

## RESEARCH ARTICLE OPEN ACCESS

# Making Sustainability Tensions Salient: Changing Information or People?

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## ABSTRACT

Sustainability issues are associated with numerous tensions. These tensions are sometimes being referred to as wicked or even paradoxical. As long as tensions stay latent for organizational members, they will not be perceived and, thus, will not be adequately managed. The question of how tensions become salient is therefore of particular interest. Prior research suggests that contextual and cognitive factors render latent tensions salient and argues that advanced cognition is required to recognize sustainability tensions. In this paper, we show that developing cognition is only one possible strategy. We argue that information links a situation with actors' cognition and is therefore vital for rendering latent sustainability tensions salient. We show that simplifying information and making information more complex are two additional ways to recognize sustainability tensions. The situation–information–cognition (SIC) rule we develop in this article shows when and under which conditions the three strategies apply interchangeably or in combination.

## 1 | Introduction

Sustainable development consists of economic, environmental, and social dimensions (World Commission on Environment and Development 1987). These three dimensions are independent of each other, while being at the same time interconnected, creating tensions (Hahn et al. 2015) and paradoxes (Carmine and De Marchi 2022a; Edwards 2021). Imagine the example of food. Biological drives that have not caught up with our sedentary lifestyle push consumers to choose high-fat high-sugar foods; foods they are programmed to experience as tasty (Drewnowski 1987). In contrast, medical advice encourages consumers to prioritize low-fat low-sugar foods and to eat five portions of fruit and vegetables a day. While deciding what to choose, they are reminded of the sustainability benefits that arise from purchasing locally produced items. At the same time, they also know that choosing imported fair-trade products can help to secure the livelihoods of the world's poor. In short, even in this seemingly mundane task, there are multiple independent objectives; consumers want

tasty and healthy foods that are produced in a socially responsible way. These objectives are all desirable in isolation but they are interconnected, leading to tensions, which are often persistent. No single option satisfies all demands. Sustainability decision-making is certainly complex.

This simple example reflects some of the typical characteristics of sustainability problems. Among others, they cannot be easily resolved, there is no single best solution, and the different elements are interconnected while being independent; the tensions between the different elements are persistent. Sustainability problems have therefore been described as wicked problems (Rittel and Webber 1973). Furthermore, more recently, sustainability problems have been characterized as paradoxical (Hahn et al. 2015; Hahn et al. 2014) and looked at through the lens of paradox theory (Carmine and De Marchi 2022a).

One precondition for tensions to be dealt with, whether they are simple, wicked, or paradoxical, is that they are perceived.

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Tensions that are not perceived remain latent. In their latent stage, they can be dormant and ignored; once they become perceived and experienced by organizational actors, they become salient, and it is only then that they will be dealt with (Smith and Lewis 2011). In other words, for organizations or consumers to make more sustainable choices, actors must first be aware of the tensions they face (Manzhynski and Figge 2020).

The question under which conditions sustainability tensions are perceived or, put differently, how tensions move from a latent stage to being salient is therefore of particular interest. Smith and Lewis (2011), for example, emphasize the importance of the context or situation in general and the specific properties of the situation, such as plurality, scarcity, and change—as well as actor cognition, that is, how actors think about and frame tensions (Hahn et al. 2014; Jarzabkowski, Lewis, and Smith 2017; Miron-Spektor et al. 2018), in particular.

However, while such research clearly indicates important factors that move a tension from latency to saliency, we argue that the role of information and its characteristics has largely been sidelined. This might be because prior work has assumed that managers have full and uninhibited access to “perfect” information that they process with unbounded cognitive skill. In reality, however, when it comes to sustainability challenges, information is often “imperfect” (Hao, Guo, and Wu 2022): messy, disorganized, excessive, or insufficient, overwhelming and confusing actors in the process—and importantly, preventing tensions from becoming salient. Adding sustainability information to the wealth of information managers deal with today is likely to lead to information overload (Neumann, Cauvin, and Roberts 2012). Businesses face ever-increasing sustainability challenges, and we risk that their ability to find solutions cannot keep pace. As a result, we face, using the words of Homer-Dixon (2002), an “ingenuity gap.” We argue that the question of whether decision-makers can find solutions and whether a tension becomes salient does not only depend on the (cognitive) capabilities of decision-makers but also on the characteristics of the information that is available to decision-makers. We believe that information is a driver of saliency—alongside characteristics of the situation and actor cognition—and that it is important to extend current models of how to recognize and manage sustainability tensions.

In this conceptual paper, therefore, we explore information—juxtaposed with the situation and actor cognition—as a driver of (sustainability) tension saliency. Specifically, we ask, “when and how does information render sustainability tensions salient?” As our main contribution, we advance theory on tension saliency by showing how information—in its various formats and quantities—links the situation and actor cognition. More specifically, we argue that it is only certain configurations of the situation, information, and actor cognition that render latent sustainability tensions salient. As a further contribution—and one that will be of particular interest to practitioners—we offer three managerial strategies that can be used to bring about sustainability tension saliency. These pivot on (1) developing cognition, (2) increasing the complexity of information, and (3) simplifying information.

We structure the remainder of our paper as follows: The next section outlines theory on latent and salient tensions. Then, we

present our overall model on rendering latent tensions salient and our three identified strategies. Subsequently, we illustrate how the three strategies can be implemented, before discussing managerial implications, limitations, and opportunities for future research.

## 2 | Latent and Salient Sustainability Tensions

In contrast to the instrumental approach on corporate sustainability (Dentchev 2004; Hahn and Figge 2011), according to which social and environmental commitments are considered as a means to advance financial outcomes and where, therefore, social and environmental concerns are aligned with economic goals, scholars have recently pointed to numerous situations when economic, social, and environmental aspects are in conflicting, yet interconnected, relationships between each other (Farrukh and Sajjad 2024; Gao and Bansal 2013; Hahn et al. 2015; Van der Byl and Slawinski 2015).

While some scholars see tensions as structurally inherent within organizations (e.g., Clegg, da Cunha, and Pina e Cunha 2002; Schad and Bansal 2018), others see them as socially constructed entities (e.g., Putnam, Fairhurst, and Banghart 2016; Smith and Tushman 2005). A third view integrates both perspectives: Tensions are inherent within organizations, but actors may or may not recognize them (Smith and Lewis 2011). When they do, that is, when they “appreciate the relationship between alternate poles as both contradictory as well as interrelated” (Knight and Paroutis 2017, 405), tensions move from latency to saliency. This means that actors start to frame or think about tensions in ways that could lead to organizationally effective responses (Jarzabkowski, Lê, and Van de Ven 2013).

Although such responses are not a given—saliency is a necessary but not sufficient condition—understanding how saliency might come about is important. Smith and Lewis (2011), for instance, argue how actors cognitively engage with the ontological reality of their environments—that are influenced by factors of scarcity, plurality, and change, for example—to make sense of tensions, albeit subjectively (Knight and Paroutis 2017; Miron-Spektor et al. 2018). However, the picture quickly becomes more complex when we consider other influential factors in the environment (Smith et al. 2017) and individual differences in actor cognition (e.g., Hahn et al. 2014; Knight and Paroutis 2017). In short, the greater the number of environmental factors and variation in cognitive styles and capabilities, the more complex the situation (Simon 1991): Varied combinations and multiple interactions between different phenomena mean that there is more than one way to render latent tensions salient (Smith and Lewis 2011). To further unpack this idea, we take a deeper dive into the construct of “complexity.”

