

Biased by sustainability? How cognitive biases shape procurement decisions under information equivocality

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Abstract

Purpose – Climate change introduces new informational asymmetries across supply chains, increasing managers' need to process sustainability-related information in procurement decisions. Such information is equivocal, making its interpretation challenging and increasing decision-makers' susceptibility to cognitive biases. Building on organizational information-processing theory and behavioral decision-making research, this study examines how cognitive biases shape procurement decisions involving sustainability information.

Design/methodology/approach – We developed hypotheses on cognitive biases emerging from three characteristics of sustainability information: structural properties (risky choice framing, attribute framing, numeracy and anchoring), inferential dynamics (halo effect) and social influences (herd effect). We tested these hypotheses through between-subject vignette-based experiments depicting individual, one-shot procurement decisions. The experiments were conducted in person with 475 participants, including managers and students.

Findings – We found that sustainability-oriented procurement decisions are vulnerable to cognitive biases. In particular, biases induced by the structural properties of information produced the strongest effects across both managers and students, followed by distortions emerging from inferential dynamics. In contrast, socially driven distortions emerged only among students, suggesting that professional experience mitigates reliance on peer behavior.

Originality/value – This study extends organizational information-processing theory-based sustainable supply chain management research by demonstrating that individual-level cognitive biases shape the interpretation of sustainability information. In doing so, we characterize the interpretation stage as being sensitive to information architecture, inferential reasoning and, under conditions of social influence, the professional experience of the decision-maker. Finally, we provide guidance for designing sustainability information and procurement decision processes that reduce susceptibility to cognitive biases.

Keywords Cognitive biases, Equivocality, Organizational information-processing theory, Procurement decision-making, Sustainable supply chain management, Vignette-based experiment

Paper type Research article

1. Introduction

Climate change has intensified the challenges associated with managing supply chains by introducing new informational asymmetries related to environmental and social performance (Howard-Grenville *et al.*, 2014). The processing of sustainability-related information in firms and across supply chain partners has become an important area of inquiry for sustainable supply chain management (SSCM), as it fosters organizational learning and supports performance improvements towards more sustainable supply chains (Dahmann and Roehrich, 2019). Several theoretical perspectives have been used to explore how firms address sustainability-related information asymmetries, including signaling theory (e.g. Song *et al.*, 2024), agency theory (e.g. Matinheikki *et al.*, 2022) and the relational view (e.g. Kähkönen *et al.*, 2023). In particular, organizational information-processing theory (OIPT)

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has emerged as a prominent theoretical lens to explain how sustainability information unfolds among supply chain partners (Bode *et al.*, 2011; Busse *et al.*, 2017; Foerstl *et al.*, 2018; Dahlmann and Roehrich, 2019). Within OIPT, information asymmetries are understood to stem from two sources: uncertainty, which arises from missing information about decision-making situations and related outcomes (Duncan, 1972), and equivocality, which arises when available information is ambiguous and open to multiple interpretations, leading to a lack of shared understanding (Daft and Lengel, 1986). Information processing therefore involves a set of organizational activities aimed at reducing uncertainty and equivocality. While uncertainty can be mitigated through additional data collection, equivocality requires interpretive judgment to render information meaningful (Daft and Lengel, 1986).

Recent empirical work in SSCM suggests that many firms have moved beyond simplistic data-gathering efforts and are increasingly concerned with managing and interpreting the underlying ambiguity of sustainability information (Dahlmann and Roehrich, 2019; Ellram and Tate, 2025). Sustainability information is frequently qualitative, self-reported, long-term oriented, weakly standardized and dispersed across multiple supply chain partners (Ellram and Tate, 2025; Matos and Hall, 2007; Wu and Pagell, 2011; Canal Vieira *et al.*, 2024). Taken together, these features make sustainability information difficult to interpret and use to effectively identify strategic and operational priorities (Dahlmann and Roehrich, 2019). This challenge is particularly salient for procurement managers, whose decisions increasingly depend on interpreting sustainability information when evaluating suppliers, assessing risks and making sourcing decisions (Khan and Hinterhuber, 2025).

Behavioral decision-making research offers a theoretically grounded explanation for how decision-makers respond to complex and ambiguous information environments. In such situations, individuals rely on cognitive shortcuts or heuristics, to simplify judgment (Tversky and Kahneman, 1974). These heuristics give rise to systematic deviations from rational information processing, commonly referred to as cognitive biases (Kahneman, 2011; Kahneman and Tversky, 1979). Recent research has called for greater attention to the role of human judgment in procurement contexts in order to develop theories and models that more accurately reflect decision-making in practice (Fahimnia *et al.*, 2019; Donohue *et al.*, 2020; Wong, 2023). While OIPT conceptualizes interpretation as a critical stage of information processing, SSCM research has shown how sustainability information is utilized by firms at the organizational level, such as for analytical assessments at the product and organizational levels, strategic planning and the development of operational guidelines and policies (see Dahlmann and Roehrich, 2019). Less is known, however, about the cognitive processes through which managers interpret sustainability information and translate it into the procurement decisions that enable such organizational use. Understanding these individual-level processes therefore requires examining the cognitive biases that systematically shape procurement judgments.

Thus, building on OIPT and behavioral decision-making theory, this study investigates the following research question: *How do cognitive biases shape procurement decisions under sustainability-related equivocality?* We developed hypotheses on six cognitive biases that emerge through three distinct characteristics of sustainability-related information. Specifically, we examine biases triggered by the structural properties of information (risky choice framing, attribute framing, numeracy and anchoring), biases arising from inferential dynamics during interpretation (halo effect) and biases shaped by the social context surrounding procurement decisions (herd effect). We tested these hypotheses using six between-subject vignette-based experiments, each depicting an individual, one-shot procurement decision and focusing on a single bias manipulation. The experiments were conducted in person with 475 participants, including 217 managers and 258 students.

This study makes two key contributions to SSCM research. First, it provides an individual-level cognitive perspective on how sustainability information is interpreted and translated into procurement decisions. Our findings demonstrate that cognitive biases are inherently

embedded within the interpretation stage of OIPT, making interpretation the “point of entry” through which cognitive biases permeate procurement decision-making.

Second, building on the structural, inferential and social characteristics of sustainability information through which these biases emerge, we further characterize the interpretation stage of OIPT in three ways. Specifically, we show that interpretation is sensitive to the architecture of information, extends beyond available information by filling information gaps through inference, and depends, under conditions of social influence, on the professional experience of the decision-maker.

From a managerial perspective, our findings suggest that improving sustainability-oriented procurement depends on designing information and decision processes that are less susceptible to cognitive biases. This includes carefully structuring and standardizing sustainability information, strengthening transparency and disclosure practices across supply chain partners, increasing awareness of how sustainability information may strategically influence procurement judgments and integrating cross-functional review processes to strengthen decision quality.

2. Theoretical background and hypotheses

2.1 Organizational information-processing theory and individual decision-making

OIPT provides a foundational framework for understanding how organizations and decision-makers cope with uncertainty and complexity. Originally developed in the 1970s with an intraorganizational focus to address organizational design problems in large firms (Galbraith, 1974), OIPT was later extended to dyadic and interorganizational settings to examine information exchanges in buyer–supplier relationships (Bensaou and Venkatraman, 1995). A central premise of OIPT is that environmental conditions generate information asymmetry, which organizations must manage in order to make effective decisions. This asymmetry stems from two distinct sources: information uncertainty and information equivocality. Uncertainty reflects a lack of sufficient or appropriate information needed to perform a task and can often be addressed through additional data collection (Galbraith, 1974). Equivocality, in contrast, arises when available information is ambiguous, ill-structured or open to multiple, potentially conflicting interpretations, leading to a lack of shared understanding (Daft and Lengel, 1986).

