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The Dilution Effect: A Barrier to Sustainable Consumption in B2B Markets?

An Experimental Study of B2B Decision-Makers' Evaluation of a Sustainable Printer

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Abstract

Previous research indicates that individuals have a tendency to perceive sustainable and functional attributes as mutually exclusive, even if this perception does not objectively reflect reality. This misconception can lead them to prefer conventional products over green alternatives, under the belief that businesses prioritizing sustainability might compromise the functionality of the product. This perception has contributed to a discrepancy where individuals express a demand for green products, but this is not necessarily reflected in their purchasing decisions. In this research, we propose the psychological phenomenon known as the 'dilution effect' as a possible explanation for this misconception. It suggested that individuals may categorize the functional attribute of a product as 'diagnostic' or relevant information, while perceiving the sustainable attribute as 'nondiagnostic' information (irrelevant). As a result, when marketers present both attributes, the nondiagnostic information dilutes the diagnostic information, leading to the perception that the product's functionality is diminished.

We conduct a single study to investigate the presence of a dilution effect and a potential method to avoid it within the business-to-business (B2B) market by testing the relationship between communication types and brand attitude. We use an A/B/C monadic testing approach (n = 100) and ask respondents to evaluate an advertisement of a fictional printer. We first examine the presence of the dilution effect by testing whether communicating a mix of unrelated functional and sustainable attributes lowers the brand attitude compared to the presentation of only the functional attribute. Within the same study, we also explore whether communicating that the sustainable benefits support the functional benefits can be a method to prevent decisions-makers from experiencing the dilution effect.

Our findings challenge our predictions; in fact, they are inconsistent with our initial expectations. The results suggest that when companies in B2B markets communicate a mix of unrelated functional and sustainable, the effects of the functional attributes on brand attitude are *higher* than communication focusing only on functional benefits. Interestingly, communicated related benefits seems to result in the *lowest* brand attitude.

Table of Contents

Table of Tables

Table of Figures

Chapter 1: Introduction

1.1 Background

Over the past few decades, there has been a significant normative shift in society toward environmental concerns. This shift is largely attributed to growing environmental consciousness among stakeholders. Consequently, this consciousness has compelled businesses to integrate environmental and social considerations into their strategies, operations, and product offerings. Kumar and Christodoulopoulou (2014) identifies the crucial role of these stakeholders in this transformation, suggesting they significantly influence a company's adoption of sustainability practices and environmental policies. Jørgensen et. al. (2021) provides further insight into this dynamic, revealing that comprehensive sustainability improvement has a positive effect on individuals' trusting belief in a company. This influence is mediated by individuals' perceived innovativeness, driven by their perception of a firm's capability to implement corporate social responsibility. This perception, in turn, impacts their satisfaction with the brand and its credibility. Building on this, it becomes evident why Sharma (2020) argues that stakeholders serve as one of the driving forces behind the implementation of green marketing strategies. Thus, it seems natural to assume that transparency and communication play a role in shaping individuals' belief in how companies utilize their resources to incorporate sustainability into their activities.

In response to the necessity of restructuring their traditional approach, companies are moving away from focusing solely on economic performance and are instead adopting the triple bottom line approach. This strategy allocates equal importance to environmental, social, and economic considerations; in a sense, one could argue that the divergent ideas of Milton Friedman and Edward Freeman are beginning to align. Rao and Holt (2005) suggest that incorporating green supply chains can improve competitiveness and economic performance. In addition, recent studies in the business-to-business (B2B) context support the notion that prioritizing sustainability can improve a manufacturer's image and lead to enhanced market performance (Vesal, 2021). In this context, it seems that the incorporation and offering of green products have become a minimum requirement for companies to remain competitive. Consequently, businesses worldwide have embraced their responsibility to promote sustainability and have expanded their product lines to include green alternatives to their conventional counterparts.

These greener products are characterized by sustainable practices during their production, consumption, and disposal stages (Chen, 2010).

In line with the discussion, Kotler (2011) predicted an increase in the number of consumers who prefer to support sustainable businesses. This prediction is reinforced by Skard et al. (2020), who found that about one-third of consumers prefer sustainable brands. However, recent research has revealed an intriguing inconsistency. There appears to be an intention-behavior gap between consumers expressed environmental concern and their actual sustainable consumption behavior. Despite consumers expressing their demand for sustainability practices and green products, their purchasing decisions may not always align with these stated preferences and expectations they have for companies. Therefore, substantial research in the business-to-consumer (B2C) domain has aimed to bridge this gap by identifying the barriers influencing the discrepancy between intentions and purchase decisions.

However, there is a significant gap in the literature, as noted by Sharma (2020), who observed that the existing research has primarily been focused on the B2C context. In fact, according to Sharma (2020), only 43 articles specifically examined sustainability in the B2B context. To our knowledge, the intention-behavior gap has been largely overlooked in this context, despite the potential relevance highlighted by Kumar and Christodoulopoulou (2014). They emphasize that B2B firms, like their B2C counterparts, are also subject to pressure from stakeholders due to their growing preference for sustainable options. Thus, the issue extends to the B2B market, especially since B2B markets typically involve more extensive marketing activities, higher economic value, and resource-intensive operations that have a substantial environmental impact (Vesal, 2021).

It becomes an issue when there is a substantial gap in understanding sustainable consumption behavior in the B2B markets as the lack of insight creates uncertainty. Companies are unable to predict how the business customers will react when presented with a green alternative to their already familiarized conventional counterparts. This then places companies in a position where they are faced with a dilemma of whether to emphasize the sustainable attribute or downplay them as they are uncertain about the consumers' preferences. Without a clear understanding of this, business risk making decisions that may not align with their customers' preferences, potentially affecting their triple bottom line. Given these trends, business have become reliant on thorough market research to investigate how sustainability can be effectively communicated

to facilitate positive changes in product judgement. Despite this, the effects of such communications have not been adequately documented. This lack of documentation has led to the initiation of our study.

1.2 Purpose of the Study

The purpose of this study addresses two main objectives. First, we aim to investigate the presence of a dilution effect in B2B markets. The dilution effect is a psychological phenomenon where relevant (diagnostic) and irrelevant (nondiagnostic) information is categorized by individuals, potentially leading to a dilution of the diagnostic information. This phenomenon might explain the discrepancy observed between demand and purchasing decisions for green products in B2B markets. Second, we aim to identify a method that B2B marketers can employ to avoid the dilution effect. This forms the basis of our research questions:

RQ1: Is there evidence of a dilution effect in B2B markets?

RQ2: How can B2B marketers avoid dilution effects in B2B markets?

Based on these two objectives, the paper aims to explore different ways of communicating the sustainability and functionality attributes of a green product to enhance understanding of its effect on the brand attitude. The thesis conducts an experimental study to gain an understanding of how B2B decision-makers evaluate a green product, providing insights into their perspectives on sustainable consumption.

1.3 Structure

The thesis is structured into eight chapters, each with a specific focus, aimed at comprehensively addressing the research questions. Chapter 1 serves as an introduction, providing an overview of the background, purpose, and research questions. Continuing to Chapter 2, the literature review explores the theory behind the dilution effect and examines relevant research conducted within the field of sustainable consumption. In Chapter 3, the conceptual model is presented, along with the formulation of hypotheses. Chapter 4 explains the methodological approach, detailing the research design and justifying the choice of product. The chapter then explains the data collection procedures and the selection and

justification of measurement variables. Additionally, a descriptive summary of the collected data is provided, forming the basis for subsequent data analysis. The chapter concludes with a discussion of the reliability of the constructs and the assessment of whether the assumptions of ANCOVA are met. Chapter 5 presents the data analysis and the corresponding findings. The subsequent Chapter 6 delves into the discussion of findings, offering potential explanations for the main findings and discussing the theoretical and managerial implications of the research. Chapter 7 addresses the limitations of the study, presenting measures taken to ensure internal and external validity, and thereafter reliability. Lastly, Chapter 8 concludes the thesis and provides suggestions for future research.

Chapter 2: Literature Review

Our research is situated within the domain of Judgement and Decision Making. It is built upon the framework of behavioral economics, which has revealed and acknowledged the presence of systematic biases that drive individuals to make decisions deviating from the neoclassical viewpoint, thereby being considered irrational. Consequently, our research aims to further explore this understanding, with a specific focus on the dilution effect. The literature review of our study will explain the theory behind the dilution effect, followed by a presentation of relevant research conducted within the field of sustainable consumption. This review will provide justification for our categorization of sustainable attributes as nondiagnostic and functional attributes as diagnostic, which forms the foundation of our research.

2.1 Theory Behind the Dilution Effect

In the process of decision-making, there are two methods of evaluating information: diagnostic and nondiagnostic. Diagnostic information refers to the specific features or attributes that are relevant to the decision at hand, whereas nondiagnostic information is extraneous and unrelated to the decision. Previous research (Cantor & Mischel, 1979; Hamilton, 1979; Nisbett & Ross,1980; Tversky and Kahneman (1972;1973)) has made conflicting predictions about how individuals consider the presence of nondiagnostic information in the evaluation process of decision-making, leading to ambiguous results regarding the impact that this type of information carries.

On the one hand, researchers argue that the presence of nondiagnostic information can influence the assessment process, leading to more extreme judgments. Individuals may integrate the nondiagnostic information and perceive it to be relevant or supportive of the diagnostic information. This can be attributed to the tendency of individuals to interpret nondiagnostic information, based on, for example, pre-existing stereotypes. To illustrate this point, consider an individual who gains random facts about Germans. They may use this nondiagnostic information to validate their preconceived stereotype that Germans are efficient, even though these random facts hold no real or direct relevance to assessing efficiency. In this context, the diagnostic information acts as an initial hypothesis about the target (Germans), which is then "confirmed" by the following nondiagnostic information (Cantor & Mischel, 1979; Hamilton, 1979; Nisbett & Ross,1980).

On the other, Tversky and Kahneman (1972; 1973), as discussed by Nisbett et al. (1981), present an opposing viewpoint, known as the dilution effect, whereby the presence of nondiagnostic information makes the assessment process less extreme. This is because the nondiagnostic information reduces the perceived similarity between the target and the outcome. To illustrate this point, we refer to the example used by Nisbett et al. (1981). Suppose we want to predict whether an individual is an engineer, or a lawyer based on two pieces of information: the first being that the person enjoys mathematical puzzles and has little interest in politics, and the second is that the person is 5ft 10 in. tall, has siblings, is ambitious, and gets along well with colleagues. The first piece of information, that the person enjoys mathematics puzzles, becomes the diagnostic information, as it fits the stereotype of an engineer and reinforces the similarity between the target and the outcome, thus strengthening the predicted outcome of the person being an engineer. The second piece of information is considered nondiagnostic as it adds no value in assessing whether the person is more likely to be a lawyer or an engineer. This information does not fit any prior knowledge or stereotype of either category. As a result, it can reduce the perceived similarity between the target and the outcome, which weakens the impact of the diagnostic information on the predicted outcome. Therefore, as we are presented with both pieces of information simultaneously, it is predicted that we will experience the dilution effect. In our research, we align with this perspective and aim to substantiate it by providing evidence that supports these propositions. Therefore, we define the dilution effect as follows:

In the presence of both nondiagnostic and diagnostic information, the evaluation process and outcome become less extreme than if the decision-maker was only presented with the relevant information.

Furthermore, Grolleau et al.'s (2019) study provides a relevant example of this effect, although their results were inconsistent with the predictions of the dilution effect. Regardless of the outcome, they still stressed the need for caution in green labeling, while emphasizing the importance of further research to test the robustness of these findings. Similarly, we believe the caution surrounding green marketing stems from the way individuals weigh the information in the evaluation process. Our prediction is that individuals may categorize the sustainable attribute as nondiagnostic information, and the functional attribute as diagnostic information. Thus, when both types of information are presented together, the nondiagnostic information (sustainable attribute) may dilute the perceived similarity between the target (product being

advertised), and the outcome (individuals' evaluation of the product). This dilution effect weakens the impact of the diagnostic information (functional attribute).

Recent research has explored the mechanisms underlying the dilution effect, proposing the averaging effect as a robust psychological explanation. The model states that each piece of information is assigned a weight, and when the nondiagnostic information is added weight equal to those assigned to diagnostic information, it dilutes the individual's overall judgment (Sivanathan and Kakkar, 2017). Therefore, when individuals give equal weight to the sustainable attribute (nondiagnostic) and the functional attribute (diagnostic), the perceived value of the functional attribute is diluted, making it less weighted in the consumer decision-making process.

2.2 The Barrier of Functionality in Sustainable Consumption

2.2.1 Intention – Behavior Gap

Olsen's (2013) research provides evidence of sustainable consumption patterns when stakeholders are presented with actual trade-offs, where the attributes are mutually exclusive. Given the growing consciousness among individuals regarding sustainability, one might naturally assume that they would prefer the green alternative. However, despite individuals expressing a strong preference for the green alternatives, his research suggests that these preferences only hold true for the greenest options when considered in isolation. When an actual trade-off becomes apparent, particularly when the green attributes negatively correlate with conventional attributes, individuals' preferences shift towards the conventional alternative. This is indicated by the findings where, for one of the products studied, over 50% of respondents preferred the green alternative. However, when the trade-offs became apparent, only 25% were predicted to purchase the item. Similarly, almost 50% of respondents preferred the green alternative for another product in the study, but this dropped sharply to 12% when trade-offs became apparent.

Researchers have employed the term intention-behavior gap to capture the observed discrepancy between consumer intentions to purchase green products and the actual rates of sustainable consumption. For instance, green products can sometimes be more expensive than non-sustainable alternatives, which can be a deterrent for some consumers. While the long-term

cost savings of using sustainable products may be significant, consumers may be hesitant to pay a higher upfront cost. Additionally, sustainable products may require more effort to use or maintain than non-sustainable products, which could be a barrier for some consumers.

2.2.2 Functionality

Olsen's (2013) findings are supported by earlier literature from Luchs et al. (2010) that reinforces the idea that sustainable attributes are not necessarily perceived as valuable. This trend remains consistent, even among environmentally conscious consumers, aligning with Olsen's (2013) findings. In an effort to understand consumer preferences, Luchs et al. (2010) aims to reveal the specific type of benefit that holds the highest value for consumers within a product category. The research gave evidence that consumers associated higher product ethicality with gentleness-related attributes and lower product ethicality with strength-related attributes. When gentleness-related attributes are valued, sustainability enhances consumer's preference. However, when strength-related attributes are valued, the positive effect of product sustainability is reduced, sometimes leading to preferences for less sustainable alternatives (referred to as the "sustainability liability"). This is particularly evident when considering functionality, as the authors found that consumers perceive sustainable products in strength-related categories as less durable than their conventional counterparts, resulting in a preference for the latter. Therefore, relying on consumers' "green profile" is inadequate.

Furthermore, this particular study revealed that consumers tend to devalue green alternatives when they perceive a compromise in durability (Luchs et. al., 2010). This observation indicates that consumers commonly seem to hold the belief that there is a trade-off between sustainability and functionality. Importantly, these findings demonstrate that such perceptions are not necessarily dependent on the actual existence of a trade-off but rather based on consumers' subjective perceptions. Building upon these findings, Luchs et. al. (2012) further investigated consumer behavior when faced with the choice between superior functionality and average sustainability, and products with superior sustainability and average functionality. The study found an inverse relationship between the two factors, indicating that consumers often exhibit hesitation in selecting a product with superior sustainability over one with superior functional performance. This reluctance is driven by consumers' feelings of distress, as they are concerned about whether their minimum required threshold of functional performance is met. These findings emphasize consumers' strong value of assured functionality and their unwillingness to risk compromising this attribute, even if that compromise may not actually exist.

These findings were substantiated by the research conducted by Luchs & Kumar (2015), which demonstrated that consumers show a higher willingness to trade off hedonic value (e.g., aesthetics) for sustainability compared to the utilitarian value (e.g., functional attribute). Additionally, the study revealed that the willingness to trade off hedonic value for sustainability is moderated by product type. For instance, when consumers place higher importance on hedonic value, they become less willing to trade off this attribute for sustainability. However, the same significant findings were not observed for utilitarian attributes. The findings in this paper reaffirm that the functional attribute holds a position of high value for consumers, and they are reluctant to compromise it.

2.2.3 Functionality Inferences for Central and Peripheral Attributes

To better understand the trade-off between sustainability and functionality, it is important to consider how making a particular attribute sustainable affects the overall evaluation of a product. Given the challenges in offering entirely sustainable products, companies must decide which components to make sustainable. Previous studies have examined how consumers weigh the trade-off between sustainability and functionality based on whether the sustainable attribute is considered a central or peripheral component of the product. Keller (1993) defines central components as essential to the product's core functions, while peripheral components, such as packaging, are less related to the product's core.

Gershoff and Frels (2015) used the concept of centrality to compare how sustainable a product appears to consumers when a central or peripheral attribute is made green. They found that if a central attribute is made sustainable, consumers are more likely to view the product as green. According to Ward et al. (2000), it is suggested that consumers form their evaluations of a product based on what they perceive as the product’s central attribute, as this attribute serves as a reference point against the evaluation of the other attributes. For instance, if a central attribute is perceived to have superior or inferior functional performance, the same perception is likely to be transferred to the other attributes. Drawing from these discussions, recent research by ShabbirHusain (2022) investigated whether consumers’ perception of a product’s functional performance changed when the central attribute was made sustainable, as compared to when the peripheral attribute was made sustainable. He concluded that when sustainability was

integrated into the central attribute, respondents tended to be more skeptical about the product's functional performance compared to when the peripheral attribute was made sustainable.

Furthermore, according to Skard et al. (2020), using probabilistic consistency theory, when a central attribute becomes green, consumers are likely to perceive this as incongruent with their beliefs about its functional quality. This holds that perceptions are formed by consistent beliefs, shaped by prior expectations about the inherent characteristics of certain products. These beliefs are influenced by sociocultural messaging that frames ethical considerations (e.g., sustainability) and product strengths (e.g., functionality) as contradictory. This fosters the belief that they are mutually exclusive. The social context is then applied in product judgment, particularly in the case of sustainability, since consumers lack perfect information on a product's strength and therefore rely on sustainability as a factor to infer it (Luchs et al., 2010). Hence, if a central attribute is presented as green, there is a higher chance of negative functional perception than if a peripheral attribute is presented as green. When a core attribute becomes green, consumers' immediate assumption is that the products' strength is compromised. This is due to the expectation that the sustainable attribute, now central, will dominate the others and, in a sense, serve as the new reference point, leading to a negative inference about quality.