### 2.1 | The Role of Complexity

The characteristics of complexity are varied, not least because the context matters. In references to the environment, multiplicity (Denis, Langley, and Rouleau 2007; Fisher 2020), uncertainty (Cohen and March 1974), and variability (Polasky et al. 2011), for example, are juxtaposed with scarcity, plurality,

and change (Smith and Lewis 2011). When describing complexity in relation to information, however, abundance and excessiveness become relevant constructs. If information is excessively abundant, that is, it overwhelms the cognitive capabilities of actors, it adds another dimension of complexity to an already complex environment. Additional dimensions stem from variations in actor cognition: Some but not all actors can accommodate contradictory ideas comprehensively (Lewis and Smith 2014; Miron-Spektor, Gino, and Argote 2011), while even in simpler situations different people draw different conclusions based on the same information (Daft and Lengel 1986; Testa, Iovino, and Iraldo 2020; Weick 1979). Even the very question of what constitutes sustainability, corporate sustainability or corporate social responsibility (CSR) is answered differently by different people (Santillo 2007; Van Marrewijk 2003) pointing to different interpretations of existing information.

Of course, environmental contexts (situation) and information will differ on the extent to which they are complex, and some of the literature on management cognition (e.g., Hahn et al. 2014; Nadkarni and Barr 2008) can help to distinguish between simple and complex types, especially in terms of “content” and “structure” (Walsh 1995). Content relates to the attributes that actors use to make sense of a situation, whereas structure refers to both “differentiation” and “integration”: Differentiation describes the number of dimensions that actors consider when they cognitively frame a situation; integration refers to the degree of interconnectedness between these dimensions (Walsh 1995).

With “simple cognition,” an actor will singularly focus on one particular attribute of a situation (e.g., the human rights record of a firm) and consider this in a way that backgrounds other

dimensions—and their interconnectedness—of the situation. Conversely with “complex cognition” actors consider several often conflicting but not overly prioritized attributes—as well as the connections between them. In this way, paradoxical cognition, that is, “frames and processes that recognize and juxtapose contradictory demands” (Smith and Lewis 2011, 390), is an example. Further, in drawing on Miron-Spektor, Gino, and Argote (2011), we argue that the high level of integration in complex cognition will encourage saliency as actors are able to contrast and amalgamate competing demands.

As Figure 1 indicates, simple cognition in simple situations is enough for actors to identify and articulate tensions. From a contingency perspective, actors can understand and manage tensions by elaborating standard routines and procedures (Clegg, da Cunha, and Pina e Cunha 2002; Luthans and Stewart 1977; Qiu, Donaldson, and Luo 2012). However, to the degree to which sustainability complicates contemporary organizations the use of simple cognition becomes inadequate (lower right square in Figure 1). In such situations, actors with simple cognition are likely to struggle to understand how to accommodate different sustainability demands simultaneously. Instead, to meet sustainability demands, more complex cognition is needed (upper right square in Figure 1). As a result, tensions are cognitively accommodated, despite the risk of overcomplication (upper left square in Figure 1).

Despite emphasizing the importance of both contextual factors and cognition, prior work has predominately taken an epistemological approach to understanding how actors perceive and interact with sustainability tensions (e.g., Bansal, Kim, and Wood 2018; Schad and Bansal 2018). Consequently, researchers tend to propose that the only possible way of rendering tensions

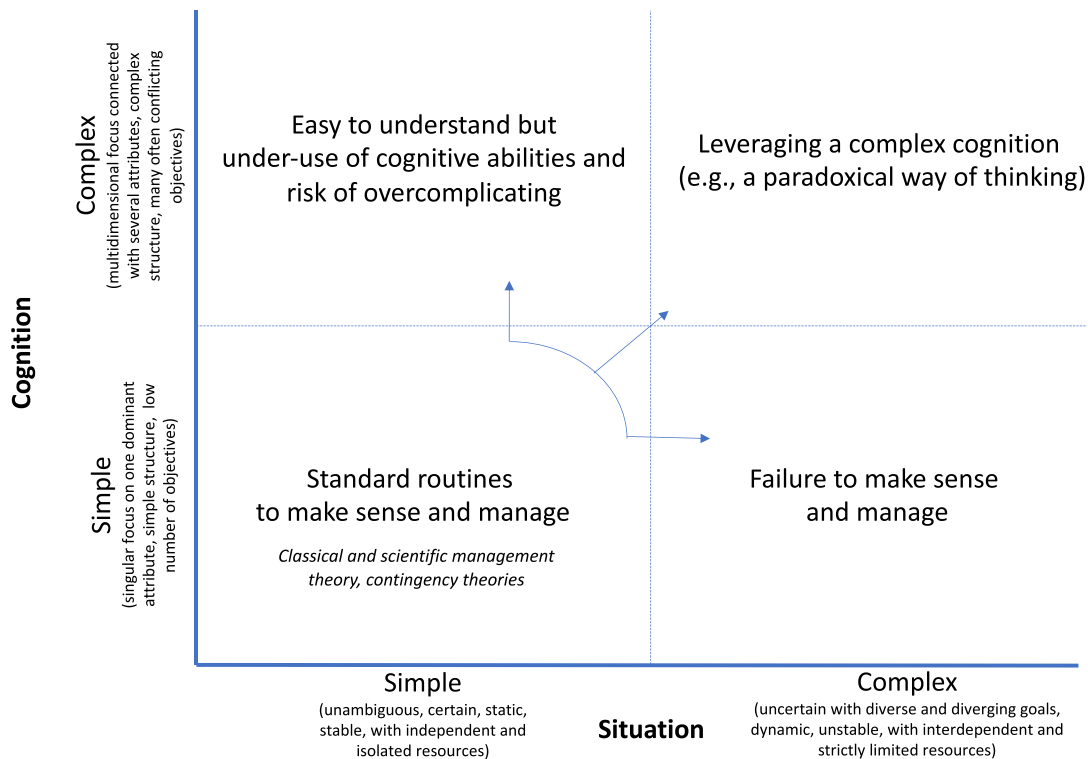


FIGURE 1 | Cognition–situation nexus.

salient is by developing actor cognition—by, for example, using rhetoric (Jarzabkowski, Lê, and Van de Ven 2013), discursive interactions (Abdallah, Denis, and Langley 2011), interpretive contexts (Knight and Paroutis 2017), or speaking up (Pina e Cunha et al. 2019).

We argue that it is information that links the context (or situation) to how actors make sense of the tensions they face: Information (a) reflects the situational context in which tensions are manifested as a latent phenomenon *and* (b) enables actors to deliberate and consider the same tensions to arrive at an understanding (or not). Thus, whether tensions move from a latent to a salient state depends on the situation, how information is presented about the situation, and actor cognition. Specifically, we propose that it is the interplay between situation and cognition that renders latent tensions salient and which remains a gap in the existing literature.

### 3 | Situation–Information–Cognition (SIC) Model: Making Latent Tensions Salient

The model we propose connects the situational context in which a tension manifests to how actors think about the tension, via the role of information. By situation we mean the “space” in which the dynamics of a tension unfurl and which host the aforementioned environmental factors (i.e., plurality and scarcity). Cognition involves thinking and processing of information, including which stems from organizational environments.

#### 3.1 | Information

To conceptualize “information,” we refer to Ackoff’s (1989) DIKW pyramid: Sequentially, data give rise to information that is transformed into knowledge (and eventually wisdom).

