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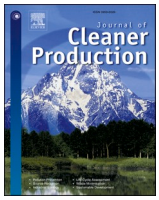

Incumbent responses to anticipated discontinuous regulatory change: The case of Scope 3 CO_2 reporting in the European steel industry

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ABSTRACT

Regulatory change can be highly discontinuous for organizations. Yet, despite the vast discontinuous change and institutionalism literatures, our understanding of incumbent behavior in response to anticipated discontinuous regulatory change is limited. To address this issue, we conducted a qualitative analysis in the European steel industry, which is facing prospective discontinuous regulatory change on Scope 3 reporting. Our findings offer new insights into this understudied field by elaborating on incumbents' expectations for the future, their ensuing motivations, and their taken or planned actions. We find evidence for heterogenous adaptation behavior that manifests in three motivational patterns: *Incentives for early movers, reasons for hesitation,* and *disincentives preventing implementation*. These patterns are a result of incumbents' varying expectations of future circumstances, opportunities, and risks, and they lead to different actions incumbents plan or take in response to the anticipated change. Our study contributes to the theoretical understanding of regulatory change as a distinct form of discontinuous change, sheds light on incumbent behavior at an early stage of a discontinuous change prior to its actual occurrence, and highlights that adaptation to a discontinuous regulatory change can have both positive and negative effects on incumbents. Our process model enables practitioners to make more informed decisions in the context of discontinuous regulatory change and policymakers may use our findings to improve the regulatory design process and subsequent compliance. Finally, our study opens up numerous pathways for future research.

1. Introduction

Regulatory change can be highly discontinuous for organizations. For instance, in 2016, the European Union passed the General Data Protection Regulation (GDPR) as a novel regulatory framework for personal data protection, which came into force on May 25th, 2018 (European Commission, 2023). Due to the introduction of the GDPR, firms using personal consumer data needed to integrate a new consumer consent query into their user experience, which often led to reduced consumer interaction (Johnson et al., 2023; Peukert et al., 2022). The online advertising industry, for example, struggled with the new regulation and suffered losses in advertisement performance and sales (Wang et al., 2023). Similarly, banks needed to develop new skills and competences and introduce novel processes in response to new directives on banking supervision in Europe (Bremus and Kliatskova, 2020; Koetter et al., 2019). For many firms, these regulatory changes impacted their daily operations with immediate effect and often induced drastic changes to their value creation processes, thus being discontinuous (Anderson and Tushman, 1990; Christensen and Bower, 1996).

Researchers have long investigated the question of how incumbent firms respond to discontinuous change in general. Initially, scholars assumed that incumbents would somewhat uniformly and systematically fail to adapt to discontinuous changes (Christensen and Bower, 1996) but later discovered that incumbent firms behave heterogeneously in response to the same discontinuous change (Eggers and Park, 2018; Kammerlander et al., 2018; König et al., 2012). Scholars of institutionalism also investigated this question by studying institutional complexity, i.e., a state in which a firm experiences multiple, partly contradicting institutional pressures simultaneously, as a dynamically changing influence that firms experience differently (Greenwood et al., 2011) and by studying patterns of compliance with such pressures (Dhalla and Oliver, 2013; Malesky and Taussig, 2016; Raaijmakers et al., 2014). More recently, Weber et al. (2019) integrated institutional theory and the conversation on incumbent response to discontinuous change by explicating institution-infused patterns of managerial sensemaking of such change.

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However, this cumulative body of research contains a severe gap as it does not provide a sufficient understanding of incumbent responses to discontinuous *regulatory* change for three main reasons. First, it primarily focuses on discontinuous change in the form of technological change and innovation. Regulatory changes, however, do not necessarily open up new pathways of creating and capturing value for a business, as is the case for many other forms of discontinuous change (Christensen and Bower, 1996; Kammerlander et al., 2018), but instead can have explicit objectives that are detrimental or restrictive to firms' value creation processes. Second, while most discontinuous changes are introduced and then diffuse over time as stakeholders react to them, discontinuous regulatory change is usually discussed and iteratively developed among stakeholders *before* any law is enacted, but then comes into force with full effect for all parties at once. Due to its implicit assumption of a diffusion process, prior research has mainly assessed incumbent behavior during or after a discontinuous change (Anderson and Tushman, 1990; Eggers and Park, 2018; Kumaraswamy et al., 2018). For discontinuous regulatory change, however, the timespan prior to its actual occurrence is of upmost importance (Malesky and Taussig, 2016). Third, although institutionalist literature has begun to address regulatory change, it tends to consider regulatory change as rather incremental and does not thoroughly include the crucial aspect of potential discontinuity (Greenwood et al., 2011; Raaijmakers et al., 2014).

As regulatory bodies such as the European Union (EU) encourage firms to contribute to global supply chain decarbonization, discontinuous regulatory change on corporate Scope 3 CO_2 reporting is frequently called for. Like the introduction of GDPR, mandatory scope 3 reporting would force firms to develop novel skills, integrate new business processes, and allocate additional human and financial resources. While the EU already regulates the reporting of Scope 1 and 2 emissions, and despite the fact that a firm's Scope 3 emissions can amount to more than 11 times of their direct emissions (CDP, 2023), its reporting remains voluntary (Hettler and Graf-Vlachy, 2023). Scholars have already investigated if and how firms voluntarily conduct Scope 3 reporting, and found that poor data quality (Busch et al., 2022; Wegener et al., 2019), low levels of comprehensiveness (Blanco et al., 2016; Hansen et al., 2022), missing industry-specific guidance (Patchell, 2018), and insufficient prioritization by management (Tang and Demeritt, 2018) are today's main hindrances for Scope 3 reporting. Furthermore, scholars specifically note that regulation is urgently needed to address these issues and increase the adoption of Scope 3 reporting towards a level required to achieve the goals of the Paris agreement (Blanco, 2021; Hettler and Graf-Vlachy, 2023; Patchell, 2018).

In this article, we aim to close this research gap by developing theory in the empirical context of prospective regulation on corporate Scope 3 CO_2 reporting in the European steel industry. We conduct a qualitative analysis (Gioia et al., 2013) of 21 in-depth interviews with managers and experts within and around the industry, as well as secondary data, to identify characteristics of incumbent behavior and subsequently develop a process theory (Langley, 1999) to illuminate relationships between characteristics. Our research setting is suitable as the steel industry is a highly polluting industry for which changes in regulation on corporate Scope 3 CO_2 reporting are frequently demanded, but the time and scope of such changes remain highly uncertain (European Commission's Joint Research Centre, 2022; European Steel Association, 2020).

Our findings offer new insights into the understudied field of firm-level adaptation behavior to discontinuous regulatory change. More specifically, we elaborate on incumbents' expectations for the future of their industry, which motivations emerge from these expectations, and which actions they have already taken or plan to take in response. We illustrate how incumbents' varying expectations of future circumstances, opportunities, and risks influence their motivation to adapt, and ultimately determine what actions they take or plan to take to prepare for the anticipated discontinuous regulatory change.

We make three critical contributions to the discontinuous change and institutionalism literatures. First, we advance the understanding of regulatory change as a distinct form of discontinuous change by illustrating incumbent behavior specific to discontinuous regulatory change. In this way, we extend the conversation on discontinuous change to a novel type of change. Second, we shed light on incumbent behavior at an early stage of a discontinuous change prior to its actual occurrence. In so doing, we allow for further nuance in our understanding of heterogeneous incumbent behavior in response to a discontinuous change, and we open avenues for future research. Third, we discover that, in contrast to other forms of discontinuous change, a successful adaptation to a discontinuous regulatory change can have both positive and negative effects on incumbent firms (e.g., on their image or competitive position), which, in turn, influences their response behavior. With that discovery, we widen the understanding of why incumbents do or do not adapt to a discontinuous change and open up new research pathways in the field of incumbent adaptation to discontinuous change.

2. Theoretical background

2.1. Incumbent behavior in response to discontinuous change

A critical challenge for incumbent firms has long been assessing and responding to discontinuous change, i.e., disruptions that drastically change traditional pathways of value creation, innovation, and organizational processes (Anderson and Tushman, 1990; Christensen and Bower, 1996; Gilbert, 2005). Scholars in this field of research have identified a plethora of barriers to adaptation and behavioral patterns of incumbent firms in response to discontinuous change, and firmly established that different incumbent firms can behave heterogeneously in response to the same discontinuous change (Eggers and Park, 2018; Kammerlander et al., 2018; König et al., 2012).

For one, scholars linked incumbent response behavior to different organizational and managerial characteristics. For example, scholars developed and revised theory on the influence of opportunity and threat perceptions on incumbent inertia in response to discontinuous change (Gilbert, 2005; König et al., 2021). They found that inertia is comprised of resource rigidity and routine rigidity, and that differences in managers' perceptions have varying effects on incumbents' inertia. Kammerlander and Ganter (2015) found that specific noneconomic goals of CEOs of family-owned businesses influence if and how the firm responds to a discontinuous change. Eggers and Park (2018) pointed out that larger firms are more likely to possess relevant resources and are better able to acquire new knowledge needed to adapt to a discontinuous change.

For another, prior research posits that there exist different types of discontinuous changes and that their characteristics induce different responses by incumbents. For example, in a comprehensive literature review, Eggers and Park (2018) laid out the characteristics of different discontinuous changes and subsequently explained the interdependencies between antecedents of incumbent responses (e.g., firm size, top management characteristics, organizational structure) and these discontinuous changes.

Notably, discontinuous *regulatory* changes are understudied in this literature stream. In the recent review by Eggers and Park (2018), regulatory change is not considered as a central representation of change and only very few scholars treat regulatory change as a discontinuity. Similarly, Kumaraswamy et al. (2018) mostly illustrate regulatory changes as a regulator's reaction toward a discontinuous innovation, but not as the core discontinuity itself.

2.2. Institutionalist perspective on firm response to regulatory change

The institutionalist literature has also concerned itself with how organizations react to different types of change, which are all understood to manifest as institutional pressures that may change over time. In this

literature, regulation, in the form of coercive pressure, is one of three fundamental pillars (Scott, 2008). In her fundamental work, Oliver (1991) defined five distinct strategic responses – acquiesce, compromise, avoid, defy, and manipulate – that incumbent firms use in response to such coercive pressures and developed a theory predicting firm response behavior.

Other scholars built on this conceptual groundwork and identified institutional complexity as a driver for heterogeneity in incumbent response. For example, Greenwood et al. (2011) found that institutional complexity is a dynamically changing state and that firms, based on their organizational characteristics and position in their field, experience it to different degrees. Such differences in experiences subsequently led to differences in response behavior. Relatedly, Raaijmakers et al. (2014) found that institutional complexity leads decision-makers to delay compliance with a coercive institutional demand to actively reduce the institutional complexity. In contrast, Luo et al. (2016) investigated firms' corporate social responsibility reporting as a response to institutional complexity and found that firms that experienced higher complexity responded with earlier (but lower quality) adaptation to the change.

Prior work on regulatory management further identified patterns that explain firms' compliance with regulatory changes. For example, Dhalla and Oliver (2013) found that strong industry identity, i.e., a collective understanding of the key industry characteristics among incumbents, often led to non-compliance with certain coercive pressures. Malesky and Taussig's (2016) work suggests that the more a firm is engaged with policymakers during the regulatory design process, the more likely the firm is to comply with a regulatory change once it is enacted. Furthermore, Kiso (2019) investigated the effects of prospective new Japanese fuel economy regulations and showed that Japanese carmakers enhanced the fuel economy of their cars more strongly than their European and US competitors, indicating that regulatory change induced technological change at a higher pace than was to be expected without regulatory intervention. Similarly, Rashid and Haque (2024) used the example of new regulation on pollution management in factories in Bangladesh to showcase differences in firms' regulatory management. They found that the number of employees of the regulatory body strongly affects adoption, while the size of fines for pollution did not, suggesting that some measures are more effective than others when aiming to improve compliance.

Lastly, work integrating the discontinuous change literature and institutionalism has already led to valuable contributions to both literature streams. In a recent study, Weber et al. (2019) leveraged institutionalist perspectives to better understand organizations' responses to discontinuous innovation in the context of new business models in the emerging "sharing economy" and identified distinct patterns of managerial sensemaking that drive heterogeneity in incumbent response and inertia to discontinuous change.

