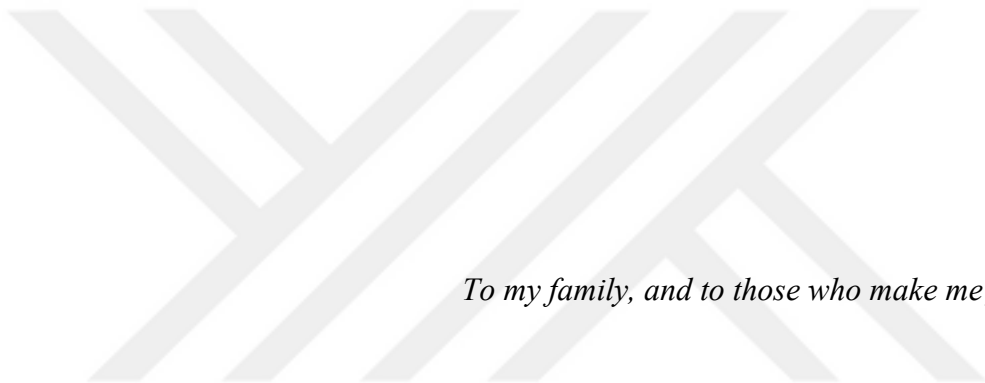


CHOICE ARCHITECTURE IN ORGANIZATIONS:
EXPERIMENTAL INSIGHTS INTO
NUDGE CHARACTERISTICS AND ENVIRONMENTAL DECISION-MAKING

A Master's Thesis

by
MERVEGÜL ÖZDEMİR

Department of
Business Administration
İhsan Doğramacı Bilkent University
Ankara
July 2025



To my family, and to those who make me feel like family

CHOICE ARCHITECTURE IN ORGANIZATIONS:
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The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

MERVEGÜL ÖZDEMİR

In Partial Fulfillment of the Requirements for the Degree of
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İHSAN DOĞRAMACI BİLKENT UNIVERSITY
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MAKING

By Mervegöl Özdemir

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Business Administration.

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ABSTRACT

CHOICE ARCHITECTURE IN ORGANIZATIONS: EXPERIMENTAL INSIGHTS INTO NUDGE CHARACTERISTICS AND ENVIRONMENTAL DECISION-MAKING

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MS, Department of Business Administration

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July 2025

In a world that demands sustainable transformation, achieving environmental goals depends not just on how organizations set strategies but on how employees put those goals into practice. This thesis explores how behavioral interventions, particularly nudges, can bridge this gap by supporting environmental decision-making within organizational contexts. Drawing from behavioral science and corporate social responsibility literature, the study focuses on two key features of nudges: transparency and frequency. Through a 2x2 between-subjects vignette experiment involving 228 business undergraduates, the research investigates how these design attributes influence support for sustainable choices in the workplace. In addition to behavioral outcomes, it investigates the psychological mechanisms of perceived threat to freedom and anger as potential mediators. The findings reveal that while nudges significantly increased environmental decision-making, neither

transparency nor frequency produced significant effects when individual differences were controlled. Instead, pro-environmental attitudes were the strongest predictor of sustainable choices, suggesting that personal values matter more than how nudges are framed or repeated. This highlights the importance of tailoring behavioral interventions to audience characteristics rather than relying solely on structural adjustments to the nudge itself. By highlighting the emotional and contextual dynamics of behavioral design, this study contributes to both theoretical and practical understanding of how organizations can foster sustainable behavior ethically and effectively.

Keywords: Corporate Social Responsibility, Sustainability, Environmental Decision-Making, Nudge Theory, Nudge Characteristics

ÖZET

ORGANİZASYONLARDA SEÇİM MİMARİSİ: NUDGE ÖZELLİKLERİ VE ÇEVRESEL KARAR VERME ÜZERİNE DENEYSEL BİR ARAŞTIRMA

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Tez Danışmanı: Doç. Dr. Ahmet Ekici

Temmuz 2025

Sürdürülebilir dönüşümün zorunlu hale geldiği bir dünyada, çevresel hedeflere ulaşmak yalnızca kurumların belirlediği stratejilere değil, aynı zamanda çalışanların bu hedefleri uygulamaya dönüştürebilmesine de bağlıdır. Bu tez, davranışsal müdahalelerin, özellikle dürtülerin, *nudge*, kurum içi çevresel karar alma süreçlerini nasıl destekleyebileceğini araştırmaktadır. Çalışmada, davranış bilimleri ve kurumsal sosyal sorumluluk literatürlerinden yararlanarak, dürtülerin iki temel özelliği olan şeffaflık ve tekrar sıklığı üzerine odaklanılmaktadır. 228 işletme lisans öğrencisinin katılımıyla gerçekleştirilen 2x2 betimsel deneysel tasarım yoluyla, bu tasarım özelliklerinin işyeri bağlamında sürdürülebilir tercihlere verilen desteği nasıl etkilediği incelenmiştir. Davranışsal sonuçların yanı sıra, algılanan özgürlük tehdidi ve öfke gibi psikolojik mekanizmaların olası aracı rolü de araştırılmıştır. Bulgular, nudge uygulamalarının

evresel karar alma davranışını anlamlı şekilde artırdığını ortaya koymakla birlikte, şeffaflık ve tekrar sıklığı değişkenlerinin bireysel farklılıklar kontrol altına alındığında anlamlı bir etki yaratmadığını göstermektedir. Bunun yerine, çevreye duyarlı tutumlar sürdürülebilir tercihler üzerinde en güçlü belirleyici olarak öne çıkmıştır. Bu durum, davranışsal müdahalelerin yalnızca nudge tasarımına değil, hedef kitlenin özelliklerine göre uyarlanması nın önemini vurgulamaktadır. Bu çalışma, davranışsal tasarımın duygusal ve bağlamsal dinamiklerini öne çıkararak, kurumların sürdürülebilir davranışları hem etik hem de etkili yollarla teşvik etmesine katkı sağlamaktadır.

Anahtar Kelimeler: Kurumsal Sosyal Sorumluluk, Sürdürülebilirlik, Çevresel Karar Alma, Nudge Teorisi, Nudge Özellikleri

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As I bring this thesis to a close, I would like to reflect on the people whose guidance, kindness, and tireless support made it possible.

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picture when I needed it most. Your presence has been my calm in the chaos and my strength in the struggle. You have been the greatest gift on this journey, and I am endlessly grateful that life brought me to you.

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This thesis is more than an academic milestone. It holds a piece of me and stands as a quiet tribute to everyone who shaped, supported, and carried me to this point.

TABLE OF CONTENTS

ABSTRACT	i
ÖZET	iii
ACKNOWLEDGEMENTS	v
CHAPTER I: INTRODUCTION	1
CHAPTER II: LITERATURE REVIEW	8
II.I. Corporate Social Responsibility	9
II.II. Decision-Making	14
II.III. Nudge Theory	18
CHAPTER III: HYPOTHESES DEVELOPMENT	26
III.I. Main Effect of Nudges	27
III.II. Nudge Transparency	28
III.III. Nudge Frequency	32
III.IV. Interaction Effects: Nudge Transparency & Frequency	35
CHAPTER IV: METHODOLOGY	38
IV.I. Vignette Development	39
IV.II. Data Collection	46
IV.III. Data Analysis	48
CHAPTER V: RESULTS	51
V.I. Hypothesis 1	53

V.II. Hypothesis 2.a.	55
V.III. Hypothesis 2.b.	57
V.IV. Hypothesis 3.a.	58
V.V. Hypothesis 3.b.	60
V.VI. Hypothesis 4	61
CHAPTER VI: DISCUSSION	64
VI.I. Theoretical Contributions	66
VI.II. Managerial & Societal Implications	71
VI.III. Limitations & Directions for Future Research	74
CHAPTER VII: REFERENCES	78
CHAPTER VIII: APPENDICES	91
VIII.I. Appendix A: Experimental Design Materials	91
VIII.II. Appendix B: Questionnaire Items	99

LIST OF TABLES

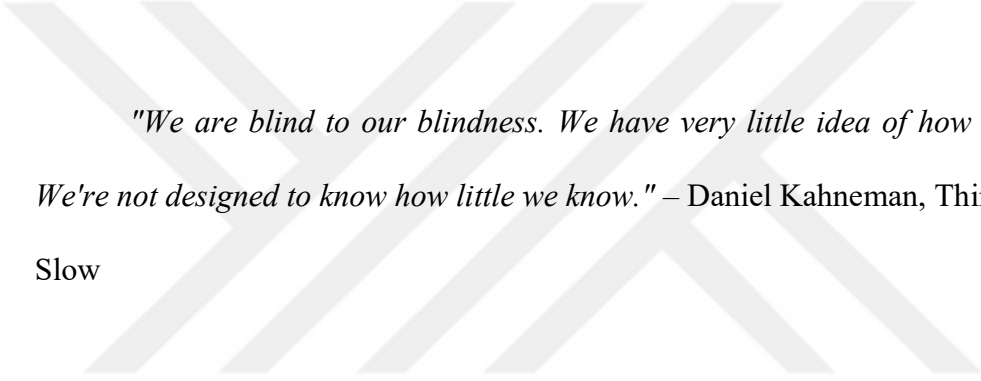
Table 1: Descriptive Statistics of the Pilot Study	42
Table 2: Descriptive Statistics of the Sample	47
Table 3: Descriptive Statistics of the Main Study	53
Table 4: Mann-Whitney U test for Hypothesis 1	54
Table 5: Ordinal Logistic Regression for Hypothesis 1	55
Table 6: Mann-Whitney U test for Hypothesis 2.a.	56
Table 7: Ordinal Logistic Regression for Hypothesis 2.a.	56
Table 8: Mediation Analysis for Hypothesis 2.b.	58
Table 9: Mann-Whitney U test for Hypothesis 3.a.	59
Table 10: Ordinal Logistic Regression for Hypothesis 3.a.	59
Table 11: Mediation Analysis for Hypothesis 3.b.	61
Table 12: Ordinal Logistic Regression for Hypothesis 4	62

LIST OF FIGURES

Figure 1: Research Model	27
Figure 2: Experimental Model	39
Figure 3: Revised Research Model	71

CHAPTER I

INTRODUCTION



"We are blind to our blindness. We have very little idea of how little we know. We're not designed to know how little we know." – Daniel Kahneman, Thinking, Fast and Slow

At the heart of modern decision-making, there lies the challenge of recognizing how profoundly our choices are shaped by forces we neither see nor fully understand. From boardrooms to everyday workplace interactions, our decisions are rarely the product of pure rationality or deliberate reasoning. Instead, they are influenced by cognitive shortcuts, emotional cues and the subtle architecture of the environments in which choices are made (Thaler, 2000; Thaler & Sunstein, 2008). As the urgency of climate change grows, this cognitive vulnerability becomes increasingly consequential, particularly in organizational contexts where decision-makers develop corporate adaptation strategies (Bleda et al., 2023).

While organizations announce bold environmental goals, the actual implementation depends not just on strategy but on the thousands of daily decisions made by employees. Understanding the way these decisions are shaped is not only a

psychological curiosity but also a strategic necessity for embedding sustainability into organizational behavior. This realization calls for a shift in how sustainability interventions are conceptualized, not merely as top-down mandates or incentive-based schemes, but as psychologically developed interventions that work in harmony with how people actually think and decide. Organizations seeking to embed sustainability into their strategies must therefore develop a more refined understanding of how these interventions can align with employees' values and emotional responses, rather than ignoring or overwhelming them. To build this understanding, it is first essential to examine the role of Corporate Social Responsibility (CSR) and its link to individual-level choices within organizations.

While much attention has been paid to corporate strategies, technological investments and regulatory frameworks in promoting sustainability, the micro-level analysis at the individual level remains comparatively underexplored (Aguinis & Glavas, 2012; Aguinis & Glavas, 2019; Gond et al., 2017; Gond & Moser, 2021; Xie & Jain, 2024). However, employees hold significant power in shaping the environmental trajectory of their organizations by deciding on how budgets are allocated, which initiatives receive support and how internal sustainability efforts are communicated. As the individual employee is not only a passive member of organizational strategy but an active decision-maker whose judgments are shaped by bounded rationality, social cues, and emotional context making (Thaler & Sunstein, 2008; Kahneman, 2003), studying this micro-level dynamic is essential to understanding how organizational sustainability can truly be meaningful.

This research applies insights from behavioral science, particularly Nudge Theory, to explore how subtle changes in the choice environment can promote environmental

decision-making in line with Corporate Social Responsibility (CSR). By focusing on individual decision-making within the scope of internal sustainability funding, this thesis integrates both cognitive and motivational perspectives to assess how behavioral design influences environmental choices in organizational environments. Given that CSR goals often rely on the judgment of individual managers and employees, understanding the cognitive foundations of decision-making becomes the next crucial step.

Traditional economic and organizational theories have long assumed that individuals make decisions rationally by carefully weighing costs and benefits (Thaler, 2000). However, a growing body of behavioral research, popularized by works like *Nudge* (Thaler & Sunstein, 2008) and *Thinking, Fast and Slow* (Kahneman, 2011), has demonstrated that this is not always the case. Instead, people often rely on mental shortcuts and heuristics, making them susceptible to framing effects, defaults and contextual nudges (Thaler, 2015; Thaler & Sunstein, 2008; Kahneman, 2011). Nudge Theory suggests that by altering the choice architecture, the way options are presented, organizations and policymakers can lead individuals toward socially desirable outcomes without limiting their freedom of choice (Thaler, 2000; Thaler, 2015; Thaler & Sunstein, 2008; Mukerji & Mannino, 2023).

At its core, the nudging reflects a pragmatic understanding of human psychology. Instead of assuming individuals will always act in their best interest when given full information, it seeks to improve choices by gently guiding attention, simplifying decision processes, and structuring options in behaviorally informed ways (Thaler & Sunstein, 2008). This is particularly valuable in sustainability, where pro-environmental actions often require small behavioral shifts that accumulate over time, rather than one-time high-stakes decisions. As environmental change often depends on cumulative, everyday

behaviors rather than dramatic one-time decisions, interventions that integrate seamlessly into routine actions are more likely to be effective in the long run. Furthermore, nudges can help overcome psychological barriers such as inertia, present bias, or decision fatigue, which frequently prevent individuals from acting on their pro-environmental intentions even when they possess the necessary knowledge and motivation.

Although this alignment between behavioral insights and sustainability challenges positions nudging as a promising tool for advancing environmental decisions, its application in organizations is underexplored. While nudging has been successfully applied in behavioral economics or public policy (Johnson & Goldstein, 2003; Thaler & Benartzi, 2004), its application within organizational contexts, especially to foster pro-environmental behavior, is still emerging. Even where it is applied, attention tends to gravitate toward macro-level CSR outcomes (Aguinis & Glavas, 2012; Aguinis & Glavas, 2019; Gond et al., 2017; Gond & Moser, 2021; Xie & Jain, 2024) rather than examining how nudges influence decisions made by individuals (Cahenzli et al., 2022; Pinel et al., 2024). This research aims to address this gap by focusing on the psychological effects of two key nudge characteristics, transparency and frequency, on environmental decision-making regarding sustainability investments within the company. Specifically, it explores how variations in how often and how openly a nudge is presented can affect budget allocations toward energy conservation initiatives in the workplace.

These design features, transparency and frequency, are not merely technical elements but fundamental parts of nudges that shape how individuals interpret and emotionally respond to behavioral interventions. A transparent nudge may preserve ethical integrity by informing individuals, but it might also raise awareness of manipulation (Paunov et al., 2019). Similarly, a frequent nudge may enhance salience, or

conversely, induce annoyance or fatigue. This duality makes these variables especially worthy of investigation. Consequently, this research also incorporates perceived threat and anger as psychological responses to nudge design. These affective reactions, often overlooked in behavioral science, may serve as critical mediators that explain when and why nudges work or fail.