2.2.4 Categorization of Products

Individuals have a natural tendency to categorize products and concepts to mentally group these products (Sloman et al., 1998). This tendency may be explained by the centrality theory, which suggests that certain attributes hold more significance for a product than others. These attributes influence how consumers categorize the product. The central attribute is the determining, and more diagnostic factor, in defining the product within a category. This concept shares similarities to our previous discussion on the overall evaluation of a product, as the perception of the central attribute influences the overall impression of the product (Gershoff and Frels, 2015). Thus, categorizing products can aid consumers' evaluation of the products, as they can base it on expectations and assumptions of the category. This involves the use of mental representations and inferences to subjectively identify a product and determine its fit within a category. These mental processes depend on stored information in consumers' memory, derived from past experiences and expectations (Usrey et al., 2020).

Consumers' product evaluation depends on whether they perceive the products as typically green in the market, which is known as green product typicality. This means that if a product is marketed as green in a conventionally non-green product category, consumers' expectations of product greenness should be lower, and performance concerns among consumers should be higher (Usrey et al., 2020). To further understand the concept of green product typicality, it is essential to consider how consumers evaluate products. Consumers often evaluate products based on the perceived benefits offered, which are usually determined by their previously held product category expectations (Chandon et al., 2000). Products that offer benefits often associated with the given category are considered congruent, while products that offer new or novel attributes that misalign with the chosen category are deemed incongruent. Thus, introducing green attributes in a product category that is traditionally considered non-green may pose a higher performance risk, as consumers are less familiar with the new attribute. However, introducing a new green attribute in a category that is already considered green may reduce this risk, as consumers already have existing expectations of greenness (Usrey et al., 2020).

2.2.5 Categorization of Information

Luchs et al. (2010; 2012) and Luchs & Kumar (2015) provide robust evidence of the trade-off between sustainability and functionality as a significant barrier to consumers' sustainable consumption. Their research reveals the significant weight consumers place on the functionality of a product as it leads to the feeling of distress if they are faced with compromising it. Therefore, we propose that individuals categorize functionality as diagnostic information. In the context of the dilution effect theory, we recognize that for an attribute to be subject to dilution, consumers must perceive the other presented information as nondiagnostic.

Considering the intention-behavior gap, it has been observed that even though consumers express a preference for green alternatives, they often end up purchasing the conventional counterpart. This can be attributed to consumers' reluctance to compromise on functionality, indicating that the sustainable attribute holds less value to them compared to functionality. Therefore, when both attributes are presented simultaneously, consumers will categorize the sustainable information as nondiagnostic, as it becomes irrelevant in the product evaluation process, where ensuring the green product meets its functionality requirements takes precedence.

2.3 Dual Process Theory

The preference for conventional products can be attributed to individuals' false assumption that the green alternative negatively affects its technical performance, taste, and design quality – essentially, its functionality (Schaltegger, 2016). According to the neoclassical assumption, individuals should be rational decision-makers and able to accurately assess the two dimensions of sustainability and functionality independently (Grolleau, 2019) However, these misconceptions are influenced by the limitations inherent in human cognition, as individuals are bounded rational and susceptible to systematic errors. Therefore, the dual process theory can assist us in understanding why consumers perceive a trade-off between the two dimensions even when it does not reflect reality.

2.3.1 Theory

The dual process theory categorizes our decision-making process into two distinct methods of thinking: System 1 and System 2. The division of labor between these two systems is rooted in their inherent differences in the decision-making process. System 1 operates automatically in response to our unconscious mind allowing us to process information and make quick judgments effortlessly, often relying on heuristics. In contrast, System 2 directs attention toward mentally demanding activities that require conscious effort and analytical reasoning. It operates in a low-effort mode and becomes engaged in complex decisions when System 1 reaches its limited capacity. Therefore, both systems are necessary for effective decision-making, making neither intrinsically superior (Kahneman, 2011).

2.3.2 Context Transfer

While section 2.2 "The Barrier of Functionality in Sustainable Consumption" has been derived from previous research conducted within the B2C context, it is important to acknowledge that cognitive biases and limitations also exist within the B2B decision-making domain. As a result, we maintain that the dual process theory allows for the transfer of insights from the B2C context to the B2B context, as both contexts involve individual decision-makers. However, the cognitive effort and processing required for decision-making differ between the two contexts.

In the B2C context, evaluations are primarily driven by individuals, often relying on heuristic and intuitive inference-making associated with System 1 thinking. This observation is

consistent with the explanation that trade-offs between sustainability and other product attributes are influenced by lay theories (Skard et al., 2020). Newman et al. (2014) propose that consumers' lay theories of resource allocation may lead them to believe that a company diverted resources away from effectiveness, strength, and functionality to enhance the product's sustainable attribute. Lin and Chang (2012) also discuss consumers' reliance on lay theories to form inferences about missing or unavailable information. Consequently, consumers may infer that a green product requires advantages over conventional attributes to compensate for its perceived disadvantages.

In contrast, B2B decisions are made by amorphous groups with varying goals and objectives, and each party brings its own psychological and cultural biases to the process, leading to interesting variances in product and supplier choices. Given these complexities, individual decision-makers in the B2B context must actively avoid relying solely on their impulses, emotions, or intuitive thinking – namely System 1. We argue that due to the nature of the transaction in a B2B environment, whereby the individuals need to analyze the product's return of investments, they are more likely to engage in System 2 thinking. As the situation requires them to use more cognitive processing to avoid systematic errors in order to navigate the complex decision-making process effectively.

However, the argument is not that one system is used exclusively in one context over the other. Rather, the argument is that the fraction of System 2 thinking is more heavily weighted in a B2B context due to the multifaceted nature of the decision-making process. One reason is that System 1 thinking cannot be switched off; therefore, even decision-makers who actively engage in System 2 thinking are still susceptible to using System 1 thinking to some extent. The other reason is that these systems are interconnected, whereby System 2 thinking is primarily derived from System 1 thinking and often incorporates suggestions from System 1, sometimes without modifications (Kahneman, 2011).

The interrelationship between System 1 and System 2 is especially relevant given the importance of trust and confidence in the B2B context. While it's true that most individuals tend to keep their emotions in check while at work and limit their expression among colleagues, it's worth acknowledging that emotional factors are still pivotal in B2B decision-making. No B2B buyer wants to jeopardize their livelihood or reputation by purchasing a faulty product or service. This helps explain why emotional factors such as brand and reputation are so important

in B2B contexts, as they convey reliability and consistency over the life of the product or service. Nonetheless, it's important to recognize that emotions do play a crucial role in B2B decision-making and that consumers may choose perceived functional attributes over sustainable due to apprehensions of selecting the "wrong" product (Luchs et al., 2010).

2.3.3 Communication Approaches

The misconceptions among individuals have led to businesses avoiding advertising the green benefits of their products due to concerns that consumers may perceive the green products as inferior to their non-green counterparts, which can undermine their purchasing decisions (Grolleau, 2019). According to Schaltegger et al. (2016), addressing these misconceptions and altering customer perceptions is the driving force in creating successful sustainability transformations in the mass market. Consequently, businesses have made efforts to address these misconceptions through different communication approaches.

For instance, when businesses promote both attributes simultaneously consumers may perceive the information as presented contradictory to their expectations and beliefs. Chen and Wu (2020) have suggested that emphasizing the functional performance of a product can alleviate consumers' concerns, but many green advertisements fail to take this approach. Instead, they rely on a single-message strategy that only highlights the product's green attributes. As a result, while focusing on a single product attribute (i.e., functional performance) can help bridge the intention-behavior gap, this does not apply to promoting only the green attribute.

Chen and Wu (2020) conducted a study to understand the influence of single and double messages on consumer perception of green attributes. Their research investigated how to portray green attributes in an advertisement by comparing the effects of using a single- or double-message advertisement and looking into the moderating effects of whether the green attribute is considered a central or peripheral attribute. They contend that a single message with green attributes as its central attribute results in a less favorable brand attitude, based on the perception that green products have inferior quality. However, if a double message approach is used, the message about the product's functionality improves consumers' initial perception that green products are of lower quality, leading to much more favorable green brand attitudes.

2.3.4 Summary

To summarize, the dual process theory, involving System 1 and System 2, provides a framework for a context transfer from the literature in the B2C domain to the B2B context. Existing literature indicates that while sustainability is inherently valued, individuals tend to perceive the functional attribute of green alternatives as inferior when compared to conventional products. We propose that B2B decision-makers are likely to share this perception, as they also hold pre-existing beliefs and associations with green alternatives. Decision-makers, being prone to systematic errors, may mistakenly view sustainability and functionality as mutually exclusive attributes, believing that one attribute comes at the expense of the other, even if it does not align with reality. Consequently, this perception significantly influences their decision-making, leading them to choose conventional products over green alternatives.

Our study introduces the argument that when functionality and sustainability are communicated together, B2B decision-makers tend to categorize the functional dimension as diagnostic information while perceiving the sustainable information as nondiagnostic. Consequently, the presence of sustainable (nondiagnostic) information dilutes the perceived value of the functional (diagnostic) attribute. Therefore, we examine the phenomenon known as the dilution effect to explore how the perception of the functional attribute as inferior occurs in green alternatives. This provides valuable insights for businesses operating in the B2B domain, enabling them to gain a comprehensive understanding of the factors that can influence the evaluation process of green products. Failing to do so may lead to a lack of appreciation for the significance of sustainability in achieving businesses' triple bottom line.

Chapter 3: Hypothesis Development

In Chapter 3, we introduce our conceptual model, which offers an abstract representation of the key components in our study and highlights the interconnectedness of our variables. We provide a comprehensive explanation of our research hypotheses, which are derived from our thorough review of prior research in Chapter 2. This literature review has contributed to our current understanding of the barrier of functionality in sustainable consumption and the theory behind the dilution effect.

3.1 Conceptual Model

In Chapter 2, we demonstrate that prior literature suggests that consumers' perception of green products hinges on their perceived trade-offs between sustainable and functional attributes, where green products are often associated with lower functionality compared to their conventional counterparts. This perception holds true irrespective of the actual attributes, as individuals are prone to systematic errors. These observations form the foundation of our understanding that decision-makers experience the dilution effect when evaluating green products, as they tend to categorize the sustainable benefit as nondiagnostic during the evaluation process. Building on this understanding, we aim to manipulate how the sustainable and functional benefits of a product are communicated in an advertisement. This approach is intended to capture the presence of a dilution effect in the B2B market, and to explore a method for avoiding decision-makers falling subject to this cognitive bias. This involves examining the relationship between the independent variable, communication types, and the dependent variable, brand attitude. Thereafter, we aim to investigate the influential roles of variables: product quality, product durability, and subjective sustainability, in order to understand the potential mechanisms driving the relationship between the independent and dependent variables. A conceptual model is presented, in Figure 1, to visually illustrate the interconnections among these variables.

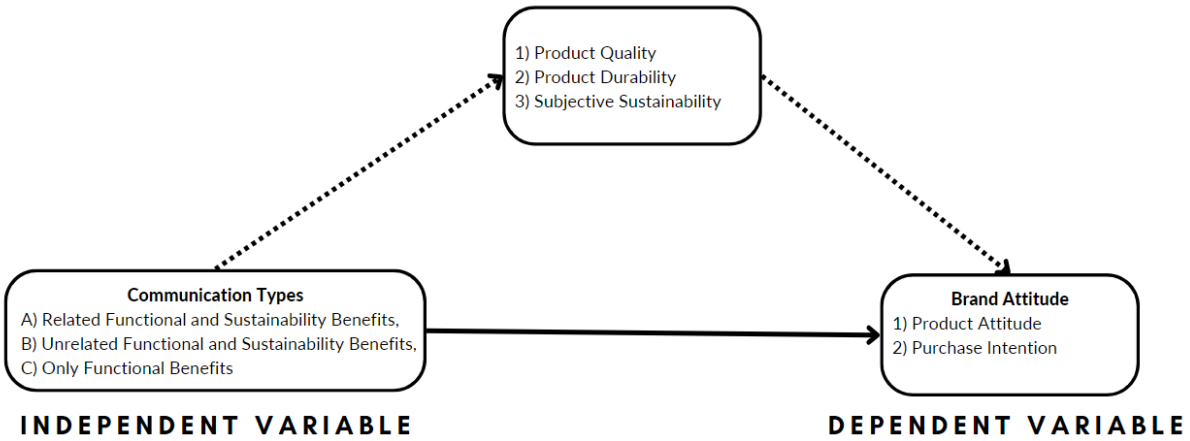


Figure 1: Conceptual Model

The model provides an abstract representation of the relationship between the independent variables (A, B, and C), the dependent variable (brand attitude), and potentially mediating variables. The independent variables are characterized by three manipulated communication types: A) Related, B) Unrelated, C) Only Functional, with the brand attitude as the outcome. The dependent variable, brand attitude, is assessed using two indicators: purchase intention and product attitude. Additionally, the model incorporates measures of product quality, product durability, and subjective sustainability as essential components.

The inclusion of measures for product quality, product durability, and subjective sustainability enables us to investigate the potential mediating role of these variables in explaining how different types of communication may influence brand attitude. These variables capture the respondents' perceptions and attitudes regarding the sustainable and functional benefits communicated in the specific treatment to which they were exposed. To assess their attitudes and perceptions of the product, respondents were asked to indicate their level of agreement with a set of relevant questions for these constructs. The constructs ‘product quality” and “product durability” were designed to capture their perception of the functional information provided, while “subjective sustainability” was intended to capture their perception of the sustainable information. By gaining insights into how respondents perceive the information of the sustainable and functional attributes, it allows us to understand their categorizing of information in the evaluation process of the advertisement.

3.2 Hypothesis: Manipulating the Communication

Our study builds upon the research conducted by Chen and Wu (2020) as a basis for the communication approach utilized in advertisements. Specifically, we aim to utilize the mechanism of single and double messages to capture the dilution effect and a method to avoid it. While their findings suggest that a double-message approach can offset consumers' perception that green products are of lower quality, we propose that the manner in which the information is presented in the double-message can impact individuals' cognitive processing of the information. Consequently, this can significantly influence the way individuals perceive and evaluate the attributes of the product. Specifically, we propose that individuals will experience the dilution effect when the double-message presents the sustainable and functional attributes as unrelated, essentially leading individuals to perceive it as distinct pieces of information. As individuals tend to place a high value on functionality, the sustainable information will be categorized as nondiagnostic to the evaluation process of the product. In this context, the presence of sustainable benefit may dilute the consumer's perception of the functional information, potentially weakening the perception of the green product functionality compared to the conventional counterpart.

Chen and Wu's (2020) research implies that a double-message approach tends to result in more favorable brand attitudes compared to a single-message approach that only focuses on sustainable benefits. However, considering the substantial weight individuals place on the functional attribute during the evaluation process of a green product, we contend that a single-message approach only highlighting functional benefits could have a significant impact on favorable brand attitudes. We believe this to be particularly evident when comparing it to a double-message approach that presents the two attributes as unrelated, as individuals may experience the dilution effect. Consequently, if our findings demonstrate that an unrelated double message has a lower effect on brand attitude than a single-message only emphasizing functional benefits, it would provide reasonable evidence to support the presence of a dilution effect. Based on this, we propose the following hypothesis:

H1: When companies in B2B markets communicate a mix of unrelated functional and sustainable benefits, the effects of the functional attributes on brand attitude are lower than communication focusing only on functional benefits.

Further, in line with Supphellen (2020), we propose that sustainable benefits should be emphasized in conjunction with other factors that consumers consider equally, or even more important than sustainability. Therefore, if B2B markets communicate sustainable benefits as supporting the functional benefit, the impact on brand attitude may be even higher than using a single message with only functional benefits. This approach enables individuals to categorize sustainable benefits as relevant information along with the functional benefits, as they are perceived as one cohesive piece of information, interrelated to each other. Consequently, this approach could potentially lead to a solution for avoiding the dilution effect by eliminating the processing of nondiagnostic information that can dilute the diagnostic information. In other words, consumers are more likely to view sustainable benefits as relevant and valuable when they are presented as being directly connected to the functional benefits of the product. As a result, the positive impact of functional benefits on brand attitude is strengthened. Therefore, we suggest that by emphasizing how the sustainable benefit supports the functional benefit, companies can achieve the highest impact on brand attitude. Accordingly, the following hypothesis is formulated:

H2: When companies in B2B markets communicate that sustainable benefits support functional benefits, the effects of the functional attributes on brand attitude are higher than communication focusing only on functional benefits.

Chapter 4: Methodology

In Chapter 4, we will outline the methodological approach used in this research. Initially, we will begin by presenting the research design, followed by a justification for the chosen product. The data collection and procedure will then be explained, along with the selection and justification of measurement variables. A descriptive summary of the collected data will also be provided, which will serve as the basis for the subsequent data analysis. Lastly, the reliability of the construct and the assessment of whether the assumptions of ANCOVA are met will be discussed.

4.1 Research Design

The research questions will be answered by analyzing research data that examines the impact of communication type (independent) on brand attitude (dependent). To investigate the hypotheses: (H1) whether communicating a mix of unrelated functional and sustainable benefits could dilute the impact of functional attributes on brand attitude, and (H2) whether communicating sustainable benefits that support functional benefits could strengthen the impact of functional attributes on brand attitude, a quantitative experimental study was conducted. This method involves manipulating one or more variables to determine the effect of the manipulation on the dependent variable (Kirk, 2013). In this case, manipulating the communication of functional and sustainable benefits in the advertisements allows us to determine the impact that such manipulation can have on brand attitude.