2.3. Incumbent behavior prior to a discontinuous regulatory change

Despite the rich knowledge on firms' adaptation to discontinuous change and organizations' reaction to change more general, there is a limited understanding of incumbent behavior prior to the occurrence of a discontinuous regulatory change. There are at least three reasons for this. First, extant literature mainly investigates discontinuous innovations (i.e., changes that constitute technological changes, innovative forms of value creation, or new business models), but does not thoroughly assess discontinuous regulatory changes. However, regulatory changes are particularly critical as they differ from discontinuous innovations in that a regulatory change does not necessarily enable new pathways of creating and capturing value for a business (Christensen and Bower, 1996; Kammerlander et al., 2018), but instead may be exclusively restrictive and thus detrimental to firms' current value creation processes (e.g., by mandating reduced environmental pollution or increased employee safety). Although some atypical discontinuous (de) regulatory changes might exhibit different characteristics, e.g., the explicit legalization of certain technologies or innovations such as ridesharing (Deerfield and Elert, 2023) or autonomous driving (Skeete, 2018), most do not and therefore require specific attention as they may pose significant challenges to incumbent firms.

Second, while most discontinuous changes are introduced – a technology is invented, for example – and then diffuse over time with all stakeholders reacting to it, discontinuous regulatory change is usually discussed and iteratively developed among stakeholders *before* a new law is passed and then, often after a certain grace period, comes into force with immediate effect for all parties. Due to this assumption of a diffusion process, or an "era of ferment" (Anderson and Tushman, 1990, p. 606), prior research primarily focused on incumbent behavior during or after a discontinuous change has taken place. Scholars emphasize that the era of ferment is often characterized by uncertainty which differs for different types of technological change and that this timespan strongly influences how firms adapt to the discontinuous change (Anderson and Tushman, 1990; Christensen and Bower, 1996; Eggers and Park, 2018; Kumaraswamy et al., 2018). For discontinuous regulatory change, however, the timespan prior to its occurrence is of upmost importance as scope, timing, and implementation of a discontinuous regulatory change are shaped essentially exclusively during this period (Malesky and Taussig, 2016). In another rare example, Lamdin (2001) assessed the impact of regulatory changes using an event study approach. In doing so, however, he was not able to investigate the aforementioned timespan prior to the occurrence of the regulatory changes.

Third, although the institutionalist literature considers regulatory change, specifically in the form of coercive pressure, it does not thoroughly account for its potentially discontinuous nature, instead often considers regulatory change as rather incremental. For example, Raaijmakers et al. (2014) studied incremental regulatory changes within the childcare sector in the Netherlands, and Dhalla and Oliver (2013) studied the effects of incrementally stricter banking regulation in Canada.

This state of the literature poses severe problems for our theoretical understanding of the focal phenomenon, warranting additional research. First, the extant theoretical foundations and conceptual understandings within the literature stream of discontinuous change are insufficient to fully explain incumbent responses to discontinuous regulatory changes. For example, this may lead to imprecise or outright incorrect conclusions about incumbents' expectations of risks and opportunities associated with potential regulatory changes. Second, the extant literature does not specifically account for firm behavior in preparation for a prospective discontinuous regulatory change. As a result, we lack a thorough understanding of situations in which a potential regulatory change is discussed but its exact scope, timing, and implementation are still unclear. Third, practitioner accounts suggest that many firms simply struggle with adaptation to and compliance with regulatory changes (Dhalla and Oliver, 2013; Malesky and Taussig, 2016; Raaijmakers et al., 2014). This is particularly important as regulatory action is expected to be a primary driver for change in many fields, especially related to global issues like climate change or artificial intelligence (Council of the European Union, 2023; US EPA, 2022), which incumbents need to respond to. Lastly, the shortcomings in our understanding of discontinuous regulatory changes are problematic for policymakers because they inhibit their ability to craft and implement effective regulation and to productively engage with incumbents during this process. Hence, we ask the research question: *How do incumbent firms act in the face of anticipated discontinuous regulatory change?*

3. Method

3.1. Research setting

We studied anticipated regulation around corporate Scope 3 CO_2 emission reporting in the European steel industry as an exploratory case

study (Siggelkow, 2007; Yin, 1994) to develop theory in response to the above research question (Christensen, 2006; Eisenhardt, 1989). The practice of corporate Scope 3 reporting is widely expected to become part of mandatory regulation in the future (Euractiv, 2022; Lloyd et al., 2022). However, as of today, it is not part of any enforced regulatory framework and most firms have not adopted this practice voluntarily (Hettler and Graf-Vlachy, 2023). The steel industry is a particularly suitable case study setting as it is a traditional industry with fairly homogenous incumbents that are facing a potentially large change due to the shift towards "green steel" (European Commission's Joint Research Centre, 2022), in which drastic regulatory changes are frequently called for (European Steel Association, 2020). Furthermore, in comparison to other industries (e.g., packaging, fashion, or food & beverage), in which end-consumer buying behavior is a strong driver for sustainability, the steel industry is much more reliant on regulatory intervention because such drivers are much less impactful. Thus, the introduction of mandatory Scope 3 reporting into a regulatory framework in the European steel industry represents a regulatory change that is both discontinuous and simultaneously widely anticipated, which makes it a viable setting for addressing the research question in this paper.

We collected data through interviews and complemented them with archival documents. First, we conducted interviews with managers and experts in and around the European steel industry. Our respondents comprised managers and directors from various departments of steelmaking firms as well as industry experts and managers working for steelmakers' suppliers and customers, industry associations, and industry service providers. We primarily approached participants by leveraging our professional network developed over years of research and practical experience in the industry and complemented the sample with newly developed relationships. We intentionally approached representatives of firms of different sizes and countries of origin within Europe to develop a diverse sample within the European steel industry. Around two out of three approached prospective interviewees agreed to participate. The interviews were conducted and recorded via video-calls, usually lasted around 30–45 min, and were subsequently transcribed for further analysis. All interview participants were guaranteed full confidentiality of their responses including the anonymization of company names or other sensitive information and that none of the transcripts would be shared outside the group of authors. We steered the interviews along a guideline outlined in Appendix A. Notably, the guideline does not include any follow-up questions that were asked dependent on the interviewees' responses. Furthermore, we slightly adjusted the questions (as well as the order in which they were asked) based on the learnings gained as data collection progressed.

Second, we consulted various relevant archival documents such as annual reports, sustainability reports, press articles, and independent industry reports. Table I provides an overview of the interview respondents as well as the archival documents used in this study. Notably, all interview respondents work for companies headquartered in Europe. Although most firms are active globally, their primary focus is the regulatory framework of the EU.

We stopped the data collection process once theoretical saturation was reached and additional data collection only lead to marginally new insights (Glaser and Strauss, 2017). We determined that theoretical saturation was reached via a combination of cross-interview comparison and ongoing data analysis as we noticed that answers given in the last interviews have essentially already been given in previous interviews (Charmaz, 2006). For example, participants 17 and 21 both strongly emphasized that uncertainty on regulation is their main concern and forces them to remain hesitant to act. This, however, had already been outlined by participants 1 and 4:

> *Yes, I strongly believe that there will be political efforts to define Green Steel and within that enforce reporting of all CO2 emissions but how they will do it, I do not really know yet. The regulation on Scope 1 emissions also took very long to establish. (Participant 1)*

Table 1
Overview of data sources.

Interviews (21 total)	
Organization	**Participant #: Role**
Steelmaker A	1: Director Transformation & Regulation 2: Procurement Manager Alloys
Steelmaker B	3: Sustainability Manager 4: Manager Digital Transformation
Steelmaker C	5: Head of Value Chain Emissions
Steelmaker D	6: Director Corporate Strategy
Steelmaker E	7: Vice President Sustainability
Steelmaker F	8: Director Production Process
Steelmaker G	9: Global Procurement Manager
Steelmaker H	10: Head of Production
Steelmaker I	11: Project Leader Procurement
Steel Consumer A	12: Sustainability Manager Metals
Steel Consumer B	13: Manager Strategic Sustainability
Steel Consumer C	14: ESG Manager
Raw Material Supplier A	15: CEO
Raw Material Supplier B	16: CEO
Raw Material Supplier C	17: Commercial Director
Industry Association A	18: Standards Manager
Industry Association B	19: Head of Corporate Sustainability
Service Provider A	20: Founder & Director
Service Provider B	21: Founder & Director
Archival Documents (74 total)	
Type	**Number**
Primary Data	
Annual Reports	28
Sustainability Reports	15
Company Websites	11
Secondary Data	
Press Articles	14
Industry Reports	6

> *Yes, with all the regulation we already have in place, I believe they [regulators] will at some point widen the scope to also include Scope 3 but at the moment, it is not included in any of our supply chain activities. (Participant 4)*

> *At the moment, there is no clear regulation. Therefore, some firms do it [requesting scope 3 data] in a comprehensive data survey and some with a simple email. This vagueness always leaves room for interpretation and therefore firms struggle with this topic a lot. (Participant 17)*

> *[…] because the methodology is not clear yet, which method to use for measurement. There are competing methodologies for the product carbon footprint, what to include, what the system boundaries are, and so on. This is often referred to as a reason for not doing it yet. And therefore, they prefer to wait until there is one clearly established methodology and standard. (Participant 21)*

3.2. Data analysis

We analyzed our data using the Gioia methodology (Gioia et al., 2013; Nag et al., 2007), i.e., we developed categorizations using constant comparison techniques (Glaser and Strauss, 2017; Strauss and Corbin, 1990). First, we read through all interview transcripts and coded all relevant phrases. Then, we applied an interpretative approach (Miles et al., 2014) to group these coded phrases into *first-order categories*. We proceeded to cluster the first-order categories into *second-order themes* to develop a structure at a higher theoretical level. This step was particularly important to shift from concrete first-order categories to more abstract second-order themes, which is needed to allow for generalizability of the results. Then, we allocated the second-order themes to *overarching dimensions* to provide a high-level structure on our evidence on incumbent behavior prior to discontinuous regulatory changes. Throughout, we used archival documents to triangulate our findings and cross-check for plausibility (Jick, 1979; Miles et al., 2014) as well as to

Table 2
Data structure and exemplary quotes.

