sustainable consumer behavior in aviation by integrating insights from the Theory of Planned Behavior, Value-Belief-Norm theory, behavioral economics, and communication research. The findings clarify how psychological factors, structural enablers, and communication message framing interact to influence willingness to pay for Sustainable Aviation Fuel. In particular, the results highlight the dominant role of environmental concern and verified certification in shaping sustainable choices, while revealing the limits of message framing and the constraining effects of structural barriers such as price sensitivity and habitual travel.

The results demonstrate that message framing alone did not significantly affect willingness to pay or SAF selection. While short-term priming effects were observed, they diminished quickly and were not sustained across behavioral tasks. In contrast, environmental concern consistently emerged as the strongest predictor of both stated and revealed preferences. Verified certification also played a critical enabling role, significantly increasing the likelihood of SAF selection. These findings underscore the importance of moral norms and institutional credibility in translating sustainability intentions into action.

Structural constraints, particularly price sensitivity and frequent travel habits, were found to limit sustainable behavior. Even environmentally concerned individuals were less likely to choose SAF when cost was perceived as a barrier, reinforcing the importance of financial and contextual enablers. Demographic characteristics such as gender and income

were not significant predictors, suggesting that psychographic variables offer more actionable insight for targeting sustainability interventions.

Overall, the findings emphasize that advancing SAF adoption requires more than persuasive communication. Effective strategies must combine clear and credible messaging with verified sustainability credentials, frictionless booking experiences, and pricing models that lower the perceived cost of action. Future research should explore these mechanisms in real-world booking environments, including personalized messaging, structural defaults, and long-term behavior tracking, to further illuminate how sustainable choices are formed and enacted.

AI and Tool Use Disclaimer

Generative AI tools were used selectively to support the research and writing process in this thesis. Specifically, Perplexity Pro and the SSE Library Research Assistant Beta were employed during the literature search phase to identify relevant sources and contextual references for Sustainable Aviation Fuel and consumer behavior frameworks. ChatGPT (GPT-4.5 Research Pro and GPT-4o) was used to assist in developing the thesis structure, refining the wording of research questions and hypotheses, improving the clarity and flow of academic writing, and formulating questionnaire items.

All theoretical reasoning, survey design, statistical analysis, interpretation of results, and creation of visual materials were conducted independently by the authors without AI involvement. All AI-supported outputs were critically reviewed and edited to ensure full alignment with academic standards and the intended contributions of this thesis.

In addition, Zotero was used to manage citations and format references in APA style. All cited sources were manually selected, reviewed, and verified by the authors.

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Appendix A

Survey

<table>
<tr><th>Block</th><th>Question</th></tr>
<tr><td>1.1</td><td>Social proof


Nudging


Neutral


Guilt

</td></tr>
<tr><td colspan="2">Demographics</td></tr>
<tr><td>2.1</td><td>What is your gender?</td></tr>
<tr><td>2.2</td><td>Which Scandinavian country do you primarily reside in?</td></tr>
<tr><td>2.3</td><td>What is your age group?</td></tr>
</table>

2.4	*What is your highest level of education completed?*
2.5	*What is your approximate annual income (before taxes)?*
Travel Behaviour	
3.1	*How often do you travel for leisure (personal vacations, visiting friends/family, etc.) by plane?*
3.2	*Are you planning to fly in the upcoming 12 months?*
3.3	*What type of leisure flights do you usually take?*
3.4	*When booking flights, which of the following factors influence your decision the most?*
Willingness to Pay	
4.1	*I am willing to pay more for a flight if it uses Sustainable Aviation Fuel (SAF)*
4.2	*I would still choose a SAF-powered flight even if a cheaper flight using conventional jet fuel is available*
Awareness and Attitude	
5.1	*I believe it is a good idea to use Sustainable Aviation Fuel (SAF) for air travel*
5.2	*I prefer to fly with airlines that use Sustainable Aviation Fuel (SAF)*
5.3	*I would encourage others to choose flights that use SAF*
Trust in Government and Institutions	
6.1	*I trust the scientific community to act in the public's best interest when developing Sustainable Aviation Fuel (SAF)*
6.2	*I trust policymakers to effectively regulate the development and use of SAF*
Trust in Airlines	
7.1	*I trust that airlines would actually use Sustainable Aviation Fuel (SAF) if I paid extra for it* and *If an airline offered SAF as an option*