Data refer to discrete objective facts about “events” and arise from the physical world, occupying space and time in a particular way. The name of a food product, price, ingredients, values of saturated and trans fats, salt, sugars, vitamins, protein, iron, calcium, potassium, carbon footprints, and labels such as fair-trade labels are examples. For data to become meaningful and contextually relevant, actors categorize, classify, calculate, correct, select, and condense data, to transform them into information (Bocij, Greasley, and Hickie 2015, 9; Curtis and Cobham 2005, 3). This enables actors to address certain questions that “begin with such words as who, what, when, where, and how many” (Ackoff 1989). Thus, for example, amalgamating some of the data as above (e.g., food prices and carbon footprints) with the context in question (e.g., individual carbon footprint goals), information emerges about the trade-off between cheaper food and lower carbon footprints.

At this point, actors might transfer information into knowledge through mental frameworks—or “schemas”—that accommodate expert experience, opinion, and/or skills. A team leader within a sustainability department might, for example, understand the environmental and social intricacies of a project in a way that a general manager does not. In short, the former takes specificities from information and data and incorporates

these into their “beliefs, values, procedures, actions, etc.” (Zins 2007, 483).

#### 3.2 | Linking Situation and Cognition to Information

While data reflect the situation, knowledge is aligned to cognitive processes. Moving from the former to the latter requires information. However, as we have argued, actors differ in their cognitive capabilities and so on, and this leads to some acquiring (differentiated) knowledge and others not.

At the same time, the quality and quantity of information itself contribute to differentiated knowledge. With the former, information is rarely “perfect”; it is frequently messy, ambiguous, and contradictory. Actors must cognitively navigate, for example, uncertainty (Tushman and Nadler 1978), ambiguity (Eisenberg 1984), novelty (Schneider 1987), and diversity (Iselin 1988) when trying to transfer data into information.

In terms of quantity, while not all actors will have access to all information, abundance is common, and returning to actor cognition, the clear limits on data storage and processing capacities of actors (Mintzberg 1973) will demand selectivity. This is particularly the case in sustainability. “Advances in technology (artificial intelligence, satellites, sensors, blockchain, and so forth) have given companies new tools for measuring and monitoring their environmental impact. Yet reporting on vital sustainability metrics still has gaping holes” (Pucker 2021, 138). Such information overload (Eppler and Mengis 2004) has pertinent implications for addressing sustainability tensions (Schad and Bansal 2018), where the amount and complexity of data typically exceed the limited cognitive capacity of decision-makers. In tension-laden contexts (Speier, Valacich, and Vessey 1999), we become “data rich and information poor” (Reck 1987, 4), a profoundly unhelpful state when dealing with the complexities of sustainability tensions.

In summary, the complexity—the quantity and quality—of data and information presents a significant problem for the recognition and navigation of sustainability tensions, especially given individual cognitive limitations. While actors must gather information to accommodate conflicting yet interrelated economic, social, and environmental demands, they must do so while avoiding overload and complexity.

#### 3.3 | Changing the Volume and Complexity of Data and Information: The SIC Rule

While condensing information might make it more manageable, actors must avoid “overcondensation” (Rappaport 1968)—where vital information is lost due to indiscriminate or excessive filtering. Like all cognitive-based phenomena “filters”—“admit[ing] certain bits of information [...] while excluding others” (Porac and Thomas 2002, 178)—are subject to individual differences. Silberzahn and Uhlmann (2015), for example, illustrate when they asked different research teams to interpret the same raw data and noted how each team gave different responses from accepting to rejecting hypotheses. Nevertheless, both information

and knowledge depend on cognition and filtering. Data and information that do not fit existing schemas might be ignored, and those that are selected might be skewed during interpretation to ensure they do fit: Cognitive framing frequently “fills data gaps with typical but perhaps inaccurate information; prompt one to ignore discrepant and possibly important information; discourage disconfirmation of the existing knowledge structure; and inhibit creative problem solving” (Walsh 1995, 282).

The challenges of (a) structuring information to adequately reflect the situation and (b) presenting information within the confines of actors’ cognitive abilities demand strategies that can render latent tensions salient and encourage effective organizational decision-making. One such strategy—when information is rich and complex, but cognition is not sufficient—is to reduce the complexity of information by customizing, reducing, structuring, compressing, aggregating, and categorizing information, as above (e.g., Ackoff 1967; Ansari and Mela 2003; Eppler and Mengis 2004; Saunders and Jones 1990). However, details can be lost, leading to imprecision, ambiguity, and inaccuracies. This approach, therefore, indicates a trade-off between simplicity and adequacy—problematic when considering tensions. In other circumstances, there might be ambiguity surrounding one pole, meaning that information is insufficient, hindering its transformation into knowledge. Thus, in contrast to the first strategy, the approach would be to increase the complexity and/or the amount of information to more adequately reflect the situation—by decomposing, detailing, disaggregating, and personalizing information (Bertschinger et al. 2013; Orcutt, Watts, and Edwards 1968; Proops 1987; Rogers et al. 1991).

Both circumstances and their strategies however involve a risk of distorting the tension to the point that it remains latent. Thus, acquiring “adequate understanding,” rather than that which is “perfect,” is important. To navigate to this point, we argue that

a necessary condition for saliency is that each pole must exhibit at least one independent piece of information, as so to reflect the underlying situation, and that all pieces of information must be adequately processed. More specifically, we propose a SIC rule:

To make tensions salient the number of independent pieces of information must be equal to or exceed the number of contradictory elements of interest or demands and be equal or lower than the number of elements that can be processed by the existing cognitive abilities.

#### 4 | Theoretical Application of SIC

In this section, we consider how the SIC rule can be used to make latent tensions salient by changing how information, the situation, and cognition relate to each other.

Figure 2 illustrates linkages between the former two, where we consider both in terms of complex and simple types: The challenge here is to structure information so it adequately reflects the situation.

Situations characterized by multiple, diverging, and contradictory goals require more complex information than situations with only one goal or those that converge.

The diagonal line in Figure 2 reflects the threshold between information and situation. All combinations below this line indicate where information is not complex enough. In contrast, all combinations of information and situations above this line are characterized by information that is sufficient to reflect the situation. However, tensions could still remain latent owing

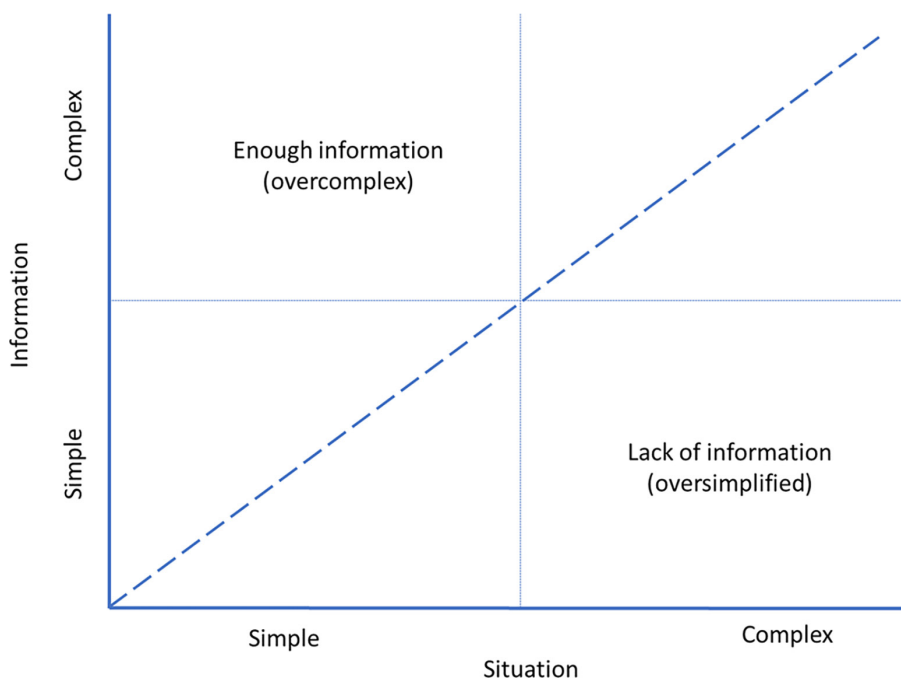


FIGURE 2 | Information and situation.