Furthermore, our design consisted of two elements: the first involved one treatment with p equal to 3, where p indicates the number of levels in the treatment. The three levels compromised three treatments (A) an advertisement that communicates that the sustainable attribute supports the functional benefits (related), (B) an advertisement that communicates a mix of unrelated functional and sustainable benefits, and (C) an advertisement that focuses only on the functional benefits. The second element involved the random assignment of experimental units to the treatment levels, with each experimental unit designated to receive only one level (Kirk, 2013). Since our treatment variations were relatively simple, it was important that the design itself could control for carryover effects. These elements are consistent with the conditions for a completely randomized design (CR-3). However, we collected data using Pollfish, a market research platform that only offered monadic A/B/C

testing. However, the monadic aspect of this method justifies the approach in our research as it ensures that respondents are randomly assigned to receive only one treatment. Thus, minimizing the potential of these biases.

	Communication mix		
	Related	Unrelated	Only functional
Treatment	Treatment A	Treatment B	Treatment C

Figure 2: 3 x 1 matrix of design

To manipulate the independent variable, three versions of a simple advertisement were created and used for a fictional product: a printer. To ensure clarity in the manipulation, all other features, such as the name of the printer and the illustration of the functional benefits, were kept constant across the three versions of the advertisement. The design was also kept similar, with adjustments made only to the variations in types of communication, namely the manipulation. Each advertisement included a long and short message, presenting the manipulation of communication type. The short message comprised a pay-off and heading that were phrased identically to ensure simplicity in the design. This is important as individuals tend to have limited attention and may not read long messages carefully, and thus we believe this allowed us to increase the chance that participants would understand the manipulation.

The long message in the first treatment, advertisement (A), shown in Figure 3 reads: *The GX is durable because of its sustainable function, namely the low-CPU, which allows the primary CPU to rest, reducing wear and tear on the machine.*

The long message in the second treatment, advertisement (B), shown in Figure 3 reads: *The GX is sustainable because most of the internal components are 100% recyclable. This limits the impact of electronic waste by enabling the reuse of materials. The change does not have any impact on the durability of the printer.*

The long message in the last treatment, advertisement (C), shown in Figure 3 reads: *The GX is built to provide advanced durability, with a design that can withstand daily use while maintaining high quality over time.*

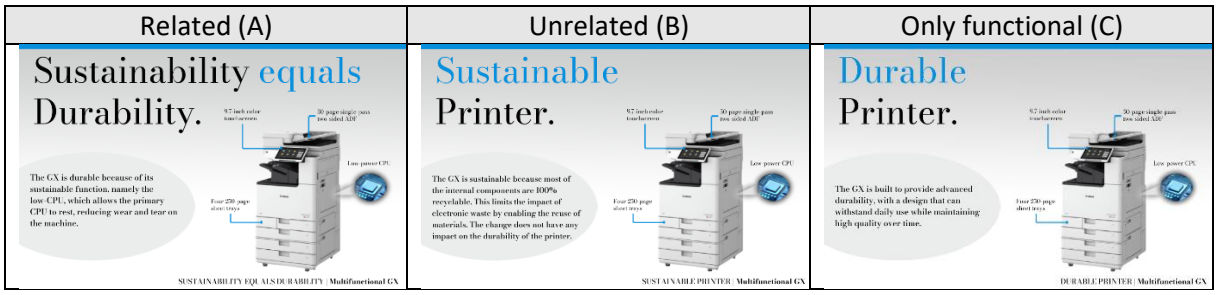


Figure 3: Overview of ads

For a more detailed view of the advertisements, please refer to Appendix B, where larger images of the advertisements can be found.

4.2 Justification for Product Choice

It is estimated that businesses replace their printers approximately every 3-5 years. In 2019, the sales of printers to businesses in the United States alone constituted over 12 million units, whereas around 106 million were sold globally (Statista, 2020). While the market for green printers is currently small, there is hope that the increased focus on sustainable consumption will encourage manufacturers to introduce greener printers. To our knowledge, there are only a few green printers on the market. As we discussed in Chapter 2, we suggest this is largely due to the intention-behavior gap identified in research on sustainable consumption. Companies risk consumers facing a sustainability liability when offering green products, potentially resulting in lower sales of these green alternatives, as consumers may prefer the conventional product.

Sustainable printers are characterized by features such as low energy usage, efficient ink consumption, use of recycled materials, and environmentally friendly production processes (Qualprint, n.d.). If more sustainable printers are purchased instead of non-green alternatives, this can contribute to reducing the negative impact on the environment caused by businesses' high consumption of printers. We find it important to study businesses' adoption of such printers in order to ensure the success of green printing products.

Printers were chosen as the product because they are easily understood and relatable to participants and they are commonly used in both B2B and B2C contexts. This choice allowed the study to have practical implications for both markets, in line with the context transfer explored in Chapter 2. Printers are widely used in many different industries and are an essential component in offices, universities, and hospitals as they are an integral part of daily operations. We argue that the central attribute of a printer is its functionality, as it directly affects the printer's ability to perform its intended task. This results in individuals being reluctant to compromise on the functionality of printer components because it directly impacts their day-to-day tasks, productivity, and the quality of their printed output. Therefore, we contend that this is an excellent choice for investigating the trade-off between sustainability and functionality. Furthermore, in terms of "green product typicality", printers do not have a reputation for being particularly sustainable. While many businesses are moving towards digital solutions, there are still some processes that require printing, which makes it difficult to eliminate the need for printers. However, with increasing pressure from stakeholders to adopt sustainable practices, businesses need to explore more sustainable printing options. This makes printers an interesting product to study in terms of sustainability.

4.3 Data Collection and Procedure

The data was collected through Pollfish, and it was used to distribute our questionnaire. By utilizing this approach to obtain the data, it simplified the data collection process in terms of collecting the intended respondents. The questionnaire was designed to be completed in a time frame of 2-3 minutes, and respondents were only presented with one, or a small group of questions, at a time. Long duration increases the likelihood of boredom and fatigue. Small groups of questions ensure that the respondents read the questions thoroughly (Saunders et al., 2016).

The questionnaire included various sections. The detailed outline of the questionnaire given to the respondents is provided in Appendix A. Firstly, the respondents were informed about the purpose of the study and were guaranteed anonymity in their answers, fulfilling the ethical obligations of survey research. The participants were thereafter randomly assigned and exposed to one of the three ads. The aim was to evenly distribute the participants between the three ads. The respondents were asked to review the ads carefully as this made the basis for the following questions. After being exposed to one of the ads, respondents were exposed to

questions concerning their intention to buy the product, attitude towards the product and the ad, perception of product quality, durability and sustainability, before asked to indicate the importance of sustainability and of a printer in the company, and how they opinion will influence the choice of printer in the company.

4.4 Selection and Justification of Measurement Variables

Saunders et al. (2009) suggest that utilizing previously developed measurement items when creating items for constructs can be advantageous. This approach facilitates comparison with past studies, which enables assessment of reliability and saves time. However, we were unable to find well-established items for all of the variables, and as a result, some statements were created solely based on the literature review. All adapted constructs and corresponding measurement items utilized in our study can be seen below, in Table 1. Please refer to Appendix C to view the measurement items corresponding to the abbreviations in the items column.

Likert scale

To examine and analyze the data, a Likert scale ranging from 1 to 7 was utilized for all statements. The statements were evaluated on scale ranging from (1) “totally disagree” to (7) “totally agree”, except for the perceived product quality and perceived impact on printer choice. For the perceived product quality, the first statement was measured on a scale ranging from (1) "extremely inefficient" to (7) "extremely efficient," while the second statement was measured on a scale ranging from (1) "no ability" to (7) "very high ability." For the perceived impact on printer choice, the statement was measured on a scale ranging from (1) “very low extent” to (7) “very large extent”.

Construct	Item	Source
Purchase Intention	PI	Putrevu and Lord (1994); Chen et al., (2015)
Product Attitude	PA1	Spears & Singh (2004)
	PA2	
	PA3	
Ad Attitude	AA1	MacKenzie et al. (1986)
	AA2	Beltramini, (1988)
Product Quality	PQ1	Newman et al., (2014)
	PQ2	
Product Durability	PD1	Grewal et al. (1994)
	PD2	
Subjective Sustainability	SS1	Chen (2010)
	SS2	
Importance of Printer	IMP1	Homburg et al. (2013)
	IMP2	
	IMP3	
Impact on Printer Choice	PCI	
Importance of Sustainability	IMS1	Vilkaite-Vaitone et al. (2022)
	IMS2	Chen and Chang (2012)

Table 1: Overview of Measurement Items

Purchase Intention

To investigate whether the incorporation of sustainable benefits in the communication type affects consumers' purchase intentions, we asked the participants to indicate their level of agreement with the statement: "If we needed new printers now, I would consider this printer". As the construct of purchase intent is generally familiar to respondents, we consider a one-item scale to be appropriate (Drolet and Morrison, 2001). The item was adopted from Putrevu and Lord (1994) and Chen et al., (2015).

Product Attitude

Consumers' attitudes towards a product are closely linked to their preferences and overall evaluations, which in turn heavily influence their intention to purchase. These attitudes are shaped by the consumers' beliefs, values, and potential concerns about the product's functional performance. In order to investigate whether adding a sustainable attribute would impact consumers' product attitudes, we asked the participants to indicate their level of agreement with the following statements: “I have a favorable impression of the printer”, “I like this

printer", and "My colleagues would like this printer". This scale was based on Spears and Singh (2004).

Ad Credibility

Ad credibility is a frequently employed measure to examine how much consumers experience (in)consistency between previously held beliefs about sustainable attributes and the claims and promises of brands. Ad credibility is defined as the degree to which a consumer believes that the claims made about a product or service in an advertisement are accurate and credible (MacKenzie and Lutz, 1989). This measure was included as research by MacKenzie and Lutz (1989) suggests that ad credibility directly affects attitudes towards the advertisement and the brand. Based on this, we wanted the respondents to indicate their level of agreement to the following statement: "I liked the ad" and "The ad was credible". The latter statement is based on the work of Beltramini (1988).

Product Quality

To investigate whether the addition of a sustainable attribute would lead to the perception that the product falls short of consumer expectations for quality, resulting in it being deemed of lower quality than its non-green counterparts, we asked the participants to consider the following statements: "How would you rate the printing efficiency of the printer?" and "How would you rate the ability of the printer to print high-quality prints?". This measure is based on the measure of product quality in Newman et al. (2014), which was also utilized by Skard et al. (2020).

Product Durability

To examine whether the inclusion of a sustainable attribute would result in the perception that the product has a shorter lifespan and is less durable compared to its non-green counterparts, we asked the participants to indicate their level of agreement with the following statements: "I believe that printer will last a reasonable amount of time before need to be replaced?" and "The printer can withstand regular use without breaking down?". This scale was based on Grewal et al. (1994).

Subjective Sustainability

As the success of green products to great extent depends on whether consumer perceive them as sustainable, it is important to measure consumers' subjective perception of sustainability.

Accordingly, we asked the participants to indicate their level of agreement with the following statements: “I feel that the printer’s environmental claims are generally reliable” and “I feel that the printer is a sustainable product”. This scale was adopted and modified based on Chen (2010).

Importance of Sustainability on a Company’s Reputation

Measuring the impact of sustainability on a company's reputation, hereafter referred to as 'importance of sustainability', is a crucial indicator of the perceived value derived from buying green products over conventional non-green products. To assess the subjective importance of sustainability for a company's reputation, we asked participants to indicate their level of agreement with the following statements: “The company’s sustainability practices are important to its reputation” and “Using non-green could damage your green reputation or image”. The first statement was based on Vilkaite-Vaitone et al. (2022), while the latter statement was adopted from Chen and Chang (2012).

Importance of Printer

Measuring the importance of a printer for a company is crucial, as it significantly impacts the level of engagement and effort put into the decision. If the printer is considered essential for the company's daily operations, any indication of lower functional performance could have a significant impact on the attitude and purchase intention towards the product. To investigate the importance of a printer, we developed a scale based on Homburg et al. (2013), in which participants were asked to indicate their level of agreement with the following statements: “A printer is critical for the company’s day-to-day operations”, “Your business relies heavily on the functionality of the printer”, and “The efficiency of your workflow is greatly impacted by the performance of the printer”.

Impact on Printer Choice

Measuring the perceived impact the respondents’ opinion will have on the choice of printer in the company is crucial, as it significantly impacts the level of engagement and effort put into the decision. We therefore wanted respondents to indicate "To which extent will your opinion influence the choice of printer in your company".

Number of Employees and Industry

Descriptive statistics such as the number of employees and the industry are added to provide context and background information about the companies or organizations that are the subjects of the study. Including such statistics makes it possible to make comparisons between different companies or industries. The number of employees indicates the scale of operations, while the industry classification helps to identify commonalities or differences between companies in a particular sector.

4.5 Descriptive Data Summary

4.5.1 Distribution of respondents

The sample consisted of 100 respondents that were randomly and evenly assigned to the three treatment groups, resulting in a distribution of (34-33-33), as shown in Figure 4. The group that was exposed to an advertisement that focused only on functional benefits consisted of 34 respondents. The group that was exposed to an advertisement that communicates that sustainable benefits support functional benefits consisted of 33 respondents. The group that was exposed to the advertisement that communicates a mix of unrelated functional and sustainable benefits consisted of 33 respondents.

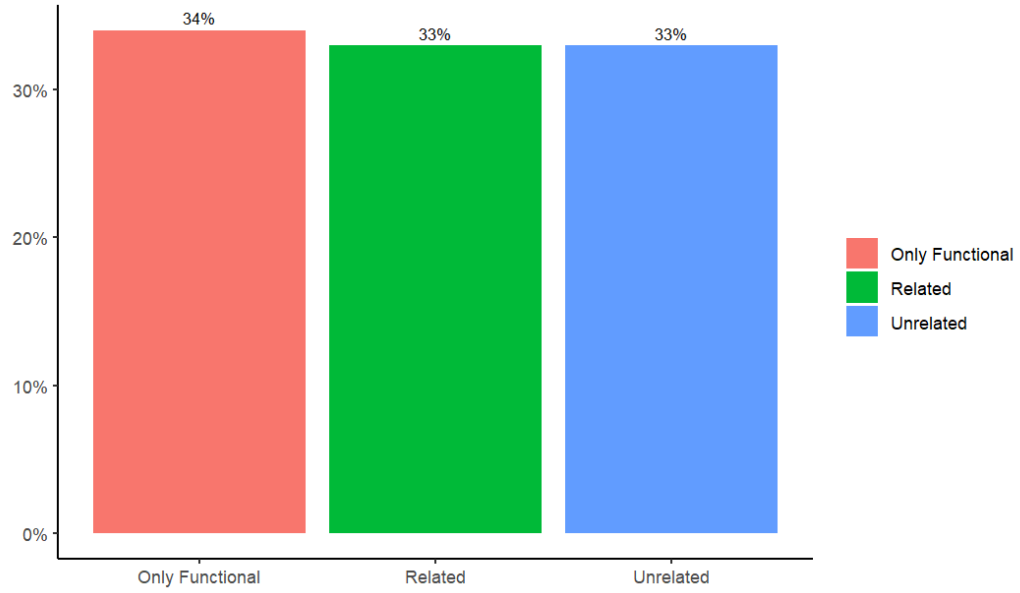


Figure 4: Distribution of respondents between communication types

4.5.2 Distribution between Industries

In addition, the survey was administrated to a sample of business professionals in relevant industries. Figure 5 illustrates the distribution of survey respondents across different industries. It is evident that the majority of respondents work in the Finance and Insurance industry, followed by Education, Human Resources and Software. The uneven distribution of respondents across industries poses a potential challenge in interpreting the data. Specifically, an overweight of respondents from a specific industry may result in data that is biased towards their perspectives and experiences. Figure 6 demonstrates that each industry is unequally represented in each ad. This could result in a skewed representation of the overall population and limit the generalizability of the findings to other industries. Therefore, it is crucial to consider the industry distribution when analyzing the data and to ensure that the sample is representative of the broader population to ensure the validity and reliability of the survey results.

