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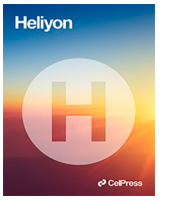

Research article

Corporate zero deforestation commitments and company-internal organizational change

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ABSTRACT

This paper addresses knowledge gaps related to implementation of corporate zero deforestation commitments (ZDCs). Drawing on an analytical framework of organizational change, we scrutinize changes and processes internal to a company in adjusting to zero deforestation supply chains. The empirical data consists of 48 online questionnaires and 49 online interviews with actors involved in forest-risk commodity supply chains, both internal actors in companies and external actors (e.g., non-governmental organizations). Concerning organizational changes, the findings show that diverse drivers have triggered companies to adopt ZDCs, but most are external drivers. Organizational change following ZDCs has taken place within companies but only to a limited extent. Our study concludes that while corporate ZDCs can be seen as having advanced private governance in the fight against deforestation, more is needed still for effective implementation. Public governance and regulations could play an increasing role in stimulating adoption and implementation of private governance initiatives, like corporate ZDCs.

1. Introduction

Private governance has a long tradition in global forest governance given the failed attempts to establish effective intergovernmental institutions [1–3]. In recent years, private governance has come into the spotlight when fighting deforestation, one of the major environmental challenges. The expanding demand for so-called forest-risk commodities (FRCs) (e.g., beef, cocoa, palm oil, timber), which is connected through global trade to deforestation in places where FRCs are produced, is an important driver of forest loss [4,5]. Many companies have started to develop their own policies to manage their reputation in the face of negative social and environmental externalities in their supply chains [6]. To be effective, such policies will require changes to companies' strategies, operation, and organization [7]. The effectiveness of private forest governance remains a matter of debate, specifically when it is not supported by strong public governance [8].

Corporate zero deforestation commitments (ZDCs) are a key element in private governance around deforestation. We define

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corporate ZDCs as voluntary, publicly stated company policies to eliminate deforestation from supply chains [9,10]. As such, they are mainly non-state actor driven and non-legally binding [3]. Notably, corporate ZDCs can also cover social aspects and non-forest ecosystems. Operationally, corporate ZDCs are often defined through different standards (notably, the High Conservation Value (HCV), High Carbon Stock Approach (HCSA), or equivalent environmental standards, and the Free, Prior and Informed Consent (FPIC) social safeguards standards), which give guidance to companies on what zero deforestation (ZD) means in practice and how corporate ZDCs should be implemented, for instance, in terms of what land can be cleared of vegetation and what areas need to be set aside for conservation [11]. The literature sees campaigns by non-governmental organizations (NGOs) as the main driver for corporate ZDC adoption [12,13]. Since the late 2000s, many companies have made corporate ZDCs [6,12]: globally, in 2021, two-thirds of the companies with the largest exposure to tropical deforestation through their production, processing, or purchasing had a ZDC [14]. However, while a ZDC could be achieved for individual supply chains or targeted geographies, the impact of these commitments on large-scale deforestation (nationally, regionally, or globally) has seemingly been limited [9]. Moreover, the earliest corporate ZDC goals, aimed for 2020, were missed [15]. Notwithstanding the historic focus on private governance when it comes to ZD, ZD goals are also increasingly raised by the public sector in some major economies consuming FRCs, such as the European Union (EU), where legally binding rules for companies have been adopted in 2023 to regulate corporate responsibilities in supply chains toward ZD.

Various aspects of corporate ZDCs have been scrutinized in the scientific literature – content and scope [e.g. [13,16]], implementation [e.g. [10,17]], and impacts and effectiveness [e.g. [18,19]]. Nevertheless, as there has been limited research conducted on company-internal processes related to ZDC adoption and implementation [e.g. [10,13,17]], there is a lack of understanding of related internal organizational changes linked to corporate ZDCs. A deeper understanding of this could provide critical insights into corporate ZDC effectiveness.

This paper addresses this knowledge gap by asking two research questions.

1) Why and how have companies made corporate ZDCs?
2) What changes have corporate ZDCs caused within companies?

By answering these research questions, our study aims to generate, systematize, and organize knowledge around corporate ZDC adoption and implementation. Our study applies a conceptual framework of organizational change for the first time (to our knowledge) in the context of companies and FRCs, assessing a critical, less explored link in the chain of ZDC design, implementation, and effectiveness. Methodologically, we draw on a rich sample of companies involved in multiple FRCs and different non-company actors, such as NGOs, providing insights through questionnaires and interviews, whereby only a few other studies have comprehensively included company perspectives [10,13,17].

2. Analytical framework

Our study mainly draws on the theory of organizational change. This theoretical lens allows analyzing organizational change (i.e., in a company), which can be triggered by internal and external shifts in the operating environment [20]. In this study, organizational change is understood as a company internally addressing conditions and processes to become "ZD-compliant." The theory explores questions such as if, why, how, and what change happens in an organization [21,22].