to cognitive deficiencies: If information is too complex, actors will find it difficult to recognize tensions. At one extreme, a simple situation characterized by a single goal (e.g., financial performance), identical goals, or several goals in harmony, for example, might be adequately described by a single piece of information. Yet, when there are two goals—such as financial and environmental performance—at least two pieces of information are required, that is, one or more for each pole, which will encourage actors to recognize the tension.

In short, the SIC rule here indicates that while complex situations require more complex information, condensing and reducing information is still attractive. The rule highlights the limitations of describing complex situations with simple information: When information is oversimplified, actors cannot adequately process the situation, meaning that sustainability tensions remain latent. More complex situations will always require more complex information than simple situations—with the caveat that excessive complexity will generate risks of inaccurate perceptions that will again keep tensions latent.

We now link information to cognition, illustrated by Figure 3, and again, we distinguish between complex and simple types for both: The challenge here is to present information in ways that fall within our cognitive capabilities.

The diagonal line in Figure 3 illustrates the threshold in the relationship between information and cognition. Above the line are combinations that are too complex for actor cognition. In contrast, combinations below (and on) the line reflect where actor cognition is sufficient for the information presented, which creates the opportunity for tension saliency. Again, this condition is necessary but not sufficient on its own. When information is lacking, for example, the analysis of the situation may fall short of what is required, as even when actor cognition is sufficient, information is not.

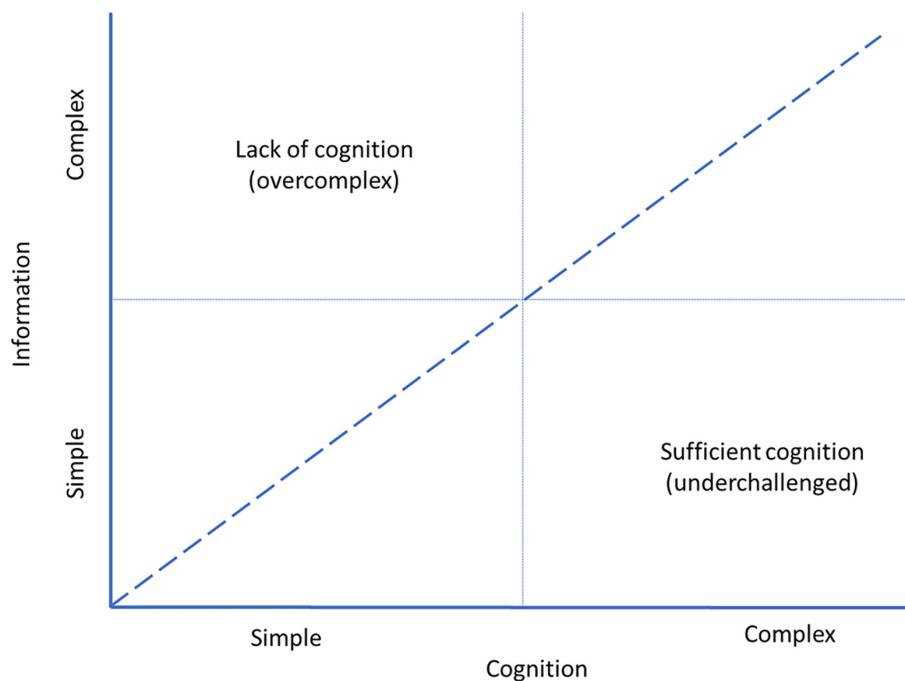
In summary, Figure 3 indicates how simple cognition cannot capture complex information, whereas complex cognition can capture simple information. In combining all three elements—situation, information, and cognition, we can now see how the SIC rule can be applied more holistically, as illustrated in Figure 4.

Numbers 1–8 in Figure 4 show eight logical sets of circumstances or “cases.” The two diagonal lines link simple and complex situations to simple and complex information, that in turn are captured by simple and complex cognition. These lines illustrate the threshold for rendering tensions salient. As seen, the cases in which tensions become salient are seen (a) above the dotted line on the left-hand side and (b) below the dotted line on the right-hand side, that is, cases (1, 2, 3, and 4).

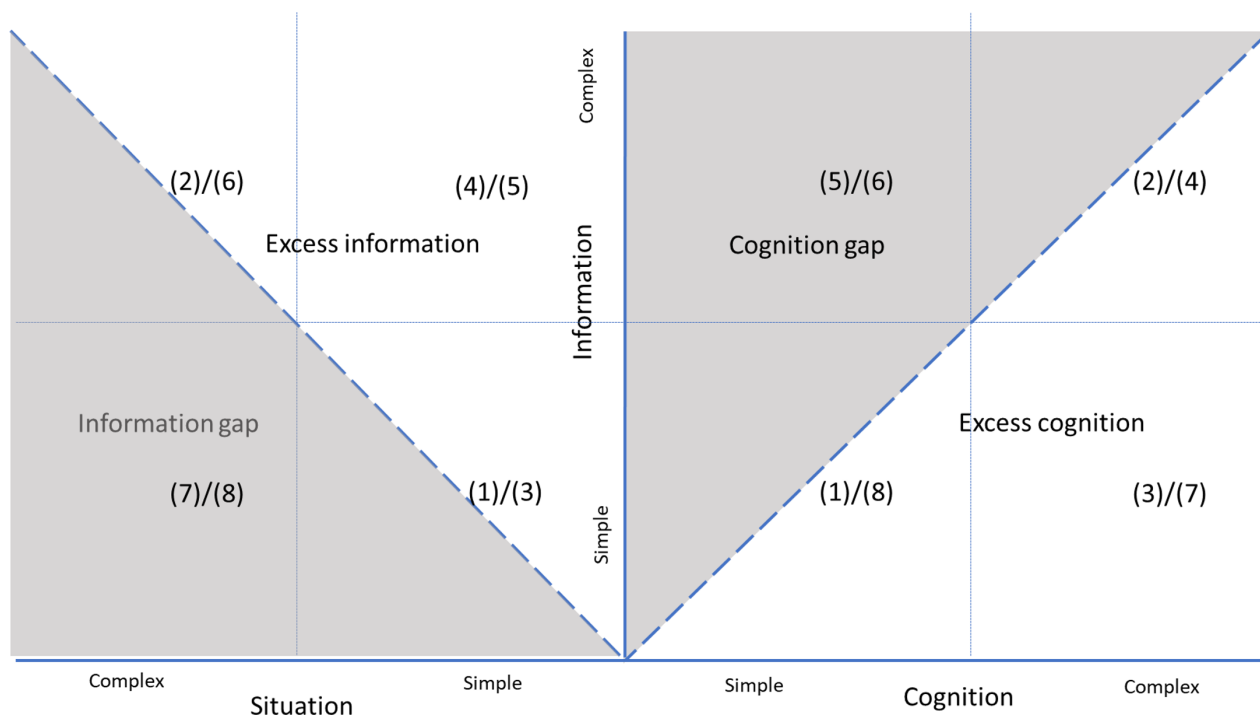
In contrast, the two shaded triangles depict cases (5, 6, 7, and 8) where, due to deficiencies in information and/or cognition, the underlying tension remains latent. Simple information on a complex situation can be captured by simple (Case 8) or complex (Case 7) cognition, but deficient information is a barrier for saliency, for example. Similarly, while complex information on either a complex (Case 6) or simple (Case 5) situation can adequately reflect the underlying situation, insufficient cognition is a barrier.