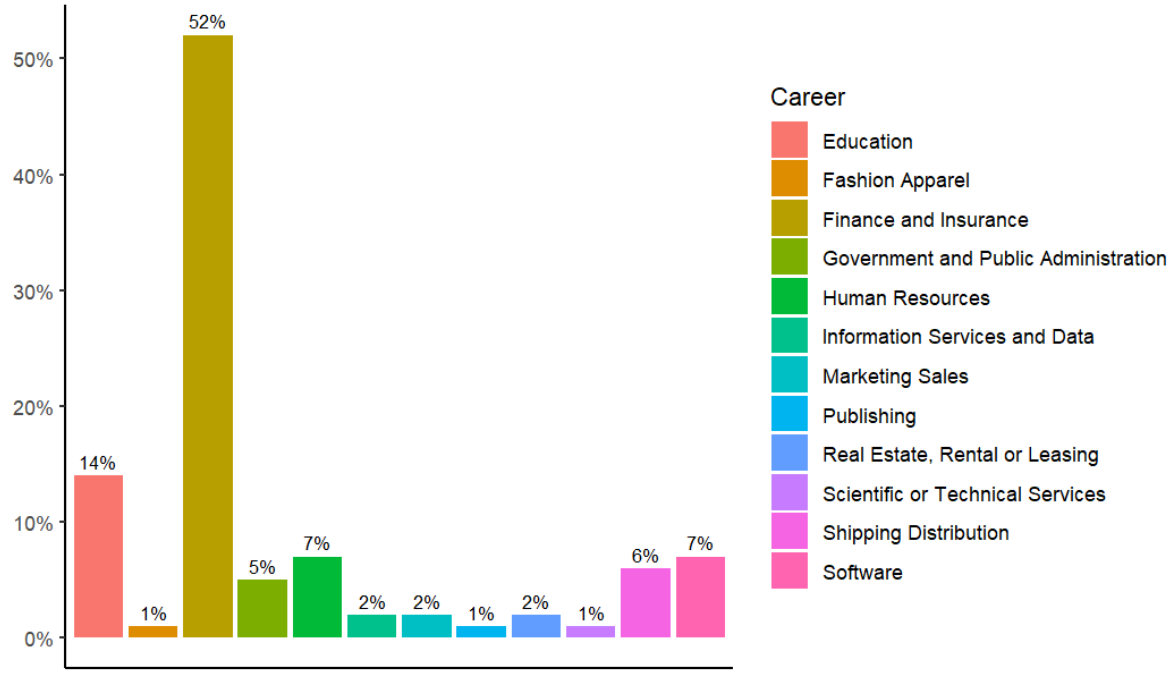


Figure 5: Distribution of respondents between industries

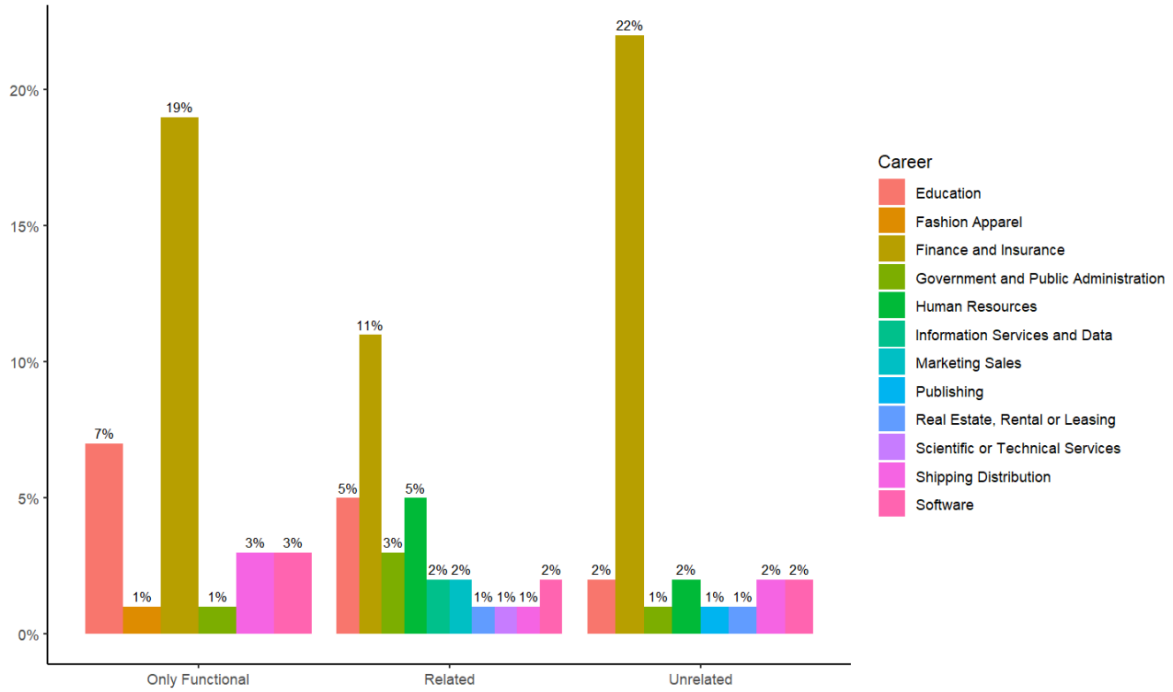


Figure 6: Distribution of respondents between industries for each communication type

4.5.3 Comparison of Mean Values for each Communication Type

Based on Figure 7, it is evident that there are variations in the mean values of the 18 questions across the three different communication types. The advertisement that only focuses on the functional aspects of the product appears to have the lowest mean values for most of the questions, while the advertisement that communicates a mix of unrelated functional and sustainable benefits seems to produce the highest mean values. This gives a general indication, but further investigation is needed to draw conclusions of its implications for our hypothesis which will be discussed in Chapter 5.

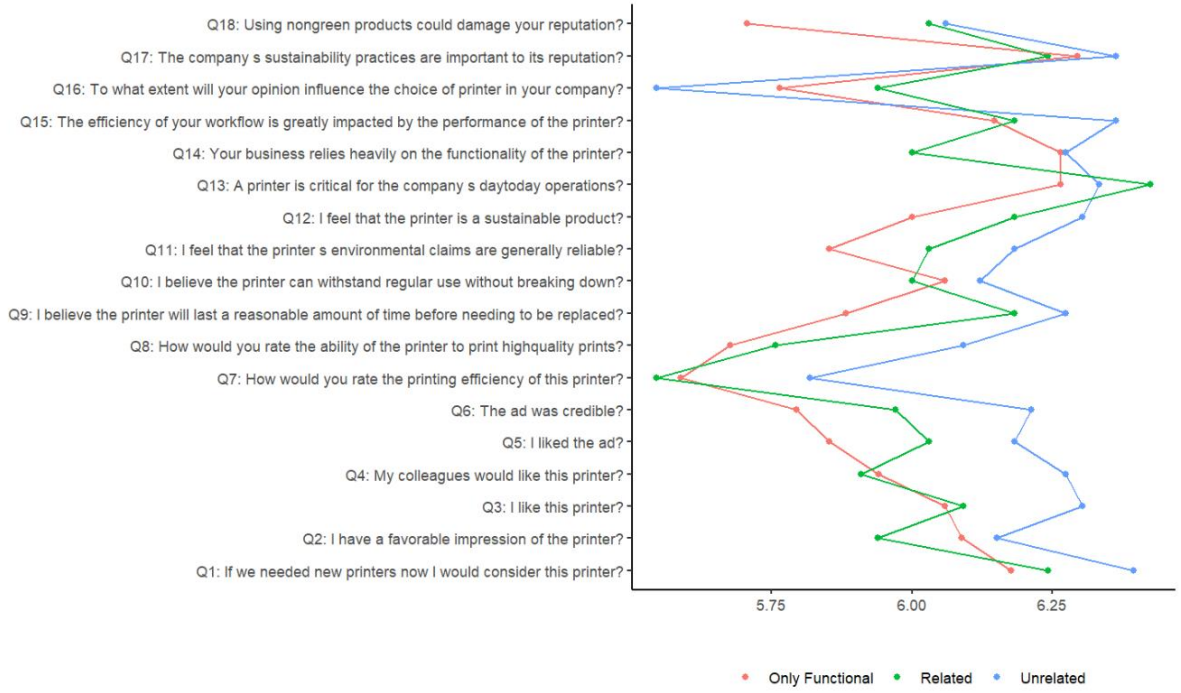


Figure 7: Comparison of means values between communication types

4.5.4 Distribution of Responses

As seen in Figure 8, most respondents in our study showed agreement with the statements being measured, falling within the upper half of the Likert Scale ranging from (5) somewhat agree to (7) strongly agree. This pattern of responses may suggest a potential response bias, where participants tend to give socially desirable responses instead of their true opinions. This bias can stem from a desire to please the researcher or fear of negative judgment. The limited range of responses may decrease the variability of the data and could, in turn, affect the reliability and validity of statistical analyses. We acknowledge the limitation of our responses and will carefully consider its impact during the interpretation of the statistical analyses.

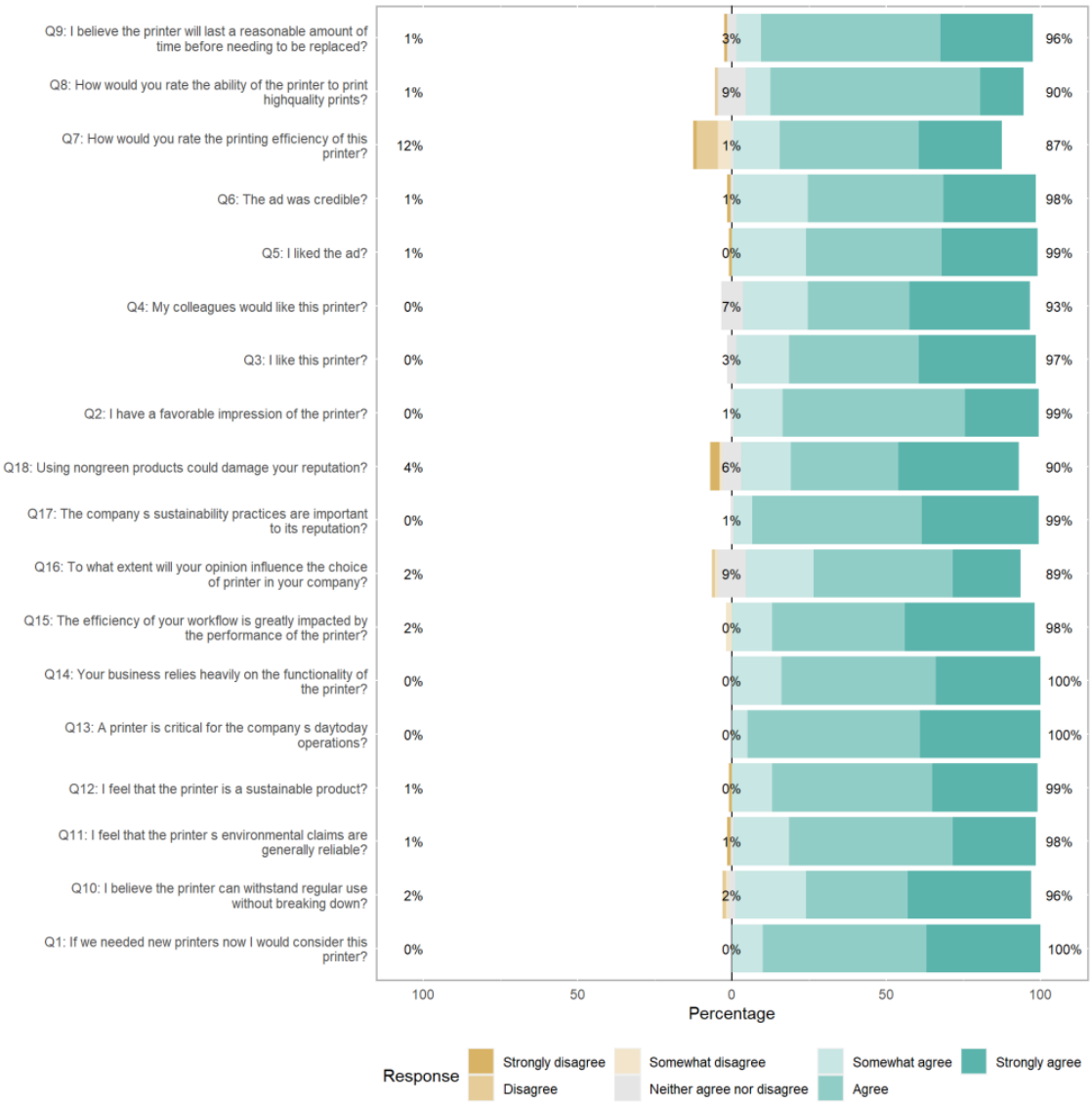


Figure 8: Distribution of responses for each item

4.6 Reliability of Constructs

In our research, we used a questionnaire to measure various constructs of interest. Some of these were measured using several items for each construct, as described in Chapter 3. We, therefore, used the responses for each item to create summated average scores for each construct, as illustrated in Table 2. The included construct consisted of scales measuring (1) brand attitude, consisting of (a) purchase intention and (b) product attitude, and scales measuring (2) ad attitude, (3) product quality, (4) product durability, (5) subjective sustainability, as well as (6) importance of printer and (7) importance of sustainability.

It's important to note that by creating a summated score based on multiple Likert-type items, we can consider our variable to be continuous enough to perform sensible calculations of for instance *mean* values and *variance*. Some statisticians may still object to this practice since the summation procedure assumes that the intervals in the Likert-type item data are equal. Nonetheless, in practice, this usually does not lead to any significant misinterpretations of the variables. Studies conducted by Carifio & Perla (2008) and Norman (2010) have supported this notion.

Constructs	Score
(1) Brand Attitude a. Purchase Intention (PI) b. Product Attitude (PA)	(PI + PA1 + PA2 + PA3) / 4
(2) Ad Attitude	(AA1 + AA2) / 2
(3) Product Quality	(PQ1 + PQ2) / 2
(4) Product Durability	(PD1 + PD2) / 2
(5) Subjective Sustainability	(SS1 + SS2) / 2
(6) Importance of Printer	(IMP1 + IMP2 + IMP3) / 3
(7) Importance of Sustainability	(IMS1 + IMS2) / 2

Table 2: Overview of items used to create summated scales

Thereafter it is crucial to check the internal consistency of a construct when using summated scores with multiple items to ensure that the items are measuring the same construct. The reason being that if there is a lack of consistency between the items, it can lead to unreliable or invalid results. Therefore, we evaluated Cronbach's alpha to assess the internal consistency of our constructs. According to Malhotra et al. (2017), a satisfactory alpha value typically ranges from 0.6 to 1, indicating reliability.

Scale	Cronbach's Alpha
Brand Attitude	0.739
Ad Attitude	0.761
Product Quality	0.606
Product Durability	0.707
Subjective Sustainability	0.689
Importance of Printer	0.253
Importance of Sustainability	-0.018

Table 3: Cronbach's Alpha for summated scales

Table 3 presents our findings, indicating that the majority of constructs demonstrate high internal consistency and are therefore acceptable. Nonetheless, the Cronbach's Alpha values for the "importance of printer" and "importance of sustainability" summated scales are below the acceptable threshold of 0.6. Consequently, instead of using a summated scale, we will utilize these items as separate scales during data analysis.

4.7 Analysis of Covariance

The Analysis of Covariance (ANCOVA) is a statistical method that extends the capabilities of the Analysis of Variance (ANOVA). The prominent distinguishing feature of ANCOVA is that it facilitates the enhanced isolation of the main effect – the effect of communication types on brand attitude – by allowing us to incorporate covariates into the model (Frost, n.d.). These covariates are continuous independent variables that exert a nuanced influence on the dependent variable. Given our small sample size (n = 100), we cannot be entirely confident that the monadic A/B/C testing design used in our study achieved proper randomization from the outset. As a result, there may be an unequal distribution of the covariates among the groups, leading to systematic differences that may affect the outcome of the study (Kang et al., 2008).

The variables of importance of printer, importance of sustainability, and impact of printer choice may serve as covariates in our ANCOVA analysis. These variables represent individual preferences and attitudes that might vary systematically between our groups and are not directly involved in the measurement of the main effect. If an imbalance in the distribution of these covariates across groups exists, differences in outcomes between groups could be due to these covariate imbalances rather than the main effect we are examining (Kang et al., 2008). For

instance, if one group has a higher proportion of participants who highly value a company's sustainability reputation, while the other group does not, the outcome may be influenced by this covariate imbalance. To account for these possible imbalances and enhance the interpretation of the main effect, we will control for these covariates.

4.8 Checking Assumptions for ANCOVA

Before proceeding to conduct an ANCOVA, it is essential to ensure that the assumptions for this type of analysis hold. These assumptions include independent observations, normality, homogeneity of variance, homogeneity of regression slope, and linearity (Statistical Aid, 2021).

To assess the assumption of independent observations, we ensured that respondents were only exposed to one treatment, thereby meeting this assumption. Further, we conducted a Shapiro-Wilks test to analyze the normality of the data. A p-value of less than 0.05 for all subgroups indicated that our data was not normally distributed, as seen in Appendix D3. However, this assumption is mostly relevant for subgroups of $n < 20$ (Statistical Aid, 2021). As illustrated in Figure 4, our subgroups consisted of $n > 30$. Therefore, we do not consider the normality of our subgroups as an issue for our analysis. In addition, we used Levene's test to assess the homogeneity of variance as required for ANCOVA. The Levene's test was chosen as it is less sensitive to deviations from normality than other tests of homogeneity of variances, such as the Bartlett test. The results of the Levene's test showed a non-significant result, with p-values greater than 0.05, as seen in Appendix D3. This indicates that we can assume the assumption of homogeneity of variance has been met.

To assess the assumption of linearity in our data, we generated scatterplots, which provided a visual method for assessing the validity of this assumption (Kassambara, n.d.). As ANCOVA linear assumption states that the relationship between the covariates and the dependent variable should be linear within each group of the categorical independent variable (Frost, n.d.). To observe a potential linear relationship, we incorporated regression lines into these plots as it allowed us to visually assess whether a linear fit was reasonable for our data. The results displayed tendencies of linearity, as depicted in Appendix 4.2. When non-linearity occurs, it can result in biased estimates, meaning that the estimated treatment effect may not accurately represent the actual relationship between the independent variable and the dependent variable. It is apparent that there are some variations in the standard deviation of our dataset. However, we believe that this variability may arise from the data not truly being continuous. Therefore,

the limited range of a Likert scale in comparison to a truly continuous variable could contribute to the observed variations in the standard deviation. However, we remain confident that these variations will not result in biased estimated that will hinder our ability to interpret the data effectively.

Chapter 5: Data Analysis

Based on the information provided in Chapter 4, it is evident that the assumptions for ANCOVA hold. Therefore, we utilized this method to analyze the data, employing the statistical programming language R. In the following chapter, we will first present the findings of the hypothesis from the results gained from ANCOVA, thereafter we will present our findings when exploring the variables: product quality, product durability, and subjective sustainability. We will then present the findings on the variable ad attitude. Lastly, we will present additional findings.

5.1 Test of Hypothesis

To determine whether there is support for H1 and H2, we examine the relationship between communication types and brand attitude. Since both hypotheses are based on the same relationship, they will be presented together.

H1: When companies in B2B markets communicate a mix of unrelated functional and sustainable benefits, the effects of the functional attributes on brand attitude are lower than communication focusing only on functional benefits.

H2: When companies in B2B markets communicate that sustainable benefits support functional benefits, the effects of the functional attributes on brand attitude are higher than communication focusing only on functional benefits.

5.1.1 Testing Communication Types on Brand Attitude

To compare the differences in mean scores of the three communication types on brand attitude, we conducted an ANCOVA. Our analysis gave an F-value of 2.492 and a p-value of 0.0884, as shown in Table 4. If we consider a more lenient significance threshold of $p < 0.10$, the results suggest that the differences among the group means for brand attitude are statistically significant. However, when using the commonly accepted threshold for significance ($p < 0.05$), the results are not statistically significant. Therefore, while there are indications of a potential difference in brand attitude across communication types, these differences are not strong enough to conclusively reject the null hypothesis at the 0.05 level.

DV: Brand Attitude	F-value	Pr(>F)
Communication type	2.492	0.0884 .
IMP1	1.640	0.2036
IMP2	25.934	1.9e-05 ***
IMP3	0.474	0.4928
IMS1	13.967	0.0003 ***
IMS2	3.135	0.0799 .
PCI	5.995	0.0163 *

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 4: Effects of communication type on brand attitude

5.1.2 Testing Significance of Covariates

We assessed the significance of the covariates in our analysis. Table 4 presents the F-and p-values for the covariates. In this table, IMP refers to importance of printer, IMS refers to importance of sustainability and PCI refers to printer choice impact. The numbers following these abbreviations correspond to specific items in the questionnaire related to each covariate.