Drawing on the literature on organizational change theory, Packard [23] develops a conceptual framework of planned organizational change, which encompasses change context, content, and process during phases of change. Planned change refers to conscious effort by an organization to achieve desired change. The framework can be used to analyze change in an organization through an ex-post perspective. We adapt this framework to our specific study context and analytical interest, analyzing internal company change processes resulting from corporate ZDCs. This is based on literature on organizational change, private governance in the context of

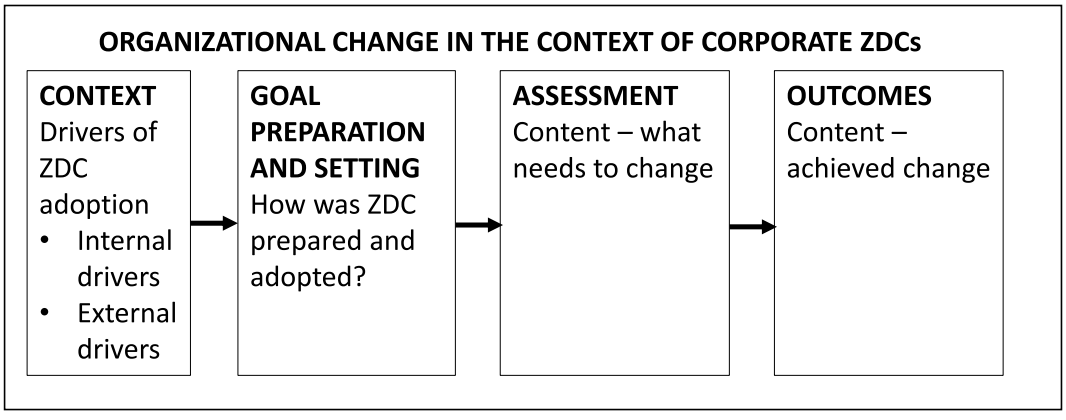

Fig. 1. Analytical framework of this study with organizational change in the context of corporate ZDCs, as adapted from a conceptual framework of planned organizational change by Packard [23], [p. 79].

sustainable land use and supply chains, and corporate ZDCs. Fig. 1 presents our analytical framework, adapted from Packard's [23] conceptual framework of planned organizational change.

Our analytical framework separates between context, goal preparation and setting, assessment, and outcomes. Context describes the drivers leading to the organization setting a goal (i.e., ZD) that requires internal change to achieve. The drivers can be internal or external to the organization [20]. In goal preparation and setting of a ZDC, the analytical interest focusses on the processes to prepare and adopt corporate ZDCs, including which (internal and external) actors are involved in the process. Assessment presents the "old state" of the organization at the time when a need for change was identified (i.e., when a ZDC was made) and assesses what changes need to be made. Outcomes refers to the change achieved after a given time, that is, the new (current) state in the organization. Crucially, this involves a comparison of the old state and the new state, providing information about the organizational changes that have taken place. Change content can then be evaluated based on whether or not the identified change needs have been addressed. Importantly, the correlation between organizational change and goal achievements is not stringent: organizational change does not necessarily result in (full) ZDC achievement.

Looking into the literature concerning the context, key internal drivers for environmental behavior in businesses are normally related to economic considerations [6,24]. These include reputation (management), lower operational risk, enhanced operational efficiency, liability mitigation (i.e., reducing socio-environmental liabilities), ability to attract and retain employees, insurance cost and availability, government and public relations, enhanced ability to plan operations and anticipate or even shape future regulatory standards, (threatened) access to markets, and product differentiation. Furthermore, the organizational values and environmental commitments of senior managers could stimulate pro-environmental change [6,13,25]. In the specific context of corporate ZDCs, Jopke and Schoneveld [13] indicate that another driver could be the expectation that corporate ZDCs will become standard for all or most companies, motivating companies with early mover advantage. A key external driver mentioned in the context of corporate ZDCs is NGOs exerting pressure on companies, thus increasing reputational risk [13,26]. NGO–company interactions regarding corporate ZDCs, however, can take the form of collaboration [13], possibly following NGO campaigns exerting pressure on companies. Additional, relevant external drivers are market and customer demand, investor pressure, and community/social license to operate [6,25,26]. Moreover, considering that governments and supply chain partners are relevant stakeholders to companies [27], pressure from governments and supply chain partners can act as corporate ZDC adoption drivers. Another possible driver of ZDC adaptation is the global climate agenda, which may have increased awareness of deforestation and triggered private action [28].

Regarding the assessment, i.e. specific company-internal problems or change needs for ZD, in existing literature FRC supply chains are often described as notoriously complex, leading to a lacking traceability of FRCs by companies [10]. This can pertain to direct and indirect suppliers. Additionally, the lack of support (such as technical assistance) for producers and a lack of direct engagement with supply chain partners can expose companies to deforestation risk [26,29]. Additional aspects include inappropriate internal policies and a lack of funding for ZD or sustainability considerations in business [30]. Organizational processes and structures can also constitute critical change needs [23]. For instance, how a company's core business units, such as procurement, operate together (or not) with units responsible for Corporate Social Responsibility and environmental questions such as deforestation can influence outcomes in terms of "ZD performance" in that intra-company collaboration can enhance addressing issues like deforestation [31]. Similarly, developing supply chain management capacity (e.g., for due diligence) in-house instead of outsourcing it could influence the outcomes with regard to deforestation. Finally, Young [32] highlights that learning and change processes are inextricably linked to each other. Learning is connected to awareness and understanding of issues, which may need to be addressed to achieve ZD. For instance, a lack of awareness within a company of its exposure to deforestation risk, and/or a lack of understanding of how exactly the company is exposed to deforestation risks may result in failure of any internal policy from the start on if left unaddressed. To this end, Guerrero et al. [26] indicate that a low level of internal information and knowledge in companies hinders corporate ZDC implementation.

In sum, our analytical framework identifies internal and external drivers that can trigger companies to prepare and adopt corporate ZDCs. The further identified company-internal factors that can expose companies to deforestation risk need to be addressed by companies in way of organizational changes. We draw on these insights in developing our methodology, in particular the analytical dimensions in our data collection instruments (online survey and interviews), as shown in detail in the next sections.