#### 4.1 | Three Paths to Saliency

Despite these barriers, there is still the potential to render latent tensions in Cases 5–8 salient. When the situation is simple, information complex, and cognition simple (Case 5), saliency can be attained in two ways. First, simple cognition can be developed into complex cognition—corresponding to what, for example, Smith and Lewis (2011) propose. Second, information can be simplified. Both approaches can be used alternatively (either/or) because the underlying situation is simple. However, when both



**FIGURE 3** | Information and cognition.



**FIGURE 4** | Situation, information, and cognition.

the situation and information are complex and cognition is simple (Case 6), the only possible strategy to make tensions salient is to develop cognition: The underlying situation is complex, and its information cannot be simplified without losing essential data.

In contrast to Cases 5 and 6, in Case 7—where both situation and cognition are complex and information is simple—there is an information gap. Saliency here is attained by increasing the complexity of information. Case 8 is more demanding as both a lack of information and simple cognition keep tensions latent. Here, two strategies must be employed simultaneously (both/and): developing cognition and increasing complexity of information. Both strategies are needed because one alone will fail to secure tension saliency. Even though actor cognition might sufficiently develop, for example, a lack of information remains preventative—and vice versa, more information cannot address deficient cognition.

In summary, we identify three strategies in which latent sustainability tensions can become salient: (1) developing cognition, (2) increasing the complexity of information to describe the situation more adequately, and (3) simplifying information to bring its complexity within cognitive limitations. The two approaches that we propose—as well as the approach of developing cognition that is favored by existing literature—as above, can be used separately, alternatively, or in combination, and we now illustrate how these three strategies can be employed.

## 5 | Strategies to Render Latent Sustainability Tensions Salient

Sustainability tensions abound in all industries and involve situations, information, and actor cognition. For some decision-makers,

for example, some corporate sustainability specialists dealing with well-known sustainability challenges, tensions will already be salient. But ideally, as it is the firm as a whole that must face and navigate these tensions, such “aware” decision-makers will embrace the task of rendering these tensions salient for other “unaware” actors—especially other key decision-makers—to enhance how firms deal with these challenges.

To illustrate the three ways in which actors can do this, we pick up the introductory food example. Consumers now frequently demand food that is both healthy and tasty, presenting a tension for such manufacturers to address: Galloping obesity (Friedrich 2017; James et al. 2001) means that consumers are increasingly interested in food that is low in saturated fat, sugars, and salt, in parallel to being biologically wired to prefer the taste of high-fat high-sugar foods (Drewnowski 1987; Drewnowski and Greenwood 1983; Erlanson-Albertsson 2005).

On its own, this tension represents a relatively simple situation. However, juxtaposed to these consumer demands are others, such as affordability and sustainability (Haack and Rasche 2021), that quickly complicate the simplicity of the healthy–tasty tension, to the point where multiple—or “knotted” (Sheep, Fairhurst, and Khazanchi 2017)—tensions appear. Plant-based alternatives to meat, for instance (e.g., those from “Impossible Foods” and “Beyond Meat”), might be tasty and sustainable, but they are not affordable for many people. Palm oil is relatively cheap and makes food tasty (Dian et al. 2017), but it has been linked to deforestation and other sustainability issues. Preferring local food decreases “food miles” emissions in comparison to products from abroad, but it can make food less affordable (Carolan 2018) because of some real comparative advantages such as climate conditions and economies of scale and the fact that externalities

are not accounted for. And so on, illustrating a complex situation, with the sequential logic being that the greater the complexity of the situation, the more likely it is to be overwhelming—a barrier for the transition from latency to saliency.

As we have argued, simple and complex situations such as those illustrated in our example of food manufacturers interact with the construct of information. “Unaware” actors (e.g., managers with nonspecialist knowledge) might draw a limited extent of information, which is simple, such as superficial categories of nutrition (“vitamins,” “salts,” etc.) or nominal labels (e.g., good and bad) for ingredients. By contrast, “aware” actors (e.g., specialized sustainability managers) might use more complex information that (a) falls outside of the healthy–tasty tension per se, such as the carbon footprint of the ingredients and that of the supply chain as a whole, and/or (b) still pertains to the healthy–tasty tension but which is more complicated (e.g., the health implications of substitute ingredients—fat replacing sugar, for instance—and their combinations).

Again, as our model proposes, cognition is important. Actors possessing simple cognition will process the situation and information at a relatively superficial level. In contrast, other more “aware” actors experienced and skilled in dietetics and the food industry will possess complex cognition: They are experts in nutrition and food production and have a breadth of knowledge that accommodates the sustainability issues that surround food production generally.

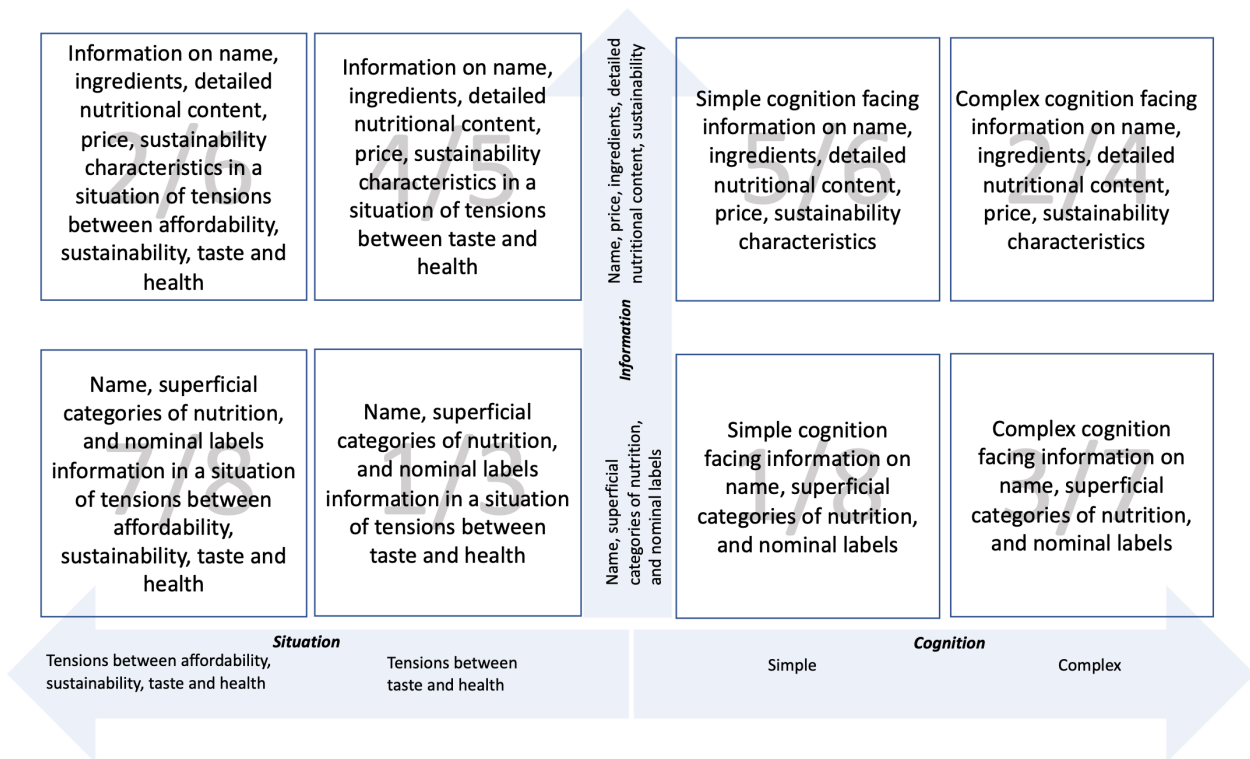
Figure 5 illustrates the examples we have used to scope simple and complex dimensions as they apply to situation, information, and cognition in our model. We now discuss the three strategies that