The p-values for the covariates IMP1 (F = 1.640, p-value = 0.2036), IMP3 (F = 0.474, p-value = 0.4928), and IMS2 (F = 3.135, p-value = 0.0799) are larger than 0.05, indicating that these covariates do not have a significant effect on the response variable after controlling for other factors. However, the covariates IMP2 (F = 25.934, p-value = < 0.001), IMS1 (F = 13.967, p-value = 0.0003), and PCI (F = 5.995, p-value = 0.0163) have p-values smaller than 0.05. This suggests that these covariates have a significant effect on the response variable even after adjusting for the effects of other variables. Overall, these results highlight the importance of considering these covariates to obtain more accurate and reliable results.

5.1.3 Tukey's Honest Significant Difference Test

While ANCOVA provides evidence that there may be significant differences in the mean values between the communication types, it does not specify which groups differ from each other. Therefore, we conducted a post-hoc comparison using Tukey's Honest Significant Difference (HSD) test. This test is commonly used following an ANCOVA to evaluate the significance of

differences between pairs of group means. The results, as presented in Table 5, show the difference between the mean scores is ΔM = 0.2348, with a p-value of 0.0478. Thus, indicating a significant difference in means of brand attitude between the respondents exposed to unrelated functional and sustainable benefits, and those who were exposed to related benefits. Furthermore indications suggest that there is also a significant difference in means between those who were exposed to unrelated functional and sustainable benefits, and those who were only exposed to functional attributes if we consider a threshold of $p < 0.10$. These differences are indicated by ΔM = 0.2141, with a p-value of 0.0754.

DV: Brand Attitude	Difference in Means (ΔM)	*p*-value (adj.)
Related – Only Functional	-0.0207	0.9751
Unrelated – Only Functional	0.2141	0.0754 .
Unrelated – Related	0.2348	0.0478 *

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Table 5: Results of Tukey's HSD Test with Brand Attitude as Dependent Variable

5.1.4 Findings of Product Quality, Product Durability, and Subjective Sustainability

We evaluate the variables of product quality, product durability, and subjective sustainability, as these variables serve as indicators of the participant's perception and evaluation of the printer's sustainable and functional attributes. The variables of product durability and product quality capture the respondents' perception of the functional attribute, whereas subjective sustainability captures the respondents' perception of the sustainable attribute. Our aim is to determine whether there are any differences in the mean scores across the three types of communication for each of these named variables. This approach enables us to identify whether the method by which information is presented influenced participants' interpretation and perception of the printer's functional and sustainable attributes. Hence, we are testing the relationship between these variables and the independent variable whilst controlling for the covariates, providing insights into how communication types may influence participants' perceptions.

Our ANCOVA gave an F = 1.449 and a p-value of 0.2401, as shown in Table 6. The p-value exceeds both the conventional significance threshold of 0.05 and a more lenient threshold of p

< 0.10. This result suggests that there is no statistically significant difference in mean scores of product quality across the communication types. In other words, the respondents' perception of the printer's functional attribute does not seem to be influenced by how this attribute was communicated in the different advertisements.

DV: Product Quality	F-value	Pr(>F)
Communication type	1.449	0.2401
IMP1	4.768	0.0316 *
IMP2	4.396	0.0388 *
IMP3	0.076	0.7834
IMS1	10.337	0.0018 **
IMS2	0.066	0.7971
PCI	19.753	2.48e-05 ***

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 6: Effects of Communication Type on Product Quality

Our ANCOVA gave an F = 0.821 and a p-value of 0.4433, as shown in Table 7. The p-value exceeds both the conventional significance threshold of 0.05 and a more lenient threshold of p < 0.10. This result suggests that there is no statistically significant difference in mean scores of product durability across the communication types. In other words, the respondents' perception of the printer's functional attribute does not seem to be influenced by how this attribute was communicated in the different advertisements.

DV: Product Durability	F-value	Pr(>F)
Communication type	0.821	0.4433
IMP1	2.778	0.0990 .
IMP2	11.042	0.0013 **
IMP3	8.815	0.0038 **
IMS1	7.166	0.0088 **
IMS2	2.367	0.1274
PCI	0.295	0.5883

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 7: Effects of Communication Type on Product Durability

Our ANCOVA gave an F = 1.589 and a p-value of 0.2097, as shown in Table 8. The p-value exceeds both the conventional significance threshold of 0.05 and a more lenient threshold of $p < 0.10$. This result suggests that there is no statistically significant difference in mean scores of subjective sustainability across the communication types. In other words, the respondents' perception of the printer's sustainable attribute does not seem to be influenced by how this attribute was communicated in the different advertisements.

DV: Subjective Sustainability	F-value	Pr(>F)
Communication type	1.589	0.2097
IMP1	1.199	0.2764
IMP2	1.155	0.2854
IMP3	2.172	0.1440
IMS1	3.159	0.0789 .
IMS2	0.013	0.9095
PCI	1.326	0.2525

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 8: Effects of Communication Type on Subjective Sustainability

5.1.5 Findings on Ad Attitude

Further, we proceeded to investigate whether there are differences in mean scores for ad attitude across the three communication types while controlling for the potential impact of the covariates. Our analysis revealed F = 2.608 and p-value = 0.0792, as presented in Table 9. These results suggest that there may be significant differences in the mean ad attitudes across different communication types, given that we consider a p-value threshold of $p < 0.10$. Additionally, the findings indicate that the covariates had a significant effect on ad attitude, expect for IMS1 (F= 0.214, p-value = 0.6444), as illustrated in Table 9.

DV: Ad Attitude	F-value	Pr(>F)
Communication type	2.608	0.0792 .
IMP1	3.341	0.0709 .
IMP2	13.424	0.0004 ***
IMP3	21.624	1.12e-05 ***
IMS1	0.214	0.6444
IMS2	4.265	0.0417 *
PCI	3.438	0.0068 **

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 9: Effects of Communication Type on Ad Attitude

Given that we accepted the results as significant at the specified threshold level in our analysis, we proceeded with a post-hoc test. This was to identify specific communication types that differ significantly in terms of ad attitude. For this purpose, we employed Tukey's HSD test. The results are presented in Table 10, and indicate a significant difference in the mean ad attitude (given $p < 0.05$) between those who were exposed to unrelated functional and sustainable benefits, and those who were only exposed to functional attributes. The difference between the mean scores is $\Delta M = 0.3734$, with a p-value of 0.0106. Overall, the test indicates that those who were exposed to communication with unrelated functional and sustainable benefits had a more positive attitude towards the ad than those who were exposed to the ad communicating only functional benefits.

DV: Ad Attitude	Difference in Means (ΔM)	*p*-value (adj.)
Related – Only Functional	0.1765	0.3417
Unrelated – Only Functional	0.3734	0.0106 *
Unrelated – Related	0.1970	0.2691

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Table 10: Results of Tukey's HSD Test with Ad Attitude as Dependent Variable

5.2 Additional Findings

Moreover, our previous findings indicated that there were no significant differences observed in the participants' perceptions of the sustainable and functional attributes influenced by the different communication types. This suggests that the direct relationship between communication types and product quality, product durability, and subjective sustainability may not be significant. Therefore, we proceeded to include the variables as interaction terms in ANCOVA to explore the possibility of interaction effects. This analysis allows us to investigate the relationship between communication types and brand attitude depending on the different levels of product quality, product durability, and subjective sustainability. This is included under additional findings as it extends beyond the scope of our initial hypothesis, but it allows for a more nuanced understanding of how communication types may influence brand attitude.

First, we examined whether the impact of the communication type on brand attitude is influenced by perceived product quality. Our analysis revealed an F-value of 2.650 and a p-value of 0.0763, as shown in Table 11. These results suggest that there may be a significant difference in brand attitude across the three types of advertisements when considering a p-value threshold of $p < 0.10$. The small p-value for product quality (3.96e-07) provides strong evidence that it significantly affects brand attitude. However, the p-value for the interaction term is 0.4344, which is larger than 0.05, indicating insufficient evidence to conclude a significant interaction effect between communication type and product quality on the brand attitude.

DV: Brand Attitude	F-value	Pr(>F)
Communication type	2.650	0.0763 .
Product Quality (PQ)	30.056	3.96e-07 ***
Communication type:PQ	0.842	0.4344
IMP1	0.077	0.7822
IMP2	18.757	3.92e-05 ***
IMP3	0.359	0.5504
IMS1	7.200	0.0087 **
IMS2	3.649	0.0593 .
PCI	1.358	0.2471

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 11: Effects of Communication Type on Brand Attitude with Product Quality as Interaction Term

Next, we examined whether the impact of the communication type on brand attitude is influenced by perceived product durability. Our analysis revealed an F-value of 2.590 and a p-value of 0.0808, as shown in Table 12. Similar to product quality, these results suggest that there may be a significant difference in brand attitude across the three types of advertisements when considering a p-value threshold of $p < 0.10$. The small p-value for product durability (8.12e-07) provides strong evidence that it significantly affects brand attitude. However, the p-value for the interaction term is 0.7146, which is larger than 0.05, indicating insufficient evidence to conclude a significant interaction effect between communication type and product durability on brand attitude.

DV: Brand Attitude	F-value	Pr(>F)
Communication type	2.590	0.0808 .
Product Durability (PD)	28.203	8.12e-07 ***
Communication type:PD	0.337	0.7146
IMP1	0.265	0.6080
IMP2	14.477	0.0003 ***
IMP3	0.149	0.7007
IMS1	8.527	0.0044 **
IMS2	1.888	0.1729
PCI	5.541	0.0208 *

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 12: Effects of Communication Type on Brand Attitude with Product Durability as Interaction Term

Lastly, we examined the relationship between the communication type and brand attitude, considering subjective sustainability. Our analysis demonstrated an F-value of 2.660 and a p-value of 0.0756, as shown in Table 13. Similarly, to product quality and durability, these results suggest a potential significant difference in brand attitude across the three types of communication when considering a p-value threshold of $p < 0.10$. Additionally, subjective sustainability has a significant effect on brand attitude ($F = 21.567$, p-value = < 0.001), while the effect of communication type on brand attitude does not seem to vary based on different levels of subjective sustainability ($F = 0.157$, p-value = 0.8547).

DV: Brand Attitude	F-value	Pr(>F)	
Communication type	2.660	0.0756	.
Subjective Sustainability (SS)	21.567	1.19e-05	***
Communication type:SS	0.157	0.8547	
IMP1	0.672	0.4147	
IMP2	23.039	6.45e-06	***
IMP3	0.014	0.9055	
IMS1	10.251	0.0019	**
IMS2	3.206	0.0768	.
PCI	4.646	0.0339	*

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'

Abbreviations: IMP = Importance of Printer, IMS = Importance of Sustainability, PCI = Printer Choice Impact

Table 13: Effects of Communication Type on Brand Attitude with Subjective Sustainability as Interaction Term

5.3 Summary of Analysis

Hypotheses	Result	Explanation
H1: When companies in B2B markets communicate a mix of unrelated functional and sustainable benefits, the effects of the functional attributes on brand attitude are *lower* than communication focusing only on functional benefits.	Not supported	No evidence is found to support the hypothesis that communicating a mix of unrelated benefits leads to *lower* impact on brand attitude, compared to communicating only functional benefits. In contrast to our prediction, there are weak indications of communicating a mix of unrelated might have a *higher* impact on brand attitude, compared to communicating only functional benefits.
H2: When companies in B2B markets communicate that sustainable benefits support functional benefits, the effects of the functional attributes on brand attitude are *higher* than communication focusing only on functional benefits.	Not supported	No evidence is found to support that communicating a mix of related functional and sustainable benefits leads to *higher* impact on brand attitude, compared to communication only functional. In contrast to our prediction, the findings give weak indications that communicating a mix of related functional and sustainable benefits leads to *lower* effect of functional attributes in brand attitude, compared to communicating only functional benefits.

Table 14: Summary of the Analyses

Chapter 6: Discussion

6.1 Main Findings

6.1.1 Hypothesis 1

Hypothesis 1 (H1): In B2B markets, when companies advertise a product's functional and sustainable attributes as unrelated using a double-message approach, it is hypothesized that the respondent's perception of the brand attitude will be lower compared to when the functional attribute is communicated through a single-message approach. This hypothesis aims to answer research question 1 exploring the presence of a dilution effect. This effect suggests that when functional and sustainable attributes of a product are presented simultaneously in a double-message approach, the respondents dilute the perceived value of the functional attribute due to the presence of the sustainable attribute. As these attributes are presented as unrelated, the functional attribute may be perceived as diagnostic, while the sustainable attribute as nondiagnostic. In contrast, a single-message approach that presents only the diagnostic information related to the functional attribute is assumed not to be subject to the dilution effect.

H1: When companies in B2B markets communicate a mix of unrelated functional and sustainable benefits, the effects of the functional attributes on brand attitude are lower than communication focusing only on functional benefits.

Based on our analysis, we found p-values slightly above the conventional statistical threshold of 0.05. These results suggest a weak indication of the potential impact of communication type on brand attitude, with significant differences in mean scores for brand attitude at a more lenient significance threshold of $p < 0.10$. However, the indications are weak, and therefore, we cannot conclusively state that the communication types significantly impact B2B decision-makers' brand attitudes. But we also cannot definitively dismiss the possibility of such an impact; therefore, it is still possible that a dilution effect may be present.

Subsequently, in order to validate our hypothesis, it is important to determine whether the mean values of the unrelated communication type are lower than those of the functional communication type. Therefore, we performed a Tukey's HSD test. The p-values, when considering a threshold of $p < 0.10$, indicate significant differences in means between the respondents exposed to unrelated functional and sustainable benefits and the respondents

exposed only to functional benefits. The results, indicated by the positive mean value, stand in contrast to our original Hypothesis 1. The findings suggest that when companies in B2B markets communicate a mix of unrelated functional and sustainable, the effects of the functional attributes on brand attitude are *higher* than communication focusing only on functional benefits. Even though the observed results contradict our initial Hypothesis 1 and challenge our theoretical framework for capturing the dilution effect, the evidence does suggest that different communication types can impact how functional attributes are perceived in B2B markets. This could potentially indicate that respondents tend to draw inferences from the information presented. Although the statistical evidence supporting these effects may not be strong, it cannot be dismissed either.

6.1.2 Hypothesis 2

Hypothesis 2 (H2): In B2B markets, when companies communicate a product's sustainable attributes as supporting, hence related to the functional benefits using a double-message approach, it is hypothesized that the respondent's perception of the brand attitude will be higher compared to when the functional attribute is communicated through a single-message approach. This hypothesis aims to answer research question 2 by exploring how the method of communication can aid in avoiding the dilution effect. When presenting the two attributes as supporting each other in a double-message approach, it implies that one attribute adds value to the other. We hypothesize that respondents will categorize this joint presentation of information as diagnostic. As a result, respondents should be able to evaluate the product more impartially, thus potentially avoiding the dilution effect. This contrasts with unrelated communication, where sustainability information was assumed to be processed as nondiagnostic.

H2: When companies in B2B markets communicate that sustainable benefits support functional benefits, the effects of the functional attributes on brand attitude are higher than communication focusing only on functional benefits.

From the discussion in section 6.1.1 Hypothesis 1, it is apparent that we cannot conclusively confirm the presence of a dilution effect. Consequently, it becomes problematic to test and formulate a solution in avoiding the dilution effect when the underlying problem itself has not been clearly identified.

Nonetheless, the results from Tukey's HSD provide indications of a significant difference in brand attitude between individuals exposed to unrelated benefits and those exposed to related benefits. Specifically, communication involving related benefits appears to give a significantly lower brand attitude compared to communication involving unrelated benefits. Consequently, there are indications that contradict our prediction in H2, as communicating related benefits seems to result in the lowest brand attitude. However, we cannot draw definitive conclusions as the presence of a dilution effect remains uncertain.

6.1.3 Potential Explanations for Main Findings

We believe the lack of significant results in our study may, to some extent, be attributed to the design of the experiment. Specifically, the absence of a manipulation check in the questionnaire introduces uncertainty about whether participants effectively recognized and processed the manipulation of our independent variable – the types of communication. This issue introduces the possibility of inherent measurement errors, which could have affected the interpretations of our results.

In the advertisements, we chose to include additional elements, such as the visual representation of the printer's functional attributes. While these elements were intended to make it authentically like a typical B2B advertisement, they may have inadvertently served as distractions, potentially diverting respondents' attention away from the manipulation. In addition, the manipulation was incorporated into the advertisement using two distinct components: the heading and payoff (short message), and a long message. Considering the presence of multiple elements within each advertisement, we suggest that the amount of time allocated by the respondents could have influenced and affected their information processing. The duration of time spent on the survey could play a determining role in the extent to which respondents processed and retained specific information, thus potentially impacting their overall interpretation of the manipulation.

As previously mentioned, our cognitive processes consist of two systems: System 1, which operates automatically and leads to quick and intuitive reactions, and System 2, which involves more deliberate and effortful thinking (Kahneman, 2011). It can be inferred that participants who completed the survey relatively quickly were more likely to rely on System 1. As a result, these participants may not have thoroughly read the long message in the

advertisement but instead rapidly processed the information presented in the heading and the pay-off by using minimal cognitive effort. System 1 excels at integrating one element at a time, and therefore, making it less capable of handling multiple elements simultaneously (Kahneman, 2011). If participants relied on System 1 for processing, it is probable that they only processed one of the two elements, especially considering that they probably only viewed the heading and pay-off. Since functionality is considered the most valuable aspect, the sustainable (nondiagnostic) information was ignored. Hence, the sustainable information was not processed and therefore incapable of diluting the functional information as the respondents did not use sufficient time to process all the information in the advertisement. However, participants who devoted more time to processing the information in the advertisement had the opportunity to activate their System 2. Given that the related information in the advertisement involved two interconnected elements, it can be argued that it required System 2 thinking. Consequently, the lack of support for our hypotheses could be attributed to the fact that some participants did not sufficiently activate their System 2 when processing the information in the advertisement.