Overarching Dimensions	2nd-Order Themes	1st-Order Categories	Exemplary Quotes
Expectations for the future context	Expected opportunities	Reach CO_2 emission reduction targets	"[…] because it was a conscious decision to explicitly set targets for this [Scope 3 emissions] and reporting builds the basis for achieving these targets." (Participant 4)
		Allow for sales of superior products with lower carbon footprints	"So actually, the only supplier where we would ask explicitly for their Scope 3 emissions, are the ones that we believe have good marketing potential in terms of green steel. And then it's the green steel premium potential, green steel premium that will incentivize the steel industry to provide more transparency." (Participant 12)
		Fulfill investor expectations	"[…] today the biggest driver [for Scope 3 reporting] I would say are the targets we have to announce for SBTi, which is let's say an extremely important point for our investors, especially over the next years. […] And now this year we are working also on the SBTi and SBTi has already announced some very complex methodology for inclusion, which includes reporting of Scope 3." (Participant 5)
		Enhance supply chain management	"I can see advantages in procurement so that processes in the supply chain are improved which may result in both better CO_2 and cost efficiency." (Participant 1)
		Improve employee satisfaction	"And the value that we've heard from steel makers often is that it's relating to how their employees feel about them, feel about the job they're doing." (Participant 18)
	Expected circumstances	Acknowledge that regulatory change is needed and will eventually come	"And because there is a lot of money involved, I am fully convinced that there will be regulatory boundary conditions in the future. Similar to what we already know from emission trading in the EU, there the calculations are also determined by regulatory provisions." (Participant 1)
		Expect that Scope 3 reporting will become an established standard business process	"Essentially how it's been pushed from our customers is 'you're out if you don't have it', so it's going to be mandatory. Further down the line, I imagine it will be very similar for us. A contract will go out for tender and it will be mandatory to the award of the contract to provide that data." (Participant 9)
	Expected risks	Be forced to disclose poor environmental performance	"If there are no regulatory provisions applicable for the entire industry, then it [doing Scope 3 reporting] is a clear competitive disadvantage. […] Of course, if I disclose my Scope 3 and the others don't, then it's a disadvantage." (Participant 10)
		Increase operational workload	"But of course, these kinds of regulations create a lot of work, especially if you are not prepared. […] Also, all supply chain aspects create a lot of work to collect and consolidate the data. And more broadly speaking, all the preparation and resources that need to be provided. In that regard, we are sometimes also hindered by our corporate slowness." (Participant 4)
		Face regulatory restrictions to operate	"And there is a risk that someday Scope 3 figures are capped. This would cause real competitive disadvantages. I mean that regulation states that only materials under certain thresholds are allowed to be imported." (Participant 1)
		Lose procurement bargaining power with suppliers	"[…] it can be detrimental to the business relationship with some suppliers because they may judge these targets or ambitions as unachievable, or they may try to take advantage of the situation and ask for price increases." (Participant 5)
		Reveal secret corporate information to competitors	"On the other hand, you would make many aspects transparent: How you work, where and how much recycling or new materials you are using. You would give away insights into your data and your business model. That may certainly be a risk." (Participant 4)
Motivation for today's behavior	Incentives for early movers	Ensure readiness once details of regulatory change are announced	"We are active, we already have Scope 3 reporting, we have a target. Such regulation would not have a direct effect then. […] when it comes to Scope 3 calculations, we have sufficient primary data, I am confident this covers all potential regulatory frameworks." (Participant 3)
		Fulfill first customer requirements	"It's [Scope 3 reporting] being driven largely by our customers. You know, they're requiring full CO_2 product carbon footprints, which does obviously include our Scope 3 emissions. So, it's now very much at the forefront of what we want to do." (Participant 2)
		Develop short-term competitive advantage	"[…] if one steelmaker is able to transparently explain their Scope 3 emissions and another is not, then it's a clear competitive advantage for the first." (Participant 14)
		Build image of industry leader for sustainability	"We want to ensure that we are seen as the leaders within our industry and being the industry's first to be on the forefront of battling climate change." (Participant 7)
		Comply with other sustainability related initiatives (e.g., Science Based Targets)	"[…] that's the reason why or some of the reasons why we've signed up for the Science Based Targets, and that requires to have Scope 3 emission targets and reporting as well." (Participant 7)
	Reasons for hesitation	Remain inactive until scope and methodologies of regulatory change are more mature	"[…] because the methodology is not clear yet, which method to use for measurement. There are competing methodologies for the product carbon footprint, what to include, what the system boundaries are, and so on. This is often referred to as a reason for not doing it yet. And therefore, they prefer to wait until there is one clearly established methodology and standard." (Participant 21)
		Emphasize shortage of resources for additional workload	"A lot of people I speak to personally don't know where to start, don't have the resources to provide us with the information. I think where our customer base is able to provide this information, their resources are much greater than ours." (Participant 2)

(*continued on next page*)

Table 2 (*continued*)

Overarching Dimensions	2nd-Order Themes	1st-Order Categories	Exemplary Quotes
		Emphasize lack of required knowledge	"I can imagine that, for many, the uncertainty around this topic is very high. With that I mean they don't know how to approach it, they lack the expertise in-house and they are not willing to purchase it externally. And then they say: 'The regulator does not force me yet, so actually I don't have to act.'" (Participant 17)
		Emphasize unavailability of required data	"I am sure we would be happy to report this but, as a matter of fact, the data basis simply does not allow for that yet. That is the pivotal reason why we are now starting this IT project with the ferroalloys." (Participant 2)
	Disincentives preventing implementation	Avoid damage to competitive position due to perception of higher CO_2 footprint	"If you disclose your Scope 3 emissions and your competitors aren't, it can appear like you have a greater environmental footprint." (Participant 18)
		Save costs and prioritize daily business	"You have to understand that it [Scope 3 reporting] costs money, it costs time of people. […] the steel industry had some good years, but we are coming into a recession now. So again, the cost will have the biggest influence and the steel producers know very well that image alone doesn't sell steel." (Participant 15)
Actions planned or taken until today	Foundational preparatory actions	Build sustainability culture	"[…] the issues of environmental management and sustainability fully arrived in our culture in all departments and are constantly emphasized by our senior management." (Participant 2)
		Increase budget and FTEs	"Yeah, we just recently, well beginning of last year, we started up a 4-person team working on supplier sustainability, so that's specifically to address this topic." (Participant 7)
		Build and transfer knowledge	"There are efforts to develop our employees in this direction. We have internal websites and meetings, we hold conferences and trainings. I personally held such trainings before already." (Participant 6)
		Develop data and IT infrastructure	"At the moment, the majority of work comes from collecting the data and building a database, which as we both well know is quite difficult." (Participant 2)
		Request primary data from suppliers	"We engage with our strategic suppliers on this [primary data] and already have first contractual agreements in place that guarantee delivery of such CO_2 figures." (Participant 3)
	Advanced early mover activities	Provide initial data to first customers	"When I speak of front-runners, I mean steel suppliers that already have algorithms in place, often even 3rd party verified, to calculate and submit their product carbon footprints to us." (Participant 12)
		Use sustainability KPIs to steer corporate strategy	"Then we are using climate targets as one of our main metrics for strategy execution. […] So, it has been put on par with the financial KPIs within our reporting structures and visualizations within our organization, it's on the same level." (Participant 7)
		Include sustainability KPIs in employee incentives	"I mean we do include our climate targets in personal incentives. So that's where it becomes very, very personal to everyone." (Participant 7)
		Pursue long-term partnerships with best suppliers	"Yes, for example we recently started the <initiative name > initiative with <steelmaker name>, which aims at enabling more sustainable steel production in the long run and this also includes Scope 3 reporting." (Participant 16)
		Announce long-term reduction targets (e.g., SBTi)	"The SBTi is also a driver for this [Scope 3 reporting]. And everyone or most key players have already committed to this." (Participant 3)
	Sector monitoring	Conduct benchmarking studies to compare own emission performance with competitors	"[…] we benchmark with our competitors or the market in general, and for Scope 3 specifically, we have to say that for us it makes up the largest share of our emissions" (Participant 8)
		Participate in industry associations to follow latest developments	"Yes, we take part in industry associations, e.g., the WV Stahl or the industry association for steel tubes. It is important to be there because there, such topics are being discussed, especially also from a political perspective." (Participant 11)
	Lobbying	Publicly campaign for "level playing field" for all participants across the industry	"We always have to consider that we need a level playing field. That means, we need to use the same criteria globally in order to reach the goals of the Paris agreement. We want to push for that." (Participant 1)
		Interact with policymakers to affect scope of regulatory change	"We have of course our government affairs team who is in contact for all types of regulations. We are also involved through Eurofer, so the European Steel Association, there we are also giving our opinions for how to account CO_2, what should be the thresholds and so on." (Participant 5)
		Engage with stakeholders to maximize chances of receiving governmental subsidies	"One result of lobbying is that a certain steelmaker now receives 4 billion in subsidies, 2 from the EU and 2 from the German government, simply because they provided their viewpoints on what will and what will not work in terms of decarbonization to politics." (Participant 21)

refine our results beyond the interview responses. Table II shows the emerging data structure with exemplary evidence. We translated quotes from non-English-speaking interview respondents.

Building on the established data structure, we developed process theory (Langley, 1999) on how incumbents motivation is influenced by their expectations for the future and how their motivation drives their planned or taken actions. We then linked these aspects using the "grounded theory strategy" of process theory (Langley, 1999, p. 699) to recognize relationships among the categories and themes, and identify behavioral patterns or strategies. In doing so, we follow Langley's approach of "making sense whatever way we can" (Langley, 1999, p. 708), integrating interview and secondary data to arrive at evidence-based theory.

Throughout our theory development process, we repeatedly integrated extant literature. During the initial phase of data analysis, we "consult [ed] with existing literature, with suspension of judgement to allow discovery of new insights" (Gioia et al., 2013, p. 26). Once we established the data structure and identified direct relationships, we

further "enfolded" (Eisenhardt, 1989, p. 544) the existing knowledge from prior studies by comparing existing work with our emerging categorization and process theory. This allowed us to further refine the articulation of our theory (Gioia et al., 2013). Overall, our methodological approach is profoundly similar to that of previous work at the intersection of discontinuous change and institutionalism (Weber et al., 2019).

4. Incumbent behavior prior to a discontinuous regulatory change

In our data, we identified three distinct patterns of motivation that give rise to the incumbents' behavior and that build the core of our theory. We further found linkages between the incumbents' patterns of motivation and their preceding expectations for the future, and, ultimately how these patterns drive incumbents' planned or taken actions in preparation for the anticipated discontinuous regulatory change. Fig. 1 shows our data structure.

4.1. Incumbents' motivation, expectation, and action

In this sub-section, we lay out the nuances of the incumbents' patterns of motivation, their expectations for the future, and their planned or taken actions.

4.1.1. Incumbents' motivation for today's behavior

Incentives for early movers. The data suggest multiple incentivizing factors that motivate incumbents to become "early movers" (i.e., be among the first to react to a certain change, innovation, or technology) in the field of corporate Scope 3 reporting. First, some incumbents emphasized their intention to be ready for any regulatory change once it is announced to minimize its potentially disruptive impact. Second, many incumbents were motivated by business opportunities associated with Scope 3 reporting in the form of fulfilling first customer requirements (i.e., being able to respond to first customer requests, such as the automotive industry asking for Scope 3 data when purchasing steel), developing short-term competitive advantages (i.e., being among the first in the industry that implement Scope 3 reporting and thereby acquiring skills that competitors do not have), or building an image of being the industry leader for sustainability. For example, Participant 14 explicitly emphasized:

> *[…] if one steelmaker is able to transparently explain their Scope 3 emissions and another is not, then it's a clear competitive advantage for the first.*

Third, incumbents were also motivated by a desire to comply with other sustainability-related initiatives such as the Science Based Targets initiative (SBTi). The SBTi is the largest global framework for firms to determine emission reduction targets and requires firms to conduct Scope 3 reporting and define Scope 3 reduction targets (World Resources Institute, 2023). As a result, firms that intend to announce emission reduction targets based on SBTi need to voluntarily conduct Scope 3 reporting. For example, Participant 3 stated:

> *And SBTi requires this [Scope 3 reporting] anyways, which is why we are very active in this space already.*

Aspects of these motivational factors can partially also be found in extant literature. For example, Kammerlander and Ganter (2015) found that certain noneconomic goals (e.g., power and control, transgenerational value, or the maintenance of family reputation) of family business CEOs influence the firm's adaptation to discontinuous innovation. They found evidence for heterogeneity in firms' responses, which they partly attributed to differences in the CEOs' noneconomic goals. Their findings support the possibility that a firm's motivation of becoming sustainability leader influences their adaptation to this discontinuous regulatory change. In addition to that, Greenwood et al. (2011) and Pache and Santos (2010) outlined that firms, due to differences in their organizational characteristics and position in their competitive landscape, respond differently to institutional complexity. As prospective regulatory change induces a dynamic change in institutional complexity, these findings may also partially explain why some firms see business opportunities in the context of Scope 3 reporting while others do not.

Reasons for hesitation. Our results show multiple reasons for incumbents to hesitate on adopting corporate Scope 3 reporting. On the one hand, our respondents pointed to a low level of maturity of future regulation, especially highlighting deficient methodologies to calculate and report Scope 3 emissions. Thus, some intended to remain inactive until future regulation would be more mature. For example, Participant 17 articulated:

> *Our industry is still far behind on this [Scope 3 reporting], especially because there is no common process for calculating those CO2 emissions, on which basis, what is included, what is excluded. Therefore, many firms, us as well, are hesitant and not confident to provide any data.*

Prior scholars have already pointed out that incumbents sometimes hesitate to respond to a discontinuous change. For example, Raaijmakers et al. (2014) found that firms delay compliance to a coercive demand to reduce the experienced institutional complexity. Other scholars pointed towards reasons that drive variations in incumbent inertia in response to the same discontinuous change, e.g., differences in managerial perceptions of opportunities and threats (Eggers and Park, 2018; Gilbert, 2005; König et al., 2021). In this context, remaining inactive until the regulatory change is more mature could thus be seen as incumbents' way of reducing institutional complexity.