key decision-makers could use to bring tensions from a latent to a salient state.

### 5.1 | Developing Cognition

This strategy is appropriate when actors cannot accommodate the information needed to adequately describe the situation. In our model, these are Cases 5, 6, and 8.

When a situation and information are complex (Case 6), developing cognition, that is, making decision-makers experts on ethics and sustainability, is the only way to render latent tensions salient. These decision-makers must adopt complex cognition when facing knotted tensions (that represent complex situations) which demand complex information to adequately reflect them. Carmine and De Marchi (2022b) show for example that holding a more complex, paradoxical cognitive frame is linked to better environmental and social outcomes. This strategy can also apply in simple situations (Case 5), such as the tension between taste and health alone, but which also involve excess and/or unrelated information, as developing cognition enables actors to identify and select which information is relevant; ethics and sustainability experts are more likely to know which piece of sustainability information is relevant for the decision at hand. Alternatively, actors can simplify information to exclude irrelevancies. Finally, if the situation is complex but the information is simple (Case 8), developing cognition is not enough—actors must also seek out additional relevant information. Case 8, for instance, illustrates the absence of much-needed information on environmental and social sustainability issues; when information on palm oil is



**FIGURE 5** | Example: model-type characteristics.



missing, it is not possible to discriminate between alternatives that are protecting biodiversity by using more responsible forms of fats and oils and those that do not.

As a strategy of rendering tensions salient, developing cognition is not new (e.g., Smith and Lewis 2011). In practice, it is, for example, reflected in corporate ethics training programs (Kaptein 2015; Weber 2015) that should at least raise the awareness of ethical challenges companies face. The literature describes how actors can organize knowledge and content (Neck and Manz 1996; Walsh 1995) to more easily recognize and juxtapose contradictory demands (Collinson 2020; Hahn et al. 2014; Miron-Spektor, Gino, and Argote 2011; Smith 2014).

However, our model provides a more holistic view where developing cognition, “making people smarter,” is only one of three possible alternatives that can be used interchangeably or in combination. Further, we argue that developing cognition can only be successful as a way of rendering latent sustainability tensions salient, on the condition that information is constant. When information is not constant, either of the two alternative strategies that we propose—(a) simplifying information and (b) increasing the complexity of information—become more appropriate.

## 5.2 | Simplifying Information

Simplifying information reduces its complexity. Actors can implement this strategy when the available information is too complex, but the situation is relatively simple—as reflected in Case 5. In our food manufacturing scenario, a sustainability manager might be asked to analyze the trade-off between food miles of a product and its development impact (Van Passel 2013) but face detailed nutritional information, the carbon footprint of ingredients, and a multitude of further information of the product in question and possible substitutes. Such complexity is potentially overwhelming which may obfuscate the tension. By simplifying information—by selecting, restructuring, categorizing, reducing, and so on (e.g., Bocij, Greasley, and Hickie 2015, 9; Curtis and Cobham 2005, 3)—actors can render the tension salient: After employing such tactics, the information needed, which adequately reflects the relatively simple situation alone, will fall within actors' cognitive capabilities—surplus and irrelevant information can be ignored.

Simplifying information as a strategy to render tensions salient has its limitations, however. First, it is not appropriate for all situations: As Figure 5 indicates, actors can only use it when they face a situation that is simpler than the available information as complex situations require complex information. For example, managers that manage a particular subaspect will require less information than managers that have the overall responsibility. Second, while actors should reduce both the quantity and the linkages between pieces of information, oversimplification is problematic in that the tension(s) in question will no longer be adequately reflected by the (overreduced) information. Looking at food miles, Van Passel (2013) finds, for example, that results of simple food

miles analyses can change when more complex information is taken into account.

## 5.3 | Increasing Complexity of Information

This strategy involves increasing (a) the quantity of information and (b) the linkages between different information, to adequately describe the situation in question. In our model, increasing the complexity of information is relevant for Cases 7 and 8. In the former, which describes actors who possess complex cognition and face complex situations but with inadequate information, it is the only viable strategy to bring about tension saliency. In Case 8, where actors have simple cognition, increasing the complexity of information must be juxtaposed with the development of cognition.

Making information more complex is the opposite of its simplification: The latter consists of reducing the complexity of its content, quantity, and the number of linkages between information; the former involves increasing the complexity of the same. In our food manufacturing scenario, where information is simple, it excludes any data relating to environmental and social sustainability issues. Additional information (e.g., that relating to food miles) enriches the content that potentially contributes to making tension salient. Decomposing information and seeking details (Bertschinger et al. 2013; Rogers et al. 1991) might also aid the process. The greenhouse gas emissions of fruit and vegetables are a good example. In the public debate, food miles are often used as proxies for greenhouse gas emissions of these foods (Kemp et al. 2010). However, the overall greenhouse gas emissions depend not only on transport but also on how and where fruits and vegetables were grown. The primary energy use for apples grown in New Zealand can for example be significantly lower than the energy use of apples from Europe or South America (Milà i Canals et al. 2007). At the same time, different modes of transport result in different carbon dioxide emissions. It can therefore be misleading from a sustainability perspective to reduce the assessment of different options to food miles and to assume that “local food is best” (Edwards-Jones et al. 2008). In short, aggregation leads to a loss of information, whereas disaggregation increases the informational value content (Orcutt, Watts, and Edwards 1968; Proops 1987). Put in the context of our example, reducing a sustainability assessment of food to food miles leaves out valuable information on how and where food was grown and how it is transported to the consumer; adding these pieces of information allows for a more precise sustainability assessment.

However, as with simplifying information, the strategy of making information more complex has its limitations. While it can close the information gap, making information more complex can potentially create a cognition gap, that is, where information becomes too complex for actor cognition. The challenge is to weigh up the beneficial impact on the informational value of adding new information, disaggregating existing information, and adding new links between pieces of information with the potential burden it places on actor cognition. Put simply, food miles are easy to understand and

integrate into decision-making. The risk of adding more sustainability information is to overstretch the cognitive abilities of decision-makers.

## 6 | Discussion

The literature details the opportunities and dangers of (sustainability) tensions for organizations (Hahn et al. 2015; Manzhynski and Biedenbach 2023). To exploit the former and avoid the latter, managers and other key decision-makers must first recognize and experience such tensions (Smith and Lewis 2011), that is, they must be salient. Yet to understand complex situations, exemplary managerial cognition is crucial (Smith and Lewis 2011), that is, “cognitive complexity may well be a necessary condition for the effective practice of leadership” (Denison, Hooijberg, and Quinn 1995, 524).