3. Methodology

Our study draws on a survey and interviews conducted with companies – defined here as businesses who produce, process/manufacture, or trade FRCs or derived products – and non-company actors – defined here as any other for-profit or not-for-profit actors knowledgeable of corporate ZDCs. Data triangulation was achieved in two ways [33]: by drawing on different types of data collection methods and different types of data sources. Data collection was carried out in three steps: 1) semi-structured expert interviews with non-company actors, 2) survey and semi-structured expert interviews with companies, and 3) survey and semi-structured expert interviews with additional non-company actors.

3.1. Selection of study participants and data collection process

For step 1, non-company actors were selected based on purposive sampling. Specifically, the aim was to select a small number of experts to inform the development of the company questionnaire and interview questions, as is common in qualitative studies [33]. Here, we selected interviewees based on expert opinions within the research team. Three interviews were conducted to inform the data collection for step 2. The interview questions addressed main topics covered in our study, such as organizational changes from

corporate ZDCs, and the insights gained provided support for the analytical dimensions of ZDC drivers and organizational change outcomes identified previously from the literature.

For step 2, potential companies were identified based on the following guidance and criteria.

1. *Impact*: Only companies ranked in Forest 500 [34] as being committed to ZD in a company-wide manner or committed to excluding production or procurement of products originating from natural forests, other natural ecosystems and/or high conservation value areas were considered having corporate ZDCs (261 companies).
2. *Commodities*: We focused on the FRCs beef, palm oil, soy, timber, pulp and paper (included in Forest 500 database) and cocoa (important regional driver of forest loss [35]). We initially aimed for a balanced representation of the different commodities, but this was partly compromised by the availability of study participants (see Table 2 for more detail).
3. *Continent*: Regarding the location of company headquarters, we aimed for at least two companies per continent, as Africa had only had three companies fulfilling the previous criteria that we could contact (final sample distribution: 1 company headquartered in Africa, 8 Asia-Pacific, 13 Europe, 4 Latin America, 5 North America).
4. *Supply chain segment of company*: We aimed for at least five companies from each company type – upstream (production, with processing and/or trade), downstream (manufacturing and/or retail), and vertically integrated (hereafter: integrated) companies (both combined), following the classification by Jopke and Schoneveld [13], as we only had nine upstream companies in the final list of companies targeted for the survey and interviews. This criterion was fulfilled (see Table 1 for more detail).

Using these criteria, we ended up with a list of 72 companies targeted for the survey and interviews. Via email we contacted people working in divisions assumed responsible for ZD, such as sustainability, sustainable procurement, or sustainable supply chains divisions. Preference was given to people working at the highest levels in the company hierarchy, presumably with more insights into organizational changes connected to corporate ZDCs. Questionnaires were sent to the companies via email. The questionnaire was drafted based on the study's analytical framework, the three expert interviews in step 1, and expert opinions within the research team. It comprised questions about drivers and processes of corporate ZDC adoption and organizational changes within the companies. Response options were either single- or multiple-choice, or along a five-point Likert scale, including the possibility to add open-text comments (see Supplementary Material 1). Subsequently, we conducted interviews with the representatives who had previously filled in the questionnaire to deepen the information provided, for instance regarding decision-making processes related to corporate ZDCs (see Supplementary Material 2). In total 31 companies participated in the study: 5 of them through filling out the survey, 1 through an interview, and 25 through both.

Considering the company representatives, 7 were working at the director level and 8 were heads of departments (reporting to

Table 1
Overview of the three main data collection steps. Step 2 includes 25 companies and step 3 includes 18 non-company actors that completed both the questionnaire and the interview.

Step 1 (September 2021): Non-company interviews			
Actor type	**Actor category**	**Interviews**	**Total**
Non-company	NGO	2	3
	Technical/other support organization	1	
Step 2 (October 2021–March 2022): Company parts A and B			
Part A: Company survey			
Actor type	**Actor category**	**Questionnaires**	**Total**
Company	Upstream company	6	30
	Integrated company	15	
	Downstream company	9	
Part B: Company interviews			
Actor type	**Actor category**	**Interviews**	**Total**
Company	Upstream company	5	26
	Integrated company	13	
	Downstream company	8	
Step 3 (December 2021–March 2022): Non-company parts A and B			
Part A: Non-company survey			
Actor type	**Actor category**	**Questionnaires**	**Total**
Non-company	NGO	11	18
	Technical/other support organization	5	
	Smallholder association	1	
	Research organization	1	
Part B: Non-company interviews			
Actor type	**Actor category**	**Interviews**	**Total**
	NGO	11 (1 written response)	20
	Technical/other support organization	7	
	Smallholder association	1	
	Research organization	1	
Total number of questionnaires			48
Total number of interviews			49

Table 2
The geographic and commodity foci of work of company (company survey) and non-company (non-company interviews) study participants (from data collection steps 2 and 3).

		Actor type	
		Company	Non-company
Geographic focus of study participants' work	Africa	9	9
	Asia-Pacific	22	14
	Europe	5	2
	Latin America	19	8
	North America	3	1
Commodity focus of study participants' work	Beef	5	5
	Cocoa	5	7
	Palm oil	17	12
	Pulp and paper	12	10
	Soy	12	6
	Timber	11	4
	Other	8	1

Note: Sums exceed number of study participants as they could select multiple commodities/geographies.