There is some uncertainty regarding whether respondents accurately processed and understood the message in the unrelated communication type. This uncertainty arises from our explicit statement that the addition of the sustainable attribute did not compromise the printer's functionality, which could have influenced their interpretation. This assertion of functional performance may have reduced the likelihood of a dilution effect, as respondents did not perceive a trade-off between the benefits. This finding aligns with previous research, which suggests that highlighting the functional performance of products can alleviate consumer concerns about performance depletion (Chen & Wu, 2020). However, for participants to capture this information, they would have needed to read the long message in the advertisement. The level of uncertainty is further amplified by the possibility that respondents relying on System 1 thinking may have overlooked or ignored the sustainable attribute, processing only the functional aspect. Hence, the accurate capture of the manipulation and the consideration of the sustainable attribute could be contingent upon the participant's amount of time spent processing the information in the advertisement.

The concept of cognitive processes also relates to the uncertainty around how respondents interpreted the message of "durability," and whether they understood that this was linked to the functionality aspect of the product. Respondents operating primarily under System 1 thinking

might lean on their pre-existing biases and association with durability, whereby individuals may have different mental associations or beliefs about the relationship between durability and functional performance. For instance, some may have a pre-existing perception of durability and therefore perceive these two characteristics – durability and functionality – as separate attributes. Moreover, individuals often prioritize immediate benefits when evaluating a product's functional performance, which aligns with the 'doer self'– focused on immediate needs. Durability, although important in the long run, may not be immediately visible or tangible during the decision-making process. This aspect of long-term value appeals more to the 'future self'- focused on long-term consequences. Therefore, due to the influence of the 'doer self,' individuals may not consider durability as being directly linked to the functional performance of the product during their immediate decision-making process. Therefore, to appreciate the connection between durability and functionality, they would possibly need to engage their System 2 thinking.

We believe that conducting a pre-test of the questionnaire could have led to improved outcomes. This would have allowed us to identify and address potential issues or shortcomings in the questionnaire before conducting the actual experiment. For instance, by detecting any misunderstandings or misinterpretations early on, adjustments could have been made to ensure the manipulation was effectively communicated. Furthermore, if participants in the pre-test did not perceive a clear distinction between functional and sustainable benefits or did not consider durability as directly related to functional performance. This feedback could have helped refine the ad content to ensure a more precise and unambiguous portrayal of the intended separation between the two types of benefits.

Lastly, while there were found indications of statistically significant differences in means, the small magnitude suggests that the practical or real-world significance of these differences may be limited. Therefore, the minimal magnitude of the mean differences between the communication types has implications for the overall interpretation of the data. When the mean differences between groups are small, it indicates that the effect or impact of the independent variable on the dependent variable is relatively small or subtle. In other words, the observed differences between the communication types may not have a substantial practical impact on individuals' brand attitudes. In addition, it's also worth noting that the overall ratings of brand attitude were not extreme, as indicated by the mean scores mostly ranging from 5 to 7 on a 7-point Likert scale. This suggests that participants' attitudes towards the brand were generally

positive, regardless of the communication type they were exposed to. The lack of extreme ratings further supports the notion that the observed differences between the communication types, while statistically significant, may not have a substantial impact on the overall brand attitude ratings.

6.2 Potential Explanation for Additional Findings

In addition, our findings indicate that product quality, product durability, and subjective sustainability seem to have an impact on brand attitude. However, the effect of communication type on brand attitude remains consistent across different levels of these interaction terms. Moreover, upon closer examination of the data, we observed no significant difference in subjective sustainability between those who were exposed to only functional benefits and those who were exposed to both functional and sustainable benefits. This suggests that even without explicit information about product sustainability, those exposed to only functional benefits still perceived the product as sustainable. This indicates that the communication type used in the advertisements may not have effectively influenced the respondent's perceptions of the attributes.

6.3 Theoretical Implications

In prior literature, there is a general consensus that consumers often face trade-offs between sustainability and other product attributes when making decisions. However, the majority of research on this topic has primarily focused on B2C consumers, leaving significant gaps in our understanding of the behavior of decision-makers in the B2B context. Our study addresses this existing research gap by enabling a transfer of context by applying the dual-process theory. This approach allows for a comprehensive extension of the current understanding of sustainable consumption in B2C, and therefore, extended to the B2B markets.

While the intention-behavior gap in sustainable consumption among B2C customers is influenced by biases from the intuitive System 1 thinking, we argue that B2B decisions primarily rely on the deliberate System 2 thinking. B2B decisions require substantial cognitive effort due to the complex decision-making process. However, our theoretical framework recognizes the interconnectedness between these two systems. For instance, emotions and beliefs rooted in System 1 can influence System 2 thinking. In addition, it is not

guaranteed that B2B decision-making completely disregards System 1. Hence, B2B decision-makers are also susceptible to biases and inferences, making the insights from B2C consumer behavior research applicable to the B2B context. Consequently, our study contributes to the understanding that decision-makers in a B2B context and individual consumers in a B2C context hold similar perceptions regarding the perceived trade-off between sustainability and functionality.

Furthermore, our findings support Chen and Wu's (2020) research, indicating that double-message advertisements have a significantly higher impact on brand attitude compared to single-message advertisements. Their study demonstrated that the double-message is more effective when the single-message emphasized the sustainable product attribute. In the same vein, our study suggests that the double-message being more effective even holds true when the single message only focuses on functional attributes. However, these findings were only applicable when the double-message conveyed a combination of unrelated functional and sustainable benefits. In contrast to the conclusions drawn by Chen and Wu, we discovered that emphasizing only the functional benefits proved to be more effective than using the double-message approach in our advertisement where the two benefits were presented as related. Consequently, when the single-message emphasizes the functional attribute, it could potentially offer more advantages than employing a double-message. As a result, our study provides insights into the positive effects of a double-message not necessarily being universally true.

We contribute to the literature by raising awareness among researchers of the importance of exploring the presence of the dilution effect in B2B markets as this effect can bias decision-makers' perception. Therefore, by exploring this topic, we believe that our research will generate further interest among researchers as our research provides a deeper understanding of these overlooked areas within the B2B context.

6.4 Managerial Implications

This study focuses on industries operating in a B2B context, that are incorporating sustainable features into their traditional products. The primary objective is to illustrate how the marketing approach influences the perception of these products among B2B decision-makers. It is crucial for marketers to recognize that systematic biases exist in this field, and the

dilution effect can hinder the adoption of green products. While it is common to enhance environmental credentials by highlighting a product's sustainable attributes, our findings suggest that addressing this perception is not straightforward. Specifically, our findings do not indicate that emphasizing a product's strengths outweighs the negative impact sustainable information about a green product can have on consumers' preferences for these products.

Furthermore, communicating sustainability as supporting functionality does not lead to a more positive brand attitude. Therefore, since appropriate strategies for implementing sustainable attributes in B2B markets are yet to be discovered, managers must exercise caution when implementing and communicating the integration of sustainable attributes, taking into account the potential drawbacks. Rushing such implementation can have significant negative implications for companies, as consumers may perceive the products to have reduced functionality. Since functionality attribute is highest weighted in the decision-making process, the intention to increase adoption by implementing a sustainable attribute can paradoxically result in decreased consumption.

Chapter 7: Limitations

In the following chapter, we will conduct a critical evaluation of our research, focusing on its reliability and validity. This approach is intended to facilitate reflective judgment, which aids in assessing the level of quality of our experiment. Therefore, we will first present measures taken to secure the internal validity, before discussing the external validity. Lastly, we discuss the reliability of the study.

7.1 Internal Validity

Several measures were taken to secure the internal validity of our findings. Internal validity refers to the confidence with which we can assert that the relationship between the independent and dependent variable is not influenced by other factors or aspects of the study (Saunders et al., 2012). In our effort to strengthen this, the questionnaire was carefully designed to measure the intended constructs and variables in our research model. We incorporated questions from previous studies that had already measured similar constructs, which further reinforced the validity of our measurement approach. To ensure data consistency, we used the same set of questions across all groups. In addition, to minimize response bias, we introduced the questionnaire without disclosing the objective of the study.

Selection bias could further influence the internal validity if the participants were improperly assigned to treatment groups, causing the groups to differ on the dependent variable prior to the treatment (Malhotra et al., 2017). To address this, we aimed to ensure randomization from the outset by using an A/B/C testing design. Respondents were randomly assigned to one of three treatments, each representing a different condition of the manipulated independent variable. This method increased the control over the experiment and helped avoid potential systematic bias. A critical aspect of ensuring internal validity was achieving an even distribution of respondents across the three treatment groups. This balanced distribution minimized the risk of biased samples, as unequal group size could potentially influence the conclusions. By maintaining an even distribution sample, we could ensure that any observed differences were actually due to the treatment conditions, and not confounded by the number of respondents per treatment.

To further strengthen our validity, we controlled for potential covariates of "importance of printer", "importance of sustainability" and "impact on printer choice". Each of these could potentially impact the dependent variable, independently of our treatments, thereby acting as confounding variables. Given our small sample size, we anticipated the potential unequal distribution of the covariates among the groups, which could lead to systematic differences. To account for these possible imbalances and increase confidence in our findings, particularly the impact of communication types on brand attitude, we controlled for these covariates in our analysis.

Lastly, to reduce the threat of instrumentation, the ads were designed to be as similar as possible while only varying the communication type. This approach minimized the possibility of respondents' reactions being influenced by other factors than the experimental design. We also recognize that self-reporting can impact internal validity, as individuals tend to overestimate their intentions when reporting their behavior (Whitehead et al., 2016). We considered this limitation, acknowledging that participants may have inaccurately estimated their responses to behavioral questions, particularly those related to sustainability and purchase intention. While we have not made specific adjustments to compensate for this, we understand that its presence could have potentially overestimated our results.

7.2 External Validity

To enhance external validity, it is important to ensure that the findings of our study conducted on a specific target population can be generalized to a broader population. By collecting data through Pollfish, survey results were accompanied with the demographic data of respondents. Based on this data, our study's external validity is limited in a global context, as the target population compromised business professionals located exclusively in the United States. Various factors such as diverse cultural backgrounds, and country-specific influence led to potential differences that make generalizing findings across national contexts challenging.

However, our study of external validity within the United States can be discussed more confidently, as indicated in Appendix D, by the diverse sample drawn from various ZIP codes across the country. This diversity allows for a more comprehensive representation of US business professionals, which is further supported by the balanced distribution of genders, with

56% females and 44% males. Despite this strength, we aimed to include various industries in our study. However, our results showed a skewed representation due to a greater representation of the Finance and Insurance sector, which then affects the external validity even within the U.S. context. In addition, a sample size of 100 may not be representative enough of the broader population. Therefore, a larger sample size and a more balanced representation across various industries would be beneficial to reduce potential limitations.

Furthermore, our study included three covariates that allowed us to control for potential confounding factors. Among these, the covariant, "importance of sustainability," can be seen as relevant when considering the study's external validity. We recognize that attitudes towards sustainability can vary significantly across different industries due to varying regulations and specific sustainability standards. Additionally, differences in attitudes may also exist across geographic regions due to diverse environmental policies and regulations. The heterogeneity of attitudes towards sustainability has the potential to influence the impact of communication type on brand attitude. While some degree of geographical heterogeneity may still exist, the inclusion of respondents from different areas in our sample may have helped control for this to some extent. The inclusion of the "importance of sustainability" covariant and the incorporation of respondents from different regions in the U.S. contribute to the external validity within the U.S. However, respondents were mostly from the Finance and Insurance sector; therefore, it is important to interpret the results within the context of this specific sector and consider its implications when generalizing the findings.

7.3 Reliability

Reliability refers to the consistency of findings across different circumstances. To ensure reliability, the findings should be consistent if, for instance, different researchers conducted the study, if diverse participant samples were involved, or if the time of data collection varied. Thus, it is important to minimize measurement error as this directly impacts reliability. According to Gripsrud et al. (2016), measurement errors can be categorized as either systematic errors or random errors. To ensure the reliability of our research, we paid close attention to systematic errors that arise from the structure and collection of the data collection. To minimize variance, we opted for a carefully designed questionnaire for data collection. However, it is important to acknowledge that collecting all the data at once could pose a potential systematic error as it could limit our ability to establish causal inference. This limitation could have been

avoided by using a cross-sectional design for data collection. Nevertheless, given the nature of the study's topics, which do not involve sensitive or frequently changing aspects, it is believed that the participants' responses remained independent of the sampling time.

Random measurement errors, in contrast, are caused by factors beyond the control of researchers (Gripsrud et al., 2016). These factors pertain to the participants themselves, such as their hesitation to provide honest responses or their tendency to quickly rush through the questionnaire (Saunders et al., 2019). To encourage honest responses, the participants were assured anonymity. Moreover, since the questionnaire was self-administered, it is assumed that participants chose a suitable time to complete it and therefore did not feel rushed. The questionnaire was specifically designed to be completed within 2-3 minutes, and participants were presented with only one or a few questions at a time. This approach aimed to minimize the possibility of boredom and fatigue. Consequently, we anticipate that the majority of respondents invested time in comprehending the questions, examining the advertisements, and responding accordingly.

Chapter 8: Conclusion and Future Research

8.1 Conclusion

To conclude, this study is set out to answer two research questions by formulating and testing two hypotheses.

The first research question: "Is there evidence of a dilution effect in B2B markets?". In response to this question, we formulated Hypothesis 2, which predicted that brand attitudes would be lower when companies in B2B markets communicate a mix of unrelated functional and sustainable benefits compared to only communicating functional benefits. However, contrary to this hypothesis, our results provided weak indications that brand attitudes may, in fact, be higher when a mix of unrelated functional and sustainable benefits are communicated. However, due to the weak statistical significance of these results, this observation remains speculative. In sum, this study did not find substantial support for the presence of a dilution effect in B2B markets.

The second research question: "How can B2B marketers avoid dilution effects in B2B markets?" In response to this question, we formulated Hypothesis 2, which suggested that brand attitudes would be higher when companies in B2B markets communicate that sustainable benefits support functional benefits (related), as compared to only functional benefits. Again, contrary to this hypothesis, our results gave weak indications that when communicated as related lead to a lower effect on brand attitude compared to communicating only functional benefits. In sum, we did not uncover substantial evidence to suggest a solution for avoiding the dilution effect. Given the ambiguity surrounding the nature of the underlying problem, it is not surprising that finding a viable test for a solution proves challenging.

While our initial hypotheses were not fully supported by the results, we maintain our belief in the presence of a dilution effect in B2B markets. Based on our review of the prior literature and application of relevant theories in Chapter 2, we recognize that decision-makers in B2B markets have bounded rationality. They often have preconceived expectations about product attributes, which can significantly impact their evaluation of a product. Although green alternatives increasingly match conventional products in terms of functionality and quality, decision-makers are prone to systematic errors and tend to employ biased inferences that hinder their ability to objectively evaluate the attributes of a product. Their preconceptions about green alternatives

being inferior continuously impact their decision-making process as these preconceptions can potentially lead to reluctance and skepticism towards green alternatives.

Therefore, we propose that the lack of support for our hypotheses could be attributed to the simplicity of our study's design. In retrospect, we should have taken into account the dimension of time when evaluating the dilution effect. In addition, we cannot be certain if respondents fully comprehended the manipulations implemented in our study. Therefore, it would have been beneficial to have included a manipulation check and conducted a pretest. We assume that considering these factors in future research would enable a more accurate assessment.

8.2 Suggestions for Future Research

We contend that research on sustainable consumption will continue to expand as it has become unquestionable that businesses can no longer only offer conventional products that lack sustainable attributes. Consequently, given its persistent significance and high relevance for businesses, researchers must continue further investigating and understanding individuals' mental processes by incorporating theories from behavioral economics and psychology into research on sustainable consumption. Such understandings will help researchers understand how to effectively employ communication methods that can alter the preconceptions held by individuals in B2B markets.

Therefore, as it remains of high relevance for businesses, researchers much further explore how businesses can alter these preconceptions through different marketing strategies and communication techniques. Our study aims to inspire future researchers by arguing that the behavioral intention gap is also prevalent in the B2B context due to the decision-maker's susceptibility to systematic errors. Given the shortage of studies in this area, we assert that research in the field of sustainable consumption within the B2B context is particularly important.

Our focus has been on the phenomenon known as the dilution effect. Despite our study not providing statistically significant support for our hypothesis, we believe that with appropriate adjustments, evidence could be found to support our hypotheses. One of these adjustments is to extend our research by incorporating a factorial design by including the factor of time as an independent variable. The purpose of this adjustment is to understand how the combined

effects of our variables of interest and the passage of time influence whether participants use System 1 or System 2 to process the information. Another adjustment involves replicating the study by incorporating objective purchase data, as relying solely on purchase intention may not be a reliable indicator of actual purchase behavior. This expansion would involve using an actual product offered by a company, rather than a fictitious one while maintaining the same experimental setup. The adjustment allows for measuring participants' subsequent purchases, providing a better reflection of actual consumer behavior, as opposed to exploring their intended behavior.

References

Beltramini, R. F. (1988). Perceived Believability of Warning Label Information Presented in Cigarette Advertising. Journal of Advertising, 17(2), 26–32. http://www.jstor.org/stable/4188673

Cantor, N., & Mischel, W. (1979). Prototypes in person perception. InL. Berkowitz (Ed.), Advances in experimental social psychology (Vol.12, pp. 3-52). New York: Academic Press.