It is in response to these information challenges that OIPT conceptualizes information processing as a set of organizational activities aimed at reducing uncertainty and equivocality (Tuggle and Gerwin, 1980). Within this framework, information processing is commonly described as comprising three stages: the gathering of information, the interpretation of that information and its transfer between exchange partners (Harland *et al.*, 2004; Lamming and Hampson, 1996).

In recent years, SSCM scholars have increasingly adopted OIPT. Sustainability challenges introduce heightened information processing demands, as firms must deal with complex and imperfect information originating across their supply networks. Accordingly, OIPT was used to examine how firms gather sustainability-related data from suppliers (e.g. through surveys, audits and reporting requirements), interpret this information to inform strategic and operational priorities (resulting, e.g. in scorecards, materiality assessments and target setting), and subsequently communicate decisions and feedback across the supply chain (Dahlmann and Roehrich, 2019). Importantly, while firms have become increasingly capable of reducing uncertainty through various information-gathering mechanisms, addressing equivocality remains a difficult challenge (Dahlmann and Roehrich, 2019). It requires proactive, strategic and innovative forms of information processing and transfer, as “some information exists but has yet to become orderly and useful” (Dahlmann and Roehrich, 2019, p. 12). Understanding decision-making under sustainability-related equivocality therefore requires examining how managers interpret information and construct judgments.

The literature on behavioral operations management has long emphasized the importance of understanding the role of human behavior in supply chain and operations management

contexts (Kaufmann *et al.*, 2012; Perera *et al.*, 2020). A growing body of work has examined the decision-making processes of procurement managers, highlighting the individual behavioral mechanisms that influence supply chain decisions, such as supplier evaluation and the consequent selection (Durach *et al.*, 2023; Wong, 2023). Part of this research has assumed that decision makers are fully rational – or can be induced to behave rationally – when making decisions, often drawing on expected utility and value frameworks (e.g. Luthra *et al.*, 2017) or rational-behavior models (e.g. Riedl *et al.*, 2013; Hinterhuber and Khan, 2025). While these models remain useful, some criticism opened the door for alternative approaches that explain why decision makers often fail to act in a fully rational or optimal manner. One stream of research in this area is grounded in the work of Tversky and Kahneman (1974), who argued that human beings have limited capacities to learn, think and act. These cognitive limitations give rise to biases, that is, systematic errors in judgment and decisions that result from the way people process information (Tversky and Kahneman, 1974). Over the past decades, a large body of research has explored the theoretical and practical implications of incorporating cognitive biases into operations management (Bendoly *et al.*, 2010; Fahimnia *et al.*, 2019; Davis, 2018). Several studies have begun to examine procurement decisions through a cognitive lens, offering valuable insights into how biases can influence managerial judgment (e.g. Tokar *et al.*, 2016; Wong, 2021; Wong, 2023). Still, significant opportunity for further empirical investigation into how cognitive biases affect procurement decisions remains open. Understanding the cognitive processes underlying procurement behavior proves essential to identifying theoretical lenses that accurately reflect real-world decisions (Donohue *et al.*, 2020). Similarly, Fahimnia *et al.* (2019) called for continued research into how individual subjective judgment influences decision-making in practice. These insights provide the foundation for examining the role of cognitive biases in sustainability-oriented procurement decisions.

2.2 Sustainability-related information and cognitive biases in procurement decisions

Sustainability-related information generates equivocality because it is characterized by features that undermine clear interpretation and shared understanding among decision-makers (Khan and Hinterhuber, 2025). First, such information is frequently qualitative and self-reported. In procurement contexts, firms often depend on survey-based questionnaires and supplier self-assessments to evaluate sustainability engagement and emissions reduction efforts (Dahlmann and Roehrich, 2019). These instruments rely on qualitative judgments and self-reported data that are difficult to interpret objectively and are systematically exposed to positive reporting bias (Ellram and Tate, 2025). Second, sustainability performance typically unfolds over long-time horizons, making it difficult for managers to link present sustainability indicators to short-term operational or financial outcomes (Matos and Hall, 2007; Wu and Pagell, 2011). This difficulty is further exacerbated by the limited formal education and training that many procurement professionals have in areas such as climate change, emissions accounting and sustainability assessment (Ellram and Tate, 2025). Third, sustainability-related information is often weakly standardized. The absence of a comprehensive, globally accepted framework for firm-level sustainability evaluation forces organizations to rely on proxy measures and estimates (Canal Vieira *et al.*, 2024). For example, Khan and Hinterhuber (2025) explored the vulnerability of purchasing managers to greenwashing in corporate decision-making. Their study showed that even experienced professionals consistently fail to distinguish between genuinely sustainable products supported by verified certifications and those backed by greenwashed claims, raising concerns about the lack of harmonization and standardization of certification standards.

Taken together, these characteristics make sustainability information particularly difficult to interpret in procurement contexts. Under such conditions, procurement managers' judgments and decisions become susceptible to cognitive biases. In the following sections,

we develop hypotheses on six cognitive biases that emerge through the structural properties, inferential dynamics and social influences associated with sustainability information.

2.2.1 Structural properties of information. Certain cognitive biases are triggered by the way information is structured and presented to decision-makers. The wording used to describe an issue, the way numerical information is expressed, or the contextual cues provided during evaluation can all shape how information is interpreted and ultimately influence decisions. Among the most influential examples of such structurally induced distortions is framing, a well-established cognitive bias whereby the presentation of identical information leads to systematically different responses. A widely studied form is *risky choice framing*, in which risk preferences shift depending on whether outcomes are described as gains or losses. Under gain frames, decision-makers tend to prefer certain outcomes, whereas under loss frames they are more likely to choose risky options (Kull *et al.*, 2014; Tokar *et al.*, 2016). The equivocal nature of sustainability-related performance outcomes amplifies risky choice framing effects. Because sustainability impacts are difficult to verify and often disconnected from short-term outcomes, procurement managers must rely on interpretive cues when evaluating risk. Accordingly, the framing of sustainability-related information as gains or losses is likely to shape preferences between certain and risky options.

Another commonly studied typology of framing is *attribute framing*, which refers to the tendency for evaluations of an object or event to vary depending on whether a key attribute is presented in positive or negative terms (Levin *et al.*, 2002). Unlike risky choice framing, which involves choosing between certain and uncertain options, attribute framing concerns judgments about how favorable or unfavorable something appears – typically measured through rating scales or yes/no evaluations. Because sustainability initiatives are often evaluated through descriptive labels, narratives and qualitative assessments, attribute framing is influential in shaping procurement evaluations (Duan *et al.*, 2022; Tokar *et al.*, 2016; Wong, 2021, 2023). For example, Duan *et al.* (2022) examined attribute framing in the context of sustainable supply chain disclosure, focusing on how firms communicate the effectiveness of specific sustainability initiatives such as e-waste recycling programs. They found that messages describing the success of these initiatives (e.g. “60% success rate” in achieving recycling targets) generated significantly more favorable evaluations than objectively equivalent negatively framed messages (e.g. “40% failure rate”). Moreover, the framing effect was more pronounced when intermediate probabilities were used, suggesting that evaluative distortions are amplified under conditions of greater equivocality.