On the other hand, incumbents often were incapable of conducting Scope 3 reporting. Our data suggest shortages of resources (e.g., personnel, budget, or other resources to accommodate the additional workload), lack of required knowledge (i.e., insufficiently trained or educated personnel to conduct Scope 3 reporting), and general unavailability of data (e.g., missing data needed to calculate a firm's Scope 3 emissions) as the main reasons. In support of a similar relationship, Dooley (2018, p. 78) claimed that innovations "were not previously implemented due to a failure to change organizational processes", which he attributed to routine rigidity. In this context, slowness to change procurement processes to include the collection of required emission data is an example of such routine rigidity that in turn may lead to the unavailability of data. Other studies highlighted the influence of different managerial opportunity and threat perceptions on resource rigidity and routine rigidity (Gilbert, 2005; König et al., 2021). Similar differences in managerial perceptions may also apply in this context and lead to the identified shortage of resources, lack of knowledge, and unavailability of data. The issue of path dependency may similarly contribute to incumbents' inertia in adopting the required capabilities (Keller et al., 2022).

Disincentives preventing implementations. Our findings further suggest two critical disincentives that outright discourage incumbents from implementing corporate Scope 3 reporting. First, incumbents want to avoid damage to their competitive position due to a potentially unfavorable perception of their CO_2 footprint. Participant 16 specifically suggested that some steelmakers deliberately avoid disclosing their poor environmental performance:

> *If I know that I have a bad CO2 footprint, then I don't have an interest in determining and disclosing it, but instead would rather try to avoid that.*

Second, incumbents intend to reduce costs and therefore prioritize daily business activities over activities needed for Scope 3 reporting. For example, Participant 15 emphasized the steelmakers' cost pressure, especially in a period of prospective recession.:

> *You have to understand that it [Scope 3 reporting] costs money, it costs time of people. […] the steel industry had some good years, but we are coming into a recession now. So again, the cost will have the biggest*

influence and the steel producers know very well that image alone doesn't sell steel.

4.1.2. Incumbents' expectations for the future industry context

Expected opportunities. Our respondents pointed to several opportunities that they expect in a future in which Scope 3 reporting is mandatory. First, the incumbents believed that it would help them reach their CO_2 emission reduction targets. For example, Participant 14 compared Scope 3 reporting to financial reporting in its functionality for steering a company:

As I said earlier, Scope 3 reporting must function in an automated manner similar to financial reporting. […] Then the operational steering of climate impact becomes easier and reaching the targets can be ensured.

Second, our respondents indicated that Scope 3 reporting may support product sales. Specifically, Scope 3 reporting may allow incumbents to credibly prove to their customers that their product has a lower carbon footprint than their competitors'. Consequently it allows them to better sell such products. Prior studies found evidence for similar commercial expectations from adapting to discontinuous changes. For example, Martinez (2022) integrated research on incumbent response to discontinuous change with business model innovation. The author elaborated on the changes to business models in response to discontinuous changes, which, similar to what we find in our research context, may include the ability to sell new or superior products.

Third, the data suggest that Scope 3 reporting will provide steelmakers with an opportunity to fulfil important investor expectations. Investors are widely expected to review a steelmakers' SBTi targets and their associated Scope 3 emission reports more diligently in the future (Bendig et al., 2023). For example, Participant 5 articulated:

[…] today the biggest driver [for Scope 3 reporting] I would say are the targets we have to announce for SBTi, which is let's say an extremely important point for our investors, especially over the next years. […] And now this year we are working also on the SBTi and SBTi has already announced some very complex methodology for inclusion, which includes reporting of Scope 3.

Related to our findings, prior work has similarly identified the importance of managing investor expectations through adaptation to discontinuous changes. For example, König et al. (2013) elaborates on how the family – as the main investor of a family-owned business – affects the firm's adoption of discontinuous technologies.

Fourth, our results indicate that incumbents hope to enhance their supply chain management through Scope 3 reporting. Our respondents believed that Scope 3 reporting allows steelmakers to improve procurement efficiency, better understand risks within their supply chain, and make more informed decisions.

Lastly, our respondents suggested that, in the future, employees will place more emphasis on working for a sustainable company. Therefore, incumbents associate conducting Scope 3 reporting with the opportunity of improving employee satisfaction and increasing employer attractiveness.

Expected circumstances. Our respondents expressed two main expectations for future circumstances within the industry. These circumstances are neither opportunities nor risks, but instead describe general conditions that do not entail direct positive or negative potential consequences for individual firms. First, most of our respondents acknowledged that a regulatory change is needed to mitigate the steel industry's impact on climate change and that it will eventually come. For example, Participant 1 voiced a particularly strong opinion:

"And because there is a lot of money involved, I am fully convinced that there will be regulatory boundary conditions in the future. Similar to what we already know from emission trading in the EU, there the calculations are also determined by regulatory provisions."

Second, most of our respondents believed that Scope 3 reporting will become an established standard business process. They emphasized that Scope 3 reporting will be common practice in the future and that a lack of adherence will effectively exclude firms from the industry. For example, Participant 2 spoke of "you're out if you don't have it".

Expected risks. Our results indicate several risks that incumbents expect to arise in a future with mandatory Scope 3 reporting. First, some incumbents feared that they will be forced to disclose poor environmental performance which they would not disclose otherwise. For example, Participant 10 specifically suggested that, unless they are forced by regulation, steelmakers would avoid disclosing their poor environmental performance:

If there are no regulatory provisions applicable for the entire industry, then it [Scope 3 reporting] is a clear competitive disadvantage. […] Of course, if I disclose my Scope 3 and the others don't, then it's a disadvantage.

Second, many incumbents believed that new regulation associated with Scope 3 reporting would cause significant operational workload in their organization, possibly to a level that overwhelms the organization. For example, Participant 6 referred to "building a second controlling department which works not in € but in CO_2".

Third, incumbents were afraid that a regulatory change may generally restrict their freedom to operate. For example, Participant 1 suggested that regulation might enforce "certain thresholds", which would limit the steelmakers' supplier choice.

Fourth, our data suggest that incumbents may lose procurement bargaining power against suppliers due to mandatory Scope 3 reporting. For example, Participant 5 argued that:

[…] it can be detrimental to the business relationship with some suppliers because they may judge these targets or ambitions as unachievable, or they may try to take advantage of the situation and ask for price increases.

Lastly, our findings suggest that incumbents associate Scope 3 reporting with the risk of involuntarily revealing sensitive information. On the one hand, some less carbon-intensive suppliers may use Scope 3 information, such as a steelmaker's current emissions and emission target commitments, to their advantage and raise prices, knowing that their customers will have to continue to purchase from them to meet their targets. On the other hand, scope 3 reporting may reveal information about specific process materials, recycling rates, or other details of the business model.

4.1.3. Incumbents' planned or taken actions until today

Foundational preparatory actions. Our findings indicate several activities that can be characterized as foundational. These activities build the basic capabilities to perform Scope 3 reporting. First, several respondents referred to the importance of building a sustainability culture within the organization. Relatedly, in a previous study, Dooley (2018) argued that an organization's cultural norms need to change for successfully adapting a discontinuous innovation. This supports the notion that "building a sustainability culture" is a foundational preparatory action.

Second, our results indicate multiple actions intended to establish basic capabilities for Scope 3 reporting. This includes providing budgets and staff (i.e., granting financial and human resources needed to establish Scope 3 reporting capabilities), building and transferring knowledge (i.e., providing educational material to employees, running training and upskilling sessions, appointing internal topic champions to encourage interpersonal teaching, etc.), and developing data and IT infrastructure (i.e., collecting data and aggregating databases, developing digital tools, integrating newly developed data and tools into existing IT landscape, etc.). Prior research identified similar activities in response to discontinuous changes. For example, Gilbert (2005) and König et al. (2021) assessed the impact of resource rigidity on incumbent

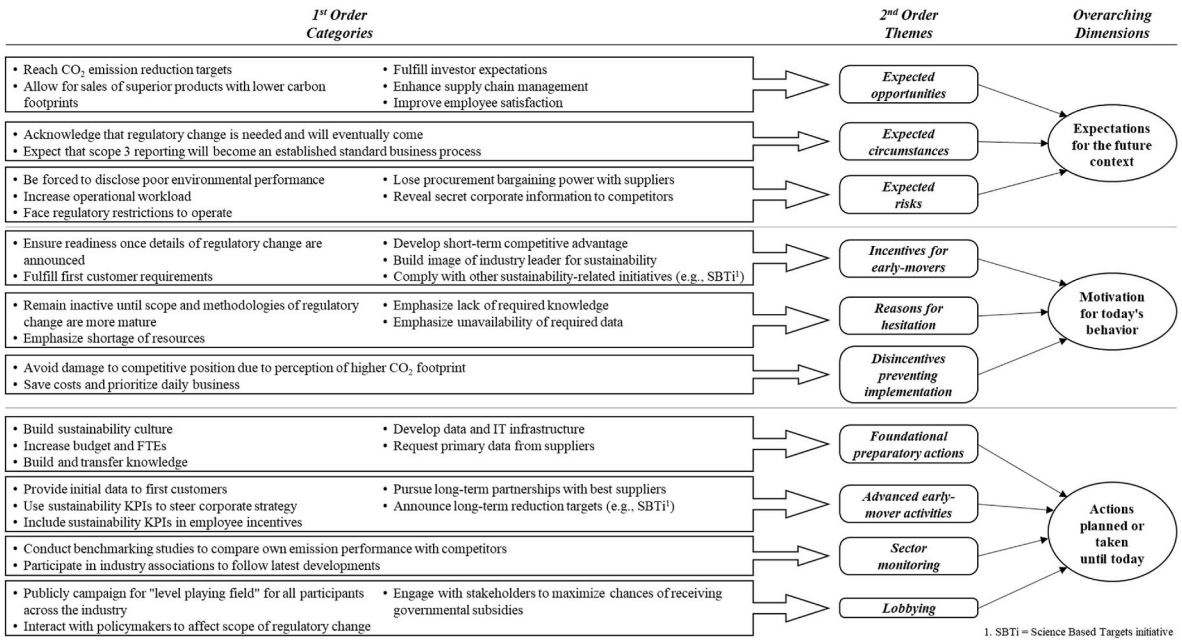

Fig. 1. Data structure.

inertia and identified the provision of financial and human resources as an important element in an incumbent's response behavior to a discontinuous change. Steinhauser et al. (2020) reviewed the role of digital complementary assets in the adaptation of a discontinuous innovation in the healthcare sector and found that they have a strong effect.

Lastly, our findings indicate frequent interactions between incumbents and their suppliers. Firms need to collect data from their suppliers, i.e., the product carbon footprint (PCF) of the purchased product, to accurately conduct Scope 3 reporting. Only if such primary data from suppliers are not available, firms may use secondary emissions factors (e.g., global average PCFs), although this is strongly discouraged by leading calculation standards (GHG Protocol, 2011). Collecting primary data is foundational because it allows incumbents to compare suppliers with one another, which is not possible based purely on secondary data. Consequently, it enables emission reduction measures by choosing the supplier with a lower footprint. For example, Participant 3 elaborated on their supplier engagement and specified that they have "contractual agreements in place" to legally ensure the delivery of primary data.

Advanced early mover activities. Our findings show that incumbents plan or take actions that can be described as activities that only advanced industry participants, or "early movers", would perform. These activities explicitly exceed foundational preparatory actions. First, many of our respondents suggested that providing initial data to first customers is a key activity to move a firm beyond foundational preparatory actions. Incumbents may provide their PCF including Scope 3 information to their customers, either directly at the point of sale or upon request by their customers. For example, Participant 12 explicitly referenced such suppliers:

> *When I speak of front-runners, I mean steel suppliers that already have algorithms in place, often even 3rd party verified, to calculate and submit their product carbon footprints to us.*

Second, our findings indicate two distinct ways of how some incumbents use key performance indicators (KPIs) related to sustainability, including Scope 3 emission, data in their daily business activities. First, incumbents want to make their climate targets a core priority and therefore use sustainability KPIs to design and steer their corporate strategy. Second, incumbents incorporate sustainability KPIs into remuneration schemes to motivate their employees to contribute to the firms' progress in that regard.

