

How are EUDR requirements implemented in companies' supply networks?

The case of Ethiopian coffee sourcing

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Abstract

Deforestation, mainly driven by agricultural expansion, is a global problem, interlinked with many pressing sustainability issues of our time, first and foremost, climate change. Previous private corporate initiatives and public policies such as FLEGT and the EUTR have not succeeded in overturning the trend. As a response to that, EU deforestation regulation was developed as the new demand-side policy to prevent forest-risk agricultural commodities from entering the EU, and, by the means of market power, curbing the halting deforestation associated with affected commodities. This is expected to be achieved by imposing the due diligence requirements on the EU exporters. However, the implementation in the agricultural supply chains, or networks, due to their length and complexity, poses difficulties for commodity traders who are affected by the regulation first-hand. Despite the history of supply chain due diligence laws like the EUDR, neither their implementation by the companies as part of their sustainability strategies, nor the responses to it in supply networks are sufficiently studied. This thesis investigates the patterns of the implementation of the EUDR both as a policy and a sustainability strategy, using the multi-tier approach through complex adaptive systems (CAS) perspective on the example of supply network of Ethiopian coffee. Building on the literature review of 50+ academic and grey literature sources and eight semi-structured expert interviews, it reveals the traders' approaches to the EUDR implementation, the behaviour of supply network actors emerging as a response to that, and the main factors influencing such behaviour and implementation process in general. The results show traders' reliance on third-party tools and services for commodities traceability which in the short term was heavily prioritized over other due diligence requirements. In the upstream part of supply network reactions varied from compliance to evasion, with the latter especially in the form of producers switching to other cash crops. These processes were shaped by diverse reasons internally, primarily the non-alignment of rules and norms regarding coffee trade and sustainability within the supply network. Externally, the implementation processes was found to be subject to high dynamism coming from sudden policy change, mismatching the overall preparedness of the local industry.

Keywords: EUDR, deforestation, supply networks, Ethiopia, coffee

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Abbreviations

- DDS – due diligence system
- EU – European Union
- EUDR – European Union Deforestation Regulation
- EUTR – European Union Timber Regulation
- FLEGT – Forest Law Enforcement, Governance, and Trade [Action Plan]
- FSC – Forest Stewardship Council
- MNC – multinational corporation
- SSCM – sustainable supply chain management
- TLAS – timber legality assurance system
- VPA – voluntary partnership agreement
- VSS – voluntary sustainability scheme
- ZDC – zero-deforestation commitment

1 Introduction

Global deforestation is happening at an alarming scale: from 2000 to 2020, about 100 M ha of forest area has been lost, which is equivalent to the area of Egypt (The World Bank, 2023). Reduction in forest area and forest degradation exacerbate climate change, contributing up to one-fifth of global greenhouse gas (GHG) emissions (IPCC, 2022). Besides, loss of forest cover is associated with an array of other grave environmental problems: biodiversity loss (Betts et al., 2017; Giam, 2017), soil erosion (Oktan et al., 2022), and disruption of hydrological cycles (Aragão et al., 2008; Zhang & Wei, 2021), to name a few. The importance of the issue and the benefits of protecting the world's forests are widely acknowledged and highlighted in numerous international treaties, such as the UN Framework Convention on Climate Change (1992), UN Convention to Combat Desertification (1994), and the Paris Agreement (2015).

About one-fourth of global deforestation is driven by global trade (Pendrill et al., 2019). Recognizing this pattern, NGOs and public opinion have pressed multinational corporations (MNCs) to address deforestation in international supply chains (Weber & Partzsch, 2018). It has led to the emergence of certifications such as FSC and PEFC for timber, Rainforest Alliance, UTZ, and FairTrade for agricultural commodities, as well as other voluntary sustainability schemes (VSS). However, VSSs has been continuously criticized for their inability to halt agricultural conversion and weak uptake (van der Ven et al., 2018).

Against this backdrop, attempts to reduce deforestation by regulating supply chains continued in the form of national demand-side policies. Pioneering regulations such as the 2008 Lacey Act in the United States and the 2013 European Union Timber Regulation (EUTR) require domestic importers to exercise due diligence to ensure the legality of timber and wood products. Yet, these policies have faced their share of issues: weak enforcement, diversion of illegally sourced wood towards less regulated markets, and exclusion of smallholders from timber supply chains due to compliance costs (Hedemann-Robinson, 2022). Perhaps even more importantly, the main driver of deforestation — agricultural expansion (Pendrill et al., 2022) — was not in the scope of timber legality policies.