In addition to verbal framing, the numerical representation of sustainability-related information also shapes how it is interpreted and evaluated. In this regard, *numeracy bias* refers to systematic differences in judgment that arise from the format in which numerical information is presented. Numeracy encompasses the ability to understand, interpret and work with probabilities, percentages and frequencies. Research in cognitive psychology shows that individuals generally find natural frequencies (e.g. “1 out of 10”) easier to process than equivalent probabilistic or percentage-based expressions (Gigerenzer and Hoffrage, 1995). Sustainability risks are frequently communicated through abstract probabilities or aggregated indicators, such as emissions reduction targets or risk scores, making numerical representation a critical determinant of how such risks are perceived. For example, Talbot and Boiral (2018) showed that firms frequently report environmental performance using intensity-based metrics rather than absolute measures of emissions. Although intensity indicators may appear to signal improvement, such reporting practices can obscure the full environmental impact of firms’ activities and “significantly affects stakeholders’ ability to understand and analyze the information disclosed” (Talbot and Boiral, 2018, p. 378).

Beyond differences in numerical format, sustainability-related indicators also frequently function as reference points in procurement evaluations. Procurement managers frequently make quantitative evaluations of suppliers’ sustainability performance, drawing on internal emission-reduction targets, third-party sustainability assessments or historical performance ratings as reference values. When such numerical benchmarks are used as points of

comparison in forming judgments, they can serve as anchors that disproportionately influence subsequent evaluations. Experimental research shows that when an initial reference value is embedded in a comparative judgment task, individuals' estimates tend to gravitate toward that value, even when it is arbitrary, outdated or only partially informative (Thorsteinson *et al.*, 2008). This systematic reliance on initial reference points is known as *anchoring bias*. In contexts where objective standards are unclear or contested, the influence of such anchors becomes particularly pronounced.

As discussed above, the way sustainability-related information is framed (in terms of gains or losses or positive and negative attributes), numerically represented (probabilities versus frequencies) or anchored to reference values systematically shapes procurement managers' evaluations, leading judgments to deviate from purely analytical assessment. Building on this reasoning, we formulate the following hypotheses.

- H1. Procurement managers exposed to gain-framed sustainability-related outcomes are more likely to prefer certain options over risky alternatives, whereas those exposed to loss-framed outcomes are more likely to prefer risky options.
- H2. Procurement managers evaluate sustainability-related initiatives more favorably when key attributes are presented in positive rather than negative terms.
- H3. Procurement managers report higher concern when sustainability-related risks are presented in frequency formats rather than equivalent probability formats.
- H4. Procurement managers exposed to higher initial sustainability reference values provide higher subsequent evaluations than those exposed to lower reference values.

2.2.2 Inferential dynamics of information interpretation. Sustainability-related information is frequently characterized by selective disclosure and partial reporting. Firms often highlight positive attributes while downplaying or omitting negative information to create an overly favorable corporate image (Lyon and Maxwell, 2011; Lyon and Montgomery, 2015). Analyses of sustainability and climate reports reveal inconsistencies in measurement practices, selective omission of data and impression management strategies that obscure sustainability performance (Talbot and Boiral, 2018; Coen *et al.*, 2022). In procurement contexts, this phenomenon creates conditions under which decision-makers are likely to infer broader sustainability performance from limited or highlighted cues. The *halo effect* captures this inferential process. It refers to the tendency for a single positive or negative attribute in one domain to spill over into judgments in other, unrelated domains, causing decision-makers to generalize impressions beyond the original attribute (Nisbett and Wilson, 1977). For example, Lyon and Maxwell (2011) showed that the disclosure of a single positive environmental outcome can lead stakeholders to make broader inferences about a firm's overall environmental responsibility. Therefore, we propose the following hypothesis:

- H5. Procurement managers exposed to positive (negative) information about a supplier's attributes in one sustainability domain will provide higher (lower) evaluations of unrelated sustainability attributes.

2.2.3 Social influences of information interpretation. Beyond the structural and inferential sources of influence discussed above, procurement decisions are also shaped by social influences. Unlike many operational metrics, sustainability practices are highly exposed to external scrutiny from regulators, investors, customers and civil society. As a result, decision-makers tend to rely on peer behavior and industry norms as a form of social validation (Christie and Huang, 1995), particularly when seeking to manage legitimacy concerns and mitigate reputational risk. This socially driven response is captured by the *herd effect*, which describes the tendency of individuals to align their judgments and decisions with those of others, particularly under conditions of uncertainty and ambiguity (Rook, 2006). When leading firms adopt specific sustainability practices or select particular suppliers, other organizations may

feel pressured to follow suit in order to preserve legitimacy, competitiveness or stakeholder approval (Golini and Kalchschmidt, 2015). Such conformity, however, can discourage independent evaluation of whether those practices are actually appropriate or beneficial for the organization itself (Gelderman et al., 2016). Accordingly, we hypothesize:

- H6. Procurement managers who are informed about the sustainability-related procurement decisions of their peers are more likely to adjust their own evaluations and decisions in line with those peers.

3. Method

We tested our hypotheses with an experimental design, which offered several methodological advantages. First, it allows for consistent manipulation of decision scenarios and sustainability information characteristics while isolating the cognitive mechanisms underlying procurement judgments, thereby providing a high degree of control over the hypothesized causal relationships (Chen et al., 2016). Directly observing and measuring cognitively biased procurement decision-making in real organizational settings is challenging, as procurement decisions are embedded in complex environments shaped by numerous contextual factors, including internal governance structures, cross-functional dynamics, timing pressures, existing supplier relationships and stakeholder scrutiny – many of which are difficult to fully observe and control. Second, context plays an important role in shaping decision-making processes (Weber et al., 2002). Biases identified in other domains may not manifest in the same way in procurement decisions involving the interpretation of sustainability information. An experimental design facilitates the investigation of these biases under simplified and controlled conditions, allowing for a precise evaluation of their effects before introducing additional organizational complexity (Tokar et al., 2016). Observing biases in such controlled settings provides a foundation for understanding how they may operate in more complex real-world contexts. Third, random assignment of participants to treatment conditions minimizes the risk of selection bias (Angrist and Pischke, 2008).

3.1 Vignette-based experiments

Our study employed vignette-based, between-subjects experiments, also known as “scenario-based role-playing experiments,” where participants, who are typically recruited to assume a pre-defined role, are asked to make judgments or decisions based on the information provided in the vignette (Aguinis and Bradley, 2014). By combining the contextual realism of field experiments with the methodological control of laboratory designs, this approach aims to capture individuals’ implicit judgments, preferences and behaviors in decision-making (Aguinis and Bradley, 2014). For this purpose, participants are confronted with “vignettes,” which are short descriptions of a hypothetical yet realistic situation that depicts the factors considered most relevant to participants’ decision-making processes (Rungtusanatham et al., 2011). Vignettes standardize the scenarios presented to participants, allowing for controlled manipulation of key variables and enhancing the internal validity of the study (Alexander and Becker, 1978).

3.2 Experimental design

To test our hypotheses, we designed six vignette-based experiments, each featuring a distinct scenario intended to isolate a single cognitive bias. In each case, participants assumed the role of procurement managers in a hypothetical firm and made a one-shot procurement decision grounded in sustainability-related information. Our experimental design followed best-practice recommendations by Rungtusanatham et al. (2011). Specifically, our predesign stage ensured alignment with previous studies on decision-making behavior. We examined existing vignettes previously validated to measure cognitive biases and used them as templates to adapt

to our specific setting. In our design stage, we ensured that the contextual description remained identical across experimental conditions in order to maintain comparability and minimize potential demand effects. In our postdesign stage, we conducted two pre-tests with 20 participants representing different levels of academic seniority in operations and supply chain management, including six pre-doctoral researchers, five doctoral students, four postdoctoral fellows and five professors. We asked them to perform two roles: first, to respond as decision-makers to the scenarios presented, and second, to provide feedback on the overall design and effectiveness of the vignettes. None of them were informed about the specific focus of the study on cognitive biases, which helped minimize potential sources of bias such as social desirability or demand effects. These pre-tests confirmed the validity of the bias manipulations and provided valuable suggestions on the wording of the scenarios, which helped refine the vignettes scenarios while preserving their core structure. [Table 1](#) reports the details of the final set of experimental vignettes together with the original sources from which the scenarios were adapted.