Third, our respondents elaborated on the development of long-term partnerships between steelmakers and suppliers. Such partnerships are intended to allow joint improvements of sustainability capabilities including Scope 3 reporting for both suppliers and customers. For example, Participant 16 specifically mentioned a recently started initiative:

> *Yes, for example we recently started the <initiative name > initiative with <steelmaker name>, which aims at enabling more sustainable steel production in the long run and this also includes Scope 3 reporting.*

Lastly, some incumbents also publicly announce long-term reduction targets. Usually, these reduction targets are based on the SBTi and therefore include specific Scope 3 targets as well. For example, in their latest sustainability report of 2022, steelmaker E announced a reinforcement of their emission reduction targets:

> *As a part of the new sustainability strategy, we launched more ambitious goals for our sustainability. […] Our approved SBTi target requires a 42% CO2 emission reduction across all scopes by 2030 compared to the 2016 baseline.*

Sector monitoring. Our data further indicate two distinct incumbent activities to monitor their sector's status and progress with respect to Scope 3 reporting. For one, our respondents suggested that incumbents conduct benchmarking studies to understand their competitors' Scope 3 emission performance and estimate their relative position in the competitive landscape. For another, many of our respondents mentioned their participation in industry associations as a means to follow the latest industry developments. It allows incumbents to engage and exchange information with each other, which in turn can be used for advising policymakers on regulatory plans. Incumbent managers suggested that participation may also be used to simply extract new information and remain informed about the latest developments concerning potential regulatory changes. For example, Participant 11 explicitly mentioned the „WV Stahl" association:

> *Yes, we take part in industry associations,* e.g., *the WV Stahl or the industry association for steel tubes. It is important to be there because there,*

such topics are being discussed, especially also from a political perspective.

Lobbying. Our results further show evidence of different kinds of lobbying by incumbents. First, incumbents publicly campaign for a "level playing field". They highlight the importance of a fair regulatory framework that ensures that all industry participants are treated equally. Since Scope 3 reporting is currently not part of any regulatory framework, this can be interpreted as a call to make it mandatory – but across the entire global industry.

Second, the data indicate that incumbents interact with policymakers to affect the scope of potential regulatory changes. Most incumbents have dedicated teams focused on lobbying and positioning a firms' standpoint within policymakers' discussions in various forums. For example, Participant 5 mentions their "government affairs team" and how they articulate their opinions on aspects like emission thresholds. Participant 21 even spoke of a newly founded position of "Chief Lobbyist" for whom "a new office was just opened in Berlin". Participant 12 explained that some industry players even attempt to prevent certain aspects of prospective regulation:

Yes, I believe it is a well-tried method of the industry to seek for closeness with associations, with policymakers, in order to have a certain impact on regulation, maybe even to inhibit certain things.

Lastly, our respondents suggested that incumbents also engage with political stakeholders to secure governmental subsidies. For example, Participant 6 emphasized that incumbents in the steel industry are currently facing a severe transformational challenge, of which Scope 3 reporting is one element that requires substantial financial investment. Therefore, incumbents lobby for governmental subsidies in this regard:

We are in a constant stakeholder approach with various ministries, states, etc. There, subsidies are being allocated and since we are not able to manage this monumental transformation challenge on our own, resources from the public authorities are needed.

Our findings relate closely to the extant literature on lobbying. Many scholars have investigated how lobbying benefits firms and enhances their performance, and that it is often seen as a risk mitigation tool intended to influence governments and policymakers. (Hadani et al., 2017; Hillman et al., 2004). In our empirical context, interacting with policymakers to affect the scope of regulatory changes, and engaging with stakeholders to maximize the chances of receiving governmental subsidies may be considered risk mitigation. Furthermore, Abdurakhmonov et al. (2022) investigated the breadth of lobbying activities and argue that a wider span of lobbying activities improves lobbying effectiveness. Our data provide evidence for such a broad span of lobbying activities, as we identified not only activities related to direct interactions with policymakers, but also with the public, industry associations, and other stakeholders, suggesting that incumbents in the steel industry may have justified hopes of relatively high lobbying effectiveness.

4.2. Incumbents' expectations for the future influencing their motivation today

In this sub-section, we describe how incumbents' expectations for the future influence their motivation today. Fig. 2, which can be understood as Fig. 1 "set in motion", illustrates our emerging process model, with solid arrows indicating direct relationships between expectations, motivations, and actions, and dotted arrows illustrating potential recursive effects.

4.2.1. Incentives for early movers as a consequence of expected circumstances and expected opportunities

Our findings indicate various direct relationships between expected circumstances and incentives for early movers, and between expected opportunities and incentives for early movers. First, the data suggest that the expected opportunity of reaching CO_2 emission targets induces the motivation to build an image of being the industry leader for sustainability by moving early on Scope 3 reporting. For example, Participant 7 connected their ambition to reach emission reduction targets with their motivation to be sustainability leaders:

So, let's say that the operating environment is expecting us, as we are within the energy intensive industries, that we are reducing our carbon footprint. […] And of course, we want to ensure that we are seen as the leaders within our industry and being the industry's first to be on the forefront of battling climate change.

Steelmaker E further espoused this relationship in their latest sustainability report. In this report, they confirm to be on track with their emission reduction targets whilst improving their Scope 3 reporting capabilities. In their statement, they even admitted that improving Scope 3 reporting accuracy has led to a higher total carbon footprint figure, which shows the firmness of their intention to become a sustainability leader:

The number of different emission sources to be included in Scope 3 calculation can be quite big: we have over a dozen of separate sources of Scope 3 emissions which need to be calculated per each production site. A bit ironically, the better and more thorough our climate reporting has become, the higher the emissions have become because we have been filling the missing gaps. But we are in a good position to lower our emissions in line with the Science Based Targets initiative.

This behavior may be grounded in a "who we are not as an organization" approach (Stanske et al., 2020). With this statement, Steelmaker E might intend to underline that they are not a firm that withholds any possibly negative information in response to a discontinuous change.

Second, our findings indicate that the opportunity to allow for sales of superior products with lower carbon footprints sparks the motivation to fulfill first customer requirements. Scope 3 reporting allows incumbents to prove to customers that their product has a lower PCF and therefore may support product sales. Thus, the earlier the incumbent establishes Scope 3 reporting capabilities, the earlier the incumbent can benefit from that opportunity. For example, Participant 6 explicated:

Yes, of course, it has become a criterion for the purchasing decision. Time, price, quality, and the fourth is now to be low carbon. That means that we are preferably chosen by our customers if we are able to show to them that we are low carbon.

This relationship may entail recursive effects. On the one hand, the opportunity to allow for sales of superior products in the future sparks the motivation to fulfill first customer requirements today. On the other hand, the more customers communicate carbon requirements today, the more relevant a firm may consider the opportunity for the future.

Third, our results provide evidence that the opportunity to fulfill investor expectations motivates incumbents to move early on Scope 3 reporting to comply with other sustainability-related initiatives. For example, Participant 5 specifically outlined that SBTi-aligned targets are "an extremely important point for our investors" and that they are therefore currently working on the SBTi's "complex methodology for inclusion". This mirrors similar direct relationships found in prior research. For example, Flammer et al. (2021) investigated the impact of shareholder activism on voluntary disclosure of climate change risks. They found that "environmental shareholder activism increases the voluntary disclosure of climate change risks" (Flammer et al., 2021, p. 18). Relatedly, Bueno-Garcia et al. (2021) analyzed the impact of different shareholders on a firm's environmental proactivity and found that especially for foreign shareholders, firms are willing to modify their environmental practices.

Fourth, we found that incumbents' acknowledgements that regulatory change is needed, and that it will eventually come, motivated them to move early to be ready once the regulatory change comes into effect.

For example, Participant 3 expressed that, because of their current Scope 3 reporting activities, "such regulation would not have a direct effect then".

Lastly, many incumbents were convinced that Scope 3 reporting will become an established standard business process, and therefore believed that moving early would allow them to build a competitive advantage. However, that of course means that such a competitive advantage would be temporary and only exist in the short term. For example, Participant 12 first mentioned preferential treatment by customers:

> *Today, those steel producers that can transparently show their product carbon footprint including Scope 3 are treated advantageously.*

Later in the same interview, he elaborated on his expectation for the future about this effect fading:

> *I believe in the future, it [Scope 3 reporting] will be increasingly less differentiated, meaning that it will become a standard procedure to report Scope 3 emissions.*

This relationship may partly be explained by the concept of "futurescapes" (Rindova and Martins, 2022). According to this concept, firms develop a narrative about a discontinuous future, in this case a future in which scope 3 reporting is well established, and use this narrative to justify changes to their organization today.

4.2.2. Reasons for hesitation as a consequence of expected circumstances and expected risks

Our results show linkages between expected circumstances and reasons for hesitation, and between expected risks and reasons for hesitation. First, the data suggest that the expected circumstance of Scope 3 reporting as an established standard business process induces incumbents to remain inactive until scope and methodologies of the regulatory change are more mature. For example, Participant 21 stated:

> *[…] because the methodology is not clear yet, which method to use for measurement. There are competing methodologies for the product carbon footprint – what to include, what the system boundaries are, and so on. This is often referred to as a reason for not doing it yet. And therefore, they [steelmakers] prefer to wait until there is one clearly established methodology and standard.*

Second, the responses indicate that the expected risk of increased operational workload makes incumbents emphasize their lack of resources and unavailability of data as reasons for hesitation. For example, the Participant 4 elaborated on the aspects of lengthy data collection processes and required resources:

> *But of course, these kinds of regulations create a lot of work. […] Also, all supply chain aspects create a lot of work to collect and consolidate the data. And more broadly speaking, all the preparation and resources that need to be provided. In that regard, we are sometimes also hindered by our corporate slowness.*

4.2.3. Disincentives preventing implementation as a consequence of expected risks

We further identified relationships between expected risks and disincentives preventing implementation. First, the risk of being forced to disclose poor environmental performance creates a disincentive that makes incumbents avoid the adoption of Scope 3 reporting. Incumbents who fear that their carbon footprint is higher than their competitors' worry that they will be forced to disclose that in the future, which might impair their public image. Voluntary disclosure of their total carbon footprint including Scope 3 would thus create unnecessary damage to their competitive position today, especially if competitors do not yet disclose their Scope 3 emissions. Therefore, many incumbents seek to eschew Scope 3 reporting until it is mandated. For example, Participant 8 specifically stated that, although they would be able to disclose Scope 3 emissions, they will not do so until regulation is in place because of their concern of damaging their competitive position:

> *We consciously left [Scope 3 emissions] out of our reporting. The reason is that we benchmark with our competitors or the market in general, and for Scope 3 specifically, we have to say that for us it makes up the largest share of our emissions. And of course, we do not want to let ourselves be viewed worse than needed. […] Therefore, as long as it is not mandatory, we will not publish it.*

Second, the risk of increased workload in the future creates the disincentive of saving costs and prioritizing daily business today. The increased workload in the future requires human and financial resources, which some incumbents want to avoid by not adopting Scope 3 reporting until it is mandated.

4.3. Incumbents' planned or taken actions driven by their motivation today

In this sub-section, we lay out how the incumbents' motivational patterns drive their planned or taken actions until today.

4.3.1. Foundational preparatory actions driven by incentives for early movers and reasons for hesitation

Our data suggest that incentives for early movers and reasons for hesitation drive incumbents to plan or take foundational preparatory actions. First, the incentive for early movers to fulfill first customer requirements induces incumbents to request primary data from their suppliers. For example, Participant 18 explained that steel-consuming industries pressure their steelmakers to get clarity on upstream emissions:

> *The other thing that we're seeing is significant pressure from customers. So, there's all sorts of customers in steel markets, but automotives and construction particularly will have upstream Scope 3 net zero targets […] that's driving steelmaker behavior to understand their own upstream emissions and not only understand it but reduce it as well.*

Second, the unavailability of required data as a reason for hesitation drives incumbents to initiate the development of corresponding data and IT infrastructure. For example, Participant 2 explained how their current data do not allow for Scope 3 reporting and that they now initiate an IT project to remedy this issue:

> *I am sure we would be happy to report this but, as a matter of fact, the data basis simply does not allow for that yet. That is the pivotal reason why we are now starting this IT project with the ferroalloys.*

4.3.2. Advanced early mover activities driven by incentives for early movers

The results indicate that, perhaps unsurprisingly, incentives for early movers directly drive advanced early mover activities. First, the motivational patterns of fulfilling first customer requirements and developing short-term competitive advantages drive the provision of initial data to first customers. For example, Steelmaker D specifically stated in its latest white paper on green steel that they already provide Scope 3 data to some of their customers due to customer demand, creating a competitive advantage:

> *The data and emission values of Scope 1, Scope 2, and Scope 3 must be recorded properly and will be passed on to customers by < Steelmaker D>. […] Since data of this kind is requested ever more frequently and may even been mandated in future, the corresponding databases could also prove to be a competitive advantage for < Steelmaker D>.*

Previous studies provide evidence for similar relationships. For example, Kammerlander et al. (2018) investigated how German book and magazine publishing companies responded to digitalization. They found that most firms developed digital products and services primarily to fulfill new customer demands.