The idea for this research emerges from recent literature that acknowledges the ethical and psychological tensions surrounding nudges. While some argue that making nudges transparent preserves autonomy and builds trust (Smith et al., 2013; Paunov et al., 2019), others suggest that transparency can backfire by triggering psychological reactance as a defensive response to perceived manipulation (Brehm, 1966; Dillard & Shen, 2005). Similarly, frequent nudging may reinforce desired behaviors by increasing salience (Lindenberg & Papies, 2019), but it can also result in fatigue, irritation, and disengagement, especially in organizational settings where the cognitive load is already high (Damgaard & Gravert, 2018). These competing perspectives underline the need for empirical investigation into how such factors interact in practice. Building on these insights, the present study seeks to answer the following research question: *How do nudge characteristics, particularly transparency and frequency, affect environmental decision-making in organizations?* By situating this inquiry within the context of internal energy conservation investments, which is a realistic and increasingly relevant concern for modern businesses (Allcott & Mullainathan, 2010; Allcott & Rogers, 2014), the research explores not just the behavioral outcomes of nudging but also its psychological side effects.

Therefore, this study moves beyond the simple question of whether nudges work. Instead, it investigates how contextual and psychological factors mediate their

effectiveness by offering a more subtle understanding of behavioral interventions. Rather than treating nudging as a universally effective tool, the research explores under *what* conditions and for *whom* these interventions succeed, backfire, or become neutral. This approach acknowledges that individual attitudes, emotional reactions, and environmental cues interact in complex ways to shape decision outcomes. By examining variables like transparency and frequency alongside emotional responses such as anger and perceived threat, the study identifies not just behavioral effects but also psychological mechanisms that underlie them. It also aims to address a broader academic call for a nuanced nudge research that critically examines the mechanisms, boundaries, and ethical boundaries of behavioral design in organizational settings.

The potential contributions of this research are threefold: First, it aims to extend the application of Nudge Theory to the under-researched domain of organizational behavior, particularly decision-making in sustainability. Although much of the existing research has centered on public policy or consumer behavior, few studies address how behavioral interventions perform in the internal operations of companies (Gajewski et al., 2022; Mukerji & Mannino, 2023). Second, the study intends to enrich the ongoing academic debate on nudge transparency, offering new evidence on whether disclosing the mechanism and intent behind nudges diminishes or enhances their effectiveness. As the recent literature calls for more nuanced, ethically grounded experimentation in this area (Bruns et al., 2018; Michaelsen, 2024), the thesis responds to this call. Third, by incorporating nudge transparency and frequency as independent variables, the research intends to contribute to emerging discussions about the potential psychological costs of nudging, such as reactance, annoyance costs or nudge fatigue (Damgaard & Gravert, 2018; Nowak et al., 2024). These effects are rarely studied directly in experimental

studies, especially in organizational contexts, making this work methodologically distinctive. Ultimately, the thesis seeks to offer not only empirical evidence but also conceptual clarity about what it means to design sustainable decisions that are both effective and respectful of individual autonomy.

The remainder of this study will first review the theoretical foundations of Corporate Social Responsibility, Nudge Theory and related research on environmental decision-making, focusing specifically on the psychological mechanisms of reactance, autonomy and salience. It will also situate the research within the broader literature on organizational decision-making by outlining the research model that guided the development of the research question and defined the operational variables of interest. Methodological choices detailing the design of the experiment and collection of the data will be discussed in Chapter Four. This chapter will also elaborate on the research's 2x2 between-subjects design, the resulting four experimental conditions, their vignette development and measurement scales used to assess both behavioral and psychological outcomes. Chapter Five will report the results from the experimental data, including both descriptive and inferential statistics. Then, findings in relation to existing literature by elaborating on theoretical implications, practical applications and limitations will be discussed. Lastly, Chapter Six will conclude the thesis with a summary of contributions, a reflection on methodological constraints and suggestions for future research in behavioral sustainability within organizations.

CHAPTER II

LITERATURE REVIEW

The three pillars that corporate social responsibility is built on, environmental, economic and social, often pull in competing directions rather than resting in harmony. For employees tasked with translating ideals into action, these tensions do not merely complicate decision-making; they also demand constant trade-offs, where gains in one area may come at the cost of another. As a result, decision-makers face the complexities of balancing long-term sustainability goals with short-term financial outcomes (Cahenzli et al., 2022), which highlights how significant it is to conduct an investigation at the individual level.

While CSR has mainly been studied from a broad perspective, the interest in micro-level analysis, particularly regarding how individual decision-making influences sustainable outcomes, is relatively recent (Gond & Moser, 2021; Xie & Jain, 2024). There remains a gap in the literature regarding how decision-making processes at the individual level can shape pro-environmental behaviors in organizational contexts. Nudge Theory, which draws on research in cognitive psychology (Kahneman, 2003; Kahneman, 2011; Thaler & Sunstein, 2008), offers a promising yet relatively underexplored framework for influencing individual behavior within organizations despite its widespread use in

behavioral economics and public policy. Therefore, this research aims to bridge this gap by examining how nudge characteristics, particularly transparency and frequency, impact environmental decision-making at the individual level, building on the literature concerning the micro-foundations of corporate social responsibility.

II.I. Corporate Social Responsibility

Corporate social responsibility (CSR) is an academic concept within the management literature, defined as "context-specific organizational actions and policies that take into account stakeholders' expectations and the triple bottom line of economic, social and environmental performance" (Aguinis, 2011, p. 858). The concept has evolved significantly over the last century. Early debates, such as the Berle-Dodd exchange in the 1930s, questioned whether managers must serve only shareholders or also broader societal interests (Berle, 1931; Dodd, 1932). Later, Friedman's (1970) classical view asserted that the only social responsibility of business is to increase profits for shareholders. In contrast, Stakeholder Theory emerged (Freeman, 1984) by arguing that corporations should create value for all stakeholders, not just shareholders. Carroll's (1991) influential Pyramid of CSR shaped a hierarchy of responsibilities like economic, legal, ethical and philanthropic, implying that businesses must be profitable while obeying laws and acting ethically and benevolently.

The academic discourse, on the other hand, distinguished normative CSR as an ethical duty to do the right thing from instrumental CSR as a means to financial ends. Scholars have called for integrating these perspectives: Donaldson and Preston (1995) critiqued the three aspects of Stakeholder Theory: descriptive accuracy, instrumental power and normative validity, which have advanced within the management literature

through the years. They suggested integrating these aspects of the theory as the normative commitment to stakeholders builds long-term success (Donaldson & Preston, 1995). Swanson (1995) urged infusing moral values into corporate performance models to reframe principles of CSR, corporate responsiveness and outcomes of corporate behavior. Jones and Wicks (1999) likewise proposed the Convergent Stakeholder Theory, bridging ethical and business cases for corporate social responsibility to demonstrate how managers can create morally sound approaches to business. Over time, CSR has shifted from voluntary philanthropy to a strategic imperative, now viewed as aligning *doing good* with *doing well* (Aguinis & Glavas, 2012; Margolis & Walsh, 2003).

This evolution has also reflected on the practical side of management and brought modern CSR to rest on the idea that companies can both fulfill ethical obligations and enhance sustainable performance by actively managing their impact on people and the planet alongside profits. Within organizations, CSR has become deeply embedded in corporate strategy rather than remaining just a charitable endeavor. Many firms now integrate CSR into their core mission, responding to both normative pressures and business incentives. In fact, by 2009, 93% of S&P 100 companies were reporting CSR activities, reflecting the mainstreaming of sustainability into corporate practice as they pursue CSR for multiple reasons: to comply with legal standards, meet stakeholder expectations, mitigate risks and build competitive advantage through reputation and trust (Glavas & Kelley, 2014). Today, CSR reporting has become nearly universal among large public companies. As of 2022, 98% of S&P 500 firms disclosed ESG-related information, including climate, social, and governance metrics, demonstrating that sustainability has firmly entered mainstream corporate practice (Center for Audit Quality, 2024). This level of transparency reflects not only efforts to comply with legal standards and meet

stakeholder expectations but also strategic moves to mitigate risk, build competitive advantage, and enhance organizational trust.

There are different reasons behind why CSR adoption has gained such popularity: some companies embrace CSR as a normative organizational value by incorporating ethical principles with a desire to do the right thing, while others take a more instrumental approach by viewing CSR as a strategic investment to enhance corporate image, brand loyalty and financial performance. Notably, researchers have generally found a small but positive relationship between corporate social performance and financial outcomes (Margolis & Walsh, 2003; Peloza, 2009), reinforcing the idea that doing good can pay off. As a result, companies increasingly utilize frameworks like the *triple bottom line*, mentioned as environmental, economic and social pillars back in this chapter, to measure success across social and environmental dimensions, alongside economic gains (Elkington, 1997).

In recent years, companies have also implemented formal CSR programs, sustainability reports and stakeholder engagement processes to institutionalize these commitments. Aguinis and Glavas (2013) differentiate embedded CSR, woven into a firm's strategy, routines and culture, from peripheral CSR, one-off programs or philanthropy different from core operations. An embedded CSR approach creates shared value by aligning social initiatives with a company's unique competencies and objectives (Aguinis & Glavas, 2013). Firms with integrated CSR actually often exhibit more coherence between their values and practices, avoiding the pitfall of greenwashing and instead making social responsibility an intrinsic part of how they do business. Consequently, today's organizations are developing better ways to assess and manage CSR outcomes, modern corporate social performance metrics and sustainability indices

help track impacts on stakeholders and society (Wood, 2010).

The aforementioned evolution of CSR can also be observed in individual-level practices. Empirical research has revealed that when leaders authentically commit to sustainability, it can enhance employees' sense of organizational justice and pride, leading to beneficial attitudes and behaviors (Rupp & Mallory, 2015). Embedding CSR into a company's core values and daily operations has also been found to improve employees' engagement, job satisfaction and organizational commitment by enabling them to find greater meaning in their work (Aguinis & Glavas, 2013; Aguinis & Glavas, 2019; Glavas & Kelley, 2014). Studies have also confirmed that employees view genuine CSR as a signal that their organization cares about more than just profit, which boosts morale and loyalty (Glavas & Kelley, 2014; Rupp & Mallory, 2015). Moreover, managers increasingly realize that socially responsible decisions can yield long-term payoffs such as talent attraction, risk reduction and brand value (Aguinis & Glavas, 2012).

In essence, CSR ultimately depends on decision-making and the pro-environmental behaviors of employees within the company. Decisions spanning corporate social responsibility involve bridging normative and instrumental logic at the individual level, doing what is right for stakeholders in a way that also advances the organization's objectives. However, deciding on how much emphasis to place on social and environmental goals relative to financial targets presents tensions between shareholder primacy and stakeholder accountability. This dilemma was foreshadowed by Goodpaster (1991), who introduced the *stakeholder paradox*, in which a purely strategic focus to treat stakeholders only as a means to shareholder ends can yield business without ethics. Whereas an overly idealistic approach by treating all stakeholders as ends in themselves can risk ethics without business (Goodpaster, 1991). This paradox is particularly relevant

to modern organizations, as it highlights the inherent tension employees may face when making sustainability decisions that require significant trade-offs between environmental and economic outcomes.

These ethical tensions remain central to contemporary management literature, as recent studies support that organizations must constantly navigate competing pressures to fulfill both financial and moral obligations (Camilleri, 2022). Moreover, the stakeholder paradox continues to frame the dilemma of treating stakeholders as either means or ends, underscoring the relevance of ethical theory in decision-making (Jensen, 2002). As a result, environmental decision-making requires managers to integrate ethical considerations into managerial decisions without abandoning pragmatic business goals. In support of this, Girschik et al. (2020) argue for a micro-level CSR perspective that emphasizes individual agency and moral engagement in confronting organizational norms, suggesting that decision-making in CSR is as much about personal commitment as it is about strategic alignment.

Although CSR and decision-making have often been examined in isolation, one as a normative expectation for firms and the other as a functional process driven by strategy and cognition, these domains are intimately linked in reality. As CSR has evolved into a strategic and operational imperative that extends beyond formal statements, it has become more embedded in practices that shape how organizations engage with stakeholders and pursue sustainability (Carroll, 1991; Aguinis & Glavas, 2012; Aguinis & Glavas, 2019). However, as discussed, the effectiveness of CSR does not depend solely on macro-level factors. Rather, it also depends on the everyday choices made by individuals, decisions shaped by cognitive limits, competing demands and personal values (Rupp & Mallory, 2015; Glavas & Kelley, 2014). As decision-making is not a purely rational process but

one bounded by these factors, such cognitive patterns can significantly influence how decision-makers interpret and act on CSR.

Ultimately, as CSR becomes more embedded in corporate strategy and daily operations, the environmental dimension of sustainability becomes more significant. Organizations today face not only moral and reputational objectives but also strategic pressures to minimize their environmental impact. However, achieving these goals is not solely linked to policies or structures but to how individual decision-makers navigate complex trade-offs between environmental responsibility and organizational performance. By drawing this connection, the discussion guides the way for examining the details of environmental decision-making and how it can be improved by behavioral interventions like nudging to support better sustainability-related decisions in organizational contexts.

II.II. Decision-Making

Decision-makers have long been assumed to follow rational decision models, objectively evaluating alternatives to maximize utility (Bazerman & Moore, 2012). In reality, however, managerial decisions often deviate from this ideal as humans are not *homo economicus* but *homo sapiens*. Simon's (1955) concept of bounded rationality argued that decision-makers face cognitive and information limitations and thus settle for choosing good enough options rather than optimally maximizing. Subsequent work in psychology and behavioral economics (e.g., Kahneman, 2003; Tversky & Kahneman, 1974) demonstrated that individuals rely on heuristics, mental shortcuts, that simplify complex decisions but also introduce systematic biases, supporting the idea that organizational decisions are influenced not only by analysis but also by these human

cognitive constraints. As argued in the previous section, these decisions typically involve multiple criteria and competing goals, forcing trade-offs between short-term and long-term objectives or between economic and ethical outcomes (Cahenzli et al., 2022; Crilly et al., 2012). Real-world decision environments are dynamic and uncertain, which further encourages reliance on intuition. As a result, cognitive biases intervene in the process and subtly undermine fully rational deliberation. Recognizing these challenges helps to examine how biases distort managerial judgments and how targeted interventions improve decision-making.

In recent years, the concept of bounded rationality has undergone renewed analysis in light of increasingly complex organizational contexts. Traditional models such as *procedural rationality* emphasize strict logical consistency and optimality, while *ecological rationality* accepts heuristics as adaptive tools suited for specific environments (Gigerenzer & Gaissmaier, 2011). However, both views are increasingly seen as limited in their ability to explain decision-making in complex, risky, and uncertain domains such as sustainability or climate action. Under such conditions, even heuristics may become ineffective or paralyzing, leading to a growing recognition of the role of motivational forces in shaping decisions. Kurdoglu et al. (2022) advance this discussion by introducing the notion of *motivational rationality*, which evaluates reasoning not by its logical structure or adaptiveness alone, but by its intent, whether it seeks to engage with reality or merely serve hedonic or defensive goals. They argue that in contexts of extreme uncertainty, decisions often appear irrational because emotional or identity-based motivations drive them. However, such actions may still be functionally valuable if they help decision-makers overcome inertia or fear and initiate action. This reframing suggests that so-called irrational behavior may be instrumental for problem-solving, especially

when traditional tools of logic or heuristics fall short. Consequently, the study of bounded rationality must be complemented by an examination of systematic cognitive biases that shape how managers perceive and respond to sustainability challenges in everyday decision-making.

Cognitive biases are systematic deviations from rational judgment that arise from the use of heuristics (Haselton et al., 2005). These biases lead managers to interpret information and options in skewed ways rather than objectively (Kahneman, 2003; Tversky & Kahneman, 1974). In the context of sustainability CSR, biases can cause decision-makers to undervalue long-term benefits, downplay ethical considerations, or favor familiar strategies even when change is needed. Overconfidence bias, for instance, refers to the tendency to be more confident in one's own knowledge and abilities than is warranted (Moore & Healy, 2008). Overconfident managers may underestimate risks or overrate the quality of their plans, potentially overlooking sustainability concerns. Anchoring is another common bias where individuals fixate on initial information and insufficiently adjust when making judgments (Tversky & Kahneman, 1974). For instance, a manager might stick to an initial budget or performance target, making them reluctant to approve a sustainability project if its projected returns seem low relative to that anchor. Status quo bias is the preference for the current state of affairs, leading to resistance to change (Samuelson & Zeckhauser, 1988). This bias can incline managers to continue business-as-usual practices and avoid innovative sustainability initiatives because any deviation from the status quo feels uncomfortable or risky. Lastly, loss aversion is the tendency to strongly prefer avoiding losses over acquiring equivalent gains (Kahneman & Tversky, 1979). Managers influenced by loss aversion focus on the short-term costs of implementing sustainable practices more than the long-term gains, making them hesitant

to invest in green projects due to fear of immediate financial losses.