CEOs), 14 were working at the manager level (reporting to directors), and 2 were specialists (advising directors). The annual revenue was <US$1 billion for 4 companies, US$1–20 billion for 13 companies, US$20–50 billion for 4 companies, US$50–100 billion for 6 companies, and >US$100 billion for 1 company (revenues were only accessible for 28 out of 31 companies).

For step 3, non-company actors were selected as study participants by combining purposive and snowball sampling [33]. The purposive sampling was done along certain criteria. Specifically, non-company actors who are knowledgeable of corporate ZDCs were targeted (e.g., NGOs and technical/other support organizations such as consultancies). Such expertise could originate from, for example, collaboration with companies, campaigning on them, or monitoring corporate ZDCs implementation. Additionally, they should cover different continents and FRCs. For snowball sampling, the interviewees in step 1 had been asked for recommendations for non-company interviewees. Consequently, a questionnaire was distributed to 30 non-company actors, out of which 18 responded, asking for the level of agreement with a summary of preliminary results from the company survey. Specifically, they were asked to indicate their level of agreement using a five-point Likert scale by viewing the visualized company survey results (mean responses) on ZDC drivers and factors exposing companies to deforestation risk. Subsequently, we conducted interviews with the 18 participants and 2 additional participants to deepen the data. Thus, 20 non-company actors participated in the study in step 3. Table 1 summarizes all data collected.

All data collection was performed in English, except for one company interview (in German). Interviews were conducted via video conference, averaging 45–50 min. Study participants were informed beforehand about the purpose of the research and data use; informed consent was obtained.

Table 2 provides an overview of the work focus of study participants. The geographic focus of most study participants was on Asia-Pacific and Latin America, followed by Africa. There was comparatively less focus on Europe and North America. Concerning the commodity focus of study participants, palm oil, pulp and paper, timber, and soy formed the main commodities. These were followed by cocoa and beef. Regarding "other" commodities, company actors referred to rubber, sugar cane, coffee, viscose, cotton, and corn,

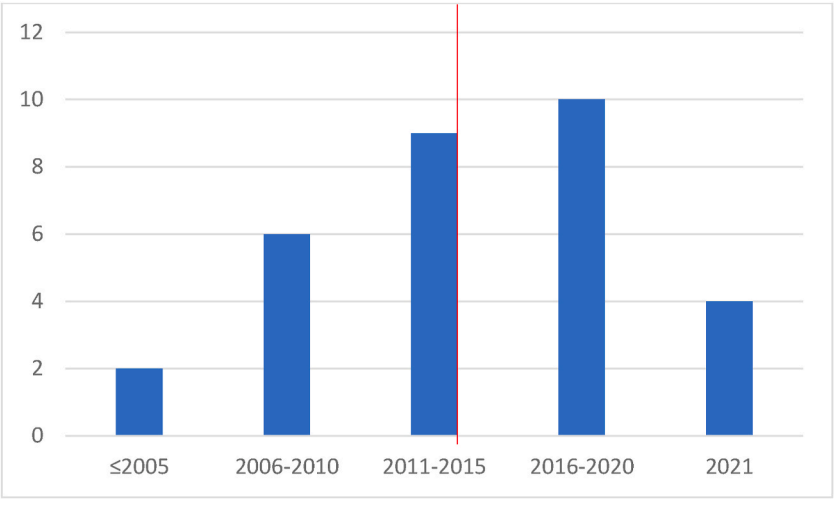

Fig. 2. Year that companies first made a corporate ZDC (company survey). The vertical red line marks the release of the HCSA Toolkit Version 1 in April 2015, used for implementing corporate ZDCs in the humid tropics.

while a non-company actor mentioned rubber.

Fig. 2 displays the year that companies who participated in the study made their first ZDC. For most, this was between 2011 and 2020, which corresponds to the overall ZD movement starting in the late 2000s. However, four companies made their first ZDC only in 2021. Two companies indicated they made their first ZDC before 2006. The HCSA Toolkit Version 1 – a methodology, on which corporate ZDC implementation now heavily relies – was released in April 2015, which means that especially the earlier adopters of ZDCs lacked uniform, operational guidance on ZDC implementation for several years.

3.2. Data analysis

The survey data was analyzed using descriptive statistics. Single- and multiple-choice questions in the company questionnaire were analyzed by counting the frequencies of the different responses, while data from Likert-type questions were analyzed by calculating the means of the responses. Additionally, the standard deviations were calculated to display the spread of the responses around the means [33]. These parametric statistics were used with Likert data, as it can be argued that responses to Likert type items can be treated as interval scales [36]. In step 3, the percentage of respondents who agreed or strongly agreed with company responses was calculated and open-ended responses were coded thematically (see below).

All interviews were first transcribed and then subjected to thematic analysis, which is a qualitative data analysis method for structuring the data and identifying patterns and themes in it. Specifically, we analyzed the interviews data combining deductive and inductive coding [37]: major data codes forming themes were derived deductively from the analytical framework (e.g., drivers of ZDC