Second, the incentive of building an image of being the industry

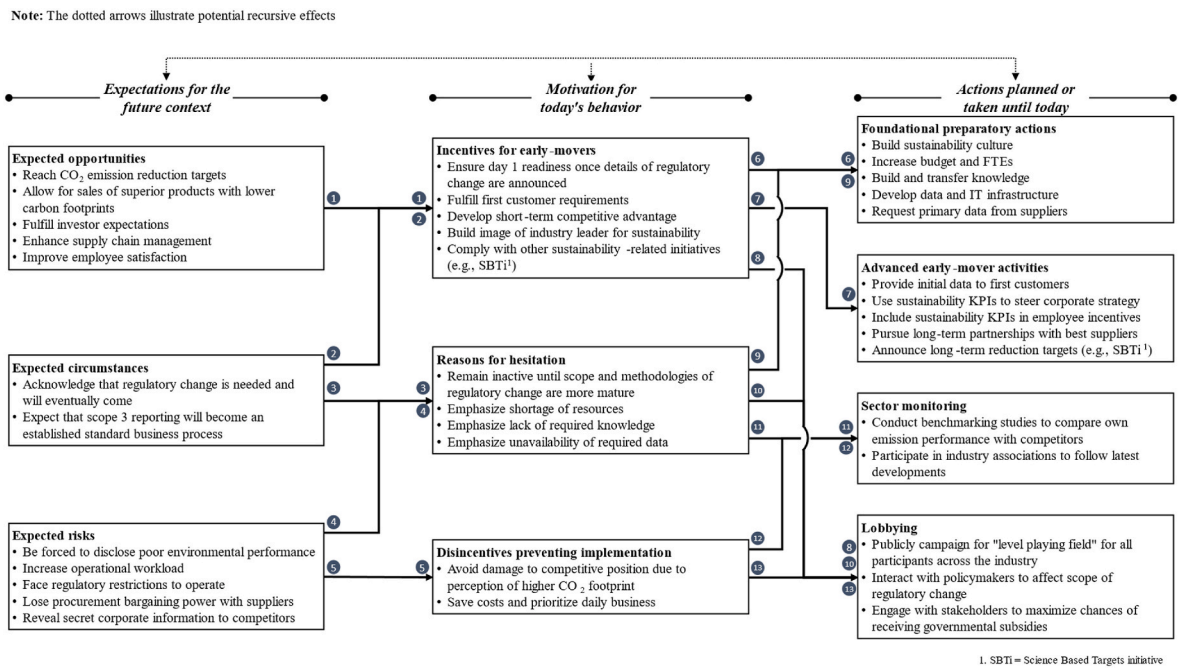

Fig. 2. Process model of incumbents' behavior prior to a discontinuous regulatory change.

leader for sustainability drives incumbents to announce long-term carbon reduction targets. For example, Steelmaker B explicated this relationship by elaborating on their "pioneering role" in correspondence to their reduction target announcement in their latest sustainability report:

> *This is why we had our greenhouse gas reduction targets validated by the renowned Science Based Targets initiative (SBTi) in the reporting year. […] Our decarbonization roadmap underscores our pioneering role in the industry for greater climate protection and sustainable transformation.*

4.3.3. Sector monitoring driven by reasons for hesitation and disincentives preventing implementation

The findings provide evidence that reasons for hesitation and disincentives preventing implementation drive incumbents to perform sector monitoring. First, the disincentive to avoid damage to one's competitive position due to the perception of a higher CO_2 footprint drives incumbents to conduct benchmarking studies. This is because benchmarking studies are needed to confirm or disprove their hypothesis about the presumed effect of disclosing their Scope 3 emissions. This relationship most likely entails recursive effects because the benchmarking results in turn determine the extent of the disincentive and may even alter incumbents' motivation if benchmarking results indicate that the incumbent actually performs better than originally anticipated.

Second, the reason for hesitation of remaining inactive until scope and methodologies of regulatory change are more mature drives incumbents to participate in industry associations. Incumbents want to know how the industry develops, how industry associations inform policymakers, and how policymakers in turn use that information to design regulation. For example, Participant 5 first acknowledged that the current drafts of future regulatory frameworks lack clarity and then added that Steelmaker C participates in industry associations to follow the discussions on the concretization of future regulation:

> *They [current drafts of future regulatory frameworks] are not very clear. First, we need to see them in the final forms. […] We work with them either through discussions in Eurofer or through other discussions like the German Steel Association with the green steel definition. So, my colleagues are participating, and we join these groups to see where the discussions on regulation are going.*

This relationship may also entail recursive effects as participation in industry associations influences the motivation to remain hesitant and possibly even alters that motivation.

4.3.4. Lobbying driven by incentives for early movers, reasons for hesitation, and disincentives preventing implementation

Our results indicate that incentives for early movers, reasons for hesitation, and disincentives preventing implementation all drive lobbying efforts. First, the incentive of building an image of industry leadership for sustainability drives incumbents to publicly campaign for a "level playing field" and to try to influence policymakers. For example, Participant 7 elaborated on their intention to promote a level playing field in the entire European industry and their request to the regulator to use all means necessary:

> *Well, we try and advocate always for a level playing field as much as possible and that, you know, in our case means that we are always promoting the full scope of emissions, including always the Scope 3 and that all kinds of policy instruments are being utilized.*

Early movers may also be inclined to engage in that type of lobbying due to the incentive to develop short-term competitive advantages because if a strict regulatory change is announced, they would gain an initial advantage due to their pre-existing capabilities for Scope 3 reporting.

Second, the incumbents' impression that scope and methodologies of the regulatory change are currently not mature enough induces them to interact with policymakers to shape the regulatory change and contribute its maturity. A striking example for this relationship was a self-developed standard for green steel, including guidelines for Scope 3 reporting, that Steelmaker C recently published. Therein, Steelmaker C emphasized the need for equal rules for all participants and asked policymakers to consider their viewpoints when designing future regulation:

> *We have spent a lot of time thinking about how to do this in a fair way that incentivizes all steelmakers to reduce emissions and ultimately achieve net zero. […] These clear definitions will also help inform targeted policy. […] This system could therefore be used by policymakers and customers to incentivize producers to further decarbonize.*

Prior research suggests that these relationships might also entail recursive effects. Malesky and Taussig (2016) argue that the more a firm is engaged with policymakers during the regulatory design process, the more likely the firm is to comply with a regulatory change once it is enacted. Thus, lobbying activities might influence incumbents' decisions to become compliant and even motivate them to become compliant while it is still voluntary, thus influencing how long they remain inactive.

Lastly, the disincentive to avoid damage to one's competitive position due to the perception of a higher CO_2 footprint makes incumbents engage with policymakers to affect the scope of future regulatory changes. For example, Participant 12 explained that some industry players who were afraid to be ostracized and thus attempted to shun regulation:

> *Many firms are certainly afraid to be placed in a certain corner if they have to disclose this type of information. […] Yes, I believe it is a well-tried method of the industry to seek for closeness with associations, with policymakers, in order to have a certain impact on regulation, maybe even to inhibit certain things.*

Our findings correspond to work in the literature on lobbying. For example, in a study on the Pharmaceutical industry, Barber and Diestre (2019) outline a fundamental trade-off for incumbents between the content quality of a regulatory change and the speed of policymakers' decision for the regulatory change. They argue that a firm's competitive position with respect to the prospective regulatory change influences which of the two aspects the firm actively pushes for. This finding supports the notion that some incumbents actively push for Scope 3 reporting to be integrated into regulation soon (i.e., likely those who believe to benefit from mandatory Scope 3 reporting) while others urge policymakers to further detail the prospective regulatory change before enacting it or maybe even try to prevent policymakers from enacting mandatory Scope 3 reporting at all (i.e., likely those who believe to have a disadvantage from mandatory Scope 3 reporting).

5. Discussion

One the one hand, our findings echo many themes from prior research. The spectrum of motivational patterns, expectations for the future, and planned or taken actions clearly illustrate well-known patterns of heterogeneity in incumbent responses to discontinuous change in terms of inertia, timing of response, and differences in managerial sensemaking (Bigelow et al., 2019; Gilbert, 2005; König et al., 2021; Raffaelli et al., 2019; Weber et al., 2019). Furthermore, it reflects key institutionalist notions around institutional complexity and compliance (Dhalla and Oliver, 2013; Greenwood et al., 2011; Malesky and Taussig, 2016; Raaijmakers et al., 2014).

On the other hand, however, our results also present important new insights for the literature streams on discontinuous change and institutionalism. In the following section, we summarize these theoretical and practical implications of our research.

5.1. Theoretical implications

We make three critical contributions to the conversation around regulation in the context of discontinuous change and institutionalism. First, we add to the academic knowledge on discontinuous change by laying out the details of discontinuous regulatory change as a specific type of discontinuous change and we develop a theory on incumbent response behavior. In the discontinuous change literature, regulatory change is rarely viewed as a relevant discontinuity (Barczak, 2016; Christensen et al., 2018; Markides, 2006) and institutionalism accounts for regulatory change largely as a factor influencing institutional complexity, which in turn is, in most cases, examined as a rather incrementally changing element (Luo et al., 2016; Motherway et al., 2018; Raaijmakers et al., 2014). In contrast, we portray discontinuous regulatory change as key discontinuity in its own right that triggers heterogeneous responses by incumbents, and we further develop a theory around organizations' expectations, motivations, and actions that may be reapplied to other types of discontinuous changes. In particular, we discuss specifics of discontinuous regulatory changes such as the aspect that, in contrast to discontinuous innovations, they do not necessarily open new pathways of creating and capturing value for a business, but instead can be purely detrimental to a firm's value creation process (e.g., by damaging a firm's competitive position due to the perception of a higher CO_2 footprint).

Second, we extend the academic knowledge of discontinuous change and institutionalism by focusing on the timespan prior to the occurrence of a discontinuous change. Existing research primarily focused on the era of ferment after a discontinuous change is introduced (Bergek et al., 2013; Danneels, 2004; Kammerlander et al., 2018), usually in the form of a technology or innovation, but not prior to that. Institutionalist perspectives illuminate the aspect of compliance (Malesky and Taussig, 2016; Raaijmakers et al., 2014), focusing primarily on the timespan after a regulatory change is enacted. In the case of a discontinuous regulatory change, the critical period is the time before the regulatory change takes effect. For example, incumbent behavior in the form of foundational preparatory actions and sector monitoring is a critical element for the adaptation to a discontinuous regulatory change and takes place in that very timespan. Furthermore, we shine light on potential "tactics" that firms use during this period. For example, ostensibly campaigning for a "level playing field" may also be interpreted as an excuse for inaction, as it frequently implies no action on Scope 3 reporting until a regulatory change is enacted. This, in turn, describes a tragedy of the commons scenario as has been previously outlined in other contexts that require shifts towards sustainability, such as fishery management (Garrity, 2012), sand mining (Ganie and Bhat, 2024), and grassland usage (Liao et al., 2023). Consequently, our work adds to the understanding of the period prior to a discontinuous change, and further opens pathways for additional research in this field.