Studies have shown that such biases frequently hinder pro-environmental and ethical decisions. Bazerman and Tenbrunsel (2011) investigated the ways managers overestimate their ability to do the right thing and how they act unethically without meaning to by putting emphasis on the nature of ethical failures in the business world and illustrating how managers can become more ethical, bridging the gap between who they are and who they want to be. Recent studies continue to validate this idea as Botzen et al. (2025) found that biases such as loss aversion and optimism bias significantly impair climate-related decisions across domains like investment, risk management, and strategic planning. Cognitive biases can also lead to managerial inertia in addressing climate change (Gifford, 2011) by preventing managers from perceiving issues like climate change as sufficiently urgent or moral, consequently delaying proactive action (Weber, 2006). This inertia is reinforced by moral disengagement and limited moral salience, which remain key psychological barriers to climate action in organizations (Palmucci & Ferraris, 2023). Additionally, empirical research has shown how different biases like availability heuristic, framing, and anchoring significantly shape the decision-making processes in business adaptation to climate change (Bleda & Pinkse, 2023). Acknowledging these cognitive pitfalls is crucial for improving sustainability-related decision-making.

Applying classical decision models in organizations also highlights the deeper tension between economic and ethical imperatives. A purely profit-driven approach can result in business without ethics, whereas an overly idealistic focus on stakeholders can yield ethics without business (Goodpaster, 1991). Effective decision-making thus requires integrating ethical considerations into managerial decisions without abandoning

pragmatic business goals (Donaldson & Preston, 1995). Therefore, environmental decision-making means balancing instrumental logic, shareholder value, with normative logic, obligations to stakeholders and society (Jones & Wicks, 1999). However, the biases discussed earlier continue to distort these well-intentioned decisions. Managers attempting to balance profit and purpose may still follow status quo bias or short-term loss aversion, guiding choices toward immediate gains at the expense of sustainability (Botzen et al., 2025). These persistent biases underscore the need for interventions that do not rely solely on rational persuasion or financial incentives. To counteract such tendencies, scholars have increasingly turned to behavioral interventions as promising tools for improving decision quality (Houedek, 2024; Amiri et al., 2024). By subtly altering how choices are presented, rather than imposing mandates or large incentives, nudges can address predictable cognitive distortions and gently steer individuals toward more sustainable and responsible choices while preserving freedom of choice (Thaler & Sunstein, 2008).

II.III. Nudge Theory

One of the domains within the behavioral interventions to decision-making is Nudge Theory, introduced by Thaler and Sunstein (2008), which proposes that carefully designed changes to the decision environment can influence the behavior and decision-making of groups or individuals without restricting freedom of choice. Nudges function as subtle prompts that encourage individuals to make particular choices by altering their environments rather than through direct rewards or penalties (Thaler & Sunstein, 2008). They modify the choice architecture to produce a predictable change in decisions to the benefit of the decision-maker by focusing on heuristic reasoning and intuitive processes

that guide decision-making (Gajewski et al., 2022). By recognizing and adapting to common cognitive biases, nudges can offer an alternative to traditional incentives and regulations that assume perfectly rational decision-making (Thaler, 2000). Rather than assuming perfectly rational actors, this approach acknowledges that people are flawed decision-makers who exhibit a systematic deviation from rationality, which suggests how behavioral change is possible by altering the choice architectures within which people make decisions (Thaler, 2000).

In recent years, nudging has gathered much attention from both scientists and policymakers, emerging as a powerful tool for shaping individual behavior in socially desirable directions. It is regarded as an efficient and promising method of promoting desirable choices since it offers a salient methodological alternative to traditional incentives, the primary tool of order ethics (OE) (Mukerji & Mannino, 2023). Unlike direct financial rewards or regulatory constraints, nudges work by subtly altering the decision-making context to guide choices while preserving individual autonomy, making them especially appealing in contexts where behavioral change is needed without pressure (Thaler, 2000; Thaler, 2015).

In practice, nudges are subtle prompts or changes in framing that encourage particular decisions. Common examples include setting defaults (e.g., automatic enrollment in green energy plans), changing option order, framing messages to emphasize gains or losses, or providing social norm feedback (Thaler & Sunstein, 2008; Sunstein, 2014). For instance, individuals are more likely to donate organs when opt-out policies are used rather than opt-in (Johnson & Goldstein, 2003). Similarly, feedback comparing household electricity usage to that of neighbors has been shown to reduce consumption (Allcott, 2011). These interventions exploit tendencies like inertia, anchoring, or social

conformity without resorting to mandates or financial penalties. Such empirical studies show that well-crafted nudges can improve outcomes like energy conservation and ethical compliance without resorting to strict regulations (Sunstein, 2014).

Nudges have also gained interest as a means of promoting environmental decision-making, such as environmentally responsible actions in organizational settings. As sustainability goals become more integrated into corporate strategies, the ability to influence employee behavior in alignment with those goals becomes increasingly valuable. By adjusting the choice architecture to support pro-environmental behaviors, organizations can more effectively align individual actions with broader social and environmental objectives (Wee et al., 2021). For instance, automatically enrolling a business unit in a green energy program with an option to opt out leverages status quo bias to promote sustainability. Similarly, placing a sustainable product at eye level or providing feedback comparing a manager's resource use to that of peers are also nudges as they guide behavior by exploiting cognitive tendencies rather than through direct commands. By doing so, nudges can enhance participation in initiatives that have societal and environmental benefits by serving not only as behavioral tools but also as mechanisms that bridge the gap between organizational policies and managerial engagement (Huang et al., 2023)

Over the past decade, nudges have gained traction in public policy domains such as health, finance, education, and environmental conservation. Governments and institutions have adopted behavioral insights units to test and apply nudges in a variety of settings. Within the realm of sustainability, nudges have been used to promote energy efficiency (Carroll et al., 2014), water conservation (Bernedo et al., 2014), towel reuse in hotels (Goldstein et al., 2008), or waste reduction through better signage and default

settings in cafeterias (Kurz et al., 2014). These applications demonstrate the versatility of nudges in promoting pro-environmental behavior with minimal disruption. Despite this growing body of research, the application of nudges in organizational contexts remains underexplored. Most nudging interventions have targeted consumers or citizens, while internal corporate settings and managerial roles present different dynamics, constraints, and ethical considerations.

A deeper understanding of nudges begins with how they are classified. Although Thaler and Sunstein's original formulation (2008) sparked widespread interest in subtle behaviorally-informed interventions, later contributions have refined the concept by introducing typologies that categorize nudges based on their mechanism of influence. One of the most comprehensive efforts in this regard is Münscher et al.'s (2015) taxonomy, which distinguishes between interventions that modify the decision information, decision structure, or decision assistance. For example, making environmental information more salient (e.g., real-time energy displays) falls under making information visible, while setting a green option as the default represents a structural change. In contrast, sending periodic reminders to reduce energy use would be considered a form of decision assistance. This framework is valuable for this research as it shows that nudges vary not just in content or goal, but in how they exert their influence, whether by changing perceptions, simplifying the task environment, or facilitating self-control.

These distinctions are not only academic; they also have practical consequences for evaluating the effectiveness and appropriateness of nudges in environmental behavior. For instance, Szaszi et al. (2018) have revealed that default nudges and visibility-enhancing interventions were among the most commonly studied and most effective in pro-environmental contexts. However, the review also highlighted a major limitation of

the literature: while most studies examined whether a nudge worked, very few explored why it worked or for whom it might backfire. Moderators like psychological reactance, personal values, or perceived manipulation were rarely tested (Szasz et al., 2018). The lack of attention to underlying mechanisms and the near absence of transparency-related manipulations has left important ethical and practical questions unanswered.

Building on this, Johnson et al. (2012) emphasize that nudges are never neutral. Every intervention involves trade-offs between clarity, complexity, autonomy, and persuasion. Their framework categorizes tools of choice architecture as either structuring the task (e.g., defaults, attribute partitioning) or describing the options (e.g., framing, evaluability). This highlights that the same behavioral goal, like reducing energy consumption, can be approached via different routes. A nudge can be silent and automatic, or overt and educative. Importantly, Johnson et al. (2012) warns researchers that audience characteristics like ideology, motivation, or numeracy can strongly influence nudge outcomes. A strategy that works for one group may backfire in another. These observations reinforce the need to examine how features like transparency and frequency modulate receptivity to nudges, particularly in diverse organizational contexts where decision-makers may be more skeptical of behavioral influence.

Taken together, these taxonomies and reviews provide both a foundation and a rationale for focusing on not only the nudges themselves but also their characteristics. From a classification standpoint, transparency is not a nudge technique, but rather a design attribute that can vary across nearly all types of nudges, whether informational, structural, or assistive. Frequency is also an attribute of delivery, relevant particularly to reminders and repeated cues. However, both dimensions are underexplored in empirical work, despite being central to debates about nudge ethics and effectiveness. As Szasz et al.

(2018) highlight, most studies fail to report whether nudges were transparent or how often they were deployed, despite these variables being able to shape participants' emotional responses, perceived autonomy, and long-term engagement. Addressing these gaps is critical for understanding the boundary conditions under which nudges succeed or fail, particularly in the more complex and strategic settings of organizational decision-making.

Within the context of this study, two attributes of nudges are especially significant: transparency and frequency. While the effectiveness of nudges has been widely demonstrated, emerging ethical concerns and behavioral nuances suggest that not all nudges are equally received (Damgaard & Gravert, 2018). Transparency, in particular, has sparked considerable debate as some scholars argue that individuals should be made aware of influence attempts in order to preserve autonomy and informed choice (Smith et al., 2013). On the other hand, some scholars claim that such awareness may undermine a nudge's effectiveness by triggering psychological resistance since once people become aware of an attempt to influence their choices, they may actively counteract the intervention by engaging in behaviors that are inconsistent with its purpose (Bovens, 2009). It is famously argued that nudges work better in the dark and risk becoming ineffective when transparency is introduced (Paunov et al., 2019). Although these claims were not empirically tested much, they are consistent with Reactance Theory (Brehm, 1966) and Self-determination Theory (Deci, 1975; Ryan & Deci, 2000), both of which suggest that individuals may resist perceived threats to their freedom and autonomy by deliberately rejecting influence attempts.

Similarly, although repetition is often used to increase salience, excessive frequency may lead to annoyance or reactance, thereby reducing compliance or even provoking counterproductive behaviors (Damgaard & Gravert, 2015). Despite the

conceptual and practical relevance of both transparency and frequency, their effects remain underexplored in the organizational behavior literature, especially in relation to sustainability-related decisions. By examining these two nudge attributes, this study aims to provide a more nuanced understanding of how behavioral interventions can be responsibly and effectively implemented in organizational settings to promote pro-environmental behavior. The fine line between helpful reminders and perceived pressure becomes especially relevant in organizational environments where cognitive load is already high.

This study builds on these insights by investigating how transparency and frequency influence environmental decision-making within organizations. Specifically, it applies information nudges, as they are behavioral interventions designed to guide individuals toward more sustainable choices by making relevant information more visible and actionable without restricting freedom of choice. These nudges used in sustainability literature typically include personalized feedback, usage data and energy-saving tips that lower the cognitive and informational barriers to action (Ruokamo et al., 2022). By improving awareness of environmental behaviors and offering simple, actionable guidance, they aim to correct sub-optimal behaviors stemming from a lack of knowledge or salience (Ruokamo et al., 2022). Empirical evidence from randomized field experiments shows that information nudging can induce changes in energy consumption behavior, but there is an apparent variation in the magnitude of the estimated effects between different studies (Carroll et al., 2014).

By adapting information nudges to organizational context, this study aims to contribute to the literature on environmental decision-making by informing how behavioral interventions can be designed to support sustainability in workplace settings.

Research has shown that nudges can enhance the salience of sustainable options and subtly redirect decision-making without limiting freedom of choice. In organizational settings, such interventions may be particularly effective where sustainability goals compete with economic performance pressures. By addressing cognitive limitations like loss aversion or status quo bias, nudges can help decision-makers recognize the long-term value of environmentally responsible choices. Studies in both public and private domains have demonstrated that pro-environmental nudges such as feedback on energy use, green default settings, and visual prompts can significantly increase sustainable behavior.

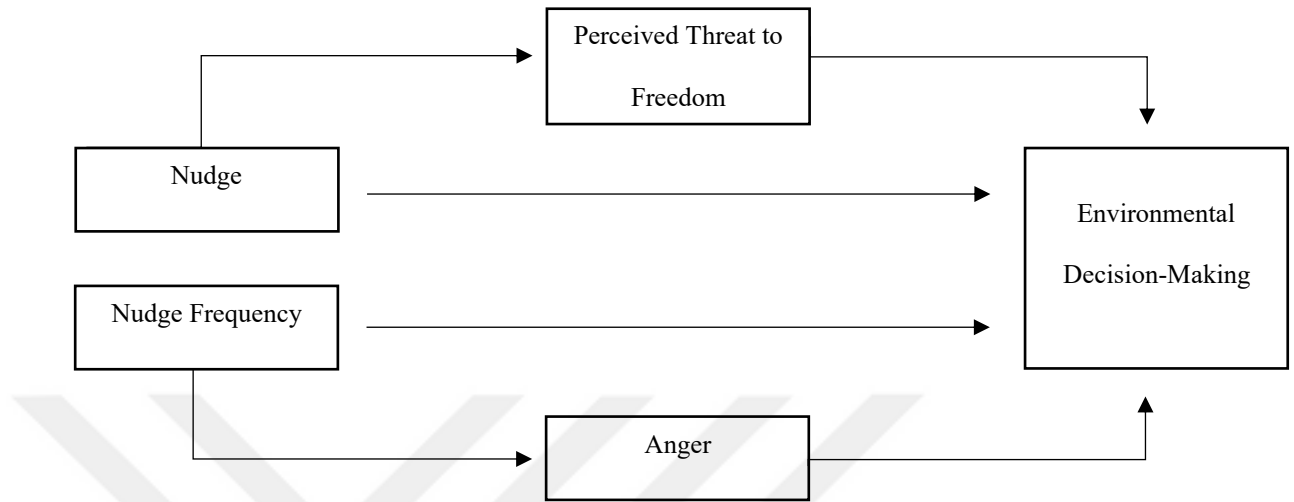
CHAPTER III

HYPOTHESES DEVELOPMENT

Building on the theoretical foundations outlined in the literature review, this chapter develops the hypotheses that guide the empirical investigation of this study. While prior research has demonstrated the effectiveness of nudges in promoting pro-environmental behavior, especially in public policy and consumer contexts, less is known about how such interventions operate within organizations, where cognitive demands, ethical concerns, and value-based trade-offs are more complex.

This chapter focuses specifically on two underexplored yet behaviorally and ethically relevant attributes of nudges: transparency and frequency. Drawing from the typologies and reviews presented before, it develops hypotheses regarding how these attributes affect individual-level environmental decisions. In addition, the chapter introduces perceived threat to freedom and anger as psychological mechanisms that may help explain the impact of transparency and frequency, especially in contexts where behavioral influence may be seen as intrusive or controlling. The research model that guides this section can be seen below:

Figure 1: Research Model



III.I. Main Effect of Nudges

As discussed previously, nudging has emerged as a promising behavioral intervention tool that can influence decision-making without restricting freedom of choice. Rooted in insights from behavioral economics and cognitive psychology, nudges address the bounded rationality and cognitive biases that often hinder optimal decision-making (Thaler & Sunstein, 2008; Kahneman, 2003). In organizational settings, where managers frequently face trade-offs on competing goals and operate under cognitive load, such interventions can be particularly useful in promoting sustainability without adding substantial decision-making load. Unlike traditional incentives or regulations, nudges offer a low-cost, scalable way to guide behavior toward socially beneficial outcomes, including pro-environmental actions (Thaler, 2000; Mukerji & Mannino, 2023).

Several studies have already demonstrated the practical effectiveness of nudges in shaping environmentally responsible behavior. For example, setting green defaults (Johnson & Goldstein, 2003), providing normative feedback (Allcott, 2011), or using simple message framing (Sunstein, 2014) have all been shown to lead individuals toward

more sustainable choices in both private and public domains. These findings are particularly relevant to internal corporate settings, where behavioral alignment with sustainability goals is often a matter of managerial choice.