Carifio, J., & Perla, R. J. (2008). Resolving the 50-year debate around using and misusing Likert scales. Medical Education, 42(12), 1150–1152. https://doi.org/10.1111/j.1365-2923.2008.03172.x

Chandon, P., Wansink, B., & Laurent, G. (2000). A Benefit Congruency Framework of Sales Promotion Effectiveness. *Journal of Marketing*, *64*(4), 65–81. https://doi.org/10.1509/jmkg.64.4.65.18071

Chen, A. C.-H., & Wu, H.-H. (2020). How Should Green Messages Be Framed: Single or Double? *Sustainability*, *12*(10), 4257. https://doi.org/10.3390/su12104257

Chen, M.-H., Tai, P.-N., & Chen, B. H. (2015). The Relationship among Corporate Social Responsibility, Consumer-Company Identification, Brand Prestige, and Purchase Intention. *International Journal of Marketing Studies*, *7*(5). https://doi.org/10.5539/ijms.v7n5p33

Chen, Y., & Chang, C. (2012). Enhance green purchase intentions: The roles of green perceived value, green perceived risk, and green trust. *Management Decision*, *50*(3), 502–520. https://doi.org/10.1108/00251741211216250

Chen, Y.-S. (2010). The Drivers of Green Brand Equity: Green Brand Image, Green Satisfaction, and Green Trust. *Journal of Business Ethics*, *93*(2), 307–319. https://doi.org/10.1007/s10551-009-0223-9

Connolly, T., Nisbett, R., & Ross, L. (1981). Human Inference: Strategies and Shortcomings of Social Judgment. *Administrative Science Quarterly*, *26*(2), 302. https://doi.org/10.2307/2392481

Drolet, A., & Morrison, D. G. (2001). Do We Really Need Multiple-Item Measures in Service Research? Journal of Service Research, 3(3), 196–204. https://doi.org/10.1177/109467050133001

Frost, J. (n.d.). ANCOVA: Uses, Assumptions & Example. Statistics By Jim. https://statisticsbyjim.com/anova/ancova/

Gershoff, A. D., & Frels, J. K. (2015). What Makes It Green? The Role of Centrality of Green Attributes in Evaluations of the Greenness of Products. *Journal of Marketing*, *79*(1), 97–110. https://doi.org/10.1509/jm.13.0303

Grewal, D., Gotlieb, J., & Marmorstein, H. (1994). The Moderating Effects of Message Framing and Source Credibility on the Price-Perceived Risk Relationship. *Journal of Consumer Research*, *21*(1), 145. https://doi.org/10.1086/209388

Gripsrud, G., Olsson, U. H., & Silkoset, R. (2016) Metode og dataanalyse (3. utg.). Oslo: Cappelen Damm

Grolleau, G., Mzoughi, N., & Sutan, A. (2019). Does advertising the green benefits of products contribute to sustainable development goals? A quasi-experimental test of the dilution effect. *Business Strategy and the Environment*, *28*(5), 786–793. https://doi.org/10.1002/bse.2280

Hamilton, D. (1979). A cognitive-attributional analysis of stereotyping. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 12, pp. 51-100). New York: Academic Press.

Hoejmose, S., Brammer, S., & Millington, A. (2012). "Green" supply chain management: The role of trust and top management in B2B and B2C markets. *Industrial Marketing Management*, *41*(4), 609–620. https://doi.org/10.1016/j.indmarman.2012.04.008

Homburg, C., Stierl, M., & Bornemann, T. (2013). Corporate Social Responsibility in Business-to-Business Markets: How Organizational Customers Account for Supplier Corporate Social Responsibility Engagement. *Journal of Marketing*, *77*(6), 54–72. https://doi.org/10.1509/jm.12.0089

Jørgensen, S., Pedersen, L. J. T., & Skard, S. (2021). How going green builds trusting beliefs. *Business Strategy and the Environment*, *31*(1). https://doi.org/10.1002/bse.2888

Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus and Giroux.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology*, *3*(3), 430–454. https://doi.org/10.1016/0010-0285(72)90016-3

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. *Psychological Review*, *80*(4), 237–251. https://doi.org/10.1037/h0034747

Kang, M., Ragan, B. G., & Park, J.-H. (2008). Issues in Outcomes Research: An Overview of Randomization Techniques for Clinical Trials. *Journal of Athletic Training*, *43*(2), 215–221. https://doi.org/10.4085/1062-6050-43.2.215

Kassambara. A., (n.d.) ANCOVA in R: The Ultimate Practical Guide. Retrieved from: https://www.datanovia.com/en/lessons/ancova-in-r/

Keller, K. L. (1993). Conceptualizing, Measuring, and Managing Customer-Based Brand Equity. *Journal of Marketing*, *57*(1), 1–22. https://journals.sagepub.com/doi/10.1177/002224299305700101

Kirk, R. E. (2013). *Experimental design : procedures for the behavioral sciences*. Sage.

Kotler, P. (2011). Reinventing Marketing to Manage the Environmental Imperative. *Journal of Marketing*, *75*(4), 132–135. https://doi.org/10.1509/jmkg.75.4.132

Kumar, V., & Christodoulopoulou, A. (2014). Sustainability and branding: An integrated perspective. *Industrial Marketing Management*, *43*(1), 6–15. https://doi.org/10.1016/j.indmarman.2013.06.008

Lin, Y.-C., & Chang, C. A. (2012). Double Standard: The Role of Environmental Consciousness in Green Product Usage. *Journal of Marketing*, *76*(5), 125–134. https://doi.org/10.1509/jm.11.0264

Luchs, M. G., & Kumar, M. (2015). "Yes, but this Other One Looks Better/Works Better": How do Consumers Respond to Trade-offs Between Sustainability and Other Valued Attributes?. *Journal of Business Ethics*, *140*(3), 567–584.

Luchs, M. G., Brower, J., & Chitturi, R. (2012). Product Choice and the Importance of Aesthetic Design Given the Emotion-laden Trade-off between Sustainability and Functional Performance. *Journal of Product Innovation Management*, *29*(6), 903–916. https://doi.org/10.1111/j.1540-5885.2012.00970.x

Luchs, M. G., Naylor, R. W., Irwin, J. R., & Raghunathan, R. (2010). The Sustainability Liability: Potential Negative Effects of Ethicality on Product Preference. *Journal of Marketing*, *74*(5), 18–31. https://doi.org/10.1509/jmkg.74.5.18

MacKenzie, S. B., Lutz, R. J., & Belch, G. E. (1986). The Role of Attitude toward the Ad as a Mediator of Advertising Effectiveness: A Test of Competing Explanations. *Journal of Marketing Research*, *23*(2), 130–143. https://doi.org/10.1177/002224378602300205

Malhotra, N. K., Nunan, D., & Birks, D. F. (2017). Marketing research: An applied approach. Pearson Education Limited

Newman, G. E., Gorlin, M., & Dhar, R. (2014). When Going Green Backfires: How Firm Intentions Shape the Evaluation of Socially Beneficial Product Enhancements. *Journal of Consumer Research*, *41*(3), 823–839. https://doi.org/10.1086/677841

Nisbett, R. E., Zukier, H., & Lemley, R. E. (1981). The dilution effect: Nondiagnostic information weakens the implications of diagnostic information. *Cognitive Psychology*, *13*(2), 248–277. https://doi.org/10.1016/0010-0285(81)90010-4

Norman, G. R. (2010). Likert scales, levels of measurement and the "laws" of statistics. Advances in Health Sciences Education, 15(5), 625–632. https://doi.org/10.1007/s10459-010-9222-y

Olson, E. R. (2013). It's not easy being green: the effects of attribute tradeoffs on green product preference and choice. Journal of the Academy of Marketing Science, 41(2), 171–184. https://doi.org/10.1007/s11747-012-0305-6

Putrevu, S., & Lord, K. R. (1994). Comparative and Noncomparative Advertising: Attitudinal Effects under Cognitive and Affective Involvement Conditions. *Journal of Advertising*, *23*(2), 77–91. https://doi.org/10.1080/00913367.1994.10673443

Qualprint. (n.d.). What is the future of sustainable printing? Qualprint. Retrieved from: https://qualprint.com/what-is-the-future-of-sustainable-printing/

Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management*, *25*(9), 898–916. https://doi.org/10.1108/01443570510613956

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research Methods for Business Students. 5th ed. Harlow, Essex, Pearson Education Limited

Saunders, M., Lewis, P., & Thornhill, A. (2012). Research Methods for Business Students. 6th ed. Harlow, Essex, Pearson Education Limited

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research Methods for Business Students. (8th ed.). Pearson: UK.

Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business Models for Sustainability. *Organization & Environment*, *29*(3), 264–289. https://doi.org/10.1177/1086026616633272

ShabbirHusain, R. V. (2022). Green offering: more the centrality, greater the scepticism. *International Review on Public and Nonprofit Marketing*. https://doi.org/10.1007/s12208-021-00324-0

Sharma, A. (2020). Sustainability research in business-to-business markets: An agenda for inquiry. *Industrial Marketing Management*, *88*, 323–329. https://doi.org/10.1016/j.indmarman.2020.05.037

Sivanathan, N., & Kakkar, H. (2017). The unintended consequences of argument dilution in direct-to-consumer drug advertisements. *Nature Human Behaviour*, *1*(11), 797–802. https://doi.org/10.1038/s41562-017-0223-1

Skard, S., Jørgensen, S., & Pedersen, L. J. T. (2020). When is Sustainability a Liability, and When Is It an Asset? Quality Inferences for Core and Peripheral Attributes. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-019-04415-1

Sloman, S. A., Love, B. C., & Ahn, W.-K. (1998). Feature Centrality and Conceptual Coherence. *Cognitive Science*, *22*(2), 189–228. https://doi.org/10.1207/s15516709cog2202_2

Spears, N., & Singh, S. N. (2004). Measuring Attitude toward the Brand and Purchase Intentions. *Journal of Current Issues & Research in Advertising*, *26*(2), 53–66. https://doi.org/10.1080/10641734.2004.10505164

Statista (2020). Number of printers and multifunctional printers (MFPs) sold in the United States from 2010 to 2020 (in million units). Retreived from: https://www.statista.com/outlook/cmo/consumer-electronics/computing/printers-copiers/united-states#volume

Statistical Aid (2021, November 1). Analysis of Covariance (ANCOVA) using R. Retrieved from https://www.r-bloggers.com/2021/10/analysis-of-covariance-ancova-using-r/

Supphellen, M. (2020). Why or how to integrate sustainability into brand positioning. *Magma*, 44–54. https://www.nhh.no/contentassets/d7030d48bc414e42be31890df2ea0d2b/magma-okt-2020-fagdel-supphellen-1.pdf

Usrey, B., Palihawadana, D., Saridakis, C., & Theotokis, A. (2020). How Downplaying Product Greenness Affects Performance Evaluations: Examining the Effects of Implicit and Explicit Green Signals in Advertising. *Journal of Advertising*, 1–16. https://doi.org/10.1080/00913367.2020.1712274

Vesal, M., Siahtiri, V., & O'Cass, A. (2020). Strengthening B2B brands by signalling environmental sustainability and managing customer relationships. *Industrial Marketing Management*, *92*, 321–331. https://doi.org/10.1016/j.indmarman.2020.02.024

Vilkaite-Vaitone, N., Skackauskiene, I., & Díaz-Meneses, G. (2022). Measuring Green Marketing: Scale Development and Validation. *Energies*, *15*(3), 718. https://doi.org/10.3390/en15030718

Ward, T. B., Dodds, R. A., Saunders, K. N., & Sifonis, C. M. (2000). Attribute centrality and imaginative thought. *Memory & Cognition*, *28*(8), 1387–1397. https://doi.org/10.3758/bf03211839

Appendices

Appendix A: Questionnaire

Introduction		
This survey is conducted as part of the data collection for a master's thesis at the Norwegian School of Economics (NHH). The survey involves filling out a questionnaire that will take approximately 2-3 minutes. Your answers are anonymous and will be treated confidentially, and we do not collect direct personally identifiable information. We will only use the data from this survey for the master thesis, which will be deleted upon completion. We greatly appreciate your participation!		
Instructions		
You will now be exposed to an advertisement for a printer. Please view and read the advertisement for the printer, and then answer the following questions.		
Exposure of the ads		
Purchase Intention: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q1	PI	If we needed new printers now, I would consider this printer
Product Attitude: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q2	PA1	I have a favorable impression of the printer
Q3	PA2	I like this printer
Q4	PA3	My colleagues would like this printer
Ad Attitude: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q5	AA1	I liked the ad
Q6	AA2	The ad was credible
Product Quality: (1) Extremely inefficient – (7) Extremely efficient / (1) No ability – (7) Very high ability *Please consider the following statements:*		
Q7	PQ1	How would you rate the efficiency of this printer

Q8	PQ2	How would you rate the ability of the printer to print high-quality prints
Product Durability: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q9	PD1	I believe the printer will last a reasonable amount of time before needing to be replaced
Q10	PD2	I believe the printer can withstand regular use without breaking down
Subjective Sustainability: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q11	SS1	I feel that the printer's environmental claims are generally reliable
Q12	SS2	I feel that the printer is a sustainable product
Importance of Printer: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q13	IMP1	A printer is critical for the company's day-to-day operations
Q14	IMP2	Your business relies heavily on the functionality of the printer
Q15	IMP3	The efficiency of your workflow is greatly impacted by the performance of the printer
Impact on Printer Choice: (1) Very low extent – (7) Very large extent *Please consider the following statement:*		
Q16	PCI	To what extent will your opinion influence the choice of printer in your company
Importance of Sustainability: (1) Strongly disagree – (7) Strongly agree *Please indicate your level of agreement with the following statements:*		
Q17	IMS1	The company's sustainability practices are important to its reputation
Q18	IMS2	Using non-green products could damage your reputation
Thank you for your participation!		

Appendix B: Advertisement

Ad 1: Only Functional

Ad 2: Unrelated

Ad 3: Related

Sustainability equals Durability.

The GX is durable because of its sustainable function, namely the low-CPU, which allows the primary CPU to rest, reducing wear and tear on the machine.

SUSTAINABILITY EQUALS DURABILITY | **Multifunctional GX**

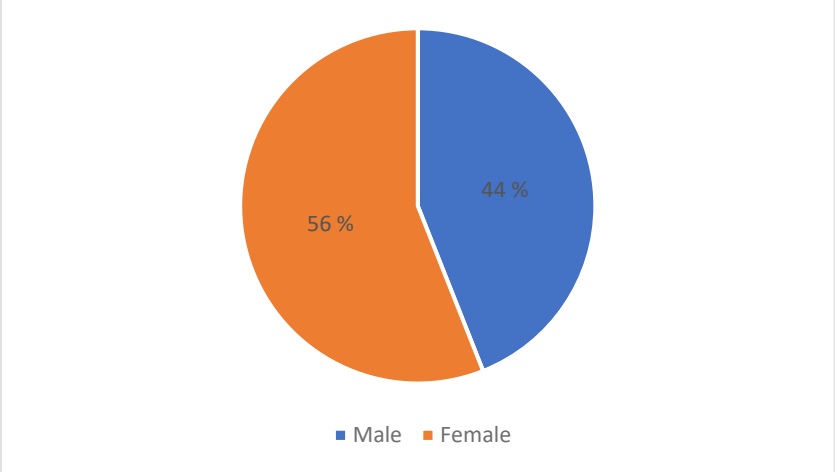
Appendix C: Constructs

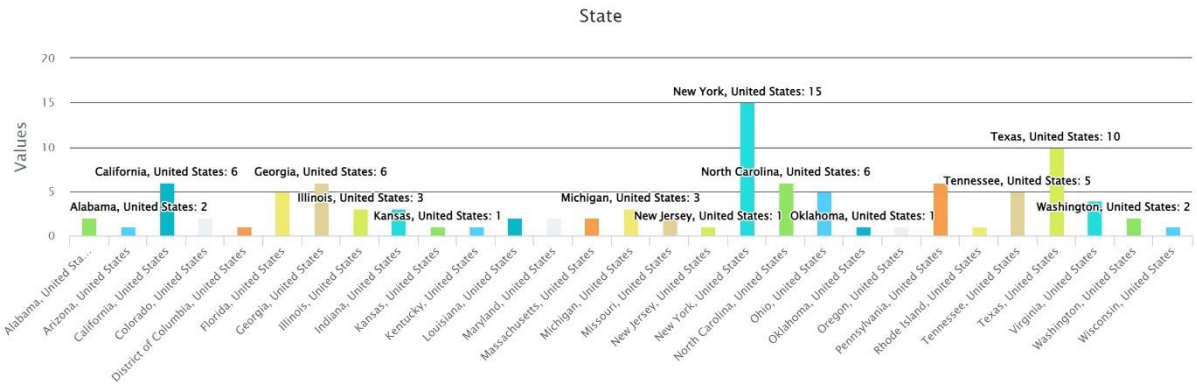
Construct	Item	Measures	Source
Purchase Intention	PI	If we needed new printers now, I would consider this printer	Putrevu and Lord (1994); Chen et al., (2015)
Product Attitude	PA1	I have a favorable impression of the printer	Spears & Singh (2004)
	PA2	I like this printer	
	PA3	My colleagues would like this printer	
Ad Attitude	AA1	I liked the ad	MacKenzie et al. (1986)
	AA2	The ad was credible	Beltramini, (1988)
Product Quality	PQ1	How would you rate the efficiency of this printer	Newman et al., (2014)
	PQ2	How would you rate the ability of the printer to print high-quality prints	
Product Durability	PD1	I believe the printer will last a reasonable amount of time before needing to be replaced	Grewal et al. (1994)
	PD2	I believe the printer can withstand regular use without breaking down	
Subjective Sustainability	SS1	I feel that the printer's environmental claims are generally reliable	Chen (2010)
	SS2	I feel that the printer is a sustainable product	
How important a printer is for the company	IMP1	A printer is critical for the company's day-to-day operations	Homburg et al. (2013)
	IMP2	Your business relies heavily on the functionality of the printer	
	IMP3	The efficiency of your workflow is greatly impacted by the performance of the printer	
Impact on printer choice	PCI	To what extent will your opinion influence the choice of printer in your company	
	IMS1	The company's sustainability practices	Vilkaite-Vaitone et al. (2022)

How important sustainability is for a company's reputation.		are important to its reputation	
	IMS2	Using non-green products could damage your reputation	Chen and Chang (2012)