Third, we show that a successful adaptation to a discontinuous regulatory change can have both positive and negative effects on incumbent firms, which, in turn, influences their response behavior. This is because the effects of adopting to a discontinuous regulatory change do not only depend on how well the change is adopted (as would generally be the case for most technological changes), but also on the firm's underlying performance along the dimensions covered by the regulatory change (i.e., in this case the magnitude of a firm's scope 3 emissions in comparison to its peers or its brand image expectations). If an incumbent has very poor carbon performance, for instance, the adoption of the discontinuous regulatory change (i.e., accurately conducting Scope 3 reporting) can have a negative effect on the incumbent's public image or competitive position due to other stakeholders becoming aware of the firm's high CO_2 footprint (Albarrak et al., 2019; Hettler and Graf-Vlachy, 2023; Khan et al., 2022). In turn, incumbents with good carbon performance may benefit from their competitors (with presumably worse carbon performance) being forced to disclose. This effect usually cannot be found with the adoption of other forms of discontinuous change such as technological innovations, where scholars mostly highlight the firms' struggles with the adoption process and discuss which factors influence the firms' ability to adapt in the first place (Eggers and Park, 2018; Kammerlander et al., 2018; König et al., 2021; Raffaelli et al., 2019). Our results further suggest that incumbents' awareness of their Scope 3 carbon performance in comparison to their peers prior to any Scope 3 reporting activity influences their motivation to either feel incentivized to move early or feel disincentivized and avoid adaptation. This may also lead incumbents to either support or oppose the discontinuous regulatory change within their lobbying activities as well as their supplier and customer engagements.

5.2. Practical implications

Our work also holds important practical implications for individual managers, firms, and policymakers. Incumbent managers might wish to apply our process model described in Fig. 2 to understand how their expectations for the future may influence their motivation today and subsequently, how their motivations influence their preparatory actions. Such awareness may enable them to alter or control their own sensemaking of the discontinuous regulatory change and ultimately make more informed decisions, as proposed in prior work (Raffaelli et al., 2019). To do so, they could evaluate which motivational patterns apply to them and whether they are more focused on risks or opportunities when thinking about the future context. This evaluation can then provide a better understanding of the actions planned or taken by their firm, or possibly the lack thereof. Finally, the full model can be useful for managers to re-evaluate their expectations and motivations, and subsequently adjust their intended actions. For example, managers might initially believe that their firms should not conduct scope 3 reporting until it is mandatory to protect their public brand image in the short term, but then realize that a more proactive approach in terms of preparatory actions, monitoring, and lobbying may reduce the longer-term risks that prospective regulation poses. Similarly, managers that already went to great lengths to position their firm as frontrunners may learn how to better leverage their position as a competitive advantage, lobby for stricter regulations, and reflect on which actions may be more or less effective to improve future resource allocation, possibly even by ceasing to perform certain activities.

Firms may leverage our findings to reassess their perceptions and subsequently reevaluate their sustainability strategy and the role corporate Scope 3 reporting may play in it. For instance, understanding that Scope 3 reporting may entail tangible business opportunities could change their perspective on voluntary reporting. Policymakers might want to take our findings as an impetus to reflect on ongoing lobbying influence and how they collaborate with industry participants to optimize the regulatory design process and ultimately shape regulation towards climate mitigation more effectively. Specifically, policymakers may use our research to better understand incumbents' anticipations and motivations surrounding regulatory change, and the topic of Scope 3 reporting in particular. Based on enhanced collaboration with industry participants during the regulatory design process, policymakers may achieve a higher compliance rate, as previously suggested by Malesky and Taussig (2016). We are optimistic that our theoretical findings transfer to other prospective discontinuous regulatory changes such as new laws surrounding ethical sourcing and supply chains (Boersma, 2018; Burchielli et al., 2009; Huber and Steininger, 2022) or data security and user protection surrounding applications of artificial intelligence (Candelon et al., 2021; Hannigan et al., 2022; Li et al., 2023). Consequently, we suggest that practitioners from many industries may benefit from our insights.

CRediT authorship contribution statement

Maximilian Hettler: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Lorenz Graf-Vlachy:** Validation, Supervision, Methodology.

Limitations and future research

Naturally, our research is subject to certain limitations and opens up new research pathways. First, as is typical for qualitative research, this study was performed in a single-industry context with a single prospective discontinuous regulatory change. This might naturally limit the generalizability of the developed theory. Further, we are aware that "single case studies often yield more complicated and over-determined theories than multiple cases" (Eisenhardt, 2021, p. 151), but are confident that our case provides strong evidence for our theory. Of course, as our sample was primarily focused on EU regulation, and consequently, investigating a similar discontinuous regulatory change within a different geographical context might lead future scholars to diverging results. We also encourage future scholars to replicate our work in the context of other regulatory changes.

Second, although the chosen point in time to analyze the steel industry on prospective regulation for Scope 3 reporting appears well-suited for the purpose of this paper, observations made at an even earlier or later point in time might have revealed slightly different results. Notably, our theory may be affected by other internal or external factors such as region, culture, global trends, or economic circumstances. For example, the motivation of being the industry leader for sustainability may be an inherent ambition based on a firm's corporate culture and strategy, and might not purely be driven by their expectations for the future with respect to regulation on Scope 3 reporting. However, as the European steel industry represents a rather homogenous group of firms, we must assume that other external factors such as underlying market dynamics and global trends (e.g., supply chain shortages) affect them relatively similarly.

Lastly, collecting detailed evidence for relationships that might create a negative perception of our respondents' organizations (e.g., disincentives preventing implementation) proved to be challenging. This is because our respondents might have been influenced by potential bias or not felt comfortable sharing information that might harm their organization. As far as possible, we aimed to prevent this by assuring interviewees confidentiality (incl. anonymization of firm names), creating an atmosphere that allowed interviewees to speak freely, reminding interviewees that they might also refuse to answer if they would prefer not to, and triangulating their responses with archival data (Golden, 1992; Huber and Power, 1985).

Our work opens up numerous new research pathways. First, future researchers might wish to replicate this study in the context of another industrial setting, different regional spheres, or in response to different prospective discontinuous regulatory changes, as has been done for other theories in this space. This would allow scholars to validate and possibly extend our theory, and thereby further contribute to our understanding of incumbent responses to prospective discontinuous regulatory changes. Second, longitudinal studies of incumbent behavior prior to discontinuous change could extend our understanding of behavior over time and the long-term consequences of incumbent preparatory actions. Third, the possibility that a successful adaptation toward a discontinuous regulatory change can have both positive and negative effects on the incumbent firm warrants additional research as to if and how this discovery applies to other forms of discontinuous changes. To this end, researchers may want to analyze incumbent behavior prior to the introduction of other discontinuous regulatory changes with a focus on the possibility that a successful adaptation to the respective discontinuous regulatory change may have adverse effects on the incumbent, influencing its response behavior. Fourth, further studies should investigate the timespan prior to a discontinuous change more deeply. To do so, scholars may reassess incumbent behavior prior to the introduction of certain technological changes or innovations. Specifically, future researchers may wish to integrate the fields of discontinuous change and lobbying more closely to better understand lobbying behavior in the context of prospective discontinuous change and how incumbents may use lobbying activities to support or oppose certain prospective discontinuous changes. Lastly, researchers may analyze how incumbent behavior during the regulatory design process relates to compliance patterns after the regulatory change is enacted to widen our understanding of how compliance with such regulatory changes may be improved.

Overall, our study offers new insights into incumbent response behavior toward discontinuous regulatory change and explores the role of varying expectations and motivations as the explanatory factors for subsequent actions. We hope that our work stimulates the conversation around discontinuous regulatory change and triggers rich future

research that further expands our collective understanding. Further, our study clearly highlights the eminent need for stricter and more effective regulatory intervention to accelerate the fight against climate change to the pace needed to achieve the Paris agreement goals, and provides actionable recommendations to move in the right direction.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Maximilian Hettler reports financial support was provided by Metalshub GmbH. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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Data availability

The authors do not have permission to share data.

References

Abdurakhmonov, M., Ridge, J.W., Hill, A.D., Loncarich, H., 2022. Strategic risk and lobbying: investigating lobbying breadth as risk management. J. Manag. 48 (5), 1103–1130.
Albarrak, M.S., Elnahass, M., Salama, A., 2019. The effect of carbon dissemination on cost of equity. Bus. Strat. Environ. 28 (6), 1179–1198.
Anderson, P., Tushman, M.L., 1990. Technological discontinuities and dominant designs: a cyclical model of technological change. Adm. Sci. Q. 35 (4), 604.
Barber, B., Diestre, L., 2019. Pushing for speed or scope? Pharmaceutical lobbying and Food and Drug Administration drug review. Atlanta Compet. Adv. Conf. 40 (8), 1194–1218, 2010.
Barczak, G., 2016. Innovation research: what's next? J. Prod. Innovat. Manag. 33 (6), 650.
Bendig, D., Wagner, A., Lau, K., 2023. Does it pay to be science-based green? The impact of science-based emission-reduction targets on corporate financial performance. J. Ind. Ecol. 27 (1), 125–140.
Bergek, A., Berggren, C., Magnusson, T., Hobday, M., 2013. Technological discontinuities and the challenge for incumbent firms: destruction, disruption or creative accumulation? Res. Pol. 42 (6–7), 1210–1224.
Bigelow, L., Nickerson, J.A., Park, W.Y., 2019. When and how to shift gears: dynamic trade-offs among adjustment, opportunity, and transaction costs in response to an innovation shock. Strat. Manag. J. 40 (3), 377–407.
Blanco, C., 2021. Supply chain carbon footprinting and climate change disclosures of global firms. Prod. Oper. Manag. 30 (9), 3143–3160.
Blanco, C., Caro, F., Corbett, C.J., 2016. The state of supply chain carbon footprinting: analysis of CDP disclosures by US firms. J. Clean. Prod. 135, 1189–1197.
Boersma, M., 2018. Between norms and practice: civil society perspectives on the legitimacy of multistakeholder initiatives to eliminate child labor. Bus. Strat. Environ. 27 (5), 612–620.
Bremus, F., Kliatskova, T., 2020. Legal harmonization, institutional quality, and countries' external positions: a sectoral analysis. J. Int. Money Finance 107, 102217.
Bueno-Garcia, M., Ortiz-Perez, A., Mellado-Garcia, E., 2021. Shareholders' environmental profile and its impact on firm's environmental proactivity: an institutional approach. Bus. Strat. Environ. 30 (1), 374–387.
Burchielli, R., Delaney, A., Tate, J., Coventry, K., 2009. The FairWear campaign: an ethical network in the Australian garment industry. J. Bus. Ethics 90 (S4), 575–588.
Busch, T., Johnson, M., Pioch, T., 2022. Corporate carbon performance data: quo vadis? J. Ind. Ecol. 26 (1), 350–363.
Candelon, F., Di Carlo, R.C., Bondt, M. de, Evgeniou, T., 2021. *AI* regulation is coming how to prepare for the inevitable. Harv. Bus. Rev. 99 (5), 102.
CDP, 2023. CDP Supply Chain Report 2022. (Accessed 25 January 2024).
Charmaz, K., 2006. Constructing Grounded Theory: A Practical Guide through Qualitative Analysis. Sage Publications, London, Thousand Oaks Calif.
Christensen, C.M., 2006. The ongoing process of building a theory of disruption. J. Prod. Innovat. Manag. 23 (1), 39–55.
Christensen, C.M., Bower, J.L., 1996. Customer power, strategic investment, and the failure of leading firms. Strat. Manag. J. 24 (4), 69–86.
Christensen, C.M., McDonald, R., Altman, E.J., Palmer, J.E., 2018. Disruptive innovation: an intellectual history and directions for future research. J. Manag. Stud. 55 (7), 1043–1078.
Council of the European Union, 2023. Climate change: what the EU is doing. available at: https://www.consilium.europa.eu/en/policies/climate-change/. (Accessed 15 February 2023).
Danneels, E., 2004. Disruptive technology reconsidered: a critique and research agenda. J. Prod. Innovat. Manag. 21 (4), 246–258.
Deerfield, A., Elert, N., 2023. Entrepreneurship and regulatory voids: the case of ridesharing. Entrep. Theory Pract. 47 (5), 1568–1593.
Dhalla, R., Oliver, C., 2013. 'Industry identity in an oligopolistic market and firms' responses to institutional pressures'. Organ. Stud. 34 (12), 1803–1834.
Dooley, K., 2018. Routine rigidity and environmental sustainability: why rational innovations are regularly ignored. Bus. Strat. Environ. 27 (1), 70–81.
Eggers, J.P., Park, K.F., 2018. Incumbent adaptation to technological change: the past, present, and future of research on heterogeneous incumbent response. Acad. Manag. Ann. 12 (1), 257–389.
Eisenhardt, K.M., 1989. Building theories from case study research. Acad. Manag. Rev. 14 (4), 532.
Eisenhardt, K.M., 2021. What is the Eisenhardt Method, really? Strat. Organ. 19 (1), 147–160.
Euractiv, 2022. EU urged to align corporate climate reporting rules with global standards. available at: https://www.euractiv.com/section/economy-jobs/news/eu-urged-to-align-corporate-climate-reporting-rules-with-global-standards/. (Accessed 19 January 2023).
European Commission, 2023. Data protection in the EU. available at: https://commission.europa.eu/law/law-topic/data-protection/data-protection-eu_en. (Accessed 30 October 2023).
European Commission's Joint Research Centre, 2022. EU climate targets: how to decarbonise the steel industry. available at: https://joint-research-centre.ec.europa.eu/jrc-news/eu-climate-targets-how-decarbonise-steel-industry-2022-06-15_en. (Accessed 20 January 2023).
European Steel Association, 2020. We are ready – are you? Making a success of the EU Green Deal. available at: https://www.eurofer.eu/assets/publications/position-papers/a-green-deal-on-steel-update/2020-10-14-EUROFER-Policy-paper-A-Green-Deal-on-Steel_V5.pdf. (Accessed 26 January 2023).
Flammer, C., Toffel, M.W., Viswanathan, K., 2021. Shareholder activism and firms' voluntary disclosure of climate change risks. Atlanta Compet. Adv. Conf. 42 (10), 1850–1879, 2010.
Ganie, J.A., Bhat, M.Y., 2024. Sand mining in BRICS economies: tragedy of the commons or fortune in the making? J. Clean. Prod. 434, 140122.
Garrity, E.J., 2012. Tragedy of the commons, business growth and the fundamental sustainability problem. Sustainability 4 (10), 2443–2471.
GHG Protocol, 2011. Corporate value chain (scope 3) standard. available at: https://ghgprotocol.org/corporate-value-chain-scope-3-standard. (Accessed 15 September 2023).
Gilbert, C.G., 2005. Unbundling the structure of inertia: resource versus routine rigidity. Acad. Manag. J. 48 (5), 741–763.
Gioia, D.A., Corley, K.G., Hamilton, A.L., 2013. Seeking qualitative rigor in inductive research: notes on the Gioia methodology. Organ. Res. Methods 16 (1), 15–31.
Glaser, B.G., Strauss, A.L., 2017. Discovery of grounded theory: strategies for qualitative research. Discovery of Grounded Theory: Strategies for Qualitative Research, pp. 1–271.
Golden, B.R., 1992. Research notes. The past is the past—or is it? The use of retrospective accounts as indicators of past strategy. Acad. Manag. J. 35 (4), 848–860.
Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E.R., Lounsbury, M., 2011. Institutional complexity and organizational responses. Acad. Manag. Ann. 5 (1), 317–371.
Hadani, M., Bonardi, J.-P., Dahan, N.M., 2017. Corporate political activity, public policy uncertainty, and firm outcomes: a meta-analysis. Strat. Organ. 15 (3), 338–366.
Hannigan, T.R., Briggs, A.R., Valadao, R., Seidel, M.-D.L., Jennings, P.D., 2022. A new tool for policymakers: mapping cultural possibilities in an emerging AI entrepreneurial ecosystem. Res. Pol. 51 (9), 104315.
Hansen, A.D., Kuramochi, T., Wicke, B., 2022. The status of corporate greenhouse gas emissions reporting in the food sector: an evaluation of food and beverage manufacturers. J. Clean. Prod. 361.
Hettler, M., Graf-Vlachy, L., 2023. Corporate scope 3 carbon emission reporting as an enabler of supply chain decarbonization: a systematic review and comprehensive research agenda. Bus. Strat. Environ. 1–20 n/a(n/a).
Hillman, A.J., Keim, G.D., Schuler, D., 2004. Corporate political activity: a review and research agenda. J. Manag. 30 (6), 837–857.
Huber, G.P., Power, D.J., 1985. Retrospective reports of strategic-level managers: guidelines for increasing their accuracy. Atlanta Compet. Adv. Conf. 6 (2), 171–180, 2010.
Huber, S.T., Steininger, K.W., 2022. Critical sustainability issues in the production of wind and solar electricity generation as well as storage facilities and possible solutions. J. Clean. Prod. 339, 130720.
Jick, T.D., 1979. Mixing qualitative and quantitative methods: triangulation in action. Adm. Sci. Q. 24 (4), 602–611.
Johnson, G.A., Shriver, S.K., Goldberg, S.G., 2023. Privacy and market concentration: intended and unintended consequences of the GDPR. Manag. Sci. 69 (10), 5695–5721.