3.3 Study participants and experimental procedure

The first phase of data collection involved 258 students, including master's students in management engineering at a public Italian university and first-level master's students from an international business school (mean age = 23.7 years; female = 45.3%). Data for this group were collected across six waves between October 2024 and October 2025. Although the use of students in managerial decision-making research has often been debated, studies in operations and supply chain management have shown that students can serve as valid proxies for managers in experimental contexts ([Perera et al., 2020](#)). Many studies have supported this view by finding consistent behavioral patterns between student and professional samples (e.g. [Bolton and Katok, 2008](#); [Bolton et al., 2012](#); [Moritz et al., 2013](#)). We deemed the choice of students for this study appropriate, as today's management engineering and business students are tomorrow's procurement professionals. Nevertheless, we intentionally replicated the experiments with practicing managers from different industries to strengthen the external validity of our findings ([Bachrach and Bendoly, 2011](#)). Our study also involved 217 managers from different industries (mean age = 40.7 years; female = 31.3%; education [high school = 12.6%; university = 83.6%; PhD = 3.7%]; industrial affiliation [industry and manufacturing = 57.1%; services and finance = 15.6%; technology and research = 11.8%; consumer and lifestyle = 11.3%; construction and real estate = 4.2%]). These participants were full-time managers, 85% of them with more than seven years of work experience, enrolled in executive MBA programs at an international business school or participating in two conferences of the Italian Association of Procurement and Supply Management. Data were collected over 10 waves from November 2024 to November 2025.

The experiments were administered in person, immediately before the start of a regularly scheduled sustainability-focused class. At the beginning of the experiment, participants were instructed to remain silent for the entire duration of the session. They were informed that they would receive six scenarios, each requiring them to assume the role of a procurement manager in a hypothetical firm and make an individual, one-shot procurement decision grounded in sustainability-related information. It was explicitly stated that each scenario was independent, and participants were encouraged to make each decision without being influenced by previous ones. It was also emphasized that there were no right or wrong answers, participation was voluntary, and all responses would remain anonymous and used exclusively for research purposes. After these instructions, participants received a stapled booklet containing, on the first page, a short set of demographic questions (age and gender for students; education type and industry affiliation additionally for managers), followed by the six scenarios, each printed on a separate page. Booklets were randomly distributed to participants to ensure comparability and strengthen internal validity. The booklet was distributed face-down, with instructions not to turn it over until the start signal. Upon the announcement, participants first completed the

Table 1. Description of the vignettes

Cognitive bias	Control condition	Treatment condition	Adapted from
<i>Risky choice framing</i>	Imagine that you are a procurement manager responsible for sourcing materials for the development of a product. The production is expected to generate 600 tons of carbon emissions. Two suppliers have been proposed for consideration. Assume the following: • If Supplier A is chosen, 200 tons of carbon emissions will be saved • If Supplier B is chosen, there is a 1/3 probability that 600 tons of carbon emissions will be saved, and a 2/3 probability that no carbon emissions will be saved Which of the two suppliers would you favor? Please report your choice here: _____	Imagine that you are a procurement manager responsible for sourcing materials for the development of a product. The production is expected to generate 600 tons of carbon emissions. Two suppliers have been proposed for consideration. Assume the following: • If Supplier A is chosen, 400 tons of carbon emissions will be emitted • If Supplier B is chosen, there is a 1/3 probability that no carbon emissions will be emitted, and a 2/3 probability that 600 tons of carbon emissions will be emitted Which of the two suppliers would you favor? Please report your choice here: _____	Tversky and Kahneman (1981)
<i>Attribute framing</i>	Imagine that you are the procurement manager at a company based in Europe. European sustainability regulations require companies to source products from suppliers who demonstrate sustainable practices. Your team is considering implementing a new supplier selection policy. This policy ensures that, on average, 90% of total procurement will come from suppliers who follow sustainable practices. Please answer the following questions by selecting a number between 1 and 7 on each scale. How helpful do you think this policy is for meeting the European sustainability regulations? Not at all helpful 1 2 3 4 5 6 7 Extremely helpful How adequate do you think this policy is for meeting European sustainability regulations? Not at all adequate 1 2 3 4 5 6 7 Extremely adequate How favorable do you think this policy is for meeting European sustainability regulations? Not at all favorable 1 2 3 4 5 6 7 Extremely favorable	Imagine that you are the procurement manager at a company based in Europe. European sustainability regulations require companies to source products from suppliers who demonstrate sustainable practices. Your team is considering implementing a new supplier selection policy. This policy ensures that, on average, 10% of total procurement will come from suppliers who do not follow sustainable practices. Please answer the following questions by selecting a number between 1 and 7 on each scale. How helpful do you think this policy is for meeting the European sustainability regulations? Not at all helpful 1 2 3 4 5 6 7 Extremely helpful How adequate do you think this policy is for meeting European sustainability regulations? Not at all adequate 1 2 3 4 5 6 7 Extremely adequate How favorable do you think this policy is for meeting European sustainability regulations? Not at all favorable 1 2 3 4 5 6 7 Extremely favorable	Tokar et al. (2016)

(continued)

Table 1. Continued

Cognitive bias	Control condition	Treatment condition	Adapted from
<i>Numeracy</i>	Imagine that you are a procurement manager. You have received a report from your sustainability team predicting a supply chain disruption if action is not taken immediately to shift to a more sustainable supply chain. The report indicates a 1 in 8 chance that this disruption will occur. Please answer the following questions by selecting a number between 1 and 7. How concerned are you about this potential disruption? Not at all concerned 1 2 3 4 5 6 7 Extremely concerned	Imagine that you are a procurement manager. You have received a report from your sustainability team predicting a supply chain disruption if action is not taken immediately to shift to a more sustainable supply chain. The report indicates a 12.5% chance that this disruption will occur. Please answer the following questions by selecting a number between 1 and 7. How concerned are you about this potential disruption? Not at all concerned 1 2 3 4 5 6 7 Extremely concerned	Roberts and Wernstedt (2019)
<i>Anchoring</i>	Imagine you are the procurement manager responsible for conducting an internal sustainability assessment of your key suppliers. You are evaluating Supplier A, a key partner you assessed in the past. This supplier has met most of your company's sustainability goals, has shown good performance in environmental practices and has a moderate level of social responsibility. You remember that last year you assigned Supplier A a sustainability score of 91/100. Now, as you evaluate Supplier A for this year, what sustainability rating would you assign them? Please report the score on a scale of 0–100: _____	Imagine you are the procurement manager responsible for conducting an internal sustainability assessment of your key suppliers. You are evaluating Supplier A, a key partner you assessed in the past. This supplier has met most of your company's sustainability goals, has shown good performance in environmental practices and has a moderate level of social responsibility. You remember that last year you assigned Supplier A a sustainability score of 51/100. Now, as you evaluate Supplier A for this year, what sustainability rating would you assign them? Please report the score on a scale of 0–100: _____	Bellé et al. (2017)

(continued)