Moreover, nudges are especially relevant for counteracting well-documented cognitive biases like loss aversion, status quo bias, and limited moral salience, which frequently lead managers to deprioritize long-term environmental outcomes in favor of short-term business objectives (Gifford, 2011; Palmucci & Ferraris, 2023). By subtly reshaping how decisions are presented, without requiring major shifts in organizational structure or personal motivation, nudges can bridge the gap between sustainability policy and individual action (Thaler & Sunstein, 2008; Huang et al., 2023). Given this evidence, it is reasonable to expect that managers exposed to nudges will be more likely to favor sustainable choices, leading to the first hypothesis of the study:

Hypothesis 1: Managers who are exposed to nudges will show stronger support for environmentally favorable decisions than those who are not exposed to nudges.

III.II. Nudge Transparency

Behavioral interventions have been effective in promoting pro-environmental behavior in a wide range of settings, including organ donation (Johnson & Goldstein, 2003), retirement savings (Thaler & Benartzi, 2004) and energy conservation decisions (Allcott & Mullainathan, 2010). However, the implementation of nudges has also raised concerns about whether they restrict freedom of choice (Paunov et al., 2019). Some research discussed that these interventions limit autonomy and people's ability to exercise informed choice (Smith et al., 2013), since the target of the nudge is unaware of the influence attempt that brings about behavioral change (Hansen & Jespersen, 2013). On

top of these arguments, it is confirmed that individuals view default nudges less favorably and perceive them as more autonomy-threatening than other types of nudges (Jung & Mellers, 2016). Therefore, ethical discussions call for transparency in behavioral interventions (Paunov et al., 2019). This has prompted a critical shift in the literature from whether nudges work, to how they can be implemented in ways that uphold ethical standards while maintaining effectiveness.

However, some research has also expressed concerns that inducing transparency may reduce the effectiveness of nudges (Paunov et al., 2019). Wood and Quinn (2003) demonstrated that being foretold about an upcoming attitude influence can make people maintain their attitudes as a form of a defensive response. Accordingly, such a defensive reaction may produce retaliation against a pre-determined choice architecture, causing a backfiring effect (Paunov et al., 2019). Supporting this perspective, Krijnen et al. (2017) and Bovens (2009) revealed some evidence that once an influence attempt is disclosed or individuals become aware that there is an attempt to control their choice, they can counteract it by engaging in behaviors that are inconsistent with the promoted course and purpose of the action (Paunov et al., 2019). Thus, claims that nontransparent nudges work better in the dark (Bovens, 2009) become remarkable, as reactance (Brehm, 1966) and Self-determination Theory (Deci, 1975; Ryan & Deci, 2000) provide robust predictions, linking resistance to the sheer presence of an influence attempt. This raises the paradoxical possibility that increased transparency, while ethically desirable, might hinder the very outcomes nudges are intended to achieve.

Social influence like nudges may be perceived as a *threat to freedom of choice* (Brehm, 1966), resulting in behavioral and cognitive efforts to reestablish freedom as well as uncomfortable, hostile, aggressive and angry feelings with an aroused state of

psychological reactance (Dillard & Shen, 2005). Consequently, by deviating from the preferred behavior, individuals may try to restore their freedom by exhibiting exactly the restricted behavior (Bruns et al., 2018). Moreover, their liking for the restricted freedom and counter-arguing against the imposed option may increase (Brehm, 1966; Dillard & Shen, 2005), since such a manner is not only too evident and direct but also too subtle and subliminal (Chartrand et al., 2007). Thus, while there is supporting evidence suggesting that transparent nudges can be effective, some research highlights potential issues with psychological reactance, indicating that the empirical findings on transparency are mixed. This divergence in findings underscores the need for more nuanced research on how different forms of transparency are perceived in applied contexts, especially in organizational settings. Consequently, further empirical research is needed to clarify the conditions under which transparent nudges work most effectively and to explore ways to mitigate potential reactance effects.

To better understand how transparency can be implemented responsibly, it is important to distinguish between minimal and comprehensive disclosures. Despite their potential to lead to the same result, reduced effectiveness, transparency in nudges can take different forms, each influencing decision-making in unique ways (Bruns et al., 2018). In this work, it is aimed to increase the salience of the transparency by providing more detailed disclosure encompassing three key components: what the nudge aims to achieve (disclosure of the target behavior), why it is being implemented (disclosure of purpose) and how such nudges generally influence decision-making (disclosure of general effect) (Paunov et al., 2019).

This three-part disclosure aligns with recent empirical and ethical recommendations that transparency should move beyond minimal or vague warnings

toward more meaningful, informative cues that help individuals understand the behavioral intervention (Michaelsen, 2024). This approach is particularly relevant as empirical studies often report that simply stating the presence of a nudge may not be sufficient to alter perceptions or behavior if the participant does not fully grasp its intent or mechanism (Wachner et al., 2020; Michaelsen, 2024). By explicitly and systematically incorporating all three core components of transparency, this research aims to contribute to more conceptually grounded and methodologically transparent experimentation. Such a framework enables clearer testing of whether transparency necessarily reduces effectiveness or if its drawbacks can be mitigated through thoughtful design.

Despite growing ethical calls for openness in behavioral interventions, transparency may not always lead to greater effectiveness. When individuals are explicitly informed of the intent behind a nudge, they may perceive it as manipulative, undermining their sense of autonomy and triggering psychological reactance. In professional environments where informed decision-making and freedom of choice are highly valued, such perceptions may be especially salient. As a result, transparency can paradoxically reduce compliance with the intended behavior by provoking resistance or skepticism. Given these concerns, the following is hypothesized as it becomes essential to empirically test whether transparent nudges can backfire in organizational contexts and perceived threat to freedom can be a mediator of this relationship:

Hypothesis 2.a.: Managers who are exposed to transparent nudges will show weaker support for environmentally favorable decisions than those who are exposed to nontransparent nudges.

Hypothesis 2.b.: Perceived threat to freedom will mediate the relationship between nudge transparency and environmental decision-making.

III.III. Nudge Frequency

Nudges can be effective in encouraging sustainable behavior in various settings by raising the salience via increased frequency. While the existing literature provides insights into the content of nudges that make them effective, e.g., regarding towel reuse (Goldstein et al., 2008) and soliciting donations for national parks (Alpizar et al., 2008), less is known about the appropriate recurrence of nudges leading to desired behavior (Nowak et al., 2024). Understanding the role of repetition is particularly important in organizational settings, where decision fatigue and competing priorities may influence the reception of frequent nudges.

Although individuals should be aware and reminded of the nudge to enable positive uptake, studies demonstrate that companies often consciously limit their sustainability appeals with greenhushing out of fear that these might induce guilt and reactance among consumers (Ettinger et al., 2021; Font et al., 2017). It is highly significant to address this discussion in the literature since individuals should be aware of the desired sustainable behaviors, while overly obtrusive nudges may backfire (Nowak et al., 2024). While backfiring refers to the opposite intended effect of the intervention (Brough et al., 2020), understanding the contextual and psychological factors that lead to backfiring is critical to preventing unintended outcomes (Nowak et al., 2024). Although research on this issue is scarce, psychological reactance and annoyance costs are demonstrated as two factors affecting the effectiveness of a nudge.

In the context of norm nudges, it is shown that increasing the frequency does not reduce the positive uptake, indicating they can be used more frequently to encourage sustainable behavior (Nowak et al., 2024). However, the point at which backfiring occurs is still unclear due to the small number of norm nudges used in this study. For

humanitarian donation research, Damgaard and Gravert (2018) found that individuals receive the benefits of warm-glow from donating but also incur an annoyance cost every time they receive a reminder to donate. While regular reminders raised donations by drawing recipients' attention to the opportunity to donate, they also raised psychological costs and the resulting dropout rates to a comparable extent (Damgaard & Gravert, 2018). However, the authors focused on a standard solicitation email by considering less how the nudge content influenced target behavior.

Considering the limitations of the prior studies and that most failed interventions are not published, more empirical evidence in which nudges may backfire in different settings is necessary to determine how these could be mitigated (Brough et al., 2020). Thus, this research considers not only nudge transparency as an independent variable but also nudge frequency to examine which frequency of nudges creates a backfiring effect through increased salience. Salience refers to the degree to which a stimulus stands out and captures attention in the decision environment. A more salient nudge is generally more effective at influencing behavior because it ensures the message is noticed and processed (Kahneman, 2011). However, excessive salience may overwhelm or irritate the decision-maker. Therefore, achieving a balance between too little and too much frequency is essential for nudge effectiveness.

Most frequency interventions are supported with a well-known nudge: reminders. Reminders are designed to restrain forgetfulness by bringing a particular decision or task to recipients' attention to induce behavioral change. (Damgaard & Gravert, 2018) A large portion of research has demonstrated that reminders can influence behavior e.g., in the context of gym attendance (Calzolari & Nardotto, 2017), adherence to medical treatments (Altmann & Traxler, 2014), personal savings (Karlan et al., 2016), take-up of social

benefits (Bhargava & Manoli, 2015), electricity consumption (Allcott & Rogers, 2014; Gilbert & Zivin, 2014) and donating to charitable organizations (Huck & Rasul, 2010; Sonntag & Zizzo, 2015) (Damgaard & Gravert, 2018), making reminders relevant for exploring the potential hidden costs behind nudges.

Annoyance costs refer to the psychological costs, such as guilt and perceived pressure, or practical costs, such as time and attention (Dana et al., 2007; Andreoni et al., 2017; DellaVigna et al., 2012; Knutsson et al., 2013; Cain et al., 2014; Trachtman et al., 2015) when a nudge becomes overly frequent, intrusive, or persistent. They may arise when the frequency of the nudge increases as its associated psychological and practical costs grow too (Damgaard & Gravert, 2018). Accordingly, annoyance stems from a sense of inconvenience or reaction to nudge fatigue from constant reminders.

In addition to annoyance, anger may emerge as a more intense affective response, particularly when individuals perceive nudges as violating their sense of autonomy or freedom of choice. Bruns et al. (2018) conceptualize anger as a key component of state reactance, as well as a perceived threat to freedom. While annoyance may lead to passive dismissal, anger, as linked to perceived manipulation and control, can drive active resistance or behavioral opposition. By examining anger as an emotional reaction to high-frequency nudging, this study aims to better understand how repeated behavioral interventions may trigger negative emotional responses that undermine their intended effect. Given the tension between increased attention and potential backfiring, this study investigates how varying levels of frequency impact the nudge effectiveness and whether anger plays a mediating role by hypothesizing the following:

Hypothesis 3.a.: Managers who are exposed to high-frequency nudges will show weaker support for environmentally favorable decisions than those who are exposed to

low-frequency nudges.

Hypothesis 3.b.: Anger will mediate the relationship between nudge frequency and environmental decision-making.

III.IV. Interaction Effects: Nudge Transparency & Frequency

While transparency and frequency have often been studied independently in the context of behavioral interventions, their combined effects on decision-making remain underexplored, particularly in organizational settings. When these two attributes interact, they may produce additive, synergistic, or even antagonistic effects. A highly transparent nudge that is also delivered frequently might be perceived as overly controlling, potentially triggering psychological reactance (Brehm, 1966) or anger. On the other hand, repeated exposure to a clearly explained nudge could foster familiarity and trust, thereby enhancing its effectiveness through increased perceived legitimacy. These possibilities suggest a need to move beyond isolated evaluations of nudge attributes and examine how their interaction influences outcomes such as compliance, motivation and engagement in sustainability-related decisions. Despite the relevance, very few empirical studies to date have tested transparency and frequency simultaneously in experimental designs (Nowak et al., 2024; Paunov et al., 2019), leaving the interaction effects largely unaddressed in the behavioral science literature.

Several psychological theories help explain why the combination of high transparency and frequent nudging may result in varied behavioral outcomes. As Self-determination Theory (Deci & Ryan, 1985) suggests, individuals will have motivation when their basic psychological needs of autonomy, competence and relatedness are satisfied. A frequent and transparent nudge may inadvertently undermine autonomy if

perceived as overly directive, even if the intent is benign. Cognitive Load Theory also offers relevant insights: high-frequency nudges that are transparently communicated may increase the amount of information individuals must process, potentially leading to cognitive overload and decision fatigue (Sweller, 1988). Conversely, when the message is well-aligned with the recipient's values and expectations, repetition combined with transparency could enhance message salience and internalization, reinforcing behavioral consistency through mechanisms such as attentional priming and norm internalization (Chartrand et al., 2007). These theories illustrate that the interaction between transparency and frequency is likely to produce non-linear effects, depending on individual perceptions and contextual factors.

Although limited, empirical studies offer some support for the importance of examining combined effects. Paunov et al. (2019) suggested that the negative impact of transparency on compliance may intensify when individuals are exposed to repeated nudges, particularly if the influence is perceived as manipulative. Similarly, Damgaard and Gravert (2018) revealed that although frequent messages increased donation behavior, they also raised psychological costs, suggesting that without careful framing, repetitive nudges can diminish trust or lead to avoidance. Michaelsen (2024) emphasized the need for meaningful transparency in repeated interventions, noting that vague or superficial disclosures are insufficient when nudges are delivered often. This has practical implications for organizational contexts, where sustainability goals often rely on repeated internal communications. Understanding how transparency and frequency jointly shape managerial responses can inform the design of more ethically sound and psychologically effective interventions, helping organizations foster voluntary, long-term pro-environmental behavior without inducing resistance or fatigue. Building on the evidence

from the literature, the interaction of transparency and frequency is expected to produce compounding negative effects:

Hypothesis 4: The negative effect of high-frequency nudges on decisions will be stronger when nudges are transparent (vs. nontransparent).

Taken together, these hypotheses aim to deepen our understanding of how not just the presence of nudges, but their structural features (transparency and frequency) shape environmental decision-making within organizations. By integrating psychological mechanisms such as perceived threat to freedom and anger, the study also seeks to illuminate the emotional and cognitive processes through which these nudges exert their influence or, conversely, provoke resistance. In doing so, it aims to contribute to both theoretical and practical discussions on how behavioral interventions can be designed more ethically and effectively in professional settings. The following chapter outlines the methodological approach used to test these hypotheses, including the experimental design, vignette development, measurement instruments, and analytical strategy.

CHAPTER IV

METHODOLOGY

The methodology of this research draws on experimental methods to explore how subtle informational prompts shape environmental choices in complex, real-world scenarios. Considering the aim of this study, its practical significance and the lack of empirical data in the field, a vignette experiment approach is taken to measure the effects of different nudge treatments on behavior (Viglia & Dolnicar, 2020). Reflecting a shift from purely rational models of decision-making toward a more psychologically informed view, this study acknowledges cognitive and emotional responses to nudges. The research also utilizes vignettes to explore how variations of the nudge frequency and transparency influence managerial willingness to allocate financial resources to an energy-conserving initiative within the company. The aim is to understand how behavioral interventions can support sustainability-related decisions within organizations, particularly when such decisions involve trade-offs between environmental and economic objectives.

Vignette experiments are widely recognized for delivering information about the hypothesized factors of interest in the decision-making processes of participants whose reactions are asked. (Rungtusanatham et al., 2011). While traditional laboratory experiments often struggle to reflect the complexity of real-world decisions, vignettes

enhance external validity by embedding participants within realistic, context-rich narratives that mirror actual workplace dilemmas and including a broad range of relevant factors to improve the generalizability of context-specific results (Aguinis & Bradley, 2014). By presenting participants with carefully crafted scenarios and asking them to respond as if they were in a specific role, vignette-based methods allowed this research to explore cognitive, emotional and behavioral reactions in a structured and context-sensitive manner.

Since both manipulated factors, nudge transparency and frequency, had two levels, the research utilized a 2x2 between-subjects design; the resulting four experimental conditions, alongside the corresponding sample names, are summarized in Figure 2.