Appendix D: Data Analysis

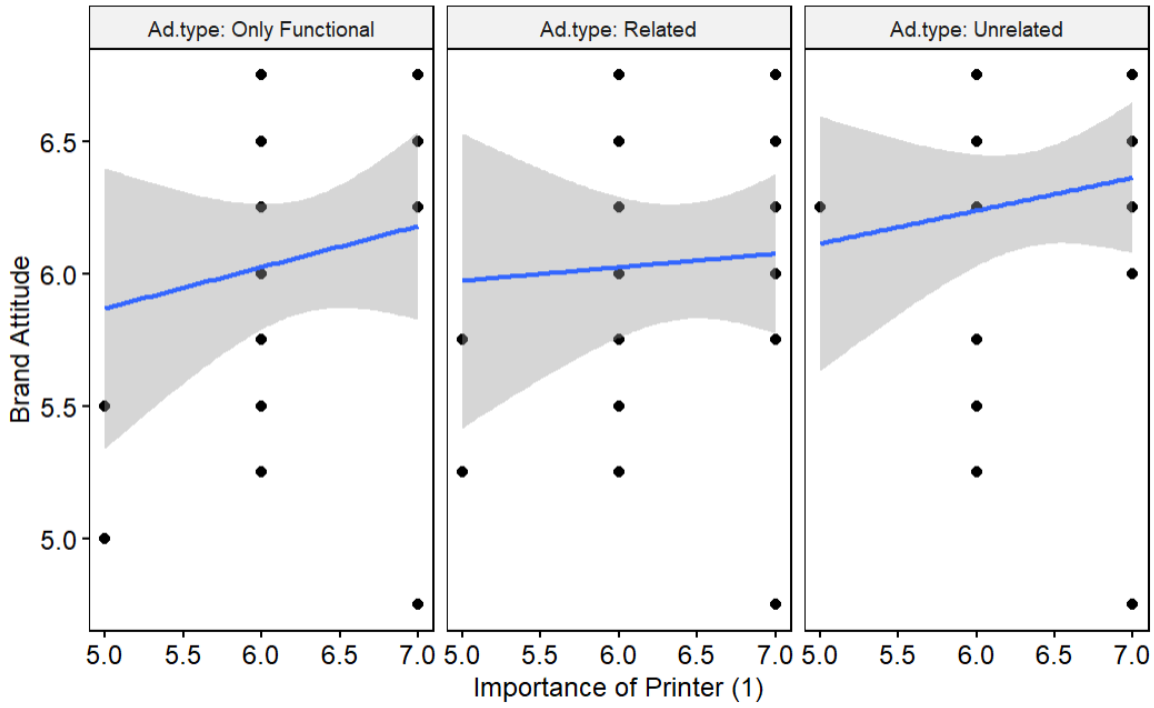
Appendix D1: Gender Distribution and Demographics



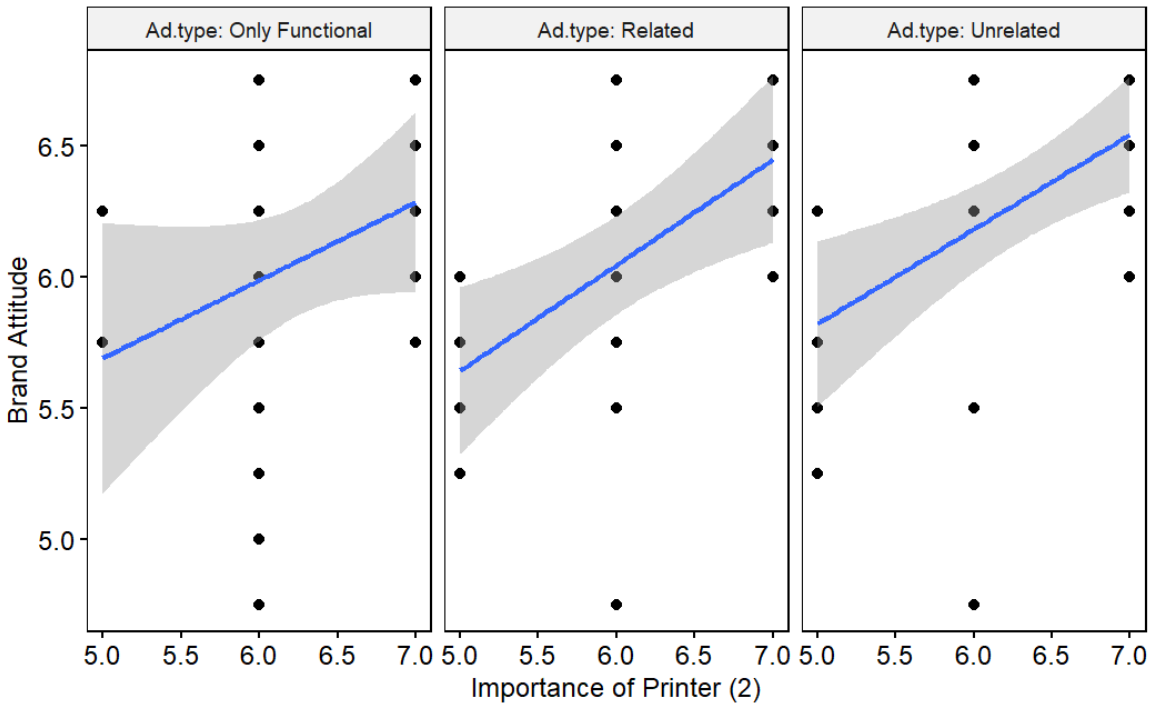


Appendix D2: Linearity Assumption of Covariates

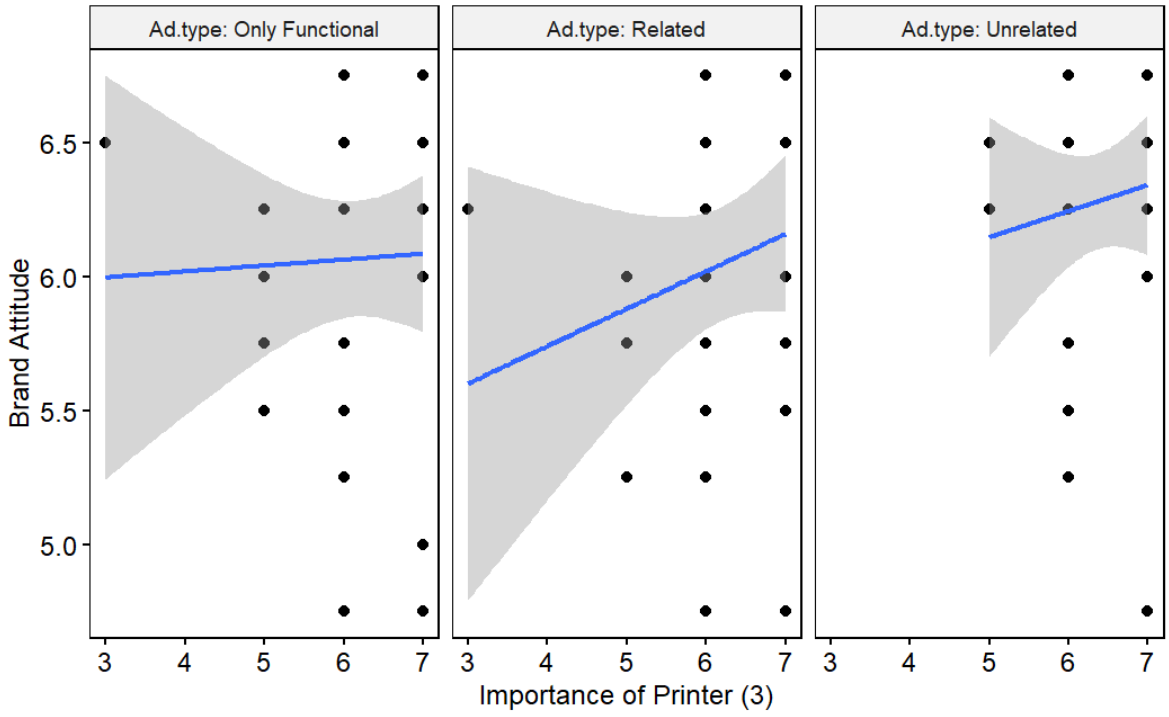
D.2.1 Importance of Printer (1)



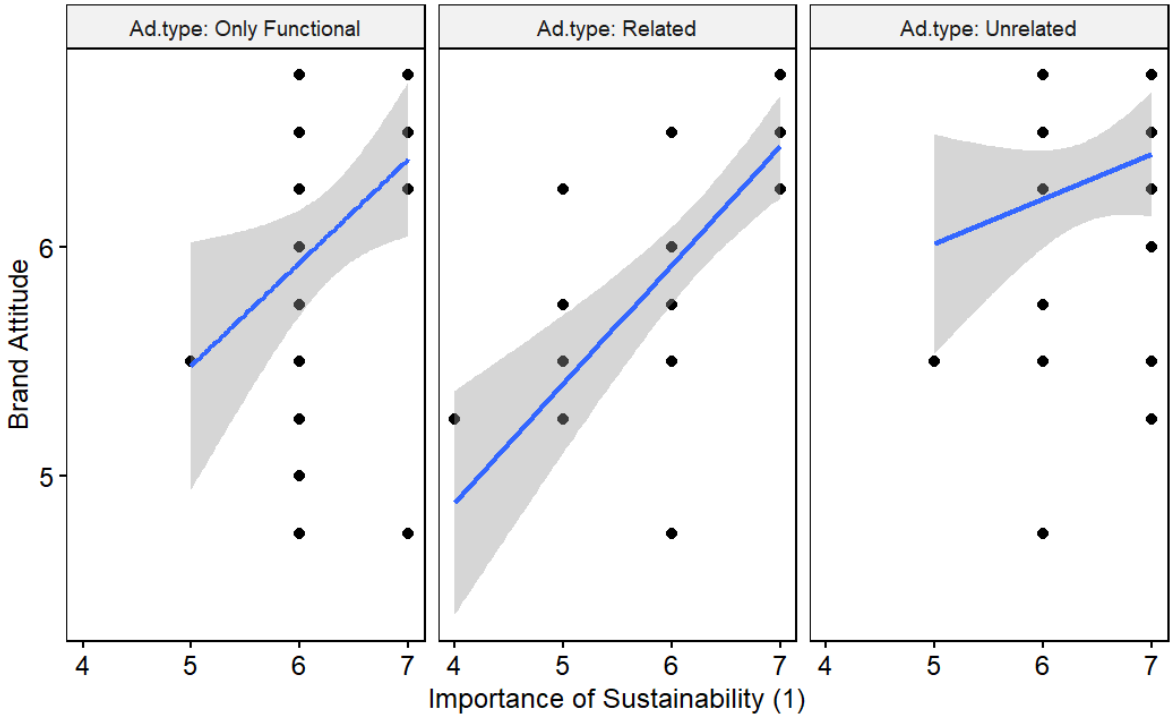
4.2.2 Importance of Printer (2)



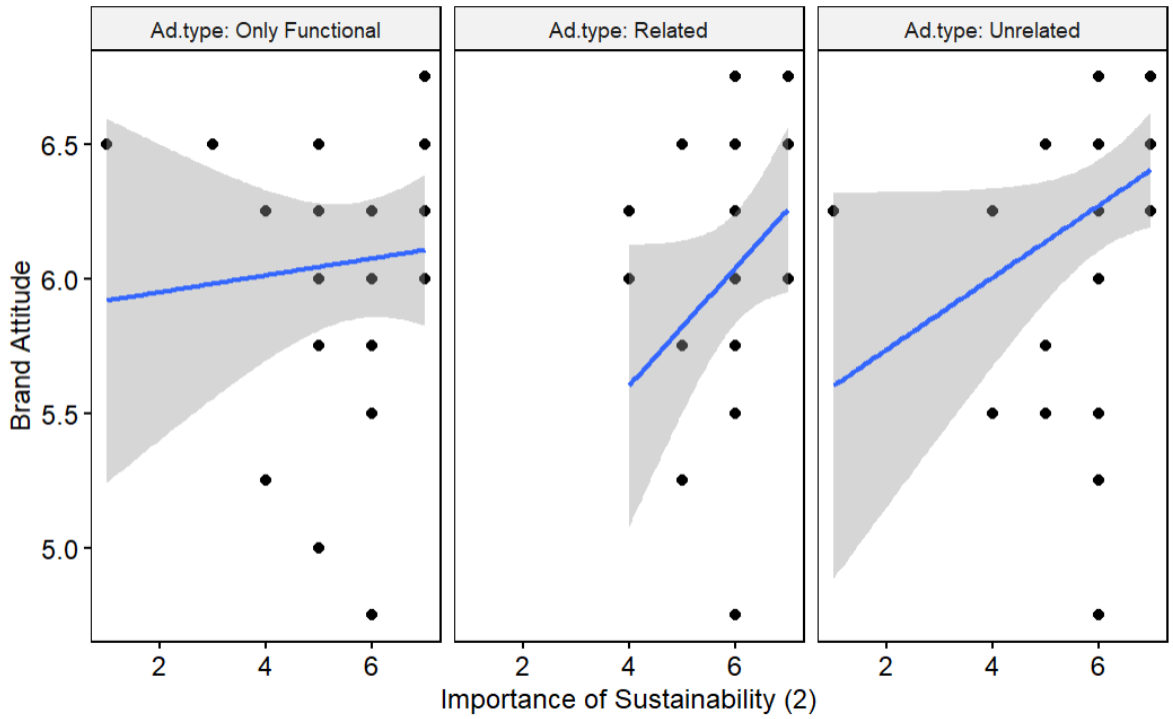
4.2.3 Importance of Printer (3)



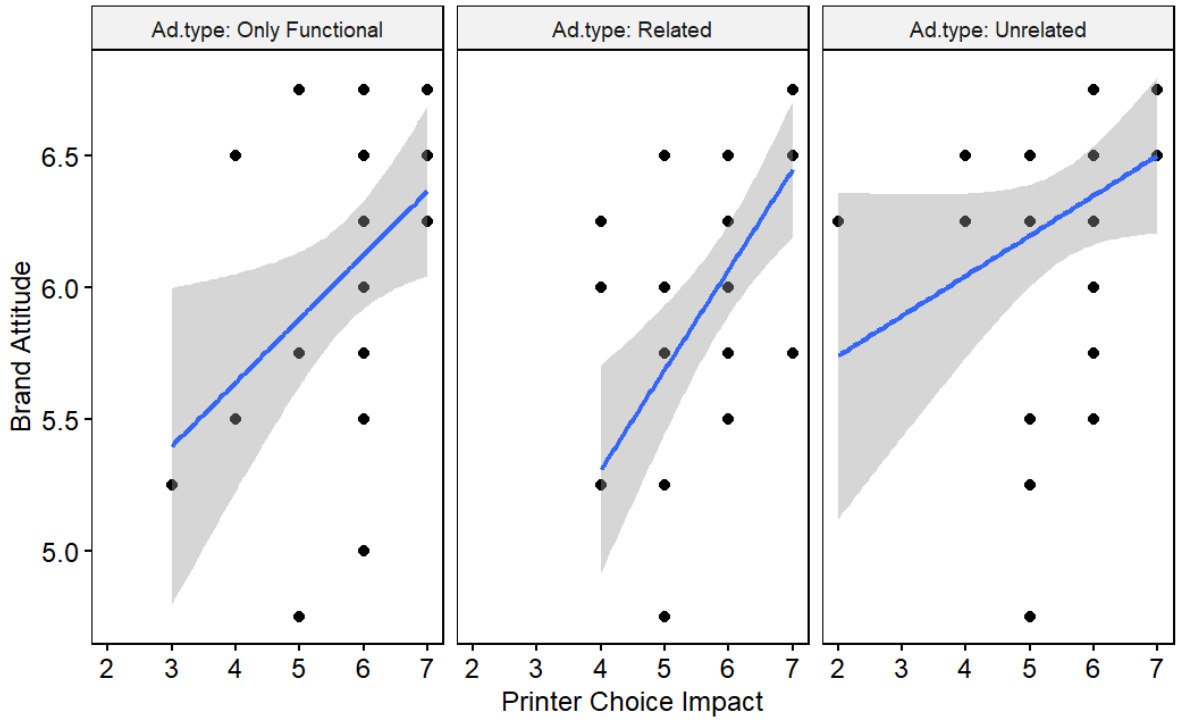
4.2.4 Importance of Sustainability (1)



4.2.5 Importance of Sustainability (2)



4.2.6 Printer Choice Impact



Appendix D3: Shapiro-Wilks Test for Normality

	Brand Attitude		Ad Attitude		Product Quality		Product Durability	
	W	P-value	W	P-value	W	P-value	W	P-value
Only Functional	0.8805	0.001457	0.7045	5.778e-07	0.7625	5.224e-06	0.6952	4.159e-07
Related	0.8903	0.003020	0.8908	0.003101	0.8984	0.004856	0.8830	0.0019827
Unrelated	0.8239	9.556e-05	0.8168	6.873e-05	0.8155	6.474e-05	0.8433	0.0002436

	Subjective Sustainability		Importance of Printer (1)		Importance of Printer (2)		Importance of Printer (3)	
	W	P-value	W	P-value	W	P-value	W	P-value
Only Functional	0.6750	2.08e-07	0.7327	1.624e-06	0.7327	1.624e-06	0.7928	1.863e-05
Related	0.9074	0.0083357	0.7415	2.959e-06	0.8119	5.481e-05	0.7675	8.207e-06
Unrelated	0.8299	0.0001266	0.7036	7.407e-07	0.7853	1.716e-05	0.7482	3.830e-06

	Impact on Printer Choice		Importance of Sustainability (1)		Importance of Sustainability (2)	
	W	P-value	W	P-value	W	P-value
Only Functional	0.8515	0.0003029	0.6881	3.253e-07	0.7730	8.011e-06
Related	0.8520	0.0003778	0.8010	3.370e-05	0.8428	0.0002371
Unrelated	0.8355	0.0001660	0.7104	9.404e-07	0.7050	7.785e-07

Appendix D4: Levene's Test for Homogeneity of Variance

Constructs	F-value	Pr(>F)
Brand Attitude	0.984	0.3775
Ad Attitude	1.8511	0.1626
Product Quality	1.4271	0.245
Product Durability	0.7159	0.4913
Subjective Sustainability	2.5193	0.08577
Importance of Printer (1)	1.1073	0.3346
Importance of Printer (2)	1.455	0.2384
Importance of Printer (3)	1.4675	0.2356
Impact on Printer Choice	0.0933	0.911
Importance of Sustainability (1)	2.1433	0.1228
Importance of Sustainability (2)	2.2767	0.1081

Signif. codes: 0.001 = '***', 0.01 = '**', 0.05 = '*', 0.1 = '.'