Table 1. Continued

Cognitive bias	Control condition	Treatment condition	Adapted from
<i>Halo effect</i>	Imagine that you are a procurement manager responsible for evaluating a supplier. You review the supplier's social and environmental sustainability performance. In terms of social sustainability, the supplier has consistently maintained a top-tier reputation in the market. They are recognized for promoting diversity and inclusion, ensuring ethical labor practices, providing fair compensation throughout their supply chain, and supporting local charities. In terms of environmental sustainability, the supplier holds standard industry certifications, complies with basic environmental regulations and implements standard measures to manage waste. Please answer the following questions by providing a rate on a scale from 0 (very poor) to 100 (excellent). (1) How would you rate the supplier's performance in terms of social sustainability? (2) How would you rate the supplier's performance in terms of environmental sustainability?	Imagine that you are a procurement manager responsible for evaluating a supplier. You review the supplier's social and environmental sustainability performance. In terms of social sustainability, the supplier has consistently ranked among the lowest performers in social sustainability in the market. Reports have highlighted poor working conditions and below-average wages. In terms of environmental sustainability, the supplier holds standard industry certifications, complies with basic environmental regulations and implements standard measures to manage waste. Please answer the following questions by providing a rate on a scale from 0 (very poor) to 100 (excellent). (1) How would you rate the supplier's performance in terms of social sustainability? (2) How would you rate the supplier's performance in terms of environmental sustainability?	Bellé et al. (2017)
<i>Herd effect</i>	Imagine that you are the procurement manager at a fashion retailer specializing in clothing made from organic cotton. Recently, your sustainability team has predicted a 20% probability that a disruption in the supply chain will occur within the next two years for BioCotton, one of your key suppliers. This disruption could cause delays in sourcing raw materials and potential production shutdowns. However, switching to a new supplier would be costly for your company, requiring research, contract negotiations, training and adjustments to the production line. Please indicate the likelihood that you will discontinue your business relationship with BioCotton. Select one of the following: Very unlikely Somewhat unlikely Somewhat likely Very likely	Imagine that you are the procurement manager at a fashion retailer specializing in clothing made from organic cotton. Recently, your sustainability team has predicted a 20% probability that a disruption in the supply chain will occur within the next two years for BioCotton, one of your key suppliers. This disruption could cause delays in sourcing raw materials and potential production shutdowns. However, switching to a new supplier would be costly for your company, requiring research, contract negotiations, training and adjustments to the production line. You know that many of your direct competitors in the fashion industry have decided to change their sourcing strategies and will no longer continue their business relationship with BioCotton. Please indicate the likelihood that you will discontinue your business relationship with BioCotton. Select one of the following: Very unlikely Somewhat unlikely Somewhat likely Very likely	Roberts and Wernstedt (2019)

Source(s): Authors' own work

demographic questions, then proceeded to read the first scenario, marked their response and waited until all participants had completed it before collectively moving to the next scenario. Responses were collected after about two minutes per scenario.

A total of 475 participants received six vignettes each, for 2,850 vignettes administered overall. After excluding incomplete records, [Table 2](#) shows the number of valid responses obtained for each experimental condition and the total number of usable observations per bias.

4. Results

4.1 Structurally induced biases

4.1.1 Risky choice framing. [Figure 1a₁](#) and [Figure 1a₂](#) present the proportion of subjects preferring the certain over the probabilistic option under different risky-choice framing conditions across both samples. For students, in the gain-framed condition, most participants (102 out of 126, 81%) selected the certain option, whereas in the loss-framed condition, only 76 of 129 (58.9%) did so, confirming greater risk aversion in gain contexts. The difference between conditions is statistically significant ($Z = 3.832, p < 0.01$).

For the managerial sample, when the scenario was framed as a gain, most participants (87 of 107, 81.3%) chose the certain option, while under the loss frame, only 64 (60.4%) did so. The difference is statistically significant ($Z = 3.362, p < 0.01$), confirming that framing systematically influenced risk preferences in sustainability-related procurement decisions.

4.1.2 Attribute framing. [Figure 1b₁](#) and [Figure 1b₂](#) display attribute framing results. For students, participants in the positive frame reported higher ratings across all three measures. Differences were statistically significant for all attributes ($p < 0.01$), strongest for *helpful* ($t = 6.93$), followed by *favorable* ($t = 6.35$) and *adequate* ($t = 5.56$). To account for the ordinal nature of the scales, nonparametric Mann–Whitney *U*-tests were conducted as a robustness check. These confirmed the same pattern, with all attributes remaining significantly different between framing conditions ($W_{\text{helpful}} = 11,528$; $W_{\text{adequate}} = 11,111$; $W_{\text{favorable}} = 10904.5$).

For managers, the same pattern emerged. Participants in the positive frame evaluated the supplier more favorably on all three attributes, with differences significant at $p < 0.01$ ([Table 3](#)). Mann–Whitney tests again confirmed the results for *helpful* ($W = 7907, p < 0.01$), *adequate* ($W = 7607.5, p < 0.01$) and *favorable* ($W = 7646.5, p < 0.01$).

4.1.3 Numeracy. For the student sample, the results supported the numeracy bias hypothesis ([Figure 1c₁](#)). Participants exposed to the frequency format reported a significantly higher level of concern ($M = 5.00, SD = 1.13$) than those exposed to the percentage format ($M = 4.61, SD = 1.12$). A one-tailed *t*-test confirmed that this difference is statistically significant ($t = 2.24, p < 0.05$). The nonparametric Mann–Whitney *U*-test yielded a consistent result ($W = 9434.5, p < 0.05$), reinforcing the robustness of the finding.

A similar pattern emerged for managers ([Figure 1c₂](#)). Managers exposed to the frequency format reported higher concern ($M = 4.96, SD = 1.49$) compared to those exposed to the percentage format ($M = 4.67, SD = 1.37$). The one-tailed *t*-test indicates marginal statistical significance ($t = 1.51, p < 0.10$), and the Mann–Whitney *U*-test confirms this difference ($W = 6361.5, p < 0.05$).

4.1.4 Anchoring. Students' average sustainability scores differed significantly between conditions ([Figure 1d₁](#)). Those in the high-anchor condition rated sustainability higher ($M = 87.33, SD = 8.87$) than those in the low-anchor condition ($M = 68.98, SD = 10.38$), with a statistically significant difference ($t = 15.07, p < 0.01$).

Managers showed the same pattern ([Figure 1d₂](#)). Participants exposed to a high anchor reported higher ratings ($M = 83.19, SD = 10.75$) than those in the low-anchor condition ($M = 61.87, SD = 14.07$), confirming a robust anchoring effect among managers ($t = 12.26, p < 0.01$).