Figure 2: Experimental Model

		Nudge Frequency	
		High	Low
Nudge Transparency	Transparent	<i>Scenario I</i>	<i>Scenario II</i>
	Nontransparent	<i>Scenario III</i>	<i>Scenario IV</i>

IV.I. Vignette Development

Vignettes were carefully developed to reflect realistic managerial decision-making scenarios while addressing the complexities of balancing economic and environmental

outcomes. Drawing from the tensions between profitability and environmental impact experienced by firms (Wu & Pagell, 2011), both contextual relevance and trade-offs faced by managers are considered by placing the participants in the role of a manager who must allocate a portion of their department's budget to support an energy efficiency initiative. This initiative involved an investment in energy-efficient machinery that brings varying levels of financial return and environmental benefit. The design objective was to simulate real-world trade-offs in organizational settings, enabling participants to engage with the task authentically and generate externally valid behavioral data (Aguinis & Bradley, 2014). The development of the vignettes was informed by an extensive review of experimental designs in prior environmental decision-making and sustainability-related studies. Particular attention was paid to how organizational trade-offs were framed in similar research by Allcott and Rogers (2014), Carroll et al. (2014), Ruokamo et al. (2022) and Kocabiyikoglu et al. (2023) to ensure theoretical rigor and contextual realism. Specifically, the aim was to embed managerial dilemmas where profitability and sustainability goals are at odds, thereby increasing ecological and psychological validity.

All participants were asked to indicate how much they would like to allocate resources to this sustainability initiative through the switch to energy-efficient machinery, making the dependent variable the amount of budget allocation measured in monetary terms. The participants were presented with choices of how much of their budget they wanted to contribute. This task was designed to simulate the allocation of organizational resources toward sustainability goals in a financially constrained environment. The choices given to the task were adapted from Kocabiyikoglu et al. (2023) as participants had three possible courses of action to choose from, with varying degrees of economic and environmental impact, to capture the suspense between different aspects of

sustainability. In particular, the alternative that brought about the lowest environmental gains for the firm was also the one that contributed the most to the firm's financial gains, while at the other end, the option that had the best environmental result was the least profitable, with three other alternatives in between, to apprehend a wide range of environmental and economic outcomes (Kocabiyikoglu et al., 2023).

By placing participants in the role of managers deciding on budget allocation, the vignettes aimed to simulate real-world decisions that involve trade-offs between sustainability goals and financial considerations. This aligns with research suggesting that realistic scenarios enhance external validity and allow participants to engage more authentically with the task (Aguinis & Bradley, 2014). The structured decision choices, on the other hand, ranging from low environmental impact with high profits to high environmental impact with low profits, were developed to capture the inherent tensions managers face in sustainability-related decisions (Kocabiyikoglu et al., 2023). This mirrors actual organizational dilemmas where profitability and environmental responsibility must be weighed against (Wu & Pagell, 2011).

A pilot study was conducted to further develop the vignettes with 32 undergraduate business students at Bilkent University, with 8 participants assigned to each of the four experimental conditions. The goal was to assess the clarity and realism of the scenarios and the effectiveness of the manipulations. The demographic characteristics of the sample were balanced across all four groups. The mean participant age ranged from $M = 21.75$ to $M = 22.38$ years ($SD \approx 1.5$), and gender distribution was consistent across the sample. Additionally, control variables were gathered during the survey, including prior exposure to any sustainability coursework, which is named SustCourse and coded binary as 0 and 1. Scores ranged from $M = 0.38$ to $M = 0.75$, confirming that these background variables

were also relatively even across conditions. Although participants engaged with the vignettes meaningfully, preliminary analysis showed that the manipulations did not produce significant effects. Mean budget contributions across the four conditions in the pilot ranged from $M = 2.13$ to $M = 2.38$, with 1 being the lowest contribution option and 3 being the highest contribution option, but these differences were not statistically significant. Table 1 provides a summary of these results.

Table 1: Descriptive Statistics of the Pilot Study

Variable	Mean	SD	Min	Max
Budget Contribution	2.22	0.49	1.00	3.00
Pro-Environmental Attitude	3.51	0.36	2.07	4.00
Perceived Threat	2.71	0.73	1.00	4.25
Anger	2.73	1.06	1.00	5.00
Age	21.97	1.09	20.00	24.00

Variable	Group	N	%
Condition	1 (Transparent-High Frequency)	8	25.00
	2 (Transparent-Low Frequency)	8	25.00
	3 (Nontransparent-High Frequency)	8	25.00
	4 (Nontransparent-Low Frequency)	8	25.00
Sustainability Course	Yes	19	59.38
	No	13	40.62

Variable	Group	N	%
Gender	Female	19	59.38
	Male	13	40.62

Budget Contribution				
	Condition 1	Condition 2	Condition 3	Condition 4
Mean	2.38	2.25	2.13	2.13
SD	0.52	0.46	0.64	0.35

Based on these findings, revisions were made to develop the vignettes further. As a second step, informal interviews were conducted with master's students from the Organization and Management track at Bilkent University, who provided further insights on enhancing managerial relevance and making manipulation checks. The revisions mentioned below aimed to directly respond to the pilot findings and ensure that participants could clearly recognize the intention and mechanism of the nudge, enhancing both ethical clarity and experimental control. Accordingly, the final vignettes featured improved clarity in wording, increased salience in the operationalization texts, and more structured and distinct response options. Due to the pilot's small sample and lack of significant effects, the pilot results were excluded from the final analysis. Although the pilot study did not yield statistically significant effects, it played a critical role in validating the experimental design and identifying areas for refinement.

The first independent variable, nudge transparency, is manipulated in the pilot

study by explicitly informing participants about the nudge and its intended influence since it was one of the most common ways of manipulating transparency (Bruns et al., 2018). However, as the pilot study did not reveal statistically significant effects, the salience of the transparency manipulation in the main study is increased by providing more detailed disclosure encompassing three key components: what the nudge aims to achieve (target behavior), why it is being implemented (endorser's purpose) and how such nudges generally influence decision-making (mechanism of effect) (Paunov et al., 2019). This approach aims to make the influence attempt more salient and ethically robust while also enabling a more meaningful engagement with the decision context in the transparent conditions of our experiment (Paunov et al., 2019). On the other hand, the nontransparent scenarios are developed by presenting the nudge in a neutral way without further messaging on its detailed components. Therefore, in two of four nudge treatments, the nudge was complemented by extended information that aimed to induce transparency on the nudge.

This multi-faceted operationalization for the first independent variable, nudge transparency, follows recent calls in the literature to move beyond simple disclosure. While previous behavioral studies often manipulated transparency through a basic notice informing participants of the nudge's presence (Michaelsen, 2024), this research adopts a more systematic and informative method. As Paunov et al. (2019) argue, different components of transparency, the *what*, *why* and *how*, may vary in their effectiveness and ethical implications, yet they have rarely been tested in combination. By disclosing all three elements, this study seeks to maximize both the salience and perceived legitimacy of the nudge, aligning with ethical recommendations and enhancing theoretical rigor.

The second independent variable, nudge frequency, is manipulated by varying the

number and richness of targeted reminders that participants receive about the initiative throughout the vignette (Nowak et al., 2024). In the pilot study, the frequency manipulation involved repeating similar messages that highlighted the benefits of the initiative. This was strengthened in the main study to enhance salience and informational depth. Participants in the high-frequency condition were told that the company had sent six informative emails about the initiative in the past three months, an approach adapted from empirical work emphasizing repeated messaging as a behavioral cue (Nowak et al., 2024). Additionally, instead of merely repeating similar phrases, informational reminders describing the financial and reputational benefits of energy-efficient machinery are integrated through the vignette. These reminders emphasized that such investments can significantly lower long-term expenses, leading firms in the sector have adopted similar measures to strengthen their sustainability leadership and aligning with environmental responsibility can attract partners and investors.

To further enhance the perceptual salience of these reminders, a graph was included to visually illustrate how structured sustainability policies impacted budget allocations in competing firms. This use of visual cues aligns with findings that visual stimuli increase salience and help activate goal-directed behavior (Lindenberg & Papies, 2019). In contrast, participants in the low-frequency condition were told they had received only one email about the initiative and saw the relevant information only once at the beginning of the vignette. Thus, the high-frequency manipulation combines verbal, quantitative and visual cues to highlight the initiative's benefits more vividly and frequently, reinforcing the choice architecture through repeated and context-rich prompts. This multi-format strategy was implemented after pilot results indicated that simple repetition alone did not produce measurable behavioral differences. Therefore, the

frequency manipulation in the main study included visual, numerical, and contextual prompts to make the initiative's relevance more vivid and persuasive. At the end, scenario 4 served as the control condition since unlike the other conditions, it lacked both the frequency and the transparency operationalization, allowing for a baseline comparison of budget allocation decisions without nudge influence.

IV.II. Data Collection

The data collection phase aimed to accumulate participant data securely through the controlled experimental environment. Before conducting the experiment, all hypotheses and other methodology-related items were preregistered. The experiment was conducted with business undergraduates at Bilkent University, in which participants played the role of a manager in a company, and they were asked to make a decision on an organizational sustainability-related initiative, aiming to investigate the effect of interventions on environmental decisions regarding energy conservation. The vignettes of the main experiment are developed based on the results from the pilot study, as discussed. Same as the pilot study, participants were randomly assigned to one of four experimental conditions derived from a 2x2 between-subjects factorial design to ensure standardization and randomization.

The experimental materials, including all vignettes and questionnaire items, were transferred online to facilitate easy, structured and efficient data collection in an online platform. This format ensured that the flow of the experiment remained consistent for all participants and that responses were automatically recorded in a structured database for subsequent analysis. A total of 228 students, 57 students per condition, participated in the experiment, as at least 179 participants were needed, according to power analysis (Faul et

al., 2007). This sample size was deemed sufficient to detect medium effect sizes with adequate power in a factorial experimental design. Participants completed the experiment in a self-paced online setting under uniform conditions. Data were recorded anonymously to ensure confidentiality and reduce social desirability bias. The table for sample characteristics by condition can be seen below:

Table 2: Descriptive Statistics of the Sample

Variable	Group	N	%
Condition	1 (Transparent-High Frequency)	57	25.00
	2 (Transparent-Low Frequency)	57	25.00
	3 (Nontransparent-High Frequency)	57	25.00
	4 (Nontransparent-Low Frequency)	57	25.00
Sustainability Course	Yes	72	31.58
	No	156	68.42
Gender	Female	127	55.70
	Male	101	44.30

After reading the scenario and making a decision for the budget allocation, participants answered a questionnaire New Ecological Paradigm (NEP) Scale, developed by Dunlap et al. (2000) to evaluate the pro-environmental attitudes of the participants. With this, it aimed to check whether there were any differences in the participants' attitudes toward environmental issues across the experimental conditions (Kocabiyikoglu et al., 2023). Participants also completed a survey derived from Bruns et al. (2018) to

measure their perception of the nudge as freedom-threatening, autonomy-decreasing, manipulative and pressuring, as well as its tendency to evoke negative emotional reactions, such as irritation, anger, annoyance and aggravation which are referred to as state reactance (Dillard & Shen, 2005). This stage aimed to check whether there were any mediations of threat to freedom of choice or annoyance costs. Lastly, the participants were asked to report basic demographic information. Relevant questions can be seen in the Appendices.

Upon completion of the data collection process, responses were systematically organized and cleaned to prepare for statistical analysis. The dataset was checked for completeness, consistency and outliers. Any missing or anomalous responses were handled according to standard data-cleaning procedures. The final cleaned dataset was then used to conduct the hypothesis testing and exploratory analyses described in the subsequent section.

IV.III. Data Analysis

The resulting dataset included a dependent variable (budget allocation), two independent variables with two levels (nudge frequency and transparency) and two control variables (NEP scores and taking a sustainability-related course before). These allowed for multifactorial analysis, including main effects and interaction effects. Statistical analysis was conducted using R software. Estimated marginal means were calculated, and descriptive statistics, including means and standard deviations of the dependent variable across the four experimental groups, were reported to provide context for the inferential results. Effect sizes are also assessed to reveal the practical significance of the findings.

To rigorously evaluate the hypotheses posed in this study, a combination of Mann-

Whitney U tests, ordinal logistic regression models, and a mediation analysis on regression-based approaches (Baron & Kenny, 1986) were employed. These approaches were selected based on the ordinal nature of the dependent variable, the design of the experimental conditions, and the aim to capture both direct and mediated effects, while controlling for individual-level covariates.

The primary dependent variable, budget contribution, was measured on a 3-point ordinal scale, which violated assumptions of interval-level data required for t-tests and ANOVA. Therefore, the analyses were designed around ordinal logistic regression. This approach allowed for modelling the probability of higher or lower levels of contribution while respecting the non-continuous structure of the outcome variable. Additionally, since individual attitudes and prior sustainability education were likely to influence environmental behavior, two covariates were incorporated throughout the analyses: NEP scores (a continuous measure of pro-environmental attitudes) and sustainability course completion (a binary indicator). Including these as controls enhanced the robustness and internal validity of the findings by reducing the influence of individual differences.

To test H1, which predicted that participants exposed to nudges would contribute more to the environmental initiative than those in the control condition, a Mann-Whitney U test was first conducted to detect group differences without assuming normality. To provide a more comprehensive analysis, an ordinal logistic regression was then applied, treating condition (nudge vs. control) as the predictor and including NEP scores and sustainability course completion as covariates. The use of this model allowed for estimating the likelihood of higher contributions while adjusting for pre-existing attitudes and educational background.

H2a and H3a tested whether transparency and frequency, respectively, reduced pro-environmental contributions. Each was analyzed using ordinal logistic regression models that compared transparent vs. non-transparent and high vs. low-frequency conditions. Again, both models included covariates to control for individual-level differences. These tests enabled for determining of whether structural features of the nudges produced significant behavioral variation.

For H2b and H3b, which explored psychological mediators (perceived threat and anger), a mediation analysis on regression-based approaches (Baron & Kenny, 1986) was conducted, as it was chosen since it allows for simultaneous estimation of direct and indirect effects while accounting for the ordinal nature of the outcome. These models tested whether threat (H2b) or anger (H3b) significantly mediated the relationships between nudge transparency or frequency and budget contribution, respectively. Good model fit indices confirmed the technical adequacy of the models.

To examine H4, the interaction between transparency and frequency, an ordinal logistic regression was conducted with both main effects and an interaction term, alongside the NEP and sustainability course covariates. This model allowed for assessing not only the independent effects of each condition but also whether their combination led to compounded effects on environmental behavior.

In summary, the data analysis strategy was designed to match the complexity of the experimental design, the ordinal structure of the outcome variable, and the need to control for individual-level factors. By integrating different analysis techniques, the study achieved both statistical rigor and conceptual clarity in assessing how nudge design affects pro-environmental decisions in an organizational context. The detailed statistical outputs from R can be found in the next section, along with relevant figures and tables.

CHAPTER V

RESULTS

This chapter presents the empirical results of the main study, which investigated the effects of nudge characteristics on environmental decision-making in an organizational context. The experiment employed a 2x2 between-subjects factorial design, with a total sample of 228 undergraduate business students. The primary dependent variable was the amount of budget allocated to an energy-saving initiative. Two control variables were also included: pro-environmental attitude, measured by the NEP scale, and prior coursework in sustainability.

The results are reported in alignment with the study's hypotheses. First, Mann-Whitney U tests and ordinal logistic regressions were conducted to test H1 through H3a, which examined the effects of having a nudge (vs. control), transparency (vs. non-transparency), and frequency (high vs. low) on budget allocation. Second, H2b and H3b tested whether perceived threat and anger, respectively, mediated the effects of transparency and frequency using mediation analysis. Finally, H4 tested the interaction between transparency and frequency on environmental decision-making using ordinal logistic regression with NEP and sustainability coursework as control variables.

The following sections present the results of each analysis in detail, including

descriptive statistics, assumption checks, and inferential test results of each analysis, which are organized by hypothesis and analytical method. Together, these findings provide critical insights into how behavioral interventions (e.g., informational nudges) influence environmental decision-making.

Table 3 presents descriptive statistics for the main variables of the study. On average, participants allocated 2.40 (SD = 0.53) units of the departmental budget to the energy-saving initiative. Pro-environmental attitudes, measured using the NEP scale, were relatively high ($M = 3.53$, $SD = 0.49$), suggesting generally favorable environmental orientations across the sample. Perceived threat to freedom ($M = 2.15$, $SD = 0.91$) and reported anger ($M = 2.08$, $SD = 1.01$) were both moderate and exhibited greater variability.