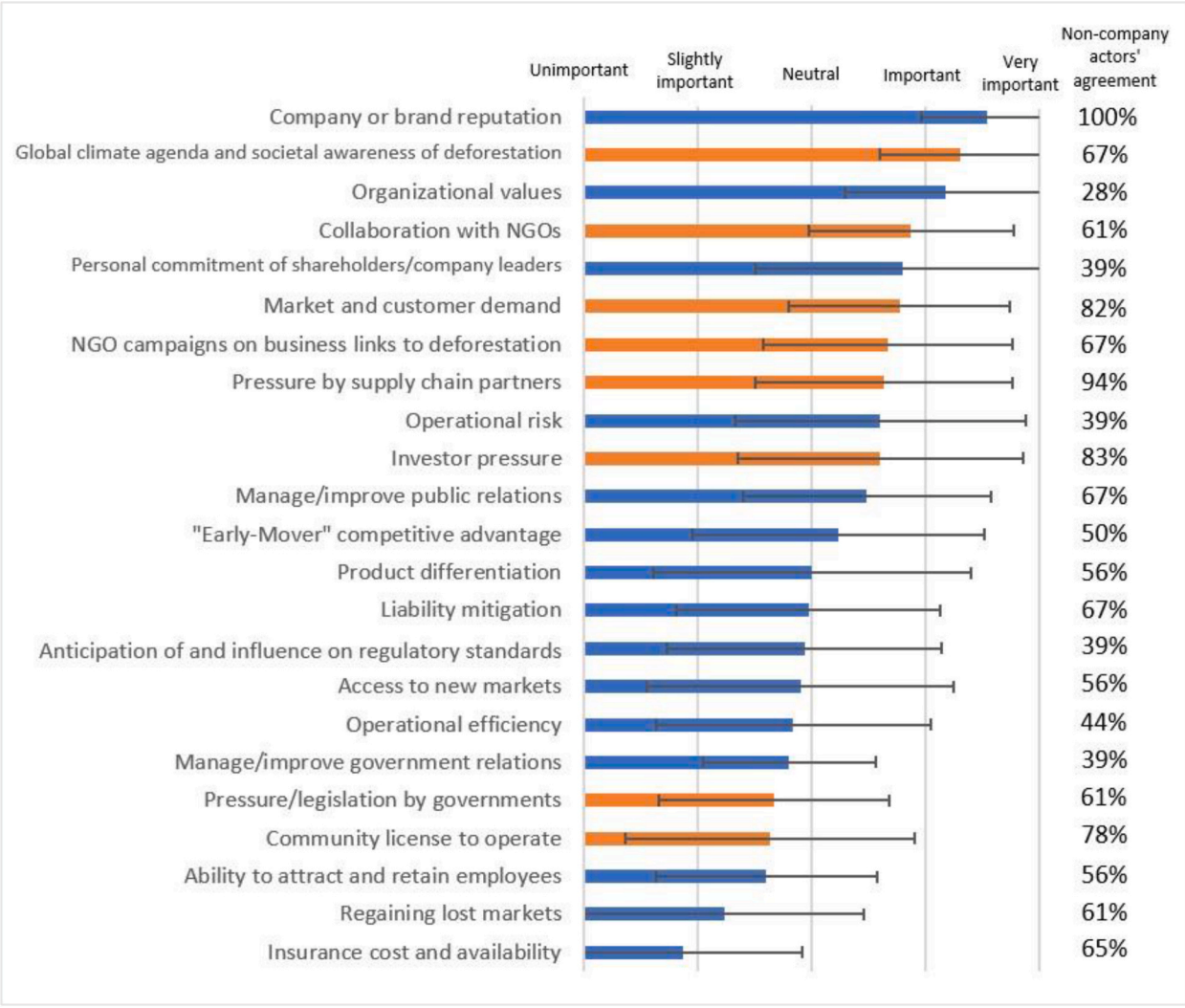

Fig. 3. Perceived level of importance of ZDC adoption drivers (company survey). Drivers marked in blue are internal; those marked in orange are external. The error bars show standard deviations. The percentages to the right show the proportion of non-company respondents who agreed or strongly agreed with the mean importance-ratings of the drivers by the companies (non-company survey).

adoption), thus following the structure of the interview guideline. Additional codes were developed inductively, until a final code system could be developed. All coding was performed in MAXQDA.

Through the sampling of study participants, our study covers several key FRCs, different continents, and a variety of types of company and non-company actors. It is not the objective of this study to systematically disaggregate these factors nor would the sample size permit performing such analysis. Our analysis aims to identify common patterns and trends in the data across the whole sample.

In section Results, we refer to "study participants" if data refer to both company and non-company sources; otherwise, we specify the actor type.

4. Results

4.1. Drivers of ZDC adoption and adoption process at companies

Fig. 3 displays the perceived level of importance of ZDC adoption drivers according to companies, including the percentage of non-company respondents who agreed or strongly agreed with the companies' ratings. The results show that drivers for companies to adopt ZDC are diverse. The most important drivers that were agreed upon by study participants were mostly external ones. When it came to the internal drivers that company actors saw as most important, there was disagreement from non-company actors (except for the driver company and brand reputation). For instance, an NGO stated regarding organizational values: "Companies made these commitments after they were forced by NGO campaigns and public pressure. If it was part of organizational values, then they would have made the commitments without this pressure. I think this is revisionist thinking and greenwash by the companies." Furthermore, the results indicate that company or brand reputation follows the suite of external drivers, meaning that companies are protective of their reputation, which is why they are responsive to various external drivers. An integrated company (pulp & paper) described that brand reputation "influences how the company is perceived and then naturally how we receive investments. And then it influences market access, and naturally our customers, and so on. So, it's kind of the overarching driver in that sense." Additionally, it was highlighted that NGO campaigns were often an initial trigger for corporate ZDCs that then influenced other drivers (internal and external) to come into play. Collaboration with NGOs was rated even slightly higher by companies as a driver.