Table 2. Valid response counts by experimental condition and bias

	Risky choice framing		Attribute framing		Numeracy		Anchoring		Halo effect		Herd effect	
	CG	TG	CG	TG	CG	TG	CG	TG	CG	TG	CG	TG
<i>Data collection – student sample</i>												
Wave 1 (October 2024)	18	15	15	18	18	16	18	16	15	18	18	15
Wave 2 (November 2024)	10	10	9	10	12	10	12	10	10	10	10	10
Wave 3 (April 2025)	7	6	6	7	7	6	6	6	6	7	7	6
Wave 4 (April 2025)	14	13	13	14	14	13	13	13	13	14	14	13
Wave 5 (April 2025)	59	64	64	58	57	63	56	64	60	58	58	63
Wave 6 (October 2025)	18	21	21	18	18	21	18	21	21	16	18	21
Observations per condition	126	129	128	125	126	129	123	130	125	123	125	128
Observations per bias	255		253		255		253		248		253	
<i>Data collection – manager sample</i>												
Wave 1 (November 2024)	3	3	3	3	4	4	4	4	3	3	3	3
Wave 2 (February 2025)	15	13	13	15	15	14	13	14	13	15	15	13
Wave 3 (March 2025)	4	4	4	4	4	4	4	4	4	4	4	4
Wave 4 (April 2025)	17	17	17	17	17	17	17	17	17	17	17	17
Wave 5 (April 2025)	6	7	7	6	6	6	5	7	5	6	6	7
Wave 6 (April 2025)	10	13	13	11	10	13	11	13	13	11	11	13
Wave 7 (April 2025)	18	16	16	18	18	16	18	16	16	18	18	16
Wave 8 (November 2025)	4	3	3	4	4	3	3	3	3	4	4	3
Wave 9 (November 2025)	20	21	21	19	19	20	17	20	19	16	19	20
Wave 10 (November 2025)	10	9	8	10	10	8	10	9	9	9	10	9
Observations per condition	107	106	105	107	107	105	102	107	102	103	107	105
Observations per bias	213		212		212		209		205		212	
Note(s): CG: Control Group; TG: Treatment Group												
Source(s): Authors' own work												

4.2 Inferentially induced biases

4.2.1 Halo effect. The results supported the halo effect hypothesis across both samples (Figure 1e₁ and Figure 1e₂). For students, mean comparison tests showed that average environmental ratings were higher in the control group (M = 61.32, SD = 18.42) than in the treatment group (M = 57.44, SD = 18.26). This difference was significant ($t = 1.67, p < 0.05$), indicating a modest halo effect.

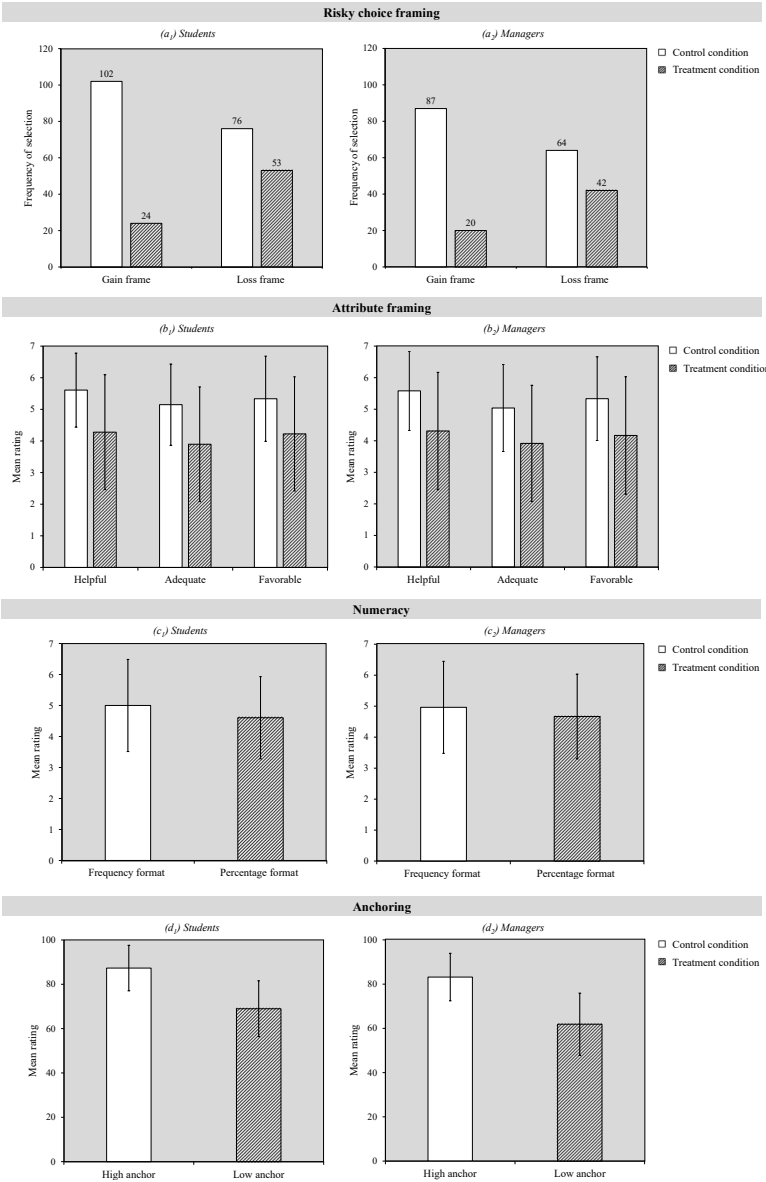


Figure 1. Results across six cognitive biases among students and managers. Source: Authors' own work

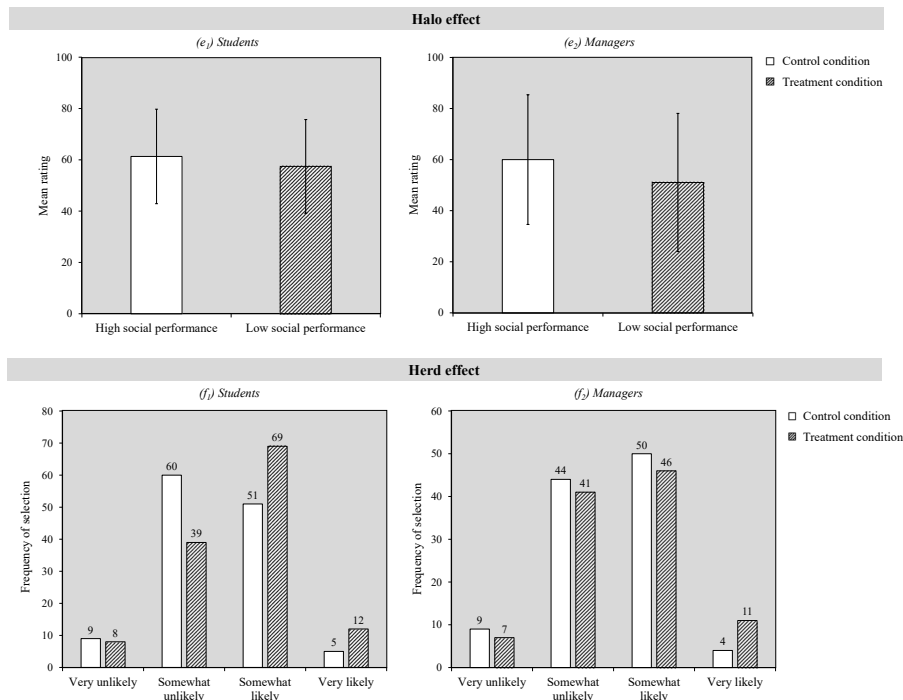


Figure 1. (continued)

Table 3. Mean attribute ratings (helpful, adequate, favorable) under positive and negative framing conditions for students and managers

Attribute measure	Students			Managers		
	Frame valence		<i>t</i> -value	Frame valence		<i>t</i> -value
	Positive	Negative		Positive	Negative	
Helpful	5.61 (1.17)	4.28 (1.82)	6.93***	5.58 (1.25)	4.31 (1.86)	5.83***
Adequate	5.15 (1.29)	3.90 (1.81)	6.35***	5.04 (1.38)	3.92 (1.84)	5.01***
Favorable	5.34 (1.35)	4.22 (1.80)	5.56***	5.33 (1.33)	4.17 (1.86)	5.24***

Note(s): Standard deviations in parentheses, *** $p < 0.01$. Subjects' ratings were analyzed using one-tailed t -tests under the assumption of equal variances, which was verified through F -tests for each attribute

Source(s): Authors' own work

Managers showed a similar pattern. Ratings were higher in the control group ($M = 59.05$, $SD = 20$) than in the treatment group ($M = 55.08$, $SD = 20.01$), and the difference was statistically significant ($t = 1.40$, $p < 0.1$).