Participants' mean age was 21.96 years ($SD = 1.56$), with a range between 19 and 26 years. The sample was relatively balanced across experimental conditions: each of the four groups (transparent high-frequency, transparent low-frequency, nontransparent high-frequency, and nontransparent low-frequency) comprised 25% of the total sample ($n = 57$ per group). A slight majority of participants identified as female (55.70%), and approximately one-third (31.58%) had previously completed a university-level course in sustainability.

An exploratory breakdown of budget contributions by condition revealed small differences in means. The transparent low-frequency group reported the highest mean contribution ($M = 2.47$, $SD = 0.54$), followed by the nontransparent high-frequency ($M = 2.44$, $SD = 0.50$) and transparent high-frequency groups ($M = 2.42$, $SD = 0.57$). The control group (nontransparent low-frequency) reported the lowest average contribution ($M = 2.25$, $SD = 0.51$). While these differences provide a preliminary overview, inferential analyses are discussed below to reveal the statistical significance of observed trends.

Table 3: Descriptive Statistics of the Main Study

Variable	Mean	SD	Min	Max
Budget Contribution	2.40	0.53	1.00	3.00
Pro-Environmental Attitude	3.53	0.49	2.00	4.73
Perceived Threat	2.15	0.91	1.00	5.00
Anger	2.08	1.01	1.00	5.00
Age	21.96	1.56	19.00	26.00

Budget Contribution				
	Condition 1	Condition 2	Condition 3	Condition 4
Mean	2.42	2.47	2.44	2.25
SD	0.57	0.54	0.50	0.51

V.I. Hypothesis 1

To test Hypothesis 1, which proposed that participants exposed to nudges (scenarios 1-3) would show stronger support for environmentally favorable decisions than those who are not exposed to nudges (control condition, scenario 4), both a Mann-Whitney U test and an ordinal logistic regression controlling for relevant covariates are conducted. To facilitate hypothesis testing, a grouping variable is derived from the original Condition (scenarios 1-4) variable. For this one, H1 Condition is created and used to test the main effect of being exposed to a nudge. This binary variable coded participants in Conditions 1-3 (nudge existent) as 1 and participants in Condition 4 (control group, no nudge) as 2.

The Mann-Whitney U test revealed a statistically significant difference in budget contributions between the nudge and control conditions, $U = 5787.5$, $p = .007$, with a small-to-moderate effect size ($r = 0.16$). This result indicates that participants who received any form of nudging allocated significantly more budget to the pro-environmental initiative compared to those who received no nudge (see Table 4).

To account for individual differences in pro-environmental attitudes and prior sustainability education, an ordinal logistic regression analysis is further conducted. The results showed a significant main effect of the nudge condition ($B = -0.753$, $SE = 0.329$, $t = -2.29$, $p = .022$), indicating that the control group contributed significantly less than those in the nudge conditions. Moreover, pro-environmental attitudes, as measured by the NEP questionnaire, were a strong and positive predictor of environmental decision-making ($B = 1.115$, $p < .001$). Completion of a sustainability-related course did not significantly predict budget contribution ($p = .657$) (see Table 5).

Together, these results support Hypothesis 1: the presence of a nudge (regardless of its frequency or transparency) led to greater support for environmental choices compared to the control condition.

Table 4: Mann-Whitney U test for Hypothesis 1

Group	N	Mean	U	p-value	Effect Size (r)
Nudge	171	2.44	5787.5	.007	0.162
Control	57	2.25			

Table 5: Ordinal Logistic Regression for Hypothesis 1

Predictor	Estimate	Std. Error	t value	p-value
H1 Condition	-0.753	0.329	-2.29	.022
Pro-Environmental Attitudes	1.115	0.298	3.74	<.001
Sustainability Course	0.132	0.298	0.44	.657
Threshold	Estimate	Std. Error	t value	
1	2	-0.186	1.106	
2	3	4.170	1.073	

V.II. Hypothesis 2.a.

To test Hypothesis 2a, which proposed that participants exposed to transparent nudges would show weaker support for environmentally favorable decisions than those exposed to nontransparent nudges, we conducted both a Mann-Whitney U test and an ordinal logistic regression controlling for relevant covariates. For this analysis, a grouping variable, H2 Condition, was derived from the original Condition variable. Participants in the transparent nudge conditions (scenarios 1 and 2) were coded as 1, and those in the nontransparent conditions (scenarios 3 and 4) were coded as 2. This coding allowed for direct comparison of transparency effects while holding nudge presence constant.

The Mann-Whitney U test indicated no significant difference in budget contributions between participants in the transparent and nontransparent nudge conditions, $U = 7,189.5$, $p = .946$, with a small effect size ($r = .11$). These results suggest that nudge transparency alone did not meaningfully alter participants' willingness to allocate budget to the energy-saving initiative (see Table 6).

To account for individual differences in pro-environmental orientation and sustainability education, we conducted an ordinal logistic regression including the same covariates used before. The effect of transparency was negative but only marginally significant ($B = -0.48$, $SE = 0.28$, $t = -1.72$, $p = .085$), indicating a trend in which transparent nudges were associated with lower contributions relative to nontransparent ones. As expected, NEP scores were a strong positive predictor of pro-environmental decision-making ($B = 1.16$, $p < .001$), while sustainability had no significant effect ($p = .711$) (see Table 7).

In sum, while the direction of effects was consistent with theoretical expectations, the lack of statistical significance means that Hypothesis 2a was not supported.

Table 6: Mann-Whitney U test for Hypothesis 2.a.

Group	N	Mean	U	p-value	Effect Size (r)
Transparent	114	2.45	7189.5	.946	0.106
Nontransparent	114	2.34			

Table 7: Ordinal Logistic Regression for Hypothesis 2.a.

Predictor	Estimate	Std. Error	t value	p-value
H2 Condition	-0.475	0.276	-1.72	.085
Pro-Environmental Attitudes	1.157	0.298	3.88	<.001
Sustainability Course	0.110	0.296	0.37	.711

Threshold	Estimate	Std. Error	t value
1	2	-0.060	1.101
2	3	4.257	1.069

V.III. Hypothesis 2.b.

Hypothesis 2b proposed that perceived threat to freedom would mediate the relationship between nudge transparency and environmental decision-making. To test this, a mediation analysis on regression-based approaches (Baron & Kenny, 1986) was conducted by using lavane package in R, where nudge transparency was treated as the independent variable, perceived threat measured with the state reactance survey as the mediator, and budget contribution as the dependent variable.

Results from the mediation analysis indicated that the path from nudge transparency to threat (a) was not statistically significant ($B = 0.04$, $SE = 0.12$, $z = 0.36$, $p = .717$), suggesting that transparency did not significantly increase perceptions of threat. However, the path from threat to budget contribution (b) was significant and negative ($B = -0.23$, $SE = 0.09$, $z = -2.68$, $p = .007$), indicating that higher perceived threat was associated with lower contributions to the environmental initiative.

The indirect effect of transparency on budget contribution via perceived threat was not significant ($B = -0.01$, $p = .719$), nor was the total effect ($B = 0.23$, $p = .152$). The direct effect of transparency on budget contribution also did not reach significance ($B = 0.24$, $p = .130$). Notably, the model exhibited excellent fit to the data ($CFI = 1.000$; $RMSEA = 0.000$; $SRMR = 0.000$), affirming the structural validity of the specified model (see Table 8).

In conclusion, although perceived threat was a significant negative predictor of environmental decision-making, it did not mediate the effect of transparency. Therefore, Hypothesis 2b was not supported.

Table 8: Mediation Analysis for Hypothesis 2.b.

Path	Estimate	Std. Error	z-value	p-value
Nudge Transparency → Threat (a)	0.044	0.121	0.36	.717
Threat → Budget Contribution (b)	-0.228	0.085	-2.68	.007
Nudge Transparency → Budget Contribution (c')	0.241	0.159	1.51	.130
Indirect Effect (a × b)	-0.010	0.028	-0.36	.719
Total Effect (c' + ab)	0.231	0.161	1.43	.152

V.IV. Hypothesis 3.a.

Hypothesis 3a posited that participants exposed to high-frequency nudges would show weaker support for environmentally favorable decisions compared to those exposed to low-frequency nudges. To test this, a grouping variable, H3 Condition, is created by recoding the original experimental conditions: participants in Conditions 1 and 3 (high frequency) were assigned a value of 1, while those in Conditions 2 and 4 (low frequency) were coded as 2.

Firstly, a Mann-Whitney U is conducted to assess differences in budget contributions between high- and low-frequency conditions. The results indicated no statistically significant difference between the two groups, $U = 6921.5$, $p = .164$, with a

small effect size ($r = 0.07$), suggesting that frequency alone did not influence pro-environmental behavior (see Table 9).

To further examine this relationship while controlling for individual differences in environmental values and prior sustainability education, an ordinal logistic regression was conducted. The regression analysis revealed that nudge frequency was not a significant predictor of budget contribution ($B = -0.24$, $SE = 0.27$, $t = -0.87$, $p = .386$). As in previous models, NEP scores remained a strong, positive predictor of environmental support ($B = 1.13$, $p < .001$), while prior sustainability coursework was not significant ($p = .686$) (see Table 10).

Together, these findings do not provide support for Hypothesis 3a. Exposure to high-frequency nudges did not significantly reduce environmental contributions relative to low-frequency nudges. Thus, Hypothesis 3a was not supported.

Table 9: Mann-Whitney U test for Hypothesis 3.a.

Group	N	Mean	U	p-value	Effect Size (r)
High-Frequency	114	2.43	6921.5	.164	0.065
Low-Frequency	114	2.36			

Table 10: Ordinal Logistic Regression for Hypothesis 3.a.

Predictor	Estimate	Std. Error	t value	p-value
H3 Condition	-0.237	0.274	-0.87	.386

Predictor	Estimate	Std. Error	t value	p-value
Pro-Environmental Attitudes	1.128	0.297	3.80	<.001
Sustainability Course	0.119	0.295	0.40	.686

Threshold	Estimate	Std. Error	t value
1	2	-0.021	1.105
2	3	4.272	1.074

V.V. Hypothesis 3.b.

Hypothesis 3b proposed that anger would mediate the relationship between nudge frequency and environmentally favorable decisions. Specifically, it predicted that high-frequency nudges would increase anger, which in turn would reduce participants' willingness to allocate a higher budget to the pro-environmental initiative.

To test this, a regression-based mediation analysis (Baron & Kenny, 1986) approach was employed, using anger as the mediator between nudge frequency and budget contribution. The analysis revealed that the path from nudge frequency to anger was not statistically significant ($B = 0.07$, $SE = 0.13$, $z = 0.54$, $p = .587$), suggesting that frequency did not meaningfully alter participants' emotional response. However, anger significantly predicted lower budget allocations ($B = -0.27$, $SE = 0.06$, $z = -4.13$, $p < .001$), indicating that greater anger was associated with weaker pro-environmental decisions (see Table 11).

Despite this direct link between anger and decision-making, the indirect effect of nudge frequency on budget contribution via anger was not significant ($B = -0.02$, $SE = 0.04$, $z = -0.54$, $p = .591$). Neither the direct effect ($B = 0.18$, $p = .252$) nor the total

effect ($B = 0.16, p = .319$) of nudge frequency reached statistical significance. Model fit indices were excellent ($CFI = 1.000$; $RMSEA = 0.000$; $SRMR = 0.000$), supporting the technical adequacy of the model (see Table 11).

In sum, although anger negatively predicted environmental contributions, it did not mediate the effect of nudge frequency on decision outcomes. Thus, Hypothesis 3b was not supported.

Table 11: Mediation Analysis for Hypothesis 3.b.

Path	Estimate	Std. Error	z-value	p-value
Nudge Frequency → Threat (a)	0.044	0.121	0.36	.717
Anger → Budget Contribution (b)	-0.228	0.085	-2.68	.007
Nudge Frequency → Budget Contribution (c')	0.241	0.159	1.51	.130
Indirect Effect ($a \times b$)	-0.010	0.028	-0.36	.719
Total Effect ($c' + ab$)	0.231	0.161	1.43	.152

V.VI. Hypothesis 4

Hypothesis 4 proposed that the negative effect of high-frequency nudges on environmentally favorable decisions would be amplified when nudges were transparent rather than nontransparent. To examine this interaction effect, an ordinal logistic regression was conducted, including the main effects of nudge frequency and transparency, their interaction, and two control variables: environmental attitudes and completion of a sustainability course.

The results indicated a significant main effect of nudge transparency ($B = 0.88, SE = 0.40, t = 2.21, p = .027$), suggesting that transparent nudges were associated with higher budget contributions. The main effect of nudge frequency was not statistically significant ($B = 0.65, p = .104$). Most importantly, the interaction effect between nudge frequency and transparency was negative but non-significant ($B = -0.79, SE = 0.56, t = -1.42, p = .156$), indicating that the hypothesized exacerbating effect of transparency under high frequency was not statistically supported.

When the model was estimated without control variables, the interaction term was significant; however, the addition of covariates attenuated this effect, suggesting that individual-level environmental attitudes may be a more influential determinant of environmental decision-making than nudge configuration. In line with this, NEP scores remained a strong and positive predictor of pro-environmental decision-making ($B = 1.12, p < .001$), while sustainability course completion did not predict contribution levels ($p = .661$) (see Table 12).

Overall, although the direction of the interaction effect was consistent with theoretical expectations, the effect did not reach statistical significance once individual differences were accounted for. Thus, Hypothesis 4 was not supported.

Table 12: Ordinal Logistic Regression for Hypothesis 4

Predictor	Estimate	Std. Error	t value	p-value
Nudge Transparency	0.877	0.397	2.21	.027
Nudge Frequency	0.646	0.397	1.63	.104
Pro-Environmental Attitudes	1.121	0.299	3.75	<.001

Predictor	Estimate	Std. Error	t value	p-value
Sustainability Course	0.131	0.298	0.44	.661
Nudge Transparency × Nudge Frequency (Interaction)	-0.788	0.555	-1.42	.156

Threshold	Estimate	Std. Error	t value
1	2	0.586	1.121
2	3	4.945	1.105

In summary, the results of this study offer partial support for the proposed hypotheses. The presence of any nudge significantly increased environmentally favorable decisions, supporting Hypothesis 1. However, the specific characteristics of nudges, transparency and frequency did not produce significant main or interaction effects on budget contributions when individual differences were controlled. Moreover, while perceived threat and anger significantly predicted lower support for the pro-environmental initiative, they did not mediate the effects of transparency or frequency as hypothesized. Notably, pro-environmental attitudes consistently emerged as a strong predictor across all models, highlighting the central role of individual values in shaping decision outcomes. Together, these findings highlight the complexity of designing effective nudges in organizational contexts and suggest that structural features of nudges may be less influential than previously assumed when individual-level differences are taken into account. The following chapter discusses these results in light of existing theory, examines their practical and theoretical implications, and reflects on the limitations and directions for future research.

CHAPTER VI

DISCUSSION

This chapter discusses and interprets the findings of the study in light of existing theoretical frameworks, prior empirical research, and practical considerations. It aims to provide a deeper understanding of how nudge characteristics, namely transparency and frequency, influence environmental decision-making within organizational contexts. By exploring not only whether these variables affected sustainable choices but also how they interacted with psychological constructs such as perceived threat *and* anger, the chapter bridges insights from behavioral science, organizational theory, and sustainability research.

At the core, this thesis aims to address a growing question of *How do nudge characteristics, particularly transparency and frequency, affect environmental decision-making in organizations?* The research's experimental design, with its 2x2 between-subjects factorial structure, allowed for the systematic manipulation of two main characteristics of nudges. By measuring not only participants' pro-environmental behavior but also their values and reactions, the study was positioned to uncover both behavioral effects and underlying psychological mechanisms behind nudge applications within organizational contexts.

The results, while partially aligned with theoretical expectations, also revealed unexpected patterns. The most robust finding was that any form of nudging, regardless of its transparency or frequency, significantly increased support for environmentally favorable decisions compared to no nudge at all. However, contrary to what might be expected based on prior discussions around ethical design and information salience, the specific design variations (transparency and frequency) did not significantly enhance or diminish this effect. Moreover, while psychological constructs such as perceived threat and anger were significantly associated with behavioral outcomes, they did not mediate the effects of the nudge characteristics. These details suggest that while nudges are generally effective tools, their effectiveness does not necessarily increase with more transparent or frequent exposure and, in some cases, may even be complicated by emotional reactions and individual values.