In this article, we extend existing theory by moving the conversation beyond cognition. We argue that cognition, on which existing research concentrates, is only one strategy to render latent sustainability tensions salient. Information also plays a key role by linking cognition to the situation: Complex situations need to be adequately reflected by information, and information needs to be understood by decision-makers. By emphasizing the connective function of information, we propose two further strategies, that is, those over and above developing cognition, that move sustainability tensions from latency to saliency. First, simplifying information so that actors can recognize and understand the organizational tensions they face, and second, making information more complex to reflect the complexity of organizational tensions in practice.

While these two strategies appear contradictory, each one should be used for different circumstances. Sustainability information needs to be simplified when there is a cognition gap, that is, when cognitive abilities are not sufficient for the information, whereas sustainability information needs to become more complex when there is an information gap, that is, when information does not reflect a sustainability tension accurately. Additionally, we have indicated the circumstances of when a single strategy is sufficient, when actors should use them interchangeably, and the contexts in which the two need to be used simultaneously.

At face value, simplifying sustainability information seems desirable. Methods to weight and aggregate sustainability information are a good example in this context (e.g., Gan et al. 2017). Methods like the ecological footprint (Wackernagel and Rees 1996) express environmental resource use in terms of required space a unit that can be understood intuitively by most. Expressing the social cost of carbon in monetary terms (e.g., Pindyck 2019) simplifies information for those dealing routinely with monetary measures. Yet, reducing the content and quantity of—and linkages between—information, risks diminishing its value. The SIC rule guides appropriate responses, that is, those that go some way to control such risks. When sustainability information is more complex than the situation, the rule shows the extent to which information can be simplified; when sustainability information is simpler than the situation, it shows the extent to which information needs to become more complex.

To help a decision-maker find the most climate-friendly option, different greenhouse gases can, for example, be aggregated according to their greenhouse gas potential (Heijungs, Centrum voor Milieukunde, and Nederlandse Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek 1992). This would constitute a simplification of information that is helpful to the decision-maker. However, information on the total social cost of different alternatives would overly aggregate this information. The decision-maker could no longer distinguish between alternatives purely on their climate impact. To be helpful to the decision-maker, this information would have to be disaggregated.

At the same time, there are implications of such control. In reality, simplifying information is a complex process in itself, and often, organizational demands are an additional complication. As the SIC rule stipulates, each pole of a tension requires at least one piece of information as a minimum, for example. A tension between the affordability of a product and its environmental impact requires, for example, information on the product price on the one hand and the environmental impact on the other hand. Aggregating information on the environmental impact can be done by expressing the environmental impact in monetary terms and amalgamating this information with the product price and, therefore, coming up with the total cost of the product. This can help to simplify the information by making the environmental side of the tension easier to understand and might sound desirable at first. However, this highly condensed piece of information does not allow the decision-maker to distinguish between products with low affordability and low environmental impact from products that are affordable but are linked to high environmental impacts. Further, some firms need complexity—and ambiguity—to thrive, as this can create the discretion needed by decision-makers to drive organizational competitiveness (Davenport and Leitch 2005). In other words, eliminating the former by simplifying information risks eliminating the latter.

Additionally, the converse, that is, replacing simple with more complex cognition, also has its implications. First, recognizing the need for more complex cognitive frames itself requires complex cognition. Second, cognitive frames are not arbitrary and evolve—we can assume that existing frames of actors are, or at least have been, appropriate for their organizational environments (March and Simon 1993), and changing such frames involves opportunity costs and trade-offs (Slawinski and Bansal 2012). Elkington (2017) identifies, for example, no less than six different mental models that managers have used to make sense of sustainability. By adopting a business case mindset, for example, with a focus on financial issues, low integration, and differentiation, managers can respond quickly to business demands. Less so by switching to more complex and holistic framing: Sustainability tensions will become salient, allowing for their leverage on the one hand, but demanding more time and resources to do so. One option is to complement existing simple cognition with complex cognition. However, while theoretically it encompasses the advantages of both, it can lead to “frame rivalry” that results in actors interpreting and responding to situations around sustainability challenges inconsistently (Gilbert 2006). This risks increasing organizational uncertainty, which, if approached as a threat, can elicit threat rigidity effects (Staw, Sandelands, and Dutton 1981).

Despite these implications, a further strength of our proposed SIC rule is that it generates insights into how multiple sustainability tensions can become salient. We challenge the notion that cognition alone causes the collapse of all possible states into one—as previous research indicates (Hahn and Knight 2021; Von Neumann 2018; Wigner 1995). Simple cognition only allows actors to perceive simple information, meaning that not all tensions can become salient, whereas complex cognition enables the recognition of a greater number of tensions associated with different sustainability challenges. At the same time, we again draw on the relevancy of information in procuring such saliency, by returning to the distinction between data and information (Ackoff 1989). As Zins (2007, 480) states, “data can arouse information and knowledge in our mind,” while “information is what context creates/gives to data. It is cognitive” (Zins 2007, 486). From this, we assume that the transformation from data to information also impacts the number of potential salient tensions, with their number depending not only on whether cognition is simple or complex, but on how data are categorized, classified, and condensed. The “Nutrition Greenhouse” initiated by Pepsico (2021), for example, encouraged entrepreneurs to develop foods that are both tasty and nutritious, while excluding complicating dimensions such as cost, price, and sustainability issues. By simplification, therefore, Pepsico controlled how entrepreneurs perceived the challenge, that is, as a robust yet uncomplicated tension on the taste–health spectrum, and which tensions became salient and which remained latent. Following Pinkse, Hahn, and Figge (2019), this could be interpreted as a way of manipulating the decision environment in such a way that decision-makers will fail to consider sustainability aspects.

Today’s corporate environment is full of sustainability tensions (Hahn et al. 2015). Our main contribution is to extend theory on organizational sustainability tensions by explaining how they are rendered salient from latency. Specifically, we show how “information” links the situation and actor cognition. We model the three components by proposing a SIC rule. This rule indicates different strategies to make sustainability tensions salient, over and above the strategies proposed by previous research that tends to focus on actor cognition. In doing so, we show how managers and other actors need to consider the spectrum of simplicity/complexity as it applies to all three components of the SIC rule, that is, situation, information, and cognition, and, most important, how the extent of simplicity and complexity of one component affects the other two. Consequently, it shows the role that information can play in making sustainability tensions salient, which is a precondition for the tensions to be addressed. We offer organizational actors a framework, with three tangible strategies, to apply in order to address the complex sustainability issues they encounter more effectively.

## 6.1 | Managerial Implications

The SIC model we present in this study can be applied across various industries to address sustainability tensions, extending beyond the food manufacturing example discussed earlier. For instance, the apparel industry faces significant sustainability challenges that revolve around unfair labor practices and environmental impacts within complex global supply chains (Garcia-Torres, Rey-Garcia, and Sáenz 2024; Shaw et al. 2006).

The high-tech sector can serve as another example: The rapid expansion of data centers to support cloud computing and AI services has led to significant increases in energy consumption and corresponding CO<sub>2</sub> emissions (Masanet et al. 2020; Sarkar et al. 2024). In both examples, stakeholders, including consumers and investors, often lack visibility into the mentioned sustainability challenges and hinder their ability to make informed decisions.