The Regulation (EU) 2023/1115 on deforestation-free products, more commonly known as the European Union Deforestation Regulation (EUDR), is a novel supply chain due diligence regulation which is expected to rectify this defect. Having entered into force on 29 June 2023 it significantly expands the scope of previous regulations by including agricultural commodities driving deforestation and obliging to mitigate risks along the supply chains (Berning & Sotirov, 2023). To comply, tracking the commodities all the way to the origin (i.e. achieving their *traceability*) is required. This assumes wider technology adoption for collecting production sites' geolocation data and its transfer along the supply chain. By investigating the data, satellite photos and other documents, buyers must assess if deforestation took place on the plot of land where production took place. If this is the case, commodities or goods derived from them must not be imported to the European Union (EU) market.

Agricultural commodities supply chains are notoriously lengthy and complex (Grabs & Carodenuto, 2021), so it is reasonable to expect challenges while operationalizing the due diligence system all the way to upstream suppliers. Despite that, the implementation of sustainability initiatives in supply chains is rarely studied from a perspective other than that of a buying firm and first-tier suppliers (Touboulic et al., 2018). In my thesis, I investigate the perspectives of EUDR requirements implementation along the whole supply chain. To operationalize the research, I focus on the example of supply chains of Ethiopian coffee to the EU. Specifically, this study will condense the perceptions and responses of supply chain actors to understand how the EUDR-triggered sustainability strategies interact with their realia and

why they interact in this way. As a result, I hope to generate insights into context-specific patterns of EUDR implementation and contribute to the body of knowledge on supply chain-based deforestation-reduction strategies' operationalization.

1.1 Problem definition

Despite being a significant turning point for the EU's policy to reduce its impact on global deforestation (Hedemann-Robinson, 2022), EUDR is yet an understudied phenomenon. The existing research was so far based on the regulation's pre-enaction drafts (Berning & Sotirov, 2023; Cesar De Oliveira et al., 2024; Köthke et al., 2023; Zhunusova et al., 2022) and, therefore, largely based on projections of future implementation. Now, EUDR has entered into force, and these projections can be tested against empirical evidence, calling for research based on the perspectives of the affected stakeholders. By exploring their perceptions in the early stage of the EUDR implementation, I contribute to the body of knowledge on policy evaluation.

As mentioned in the introduction, EUDR implementation in supply chains falls on the shoulders of the commodity-buying companies. While corporate initiatives to reduce deforestation have received the attention of some scholars (for example, Bager & Lambin, 2022; Lambin et al., 2018), they have been driven mostly by public opinion and NGO pressure and guided by voluntary supply chain initiatives such as sectoral standards, companies' codes of conduct, and others (Lambin et al., 2018). The previous studies of "hard law" drivers of corporate accountability on the issue of commodity trade-related deforestation focused on supply chain policies regulating the legality of sourcing and trading timber (Berning & Sotirov, 2023), such as the 2003 Forest Law Enforcement, Governance, and Trade (FLEGT) Action Plan and the 2013 EU Timber Regulation (EUTR). However, these policies only impose on companies the legality due diligence rules, i.e. ensuring that the timber sourced does not come from illegal sources. In turn, the EUDR's due diligence is designed to tackle deforestation in general, whether it is legal or not. It has not yet been studied how companies implement deforestation reduction initiatives under *mandatory* due diligence rules. I argue that such research is required since the number of businesses directly affected by EUDR due diligence requirements in the EU alone is almost 1.3 million enterprises (Bougas et al., 2021, p. 169), with many more, by extension, being affected in their supply chains indirectly.

While the EU buyers are legally bound to establish a due diligence system (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 12(1)), implementing the EUDR's requirements into the supply chains is a separate task. In practice, it means introducing sustainability requirements into information, materials, and financial flows, which constitute the subject of sustainable supply chain management (SSCM) (Seuring & Müller, 2008). Also, by adopting such requirements, a company would need to balance its economic interests (maintaining the agricultural commodity trade) on the one hand and the social and environmental needs of society (ensuring the supply of deforestation-free products) on the other, effectively rendering the task as a corporate sustainability strategy implementation (Engert & Baumgartner, 2016). That makes EUDR requirements implementation by buying companies a sustainable supply chain strategy implementation task. Since supply chains can be so large and complex, they resemble a web of actors (or "supply network") (Choi & Hong, 2002), where cooperation of its actors and, therefore, diffusion of environmental strategies cannot be assumed to happen linearly and predictably (Nair et al., 2016). This implies the need to understand the factors that drive these actors' reactions, namely why do they choose to cooperate or not.