On the driver market and customer demand, a downstream company (palm oil) said that around 2010, it had noticed that customers showed interest in questions around deforestation, which influenced the ZDC adoption. A part of the non-company actors believed this driver to have been even more important than rated by the companies. Pressure by supply chain partners (e.g. through buyer concerns) has also been an important reason for companies to adopt ZDCs, whereby a technical/other support organization noted: "Some palm oil companies I know have been under heavy stress because of [pressure by] lots of buyers. So, they've basically just been forced to sign these things [ZDCs], and they were not ready to implement them." Investor pressure (e.g., through shareholder or lender concerns) was also pointed out as an important driver; a technical/other support organization described this as "much more permanent than NGOs' pressure" and particularly relevant for upstream companies. Study participants described that investors have raised concerns over deforestation and that their demands must be considered in company decision making. "Early-Mover" competitive advantage was perceived as less important. Some companies even described it as a disadvantage; for instance, according to an upstream company (timber): "If you are the first that has a ZDC, you have to explain to your customers why the timber is more expensive now. […] So, if you are the second, if they [customers] already accepted that this is important, then you're in a better position than the first" (upstream company, timber).

Table 3 gives an overview of the actors involved in the ZDC adoption process. Company interview and survey results indicate that adopting a ZDC was often not a hasty decision by companies participating in the study, but rather, a long, thorough process; companies reported that many company-internal and -external actors and different levels of company hierarchies were involved in their ZDC adoption and implementation process. For example, companies' operations units were commonly involved in the ZDC adoption process. An integrated company (beef) pointed out that "the main guys that were involved with this were the team of cattle purchasing because they were the first line of contact with the producer." The most frequently mentioned company-external actors in interviews include NGOs, suppliers and smallholders, customers, and consultancies. For instance, an upstream company (cocoa) explained the support received from a consultancy: "*And so basically the cocoa department found an entity […] who helped kind of ease the board into a*

Table 3
Overview of company-internal and external actors involved in the ZDC adoption process at companies (in brackets is the number of companies that mentioned the actor type).

Internal actors	External actors
• Company leaders (19) • Sustainability units (17) • Operations units (e.g. procurement/purchasing, trading, plantation management) (14) • Others (6)	• NGOs (18) • Suppliers and smallholders (12) • Customers (9) • Consultancies (8) • Multi-stakeholder platforms (6) • Investors (5) • Governmental institutions (5) • Scientific institutions (4) • Other companies (4) • Others (9)