By making the most relevant choice of the three alternative strategies, namely, developing cognition, simplifying information, and increasing the complexity of information, firms can make sustainability tensions salient for targeted stakeholders and, therefore, facilitate better-informed decision-making. In line with the developing cognition strategy, apparel companies can organize educational campaigns for consumers to highlight the environmental and social implications of fast fashion. For instance, Patagonia’s “Don’t Buy This Jacket” campaign aimed to raise awareness about the environmental costs of consumerism and encouraged more sustainable purchasing behaviors (Hwang et al. 2016). Tech industry companies can organize educational initiatives to enhance awareness about the environmental impact of data centers. For example, Google has conducted workshops and published reports detailing the carbon footprint of their data centers where the company explains how energy consumption contributes to greenhouse gas emissions (Radovanović et al. 2022; Silva et al. 2024). The efforts in both examples aim to develop stakeholders’ cognition of the link between operations in the industries and environmental impact.

Often, however, simplifying information is needed to convey the message about sustainability tensions. According to this strategy, the implementation of clear labeling systems in the apparel industry that indicate the sustainability credentials of products can help consumers easily identify eco-friendly options. For example, the Higg Index, developed by the Sustainable Apparel Coalition, provides a standardized way for fashion brands to communicate the environmental performance of their products and, therefore, to simplify complex sustainability data for consumers (Radhakrishnan 2014). To make the sustainability tension of energy consumption salient tech companies can implement clear and accessible metrics that highlight the environmental impact of their data centers. For instance, Microsoft has adopted the power usage effectiveness (PUE) metric, which measures the efficiency of data center energy use (Garimella et al. 2013). By publicly sharing PUE scores in an understandable format, Microsoft enables stakeholders to easily grasp the energy efficiency of their operations. This transparency simplifies complex technical data and supports informed discussions regarding environmental impact.

To increase the complexity of information, businesses should be ready to collect and provide more detailed information on relevant practices. For instance, in the apparel industry, firms can provide detailed reports on supply chain audits, labor conditions, and environmental impact assessments. Some brands, for example, Eileen Fisher, publish comprehensive sustainability reports that delve into their sourcing practices and environmental initiatives (Weber 2019). In the tech industry, firms can provide detailed reports that include comprehensive data on energy consumption patterns, sources of energy, and the effectiveness

of energy-saving measures. Ericsson, for instance, publishes in-depth sustainability reports that delve into their energy usage, renewable energy initiatives, and carbon reduction strategies (Arvidsson and Dumay 2022; Vieira and Radonjić 2020).

Ultimately, our study underscores the importance of integrating information management practices into business strategy and sustainability efforts. Central to our argument in this study is the premise that by actively engaging with information (not solely relying on cognition as prior literature emphasizes), actors can render sustainability tensions salient. By leveraging the strategies outlined in our SIC model, organizations can make sustainability tensions recognizable across diverse contexts and various organizational levels as well as stages of decision-making, for example, ranging from the formulation of business strategy to the reporting of a firm's activities. We also show that which strategy is effective will depend on the specific constellation of situation, information, and cognition. Put simply, reporting more or educating people more on sustainability is not always the most expedient solution. The practical implications of our study also hold relevance for both internal operations and external communication with key stakeholders. This shift highlights the strategic role of information in addressing sustainability tensions.

Within firms, for example, sustainability managers can ensure that sustainability tensions are brought to the forefront by tailoring information to be more digestible and contextually relevant for other managers and employees. This approach aligns sustainability considerations with other strategic organizational objectives. Externally, simplifying complex sustainability information is particularly important for communication with external stakeholders such as investors, regulators, and consumers. For instance, by transforming information into clear and accessible formats, firms can engage those stakeholders, who do not have the technical expertise to fully interpret granular sustainability data, with relevant environmental and societal challenges. This process of simplification, however, is not merely an act of reduction: It involves striking a balance between clarity and sufficient comprehensiveness as our SIC rule postulates. As Leonardo da Vinci is famously credited for saying, “Simplicity is the ultimate sophistication.”

## 6.2 | Limitations and Further Research

Some of the implications of our model present distinct challenges as to how decision-makers can move from complexity to simplicity—and vice versa—in practice, as we outline above. However, additional to these are some theoretical limitations. First, while we argue for simple/complex ideal types (Doty and Glick 1994) and for a binary distinction between latent and salient tensions, we acknowledge that in practice, sustainability tensions are more differentiated; situation, information, and cognition do not fall neatly into a simple/complex dichotomy, and different sustainability tensions will vary on the extent to which they are salient (Bundy, Shropshire, and Buchholtz 2013).

Second, our model does not accommodate the value that ambiguity sometimes presents. To attain “unified diversity”—where individuals agree but keep their views (Eisenberg 1984)—information

is best left equivocal, for example (Bernheim and Whinston 1998). Further, ambiguity can aid the effective communication needed to ensure organized action (Donnellon, Gray, and Bougon 1986). Scandellius and Cohen (2016) argue, for example, that the use of equivocal phrases allows multiple interpretations to coexist, helping with a better engagement of stakeholders in sustainability activities.

Third, our model is based on rational decision-making, where we present the process of saliency as conscious and considered. In practice, however, actors might use intuition or even irony when facing organizational issues in general (Dane and Pratt 2007; Keller and Sadler-Smith 2019) and sustainability in particular (Menzel 2013), where decisions are made using unconscious information processing (Epstein 1994; Lieberman 2000).

Further research could begin with explorations into how changing the situation (e.g., simplifying) could render sustainability tensions salient. For example, internalizing the external costs of climate change through carbon taxes constitutes a simpler situation for decision-makers with a business case cognition. In this way, the tension between environmental and financial performance becomes apparent to decision-makers, who otherwise would not have perceived it. We do not attend to this strategy in this paper, and a review of the literature also indicates a lack of theorization. Further, making sustainability tensions salient is essential, but it is only the first step in successfully dealing with sustainability tensions. After recognizing actors need to respond to sustainability tensions. Therefore, further research can focus on linking the strategies actors use to recognize sustainability tensions and managerial strategies actors employ to respond to sustainability tensions such as integration, differentiation, or transcendence (Jarzabkowski, Lê, and Van de Ven 2013). Finally, our model, although arguably comprehensive, remains conceptual. Thus, empirical applications—ideally across a range of organizational and sustainability contexts, using both quantitative and qualitative measures—would help to both refute and extend the model as appropriate.

## 7 | Conclusion

This paper starts from the premise that sustainability tensions need to be salient to be addressed. Existing research focuses on the characteristics of the underlying tension, the situation, and on cognitive abilities as drivers for the salience of tensions. Put differently, the kind of sustainability tension decision-maker face and their cognitive abilities determine whether a tension will be salient. We identify information as a missing link between the sustainability situation decision-makers face and their cognitive abilities. We postulate a general condition of making sustainability tensions salient, that is, there must be congruence between information and the situation, and information and actor cognition. Based on our model, we present three possible strategies of rendering sustainability tensions salient: (1) by developing cognition, (2) by increasing information complexity, and (3) by simplifying information. Our model defines the conditions under which the three strategies decision-makers can apply either in isolation or in combination. In particular, we show that customizing, selecting, reducing, compressing, aggregating, structuring, and categorizing simplify sustainability

information, whereas decomposing, detailing, disaggregating, and personalizing increase the complexity of sustainability information. The SIC rule determines the limits to which information can be made more complex (as it relates to situations) or simpler (as it relates to actor cognition). In this way, we indicate the trade-off that actors must navigate between simplifying information to make it accessible and making information complex enough to reflect the underlying tensions.

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