4.3 Socially induced biases

4.3.1 Herd effect. The proportion of students indicating they were *somewhat likely* or *very likely* to discontinue the supplier relationship was higher in the treatment group than in the control group (Figure 1f). Specifically, 63% of participants in the treatment group expressed this intention compared with 45% in the control, a statistically significant difference

($\chi^2 = 7.97, p < 0.01$). This finding shows that participants informed about competitors' decisions to end the relationship were more inclined to do the same, evidencing a clear herd effect. The Mann–Whitney *U*-test corroborated this result, showing significantly higher likelihood scores in the treatment group than in the control ($W = 6452.5, p < 0.01$).

Among managers, no evidence of a herd effect emerged (Figure 1f₂). The share willing to end the supplier relationship was similar across conditions (51% in the control group vs 54% in the treatment group), with no significant difference ($\chi^2 = 0.18, p > 0.1$). Likewise, the Mann–Whitney *U*-test revealed no significant variation in likelihood scores ($W = 5189.5, p > 0.1$).

4.4 Comparative insights on effect magnitudes

We also calculated standardized effect sizes to provide comparative insights into the relative magnitude of the six biases across the student and manager samples (Table 4). Overall, effect sizes tended to be larger among students than among managers, although the differences

Table 4. Summary of hypotheses, empirical support and standardized effect sizes across cognitive biases for students and managers

Cognitive bias	Hypothesis	Support and standardized effect size	
		Students	Managers
<i>Risky choice framing</i>	H1. Procurement managers exposed to gain-framed sustainability-related outcomes are more likely to prefer certain options over risky alternatives, whereas those exposed to loss-framed outcomes are more likely to prefer risky options	Supported (OR = 2.97) [***]	Supported (OR = 2.92) [***]
<i>Attribute framing</i>	H2. Procurement managers evaluate sustainability-related initiatives more favorably when key attributes are presented in positive rather than negative terms	Supported (d = 0.79) ^a [***]	Supported (d = 0.74) ^a [***]
<i>Numeracy</i>	H3. Procurement managers report higher concern when sustainability-related risks are presented in frequency formats rather than equivalent probability formats	Supported (d = 0.35) [**]	Supported (d = 0.20) [*]
<i>Anchoring</i>	H4. Procurement managers exposed to higher initial sustainability reference values provide higher subsequent evaluations than those exposed to lower reference values	Supported (d = 1.89) [***]	Supported (d = 1.70) [***]
<i>Halo effect</i>	H5. Procurement managers exposed to positive (negative) information about a supplier's attributes in one sustainability domain will provide higher (lower) evaluations of unrelated sustainability attributes	Supported (d = 0.21) [**]	Supported (d = 0.20) [*]
<i>Herd effect</i>	H6. Procurement managers who are informed about the sustainability-related procurement decisions of their peers are more likely to adjust their own evaluations and decisions in line with those peers	Supported (d = 0.34) ^b [***]	Not supported (d = 0.17) ^b

Note(s): Odds ratios (OR) are reported for binary decisions, while Cohen's *d* is reported for continuous outcomes, ^aFor *attribute framing*, effect sizes are calculated as the average of the Cohen's *d* values across the three evaluation dimensions (*helpful*, *adequate*, *favorable*), ^bFor *herd effect*, Cohen's *d* is calculated based on Likert-scale responses by assigning numerical values to response categories (1 = very unlikely to 4 = very likely) and computing the standardized mean difference between treatment and control groups

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Significance levels are based on the original hypothesis tests reported in the results section

Source(s): Authors' own work

remained limited for most biases. Biases induced by the structural properties of information produced the strongest effects, particularly anchoring ($d_{\text{students}} = 1.89$; $d_{\text{managers}} = 1.70$), followed by attribute framing ($d_{\text{students}} = 0.79$; $d_{\text{managers}} = 0.74$) and risky choice framing ($OR_{\text{students}} = 2.97$; $OR_{\text{managers}} = 2.92$), whose odds ratios reflected medium-to-large effects. Numeracy generated more moderate magnitudes ($d_{\text{students}} = 0.35$; $d_{\text{managers}} = 0.20$). Inferentially induced distortions (halo effect) remained comparatively weaker across both samples ($d_{\text{students}} = 0.21$; $d_{\text{managers}} = 0.20$), whereas socially induced biases appeared more contingent on professional experience. Specifically, the herd effect was moderate among students ($d = 0.34$) but became negligible among managers ($d = 0.17$).

4.5 Robustness checks

We conducted several supplementary analyses to assess the robustness of our results across experimental conditions, scenario positions and samples. First, we performed tests of balance between conditions, which confirmed that the control and treatment groups were statistically comparable at baseline (Table A1 in Appendix). Second, we added control variables to our models. Although random assignment should minimize the need for controls, we included them to account for potential systematic variation. For students, we controlled for demographic characteristics; for the manager sample, we also included education and industrial affiliation. Results remained highly consistent across both samples (Table A2 and Table A3 in Appendix), supporting the internal and external validity of the experimental design. Third, we examined whether the findings were sensitive to changes in scenario order. To do so, we conducted a supplemental data collection wave with 42 managers, in which the bias-related vignette scenarios were presented in a different randomized order compared to the previous data collection waves. Results reproduced the original directional patterns across all six biases (Table A4 in Appendix), suggesting that scenario ordering does not affect the observed results. Finally, we conducted checks on response quality to assess whether participants' responses might have been affected by declining attention across the sequence of scenarios. Specifically, we examined missingness patterns and whether standardized effect sizes declined across scenario positions. Missing responses remained consistently low and did not increase throughout the sequence, while no systematic reduction in effect sizes was observed across positions (Table A5 in Appendix).

5. Discussion and conclusion

This study demonstrates that the interpretation of sustainability information leads to systematic cognitive distortions in procurement judgments and decisions. Overall, most biases emerged in both the student and manager samples, suggesting that these cognitive distortions are robust across different levels of procurement experience. At the same time, effect sizes tended to be larger among students, although the differences were small for several biases. Importantly, the findings revealed distinct patterns across the three characteristics through which sustainability information generated cognitive biases. Biases induced by the structural properties of information produced the largest and most consistent effects across both samples. Within this group, anchoring displayed the strongest effect, followed by attribute framing and risky choice framing, while numeracy generated more moderate effects. These distortions remained strong even among experienced managers, suggesting that professional expertise does not eliminate the influence exerted by the architecture and presentation of sustainability information during interpretation. Biases emerging from inferential dynamics displayed comparatively weaker – yet still significant – effects across both samples. In particular, the halo effect showed that decision-makers inferred broader sustainability performance from isolated cues, although these spillover effects remained less pronounced than those generated by the structural properties of information. Finally, biases emerging from the social context surrounding information interpretation produced the most contingent and experience-

dependent pattern across the two samples. Herd behavior emerged among students but not among managers, suggesting that socially driven distortions are more strongly influenced by professional experience than the other categories of biases examined in this study. Students, who typically lack direct procurement experience, appear to substitute independent evaluation with social proof when equivocality is high, aligning their choices with perceived industry norms. Managers, in contrast, possess domain-specific expertise, which likely enhances their perceived behavioral control (Ajzen, 1991) and reduces reliance on socially endorsed signals during procurement decisions.