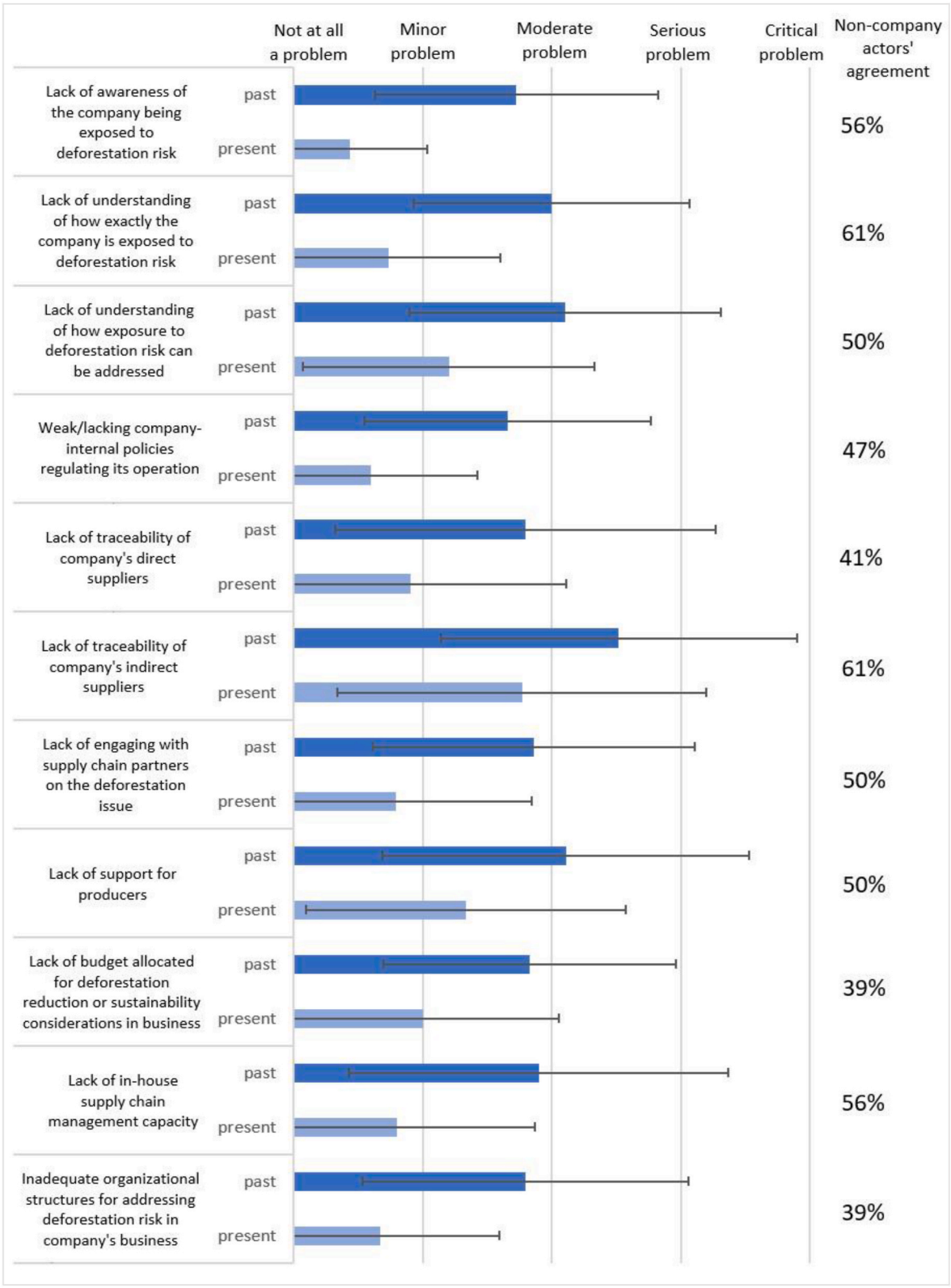

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Fig. 4. Perceived level of problem of company-internal factors that potentially expose companies to deforestation risk (company survey). Past refers to the time when companies made their corporate ZDCs, present refers to 2021/2022. The error bars show standard deviations. The percentages to the right show the proportion of non-company respondents who agreed or strongly agreed with the mean problem-ratings of the factors (at the factor level) by the companies (non-company survey).

ZDC. They were very professional, had done this before for other companies, explain what it meant, helped us develop a policy and a road map."

Nine companies reported that they had specifically undertaken analyses of economic risks and opportunities of corporate ZDCs, indicating that economic viability is a critical component of ZD. For instance, an upstream company (soy) explained: "We had two years of collecting a lot of data and trying to see for the next 5–10 years what the opportunities on business would be and what would be the risks from having or not having sourcing in this region anymore or having a warehouse that should handle only ZD volumes."

4.2. Organizational change outcomes

Fig. 4 shows how company-internal actors perceive the development of internal factors that potentially expose companies to deforestation risk, comparing the time of ZDC adoption until 2021/2022. Overall, company actors indicated that various factors exposing companies to deforestation risk have considerably improved at their given company since making a corporate ZDC. However, non-company actors largely disagreed with companies' ratings and pointed to much smaller organizational changes.

For example, the factor weak/lacking company-internal policies regulating its operation was rated by companies between not at all a problem and minor problem in the present. An integrated company (pulp & paper) commented that its policies lacked precision and clarity in the past, which was addressed with the ZDC, while a downstream company (multiple commodities) said it used to lack ZD relevant policies altogether. Just 47 % of non-company respondents agreed with the companies' rating. For example, an NGO commented: "When we started working with some palm oil companies, we realized how little internal control they had over environmental and social outcomes. While this has improved, it seems this is also currently underrated [as a problem by companies]." The factor lack of budget allocated for deforestation reduction or sustainability considerations in business was rated by companies as a minor problem in the present, with only 39 % of non-company respondents agreeing to this. A technical/other support organization noted: "Sometimes corporate ZDCs were made without understanding how much it would cost for the company. And hence, now that they're in the process of translating it into how much needs to be put on the table and they realize the size of the challenge, there's a lot of pressure for this budget to be reduced. So, some companies may be desperate to find cheaper ways of achieving the commitments." For instance, in the context of palm oil in Indonesia, our findings suggest that despite a narrative of companies being "forced" by government to excise parts of conservation set aside areas linked to corporate ZDCs, companies have ways to hold on to such areas if they are willing enough to invest in forest conservation: "Some companies hold on to undeveloped land with license, others don't. […] If the company really is committed to conserving that area, then there are ways to maintain that as a conservation area. It really depends on how hard the company wants to fight for it" (technical/other support organization).

A few factors appear more difficult to change according to the survey results. The factors lack of understanding of how exposure to deforestation risk can be addressed, lack of support for producers, and lack of traceability of company's indirect suppliers showed less change over time, with the latter showing the least amount of change. Here, an upstream company (soy) argued that data gaps remained and needed addressing to further improve the traceability of indirect suppliers. Non-company actors agreed to the extent that the factor was rated a more serious problem than the other factors, but also asserted that it should be a more serious problem still both in the past and in the present than what was indicated by the companies.

5. Discussion

5.1. Drivers of ZDC adoption and adoption process at companies

Our results show that NGO campaigns, while not the top-rated driver, were often considered critical, initial triggers. Our results generally are in line with Jopke and Schoneveld [13], who find NGO campaigns and company–NGO collaborations to be important drivers of ZDC adoption. In the context of soy, Guerrero et al. [26] also find that NGOs play an important role as external motivators for companies by exerting pressure and increasing companies' reputational risk. Furthermore, our results showing company or brand reputation as the top driver agree with Krause et al. [38], who find that companies commit to nature conservation if they perceive prospective benefits, for instance in terms of image gains. In contrast to previous studies [13], we do not find early-mover competitive advantage to be very important. Our results also disagree with the finding by Jopke and Schoneveld [13], [p. 14] that "pressures from shareholders or financiers did not meaningfully play into the adoption decision," as this driver was found to be relevant in our results.

Our findings agree with Bager and Lambin's [17] indication that external pressures motivate ZDC adoption. This leads to the insight that governments – being in a position to influence many of the important external drivers – could have important leverage over company behavior. For example, governments could introduce regulation that stimulates market and customer demand for ZD-compliant commodities and products (also found as important driver by Guerrero et al. [26]) or steers investors in a way that creates further pressure for supply chain actors to adopt and implement corporate ZDCs. A recent, prominent example is the EU Regulation on deforestation-free products, adopted in 2023, which mandates companies to ensure that certain commodities and derived products are legally produced and free of deforestation and forest degradation if they are to be imported to or exported from the EU market. Such supply chain regulations can have the potential to influence company behavior, including by stimulating the

adoption and implementation of corporate ZDCs. Simultaneously, companies with properly embraced ZDCs could be better positioned to respond to such regulations due to the organizational change processes already at place compared to companies without ZDCs, which could prove a competitive advantage to ZDC-companies in some markets.