This chapter is organized around three main objectives: First, it outlines the theoretical contributions of the study, situating the findings within the broader academic literature on nudge theory, decision-making, and micro-level CSR. Second, it explores the managerial and societal implications, providing actionable insights for policymakers designing behavioral interventions in corporate sustainability contexts. Finally, the chapter reflects on the limitations of the research design and execution and proposes future research directions that could extend, refine or challenge the conclusions drawn in this study. While following this outline, the chapter emphasizes that the effectiveness of nudging is not merely a technical question of what works, but also a psychological and ethical question of for whom, under what conditions, and at what cost. As organizations continue to incorporate behavioral insights into their sustainability strategies, understanding these dynamics becomes even more crucial, not only for

promoting environmentally responsible behavior but also for doing it in ways that are ethical and effective.

VI.I. Theoretical Contributions

This research potentially offers several key theoretical contributions to the fields of behavioral science, organizational sustainability, and the micro-foundations of corporate social responsibility. Specifically, it enriches the growing literature on how psychological and structural features of nudges shape individual-level sustainability decisions in organizational settings. By empirically testing how nudge transparency and frequency influence environmental decisions, this study intends to bring new insights into the domain of behavioral science and sustainability.

The first major contribution is related to the consistent support for Hypothesis 1, which showed that the presence of a nudge was significantly sufficient to increase the support for environmentally favorable options. Participants exposed to any nudge condition in scenarios 1,2, and 3 allocated more of their hypothetical departmental budget toward a sustainability initiative than those in the control group. This aligns with earlier research on the power of default settings, salience, and behavioral prompts in influencing individual behavior (Thaler & Sunstein, 2008; Allcott & Rogers, 2014). It also underscores the core premise of nudge theory: small changes in how options are presented can lead to substantial shifts in decision-making without the need for coercion or incentives.

This contribution also refines our understanding of nudge effectiveness. Notably, Hypotheses 2a and 3a, which predicted main effects of transparency and frequency, were not supported. These findings challenge a common assumption in both ethical and

practical discussions around nudging: that greater transparency and higher salience, through frequency, automatically lead to better outcomes. From a theoretical standpoint, this invites a more cautious view of nudge enhancements. While transparency is often supported for ethical reasons (Smith et al., 2013; Paunov et al., 2019), and frequency is believed to enhance message retention and action (Damgaard & Gravert, 2018), neither produced significant differences in pro-environmental contributions in this experiment, although the research expected negative effects through backfiring. It is also important to note that the lack of support for these hypotheses does not confirm the alternative hypotheses, but instead suggests that transparency and frequency may not be straightforwardly effective or harmful, it highlights the complexity and context sensitivity of nudge effects in managerial settings.

The study also delves into the psychological underpinnings of these effects, testing Hypotheses 2b and 3b, which posited perceived threat and anger as mediators of the effects of transparency and frequency, respectively. Although neither hypothesis was supported, the findings are theoretically noteworthy. Both threat and anger significantly predicted lower environmental contributions, suggesting these emotional responses are relevant to understanding decision outcomes. However, they did not mediate the relationship between the independent variables and the behavioral outcome. This non-significant mediation effect suggests the need to explore additional explanatory mechanisms.

Another theoretical finding relates to Hypothesis 4, which examined the interaction between transparency and frequency. The analysis revealed a directional trend: participants in the transparent-high frequency condition allocated the lowest average budget to sustainability, supporting theoretical concerns about backfire effects when

nudges are seen as too controlling or overwhelming. However, this interaction, as expected with the hypothesis, lost its statistical significance when individual-level environmental attitudes (New Ecological Paradigm (NEP) scale) were controlled for. This is a crucial insight, as it suggests that individual values may override the effects of structural features in shaping sustainability behavior. Participants with strong pro-environmental beliefs contributed more across all conditions, indicating that internalized values, rather than external nudges, may drive more of environmental decision-making in certain contexts. As the results of this study reveal, NEP scores were among the most significant predictors of behavior across all experimental conditions, which underscore the strength of personal environmental values in shaping sustainable decisions. This finding suggests that nudges may be more effective when aligned with or reinforcing such internal values, rather than attempting to override them.

In this sense, the study combines two different domains of organizational behavior and micro-CSR literature. While much of the existing literature on CSR focuses on macro-level strategies (Aguinis & Glavas, 2012; Gond & Moser, 2021), this research draws attention to the individual decision-maker and highlights how subtle features of choice architecture interact with personal values and emotions. It advances the theoretical conversation around bounded rationality (Simon, 1955; Kahneman, 2011) and cognitive-affective trade-offs in managerial judgment, showing that even rational-seeming decisions (e.g., budget allocation) are subject to nonconscious influences and emotional responses. Recent debates in decision science further challenge the sufficiency of traditional bounded rationality frameworks by introducing motivational dimensions of reasoning. As Kurdoglu et al. (2022) argue, under conditions of extreme uncertainty, decision-makers may rely not on logic or heuristics, but on motivationally irrational or emotionally charged

reasoning to break inertia and initiate action. This reframing is especially relevant in sustainability contexts, where decision-making involves ethical and long-term trade-offs. It also suggests that influencing behavior may require more than simply optimizing choice architecture, it may demand acknowledging the deeper psychological and motivational forces at play. Future research should continue to explore how bounded rationality intersects with emotional, identity-based, or motivational rationality to shape sustainable organizational behavior.

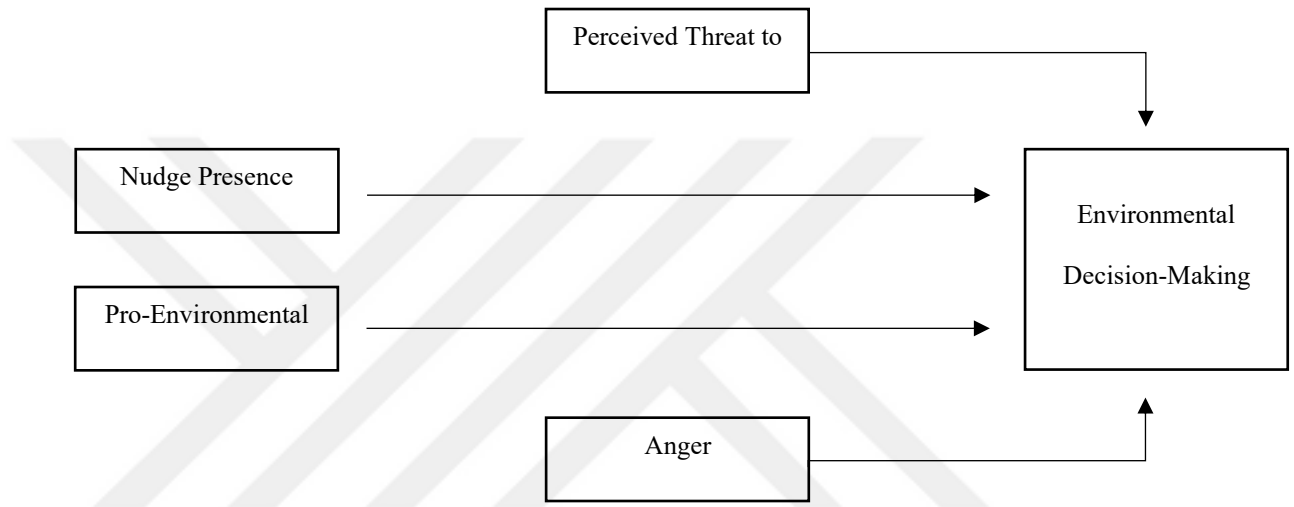
Finally, the study makes a methodological contribution by integrating a between-subjects experimental design with mediation analysis based on regression-based approaches (Baron & Kenny, 1986), and by employing ordinal logistic regression to analyze the main and interaction effects on an ordinal outcome variable. The use of ordinal logistic regression, rather than simpler mean comparisons, allowed for a more statistically precise modeling of the dependent variable while preserving the ordinal nature of the budget allocation levels. Furthermore, the inclusion of covariates such as pro-environmental attitudes and prior coursework in sustainability increased the robustness of the findings, helping to isolate the sole effects of the experimental manipulations while controlling for individual-level differences. By accounting for these variables, the models better revealed the behavioral effects, rather than the confounding influences of individual values or educational background. Together, these methodological choices enhance the ecological and statistical validity of the study and create a replicable framework for evaluating behavioral interventions in realistic organizational contexts. However, these contributions should be interpreted as potential avenues for methodological refinement rather than conclusive validations, given the exploratory nature of the study and the mixed pattern of hypothesis support.

Building on the empirical findings of this study, a revised conceptual model has also been developed to reflect the relationships that were actually supported by the data. As illustrated in Figure 3, the most robust and consistent predictors of environmental decision-making were the presence of a nudge and participants' pro-environmental attitudes, as measured by the NEP scale. These findings suggest that while structural interventions like nudges are effective in prompting sustainability-oriented behavior, individual values remain a central force in shaping decision outcomes. Indeed, NEP scores emerged as the most significant predictor across all models, reinforcing the idea that internalized environmental concern may override or amplify the effects of external behavioral cues. This finding also reflects prior research emphasizing the importance of aligning interventions with personal values to maximize their effectiveness.

In addition to these drivers, emotional responses, particularly perceived threat to freedom and anger, were found to significantly and negatively predict environmental decision-making, even though they did not function as mediators. This complicates the straightforward application of behavioral tools and highlights the emotional costs that may arise even from well-intentioned nudges. While neither transparency nor frequency of nudges significantly influenced behavior on their own, the presence of negative affective reactions suggests that how a nudge is received emotionally may shape its success or failure. These insights support a more nuanced, psychologically sensitive approach to behavioral intervention design, one that accounts for individual-level differences in both values and emotions rather than relying solely on the formal features of the nudge. The revised model thus offers a more grounded, empirically informed framework for understanding sustainable decision-making in

organizational contexts to move beyond theoretical assumptions toward practical, human-centered design.

Figure 3: Revised Research Model



VI.II. Managerial & Societal Implications

Beyond academic contributions, the findings of this study carry significant implications for managerial practice and broader societal efforts to promote CSR within organizations. Firstly, the support for Hypothesis 1 underscores the practical efficacy of even basic nudges in stimulating pro-environmental behavior. This finding is both encouraging and actionable for managers seeking low-cost, scalable solutions to promote sustainability. In many organizations, the barriers to implementing more environmental practices are not material but psychological, as employees may lack the salience or cognitive ability to prioritize environmental behavior against competing demands. This

study shows that subtle interventions can meaningfully increase support for such behaviors.

Second, the findings warn us against assuming that more information (transparency) or repeated reminders (frequency) necessarily increase or decrease sustainable behavior. While Hypotheses 2a and 3a predicted that transparent or high-frequency nudges would reduce pro-environmental contributions due to psychological reactance or annoyance, these hypotheses were not supported. However, these features did not significantly enhance contributions either. The absence of significant effects should not be interpreted as evidence that these characteristics are universally ineffective but rather as an indication that their impact may be conditional on factors not captured in this study. In many corporate settings, particularly those that already have frequent sustainability messaging, such features may simply be filtered out, leading to no tangible effect. These findings emphasize the importance of shaping nudges to the organization environment and suggest that context-sensitive designs that avoid overexposure or over-explanation may be preferable, not because transparency or frequency backfire, but because they may be ignored altogether when not thoughtfully tailored.

The emotional effects observed in the study also have direct managerial relevance. Even though threat and anger did not mediate the structural variables' effects, their negative associations with budget contributions are important. In practice, this means that nudges that elicit feelings of annoyance or pressure can lead to behavioral disengagement. This aligns with findings from reactance theory (Brehm, 1966) and has significant implications for how managers frame sustainability communications. In this regard, organizations may benefit from pretesting emotional reactions to nudge campaigns or incorporating feedback mechanisms to reduce unintended backlash. Rather than

emphasizing obligation, nudges should frame sustainable behaviors as empowering, value-aligned choices. Emphasizing shared purpose, agency, and voluntary engagement may help mitigate feelings of threat or irritation.

Another critical implication lies in the robustness of NEP scores as predictors of behavior. Across all models, environmental attitudes remained the strongest and most consistent determinant of sustainability-related decisions. For managers, this underscores the importance of audience segmentation. Rather than deploying the same nudges to an entire organization, internal sustainability campaigns could be tailored to individual differences in values and attitudes. For instance, employees identified through surveys as environmentally moderate might benefit more from nudges than highly engaged or disengaged individuals. This personalization mirrors approaches in consumer behavior and could be adapted to organizational behavior. In terms of organizational learning, the results also suggest the need for feedback loops in nudge design. Rather than rolling out interventions based solely on best practices or intuition, firms should consider piloting different nudge formats and measuring employee responses, including emotional reactions, before implementing. Incorporating employee feedback into the design process can enhance both the effectiveness and legitimacy of behavioral interventions.

At the societal level, these findings contribute to ongoing debates about behavioral governance and the ethics of influencing individual choices. While some scholars warn against the use of nudges as covert manipulation (Bovens, 2009), others argue for transparent, autonomy-preserving design. This study complicates that debate by showing that transparency may not always help and could even backfire under certain conditions. The results suggest a need for more sophisticated frameworks for ethical nudging, ones

that consider not only intent and disclosure but also emotional consequences and audience response.

In the context of climate action and sustainability policy, the findings reinforce the idea that individual-level interventions are necessary but insufficient. Nudges can be powerful tools for activating short-term pro-environmental preferences, but their impact depends on core values, emotional responses, and the broader organizational culture. Policymakers and institutions that rely on nudges must therefore complement them with structural supports (e.g., infrastructure, incentives) and value-shaping efforts (e.g., education, cultural change) to observe effects in the long term. Furthermore, this study highlights the importance of ethical transparency not just in disclosing nudge intent but also in evaluating how such disclosures interact with individuals' pre-existing attitudes and emotional reactions.

In sum, the study offers managers and policymakers a set of nuanced insights: monitoring emotional responses by avoiding overexposure, tailoring interventions to audience segments, and embedding behavioral tools within broader systems of organizational learning and support. These recommendations can help ensure that nudges serve not only as effective behavior-change tools but also as ethically responsible and emotionally intelligent components of sustainability strategy within organizations.

VI.III. Limitations & Directions for Future Research

Despite the contributions outlined above, this study has several limitations that should be acknowledged, along with corresponding directions for future research. First, the experimental design relied on vignettes, which, while ecologically designed to mimic real-life scenarios, do not capture the full complexity of actual behavior in workplace

settings. Vignette-based studies offer strong internal validity and allow for precise manipulation of independent variables, but they lack the behavioral realism that comes from observing actual decisions in dynamic, interactive environments. Future research could extend these findings through field experiments in real organizations, where variables such as social norms, leadership, and team dynamics play a larger role.

Second, the sample population consisted of undergraduate business students, which may limit generalizability. While these participants are future managers and were likely familiar with business concepts, they differ from actual decision-makers in terms of experience, risk aversion, and responsibility. Professional decision-makers might respond differently to nudges due to higher stakes, accountability structures, or exposure to prior nudging attempts. Future research should replicate the study with more diverse and representative samples, including mid-level managers, sustainability officers, and cross-functional teams.

Third, the short-term nature of the intervention means that some effects, especially those related to frequency, may have been underestimated. Nudges deployed in organizations often occur over weeks or months, and it is in these extended timeframes that nudge fatigue or annoyance costs are most likely to emerge. Longitudinal studies could track how employees respond to repeated nudges over time, measuring not only initial behavior change but also sustainability of action and emotional responses of long-run.

Fourth, the study relied on self-reported behavioral intentions (budget allocation) rather than actual behavior. Although intention is a reliable predictor in many decision contexts, it remains susceptible to social desirability bias, especially in domains like environmental behavior. Participants may have overstated their willingness to allocate

budget to sustainability due to perceived expectations. Moreover, in organizational settings where environmental decisions have real budgetary consequences, behavioral patterns may differ substantially from those observed in hypothetical scenarios. Future studies should use a larger scale of options presented to the participants or even explore behavioral outcome measures, such as login data on sustainability dashboards, attendance in green programs, or actual budgetary shifts in controlled environments.