5.1 Theoretical implications

OIPT has traditionally emphasized that equivocal information requires cognitive skills in order to be processed, especially when information is difficult to evaluate, ill-structured or associated with risky decisions and uncertain consequences (Daft and Lengel, 1986). What emerges from our study is that the complexity of sustainability-related decisions extends beyond possessing the cognitive skills needed to make equivocal information orderly and useful for decision-making. Cognitive skills such as attention, memory, planning and reasoning remain salient for interpreting sustainability data, yet the interpretation process itself does not lead to fully rational decisions; it instead generates judgments and decision-making that are vulnerable to cognitive biases. The interpretation stage of OIPT consequently becomes the “point of entry” through which cognitive biases permeate procurement decision-making. In this sense, our study extends OIPT-based research in SSCM by demonstrating that cognitive biases are inherently embedded within the interpretation of sustainability information, thereby enriching the interpretation stage of OIPT with an individual-level cognitive perspective.

Beyond demonstrating the presence of the observed cognitive biases, our findings across the three characteristics of sustainability information (structural, inferential and social) provide the basis for identifying three characteristics of the interpretation stage of OIPT. The first characteristic is that interpretation is sensitive to the architecture of information. We found that describing the same sustainability outcome as a gain rather than a loss changes the way managers evaluate risk, presenting identical attributes in positive rather than negative terms leads to more favorable evaluations and expressing the same numerical information as frequencies rather than probabilities changes how concrete and cognitively salient that information becomes. Likewise, evaluating current sustainability performance relative to different benchmarks, targets or prior performance shapes the standards against which that information is interpreted, making existing interpretations more likely to be reinforced. Thus, wording, numerical representation and comparison matter: they become integral (and influential) components of the interpretation process.

The second characteristic is that interpretation is an inferential process. Our findings suggest that procurement judgments are also shaped by what information is emphasized or selectively disclosed. Interpretation therefore extends beyond processing available information and becomes a process of filling informational gaps. One possible mechanism through which these gaps are filled is the use of existing assumptions, beliefs and prior experiences about the object of interpretation, such as the supplier or the broader supply chain context. This interpretation is consistent with the organizational sensemaking perspective, which suggests that decision-makers rarely interpret information in isolation but rely on existing cognitive frames to construct meaning from incomplete information (Weick, 1995). This suggests that the interpretation stage may also exhibit a form of path dependency, whereby previously formed beliefs and knowledge influence how new (and selectively disclosed) sustainability information is understood. This raises broader concerns about the need for sustainability information that is transparent and sufficiently complete, particularly in contexts characterized by greenwashing, greenhushing and selective disclosure practices.

The third characteristic is that interpretation is contingent on the professional experience of the decision-maker. Our findings suggest that social cues influence how sustainability

information is interpreted, but that their effect is not uniform across individuals. Professional experience reduces reliance on socially endorsed judgments, enabling managers to interpret sustainability information independently. Interpretation cannot be understood solely as a property of information itself; it also depends on the professional experience of the individual performing the interpretation. Professional experience therefore becomes another condition through which the interpretation stage unfolds.

5.2 Managerial implications

Practitioners seeking to enhance decision quality and operational effectiveness in sustainability-oriented procurement should first pay close attention to how sustainability information is organized. Cognitive distortions can be reduced by decomposing and structuring the decision dilemma, that means, in practice, identifying decision criteria separately, defining them clearly, assigning explicit weights to them and evaluating suppliers through a more structured and methodologically consistent process (Kaufmann *et al.*, 2012). Also, once these informational foundations are established, standardizing the structural design of sustainability information – such as KPIs, evaluation scorecards, benchmarks, audit procedures and reporting formats – across organizational functions and supply chain partners provides potential for more appropriate evaluations and decisions.

A second managerial implication concerns the importance of establishing a minimum shared informational threshold among supply chain partners, as greater informational alignment reduces the space through which inferential distortions can emerge. This also requires buyers to understand the ways sustainability information is constructed, emphasized and communicated throughout supplier relationships. The debiasing literature refers to this approach as “taking the supplier’s process perspective,” which includes “developing an increased awareness of how the supplier might try to influence the buyer’s decision and an understanding of the supplier’s sales approach, and viewing the process from outside of the buyer’s perspective” (Kaufmann *et al.*, 2012, p. 414). This debiasing construct can strengthen decision quality by encouraging procurement managers to make more reasonable estimations and eventually better judgments and decisions.

Also, the choice of who ultimately interprets sustainability information and makes procurement decisions inside organizations becomes relevant in this context. Professional experience influences the extent to which decision-makers rely on external validation, peer behavior or socially endorsed signals during sustainability evaluations. From a managerial perspective, this highlights the importance of carefully considering a senior profile for the individual involved in sustainability-oriented procurement decisions.

Overall, there is a pressing need to increase awareness of cognitive biases among managers. During our data collection process, many managers appeared unfamiliar with the existence of cognitive biases and the ways through which they may influence individual decisions. This suggests that firms should incorporate targeted sustainability literacy programs or training initiatives such as decision-making simulations and scenario-based exercises for managerial roles. In parallel, cross-functional review mechanisms may help counteract individual-level distortions by intentionally introducing alternative interpretations and different perspectives into the decision-making process. This is particularly important because decision-makers often tend to unconsciously reinforce their initial judgments, whereas interaction with colleagues and other organizational actors can challenge cognitive inertia and broaden the range of scenarios considered during evaluation (Kaufmann *et al.*, 2012).

5.3 Limitations and future research

We acknowledge some limitations in this study. First, we used vignette-based experiments, which simplify real-world conditions to achieve an operational research design. While controlled, in-person experimental settings allow for focused analysis of specific biases, they overlook the complexity and contextual factors present in actual procurement environments.

Future studies could improve the applicability of our findings through natural field experiments featuring richer environmental complexity (e.g. multi-criteria evaluation settings or portfolio-level sourcing decisions) and by embedding real financial consequences for participants.

Second, while this study attempted to cover a wide range of cognitive biases relevant to procurement choices, the selection is not exhaustive. Future research could integrate additional biases, such as loss aversion, overconfidence or probability weighting, to further examine their influence on decisions under sustainability-related equivocality. Another direction for future research is the exploration of debiasing techniques. While identifying a cognitive bias and demonstrating its influence on decisions is valuable, showing how to effectively mitigate the bias and improve decision quality would be even more beneficial (Kaufmann *et al.*, 2012).

A third limitation of this study is its exclusive focus on one-shot, individual decisions. Since procurement decisions can also occur collaboratively within work groups or teams, future research could explore how cognitive biases manifest and influence procurement decision-making in group settings. Another promising avenue is to examine how multiple biases interact simultaneously.

Looking ahead, the increasing use of artificial intelligence (AI) in decision-making contexts adds both complexity and opportunity for research on cognitive biases. With large language models and other AI-based decision aids becoming more prevalent, it is important to examine how these tools may introduce their own biases or amplify existing ones. For instance, AI models trained on biased historical data may replicate these patterns in their recommendations, while entirely new forms of algorithmic bias may also emerge. This area of research is still in its early stages (see, e.g. Chen *et al.*, 2025), yet its evolution raises an important question for behavioral operations research: how can AI systems be designed to support better decision-making and under what conditions should human judgment be encouraged or moderated? Human decision-making is often intertwined with information systems, whether through semi-structured data or decision support systems (Fahimnia *et al.*, 2019; Guida *et al.*, 2023). Research in this area can bridge the gap between algorithmic recommendations and the complex realities of human judgment, helping to identify when cognitive biases are beneficial and when they may lead to suboptimal outcomes (Petropoulos *et al.*, 2018; Flicker, 2025).

Supplementary material

The supplementary material for this article can be found online.

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