Overall, the results reveal a web of multiple drivers leading to ZDC adoption. This is also reflected in our findings related to the ZDC adoption process at companies: typically, there were many company-internal and -external actors and different levels of company hierarchies involved in the process, and while just nine companies had specifically performed analyses of economic risks and opportunities linked to corporate ZDCs, multiple interests, incentives, and pressures had often been weighed in the overall ZDC adoption decision. Since the various drivers are in practice strongly interwoven (e.g., NGO campaigns influencing brand reputation influencing customer demand), the practical distinction between internal and external drivers appears somewhat blurred. Although the distinction can serve analytical purposes, the interwoven nature and dynamism are important to keep in mind when considering the functioning of practical processes of ZDC adoption.

5.2. Organizational change outcomes

Company actors claimed there have been considerable changes, while non-company actors largely disagreed with this and saw much smaller changes. The differing views might overall mean that reality lies somewhere in between. The organizational changes relate to solving various company-internal issues that can expose companies to deforestation risk, such as a lack of understanding of ZD or inadequate organizational structures. Our results show that while ZDCs have triggered organizational change processes at companies, companies must still undergo further and more significant organizational changes in way of achieving their ZDCs. For instance, there is a lack of capacities and funding related to ZD at companies. This could be a result from the lack of willingness to mobilize sufficient resources. Research in the context of palm oil, for example, has concluded it is likely that companies could mobilize much larger budgets for ZDC implementation than they currently do [39]. While cost-cutting may be normal practice in business, it can become problematic if it undermines effective or meaningful implementation. Similarly with beef and soy, the expenditures of a ZD policy for sourcing companies might be just 0.4–6.8 % versus the value on the embedded material [40]. Bager and Lambin [17] observe that "companies generally underestimate the scale and cost of ZDC implementation." Our findings are in line with Guerrero et al. [26], who conclude that "while external motivators can help companies make commitments, internal motivators are needed to translate commitments into actions."

Previous research describes corporate ZDCs as a new turn to commodity governance through supply chains [41]. Arguably, corporate ZDCs have added value to private governance in this sense, as they have brought corporate actors – to a degree – on board in the fight against deforestation. This has also resulted in some organizational changes in companies. Yet, they are no magic bullet, as is no single governance mechanism. Also, considering that our sample covered only ZDC companies and that our results indicate there have been only limited internal changes inadequate still for addressing deforestation linked to their business, companies without a corporate ZDC are likely in a much weaker situation when it comes to their intention to adopt a corporate ZDC and the internal changes necessary to implement it. In 2021, one-third of the companies with the largest exposure to tropical deforestation did not have a ZDC [14]. These perspectives reinforce a message that while corporate ZDCs can lead to company-internal changes on the way of implementation, for their broader adoption and enhanced implementation companies require internal motivators, which could be triggered by external pressures. In this vein, corporate ZDCs may best be combined with public governance, such as supply chain regulations that incentivize the adoption and implementation of private governance initiatives.

5.3. Limitations

Our study comes with certain limitations. The topic of deforestation in supply chains is a sensitive topic for companies from a public relations perspective. Hence, it is plausible to assume a certain positive bias amongst that part of companies who participated in our study. We aimed to mitigate this through ensuring data confidentiality and anonymity to study participants and by triangulation through non-company actors' perspectives. Another limitation is that our sample consists of larger companies that have comparatively more resources for ZDC implementation and they are also potentially more progressive ones in implementing corporate ZDCs, and as such represent best-case scenarios. Smaller companies with corporate ZDCs might not perform as well in implementing their commitments as they may lack the capacity to do so. Also – as said above – our study by design excludes companies without corporate ZDCs. As such, our study does not shed light on organizational changes within such companies and how they might compare to ZDC-companies. Finally, the study does not have in its scope or aims to advance the theoretical understanding of private commitments, like corporate ZDCs. Thus, the study's theoretical contributions are less relevant than the analytical examination of organizational change and related processes linked to corporate ZDCs.

6. Conclusions

Corporate ZDCs can be perceived as having advanced private governance in the fight against deforestation. Yet, more is still needed from companies for the effective implementation of the commitments. Here, governments, civil society, and other actors should be mindful of which drivers to leverage when wanting to influence company behavior in terms of pushing for ZDC adoption and implementation. Through the introduction of supply chain regulations, governments could particularly have a role in triggering company-internal motivators that stimulate adoption and implementation of private governance initiatives, like corporate ZDCs. More research is needed to better understand the impact of corporate ZDCs on deforestation, as well as what drivers company-external actors

could best leverage (and how) to influence company-internal processes for more effective implementation of the commitments. Research is also needed to better understand certain company decisions in avoiding to adopt and implement corporate ZDCs or related policies.

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Data availability statement

The data that has been used is confidential.

CRediT authorship contribution statement

Mathias Cramm: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Theresa Frei:** Writing – original draft, Methodology, Formal analysis, Data curation. **Aida Greenbury:** Writing – original draft, Methodology, Formal analysis. **Georg Winkel:** Writing – original draft, Conceptualization. **Yitagesu Tekle Tegegne:** Writing – original draft, Conceptualization. **Metodi Sotirov:** Writing – original draft.

Declaration of competing interest

The authors 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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