Additionally, the psychological constructs measured, threat and anger, represent only a subset of the possible emotional and cognitive mediators. Other variables, such as perceived autonomy, trust, moral licensing, or value alignment, may offer more precise explanations for how nudges succeed or fail. For instance, perceived autonomy can directly affect the acceptance of a nudge, while trust in the source of the intervention may condition whether the message is viewed as helpful or manipulative. Likewise, moral licensing could lead individuals to reduce future pro-environmental actions if they feel they have already done enough after complying with a nudge. These alternative mediators may better capture how individuals interpret and react to nudge features like transparency and frequency. Therefore, expanding the mediator model in future research could provide deeper insights into the psychological mechanisms at play. Cross-cultural studies also represent another promising avenue for future work. Norms around transparency, authority, and influence differ substantially across cultures. What is perceived as helpful information in one setting might be seen as intrusive or manipulative in another. Studies conducted in non-Western contexts or comparing multiple national cultures could help clarify the boundary conditions of nudge effectiveness.

Lastly, while this study offers valuable insights into how individuals respond to nudges, it is important to acknowledge the methodological constraints and

challenges encountered during the experimental process itself. Designing a controlled experiment that simulates organizational decision-making within an academic setting presents inherent trade-offs. The use of vignette-based scenarios and a one-time budget allocation task allowed for experimental control, but inevitably limited the capacity to observe long-term behavioral dynamics such as habituation, fatigue, or sustained attitude change. Despite these challenges, the study made efforts to ensure internal validity and realism, including conducting manipulation checks with other graduate students to confirm that the experimental conditions were clear, credible, and meaningful. These efforts improved the robustness of the findings, yet the short-term, controlled nature of the experiment still limits its ability to fully reflect how nudge characteristics perform in real organizational life over time. Future research should therefore prioritize longitudinal and embedded field designs to explore how nudge effects evolve or diminish over time.

In conclusion, this thesis highlights that while nudges can be effective in driving organizational behavior toward CSR, their design must be context-sensitive, emotionally aware, and value-aligned. Simple interventions can be powerful, but they are not universally effective, nor are they immune to resistance. Therefore, the study invites a more careful, tailored approach to behavioral design that considers individual differences and organizational dynamics by shifting from the question of *what works?* to the more reflective inquiry of *for whom, when, and at what cost?*

CHAPTER VII

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CHAPTER VIII

APPENDICES

VIII.I. Appendix A: Experimental Design Materials

Scenario I

You are a manager at a mid-sized manufacturing company committed to improving its sustainability practices. The company has recently proposed an energy conservation initiative to switch to energy-efficient machinery. This initiative aligns with the company's goal of reducing its carbon footprint by 30% over the next five years while ensuring financial stability.

You have been asked to allocate a portion of your departmental budget to this initiative. Some information about the initiative is provided below to help your decision-making process. Over the past 3 months, the company has shared 6 emails about this initiative in the company. Please take these into account as you allocate your departmental budget.

Environmental Impact: The new machinery reduces energy consumption by up to 40%, directly contributing to the company's net-zero emissions target.

Economic Impact: Initial costs are high, but the investment is expected to yield savings in operational energy costs over 7–10 years.

The initiative encourages managers to allocate funds for purchasing energy-efficient

machinery, which will reduce energy consumption and operational costs.

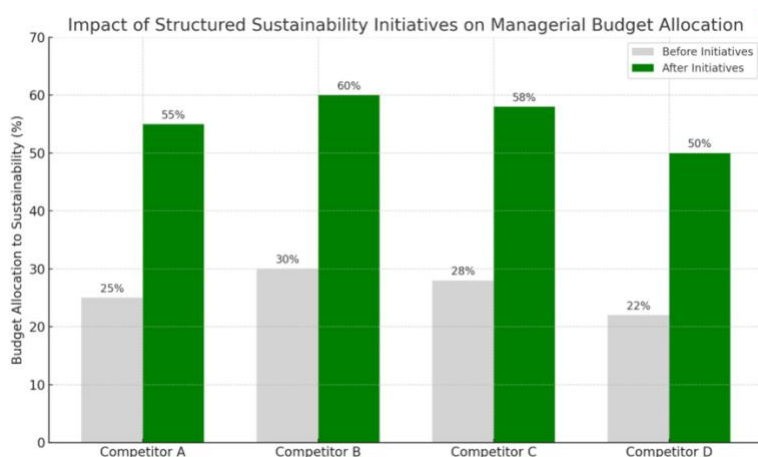
Energy-efficient machinery has been shown to significantly lower long-term expenses. Research across industries indicates that companies investing in sustainable technology often see improved financial performance due to reduced energy waste and maintenance costs.

The company supports this initiative because it aligns with its long-term sustainability goals, enhances its corporate reputation, and helps meet environmental regulations.

Many leading firms in our sector have adopted similar energy conservation measures, strengthening their reputation as sustainability leaders. Industry trends suggest that aligning business operations with environmental responsibility can attract partners and investors.

Research suggests that when managers are provided with clear, structured sustainability initiatives that have financial justifications, they are more likely to allocate resources toward long-term environmental goals.

The results of this research are displayed below:



How much of the departmental budget would you like to allocate to this energy-conserving policy?

Low Contribution = 1: You choose to allocate a small portion of your budget. This reflects a limited investment in sustainability, with a focus on preserving short-term departmental resources rather than prioritizing long-term energy savings, financial gains, and corporate reputation benefits.

Moderate Contribution = 2: You choose to allocate a moderate portion of your budget. This reflects a balanced approach, supporting the company's sustainability goals and recognizing future cost savings, while also maintaining flexibility to address current departmental needs.

High Contribution = 3: You choose to allocate a substantial portion of your budget. This reflects a strong commitment to advancing the company's sustainability strategy, achieving long-term operational savings, and strengthening the company's reputation as an industry leader in environmental responsibility.

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Scenario II

You are a manager at a mid-sized manufacturing company committed to improving its sustainability practices. The company has recently proposed an energy conservation initiative to switch to energy-efficient machinery. This initiative aligns with the company's goal of reducing its carbon footprint by 30% over the next five years while ensuring financial stability.

You have been asked to allocate a portion of your departmental budget to this initiative. Some information about the initiative is provided below to help your decision-making process. Over the past 3 months, the company has shared an email about this initiative in the company. Please take these into account as you allocate your departmental budget.

Environmental Impact: The new machinery reduces energy consumption by up to 40%, directly contributing to the company’s net-zero emissions target.

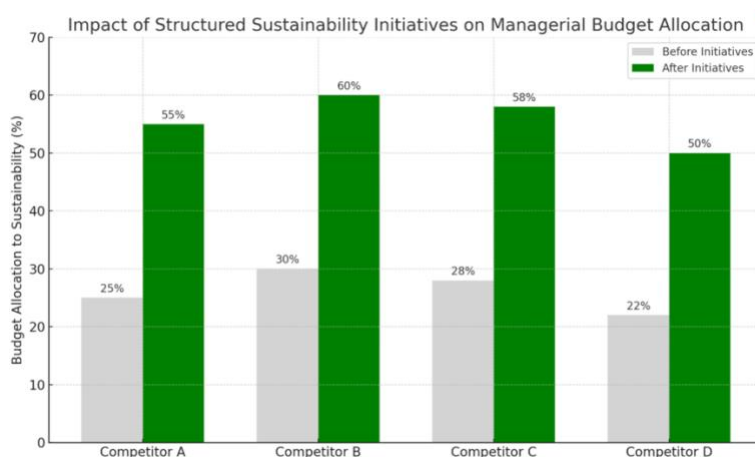
Economic Impact: Initial costs are high, but the investment is expected to yield savings in operational energy costs over 7–10 years.

The initiative encourages managers to allocate funds for purchasing energy-efficient machinery, which will reduce energy consumption and operational costs.

The company supports this initiative because it aligns with its long-term sustainability goals, enhances its corporate reputation, and helps meet environmental regulations.

Research suggests that when managers are provided with clear, structured sustainability initiatives that have financial justifications, they are more likely to allocate resources toward long-term environmental goals.

The results of this research are displayed below:



How much of the departmental budget would you like to allocate to this energy-conserving policy?

Low Contribution = 1: You choose to allocate a small portion of your budget. This reflects a limited investment in sustainability, with a focus on preserving short-term departmental resources rather than prioritizing long-term energy savings, financial gains, and corporate reputation benefits.

Moderate Contribution = 2: You choose to allocate a moderate portion of your budget. This reflects a balanced approach, supporting the company's sustainability goals and recognizing future cost savings, while also maintaining flexibility to address current departmental needs.

High Contribution = 3: You choose to allocate a substantial portion of your budget. This reflects a strong commitment to advancing the company's sustainability strategy, achieving long-term operational savings, and strengthening the company's reputation as an industry leader in environmental responsibility.

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Scenario III

You are a manager at a mid-sized manufacturing company committed to improving its sustainability practices. The company has recently proposed an energy conservation initiative to switch to energy-efficient machinery. This initiative aligns with the company's goal of reducing its carbon footprint by 30% over the next five years ensuring stability.

You have been asked to allocate a portion of your departmental budget to this initiative. Some information about the initiative is provided below to help your decision-making process. Over the past 3 months, the company has shared 6 emails about this initiative in the company. Please take these into account as you allocate your departmental budget.

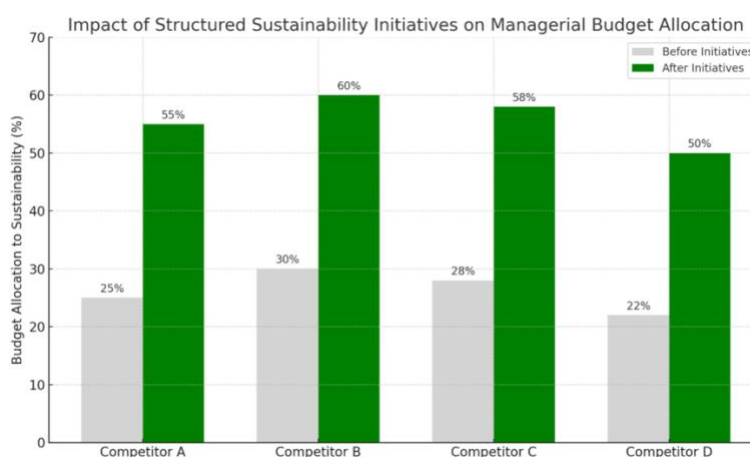
Environmental Impact: The new machinery reduces energy consumption by up to 40%, directly contributing to the company’s net-zero emissions target.

Economic Impact: Initial costs are high, but the investment is expected to yield savings in operational energy costs over 7–10 years.

Energy-efficient machinery has been shown to significantly lower long-term expenses. Research across industries indicates that companies investing in sustainable technology often see improved financial performance due to reduced energy waste and costs.

Many leading firms in our sector have adopted similar energy conservation measures, strengthening their reputation as sustainability leaders. Industry trends suggest that aligning business operations with environmental responsibility can attract partners and investors.

The results of a research called *Impact of Structured Sustainability Initiatives on Managerial Budget Allocation* are displayed below:



How much of the departmental budget would you like to allocate to this energy-conserving policy?

Low Contribution = 1: You choose to allocate a small portion of your budget. This reflects a limited investment in sustainability, with a focus on preserving short-term departmental resources rather than prioritizing long-term energy savings, financial gains, and corporate reputation benefits.

Moderate Contribution = 2: You choose to allocate a moderate portion of your budget. This reflects a balanced approach, supporting the company's sustainability goals and recognizing future cost savings, while also maintaining flexibility to address current departmental needs.

High Contribution = 3: You choose to allocate a substantial portion of your budget. This reflects a strong commitment to advancing the company's sustainability strategy, achieving long-term operational savings, and strengthening the company's reputation as an industry leader in environmental responsibility.

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Scenario IV

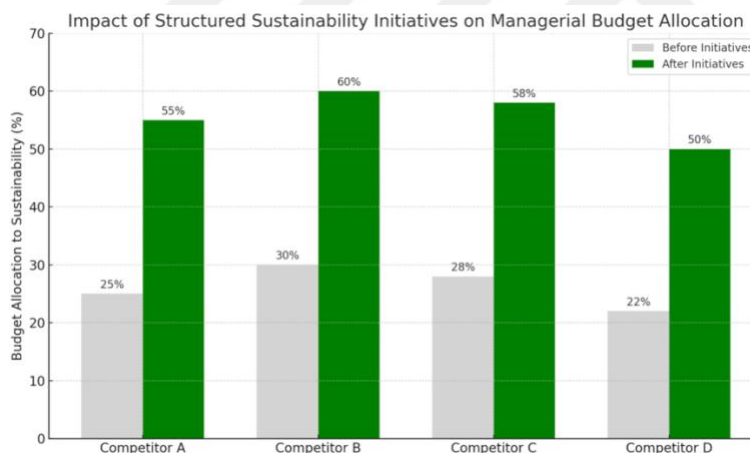
You are a manager at a mid-sized manufacturing company committed to improving its sustainability practices. The company has recently proposed an energy conservation initiative to switch to energy-efficient machinery. This initiative aligns with the company's goal of reducing its carbon footprint by 30% over the next five years while ensuring financial stability.

You have been asked to allocate a portion of your departmental budget to this initiative. Some information about the initiative is provided below to help your decision-making process. Over the past 3 months, the company has shared 6 emails about this initiative in the company. Please take these into account as you allocate your departmental budget.

Environmental Impact: The new machinery reduces energy consumption by up to 40%, directly contributing to the company's net-zero emissions target.

Economic Impact: Initial costs are high, but the investment is expected to yield savings in operational energy costs over 7–10 years.

The results of a research called *Impact of Structured Sustainability Initiatives on Managerial Budget Allocation* are displayed below:



How much of the departmental budget would you like to allocate to this energy-conserving policy?

Low Contribution = 1: You choose to allocate a small portion of your budget. This reflects a limited investment in sustainability, with a focus on preserving short-term departmental resources rather than prioritizing long-term energy savings, financial gains, and corporate reputation benefits.

Moderate Contribution = 2: You choose to allocate a moderate portion of your

budget. This reflects a balanced approach, supporting the company's sustainability goals and recognizing future cost savings, while also maintaining flexibility to address current departmental needs.

High Contribution = 3: You choose to allocate a substantial portion of your budget. This reflects a strong commitment to advancing the company's sustainability strategy, achieving long-term operational savings, and strengthening the company's reputation as an industry leader in environmental responsibility.

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VIII.II. Appendix B: Questionnaire Items

Questionnaire on Covariates

What is your gender?

What is your age?

Have you the course MAN 409 Sustainability and Social Impact in Business?

Questionnaire on Pro-Environmental Behavior (Derived from Dunlap et al. (2000))

Revised New Ecological Paradigm (NEP) Scale

Please indicate to what extent do you agree with the following statements on a 5-point Likert scale that ranges from the statement "strongly disagree" to "strongly agree".

We are approaching the limit of the number of people the Earth can support.

Humans have the right to modify the natural environment to suit their needs.

When humans interfere with nature it often produces disastrous consequences.

Human ingenuity will insure that we do not make the Earth unlivable.

Humans are seriously abusing the environment.

The Earth has plenty of natural resources if we just learn how to develop them.

Plants and animals have as much right as humans to exist.

The balance of nature is strong enough to cope with the impacts of modern industrial nations.

Despite our special abilities, humans are still subject to the laws of nature.

The so-called “ecological crisis” facing humankind has been greatly exaggerated.

The Earth is like a spaceship with very limited room and resources.

Humans were meant to rule over the rest of nature.

The balance of nature is very delicate and easily upset.

Humans will eventually learn enough about how nature works to be able to control it.

If things continue on their present course, we will soon experience a major ecological catastrophe.

Questionnaire on State Reactance (Derived from Bruns et al. (2018))

Perceived Threat to Freedom

Please indicate to what extent do you agree with the following statements on a 5-point Likert scale that ranges from the statement “strongly disagree” to the statement “strongly agree”.

The information given for the initiative threatened my freedom to choose.

The information given for the initiative tried to make a decision for me.

The information given for the initiative tried to manipulate me.

The information given for the initiative tried to pressure me.

Anger

Please indicate to what extent do you agree with the following statements on a 5-point Likert scale that ranges from the statement “Not at all” to the statement “Very”.

Please indicate how irritated you were with regard to the given information about the initiative. Please indicate how angry you were with regard to the given information about the initiative.

Please indicate how annoyed you were with regard to the given information about the initiative. Please indicate how aggravated you were with regard to the given information about the initiative.