Kammerlander, N., Ganter, M., 2015. An attention-based view of family firm adaptation to discontinuous technological change: exploring the role of family CEOs' noneconomic goals. J. Prod. Innovat. Manag. 32 (3), 361–383.
Kammerlander, N., König, A., Richards, M., 2018. Why do incumbents respond heterogeneously to disruptive innovations? The interplay of domain identity and role identity. J. Manag. Stud. 55 (7), 1122–1165.
Keller, A., Konlechner, S., Güttel, W.H., Reischauer, G., 2022. Overcoming path-dependent dynamic capabilities. Strat. Organ., 147612702211258
Khan, H.Z., Houqe, M.N., Ielemia, I.K., 2022. Organic versus cosmetic efforts of the quality of carbon reporting by top New Zealand firms. Does market reward or penalise? Bus. Strat. Environ. 32 (1), 686–703.
Kiso, T., 2019. Environmental policy and induced technological change: evidence from automobile fuel economy regulations. Environ. Resour. Econ. 74 (2), 785–810.
Koetter, M., Krause, T., Tonzer, L., 2019. Delay determinants of European banking union implementation. Eur. J. Polit. Econ. 58, 1–20.
König, A., Graf-Vlachy, L., Schöberl, M., 2021. Opportunity/threat perception and inertia in response to discontinuous change: replicating and extending Gilbert (2005). J. Manag. 47 (3), 771–816.
König, A., Kammerlander, N., Enders, A., 2013. 'The family innovator's dilemma: how family influence affects the adoption of discontinuous technologies by incumbent firms'. Acad. Manag. Rev. 38 (3), 418–441.
König, A., Schulte, M., Enders, A., 2012. Inertia in response to non-paradigmatic change: the case of meta-organizations. Res. Pol. 41 (8), 1325–1343.
Kumaraswamy, A., Garud, R., Ansari, S., 2018. Perspectives on disruptive innovations. J. Manag. Stud. 55 (7), 1025–1042.
Lamdin, D.J., 2001. Implementing and interpreting event studies of regulatory changes. J. Econ. Bus. 53 (2–3), 171–183.
Langley, A., 1999. Strategies for theorizing from process data. Acad. Manag. Rev. 24 (4), 691–710.
Li, S., Liu, Y., Feng, J., 2023. Who should own the data? The impact of data ownership shift from the service provider to consumers. J. Manag. Inf. Syst. 40 (2), 366–400.
Liao, Q., Dong, W., Zhao, B., 2023. A new strategy to solve "the tragedy of the commons" in sustainable grassland ecological compensation: experience from inner Mongolia, China. Sustainability 15 (12), 1–24.
Lloyd, S.M., Hadziosmanovic, M., Rahimi, K., Bhatia, P., 2022. Trends show companies are ready for scope 3 reporting with US climate disclosure rule. Environ. Res. Lett. 13 (10), 1–5.
Luo, X.R., Wang, D., Zhang, J., 2016. Whose call to answer: institutional complexity and firms' CSR reporting academy of management journal whose call to answer: institutional complexity and firms' CSR reporting. Acad. Manag. J. 61 (1), 321–344.
Malesky, E., Taussig, M., 2016. The danger of not listening to firms: government responsiveness and the goal of regulatory compliance. Acad. Manag. J. 60 (5), 1741–1770.
Markides, C., 2006. Disruptive innovation: in need of better theory. J. Prod. Innovat. Manag. 23 (1), 19–25.
Martinez, F., 2022. Organizational change in response to environmental complexity: insights from the business model innovation literature. Bus. Strat. Environ. 31 (5), 2299–2314.
Miles, M.B., Huberman, A.M., Saldana, J., 2014. Qualitative Data Analysis: A Methods Sourcebook, third ed. Sage Publications Inc, Thousand Oaks, CA.
Motherway, D., Pazzaglia, F., Sonpar, K., 2018. Failures in regulator-led deinstitutionalization of questionable business practices. J. Bus. Ethics 149 (3), 627–641.
Nag, R., Corley, K.G., Gioia, D.A., 2007. The intersection of organizational identity, knowledge, and practice: attempting strategic change via knowledge grafting. Acad. Manag. J. 50 (4), 821–847.
Oliver, C., 1991. Strategic responses to institutional processes. Acad. Manag. Rev. 16 (1), 145.
Pache, A.-C., Santos, F., 2010. When worlds collide: the internal dynamics of organizational responses to conflicting institutional demands. Acad. Manag. Rev. 35 (3), 455–476.
Patchell, J., 2018. Can the implications of the GHG Protocol's scope 3 standard be realized? J. Clean. Prod. 185, 941–958.
Peukert, C., Bechtold, S., Batikas, M., Kretschmer, T., 2022. Regulatory spillovers and data governance: evidence from the GDPR. Market. Sci. 41 (4), 746–768.
Raaijmakers, A.G., Vermeulen, P.A., Meeus, M.T., Zietsma, C., 2014. I need time! Exploring pathways to compliance under institutional complexity. Acad. Manag. J. 58 (1), 85–110.
Raffaelli, R., Glynn, M.A., Tushman, M., 2019. Frame flexibility: the role of cognitive and emotional framing in innovation adoption by incumbent firms. Strat. Manag. J. 40 (7), 1013–1039.
Rashid, S., Haque, N., 2024. Regulatory or market pressures: what promotes environmental grandstanding in Bangladesh? J. Clean. Prod. 457, 142444.
Rindova, V.P., Martins, L.L., 2022. Futurescapes: imagination and temporal reorganization in the design of strategic narratives. Strat. Organ. 20 (1), 200–224.
Scott, W.R., 2008. Institutions and Organizations: Ideas, Interests and Identities, third ed. Sage Publications Inc, Thousand Oaks, CA.
Siggelkow, N., 2007. Persuasion with case studies. Acad. Manag. J. 50 (1), 20–24.
Skeete, J.-P., 2018. Level 5 autonomy: the new face of disruption in road transport. Technol. Forecast. Soc. Change 134, 22–34.
Stanske, S., Rauch, M., Canato, A., 2020. Anti-identity strategizing: the dynamic interplay of "who we are" and "who we are not". Strat. Organ. 18 (1), 136–170.
Steinhauser, S., Doblinger, C., Huesig, S., 2020. The relative role of digital complementary assets and regulation in discontinuous telemedicine innovation in European hospitals. J. Manag. Inf. Syst. 37 (4), 1155–1183.
Strauss, A., Corbin, J.M., 1990. Basics of Qualitative Research: Grounded Theory Procedures and Techniques. SAGE Publications, Inc, Thousand Oaks, CA.
Tang, S., Demeritt, D., 2018. Climate change and mandatory carbon reporting: impacts on business process and performance. Bus. Strat. Environ. 27 (4), 437–455.
US EPA, 2022. Climate change regulatory actions and initiatives. available at: https://www.epa.gov/climate-change/climate-change-regulatory-actions-and-initiatives. (Accessed 15 February 2023).
Wang, P., Jiang, L., Yang, J., 2023. The early impact of GDPR compliance on display advertising: the case of an ad publisher. J. Market. Res. (61), 70–91.
Weber, F., Lehmann, J., Graf-Vlachy, L., König, A., 2019. Institution-infused sensemaking of discontinuous innovations: the case of the sharing economy. J. Prod. Innovat. Manag. 36 (5), 632–660.
Wegener, M., Labelle, R., Jerman, L., 2019. Unpacking carbon accounting numbers: a study of the commensurability and comparability of corporate greenhouse gas emission disclosures. J. Clean. Prod. 211, 652–664.
World Resources Institute, 2023. Science Based Targets initiative (SBTi): driving ambitious climate action in the private sector by enabling companies to set science-based emissions reduction targets. available at: https://www.wri.org/initiatives/science-based-targets. (Accessed 15 September 2023).
Yin, R.K., 1994. Case Study Research Design and Methods: Applied Social Research and Methods Series, second ed. Sage Publications Inc, Thousand Oaks, CA.