7.2	*I would trust them to follow through on their commitment*
Environmental Concern	
8.1	*Protecting the environment should be a top priority, even if it means making significant changes in our daily lives*
8.2	*I feel personally responsible for helping to reduce environmental problems like climate change*
8.3	*Environmental issues such as global warming and pollution are among the most serious challenges we face today*
Barriers to choosing SAF	
9.1	*What prevents you from paying extra for a sustainable flight option?* *a) Higher ticket price.* *b) I do not believe that sustainable flights significantly reduce environmental impact.* *c) No clear benefit for me as a traveler.* *d) I believe the responsibility should be on airlines/governments, not consumers.* *e) I already minimize my environmental impact in other ways (e.g., fewer flights, train travel).* *f) Other*
9.2	*What could make you more likely to choose a sustainable flight option?* *a) Clear and verified sustainability certifications for airlines.* *b) Financial incentives, such as tax breaks or subsidies for green travel.* *c) Better information on how sustainable aviation benefits the environment.* *d) If sustainable flight options became the standard (rather than an extra-cost option)* *e) Other*
Willingness to Pay – CVM and CBC Scenarios	

10.1	*Imagine you are booking a flight for a vacation. Which option would you choose?* *a) 2000 kr, no CO_2 reduction, regular jet fuel.* *b) 2200 kr, 30% lower emissions, biofuel blend.* *c) 2500 kr, 50% lower emissions, full biofuel.* *d) 2750 kr, 100% carbon neutral, carbon offset + full biofuel*
10.2	*If your round-trip flight currently costs 2000 kr, how much extra would you be willing to pay for a sustainable flight option (e.g., lower emissions, biofuels, carbon offsets)?* *a) 0 (I would not pay extra).* *b) 50–100 kr more.* *c) 101-200 kr more.* *d) 201-300 kr more.* *e) 301-400 kr more.* *f) 401-500 kr more.* *g) 501-600 kr more.* *h) More than 600 kr*
10.3	*Which sustainable aviation initiatives would you support the most?* *a) Airlines using biofuels or sustainable aviation fuels (SAF).* *b) Airlines offering carbon offset programs.* *c) Airlines investing in fuel-efficient aircraft and green technology.* *d) Airlines reducing single-use plastics and waste.* *e) Other*
10.4	*In the month of April, AirGreen invites you to choose one of the following extras for FREE. Which one would you like for your journey?* *a) Fast track.* *b) Priority boarding.* *c) Sustainable Jet Fuel (SAF).* *d) Food onboard.* *e) Complimentary WiFi*
Attitude Check	

11.1	*Please select 'Rarely' below to show that you are reading carefully*
11.2	*Before this survey, were you aware that airlines offer sustainable aviation initiatives (e.g., biofuels, carbon offset programs, eco-friendly aircraft)?*

Appendix B

Summary of Data Analysis Procedures and Results

Table B1

Descriptive Statistics

Variable Category	Analysis Conducted	Values
Demographics	Frequencies, Percentages	42.6% aged 25–34; 60% male; 62.1% Swedish
Travel behavior	Frequencies	36.8% fly 2–3x/year; 72.6% plan to fly
Booking priorities	Multiple Response Frequencies	Price (94.1%), Duration (80.7%), Sustainability (15.5%)
SAF flight choice (CBC)	Frequency	57.4% chose sustainable option

Table B2

ANOVA and Paired T-Test Results

Test Type	Statistic	*p*-value
One-way ANOVA (WTP)	$F(3,186) = 0.431$	.731
Paired t-test (WTP)	$t(189) = 4.26$	< .001

Table B3

Group Mean Comparison (WTP)

Message Condition	Mean (Immediate WTP)	Mean (Later WTP)

Neutral group	283.4	250.2
Nudging group	312.5	275.4
Social proof group	278.1	240.9
Guilt-based group	309.6	268.7

Table B4

Chi-Square Results

Comparison	χ^2	*p*-value
Message × SAF choice	4.981	.173
Message × WTP bracket	5.58	.134
Message × Flight package	3.58	.316

Table B5

Logistic Regression Model Summary (SAF Choice)

Predictor	Odds Ratio	*p*-value
Environmental concern	2.05	.002
Attitude toward SAF	1.90	.024
Airline trust	0.996	.977

Table B6

Extended Logistic Regression (Barriers and Enablers)

Predictor	Odds Ratio	*p*-value
Higher ticket price	0.363	.023
No clear benefit	0.618	.349

Certification (enabler)	6.01	< .001
Financial incentives	1.012	.976
SAF as standard (enabler)	0.734	.466

Table B7

Linear Regression Summary (WTP)

Predictor	Beta (β)	p-value
Environmental concern	.298	< .001
Airline trust	.138	.039
Attitude toward SAF	.146	.082
Age group	.145	.028
Travel frequency	–.139	.035
Income	–.094	.153

Table B8

Scale Reliability (Cronbach's Alpha)

Construct	α
Attitudes toward SAF	.764
Environmental concern	.784
Airline trust	.877
WTP intention	.841
Institutional trust	.521