Embracing a larger perspective, that means that the implementation of EUDR as an EU policy also depends on sustainability strategy implementation by companies and their supply networks' responses, including non-EU suppliers. As an early EUDR study shows, suppliers' preparedness

can vary significantly even between commodity sectors within one producer country (Cesar De Oliveira et al., 2024), so understanding their potential responses is crucial. Yet, in the 2021 impact assessment preceding the adoption of EUDR prepared for the European Commission, suppliers' potential response to the policy was merely mentioned as "likely to be required to change their operations" (Bougas et al., 2021, p. 142). Moreover, non-EU countries supplying the EU 94.1% of all products covered by EUDR constituted only 8% of the policy's impact assessment targeted interview respondents (Bougas et al., 2021). Another overlooked perspective is that of upstream supplier tiers, with the majority of SSCM literature assuming linearity of supplier interaction with the focal firms' environmental strategies (Choi et al., 2001; Touboulie et al., 2018). Few exceptions are limited to the Global North supply chains and call for more research in various contexts (Nair et al., 2016; Touboulie et al., 2018). These trends point out the lack of knowledge on the expected supplier responses to the introduction of EUDR requirements by buying firms as part of their sustainability strategies in the context of supply networks located in non-EU producer countries. My research is motivated by this gap, which I address in my thesis by investigating the Ethiopia-EU coffee supply chain stakeholders' responses to the introduction of EUDR.

1.2 Aim and research questions

The general aim of this research stems from the twofold nature of the EUDR implementation as a policy and a sustainability strategy, as the discussion above suggests. Consequently, it first aims to inform the decisions of policymakers pertaining to the assessment and implementation and, potentially, design of demand-side zero-deforestation policies, incorporating a holistic perspective of actors in the affected regions and supply chains. Second, it aims to contribute to an underrepresented perspective of supply chains as complex systems with actors exhibiting emergent behavior that is hard to steer (Choi et al., 2001), adding to the body of knowledge on the patterns of sustainability strategies' in multi-tier supply chains. Furthermore, the analysis of approaches to the implementation of focal firms and the emergent responses of supply chain actors from the introduction of sustainability strategy could facilitate more informed decision-making and strategic planning in corporate sustainability, procurement, and supply chain functions.

A more concrete research aim is to generate knowledge on patterns of the early-stage implementation process of EUDR requirements on a company level and the factors influencing their proliferation in supply chains as applied to the case of coffee from Ethiopia. This will be achieved by answering the following research questions (RQs):

RQ1: What are the approaches and patterns of implementation of the EUDR-driven zero-deforestation strategies by companies?

RQ2: What are the emergent aspects of the EUDR requirements' implementation in supply networks?

RQ3: What are the main factors influencing the implementation of the EUDR-driven zero-deforestation strategies in supply networks?

1.3 Scope and delimitations

The scope of the study is defined by the geographical scope of the EUDR enforcement, by the list of the major agricultural exporters to the EU, and by the scope of commodities covered by the EUDR.

Thus, the geographical scope is limited to the EU and Ethiopia. On the one hand, it is determined by the territorial application of the EUDR to 27 EU member states and the chosen producer country, which is in top-five coffee exporters to the EU by volume (Bougas et al., 2021). No narrowing of the geography was deemed necessary in the EU since the focus of the current thesis is on the up- and midstream segments of the value chain, the latter being dominated by a few MNCs (Grabs & Ponte, 2019). In the upstream segment, the choice of a country-level approach was driven by the EUDR's logic, where the strictness of due diligence requirements to be implemented by a buyer depends on benchmarked deforestation risk, which the EU assigns on a country-by-country basis (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 29(1)). Going to a smaller sample and limiting the scope to one or several coffee-producing regions was not feasible since the data collection was confined to remote options only (as opposed to, e.g., field observations) due to limited resources. All the stakeholders interviewed were working across the country or at least in multiple Ethiopian regions.

The research is limited to one commodity included in the scope of the EUDR: coffee (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, Annex 1). As of 2022, coffee was Ethiopia's most exported product (OEC, n.d.), and therefore, sufficient country-specific information was assumed to be available in this industry. The combination of geographical and commodity delimitations for the study was also motivated by the assumption that the policy introduction would significantly affect Ethiopian coffee supply network due to the importance of coffee exports for the country's economy.

The study is designed to capture the emerging patterns of responses to the EUDR and deforestation-reduction sustainability strategies in the early stage of implementation since the implementation is a crucial part of both the policymaking process (Smith, 1973) and corporate environmental strategies (Engert & Baumgartner, 2016). Importantly, it was conducted after the EUDR's entry into force but before the deadline for establishing due diligence systems by the buyers. While some outcomes might persist, many of the results will be valid only for early-stage developments.

The cut-off date for the literature review is 31 March 2024, meaning that no academic papers published after that date were used as sources to allow more time to analyze the data properly. However, shorter non-academic sources, such as news articles published after the cut-off date, may be cited to illustrate the societal importance of the ongoing discourse. For the literature review on EUDR's predecessors, only the literature from 2008 onward was considered when the first mandatory due diligence deforestation-reduction policy — US Lacey Act — was adopted. It is motivated by the focus the study on the environmental strategies spurred by *mandatory* due diligence policies.

The research focused on mid- and upstream parts of the value chain. The actors at the end of the value chain, such as retailers, were excluded from the study boundaries in line with the study's aim to highlight the supply chain responses to the implementation process in the affected producer countries. The main reason is that the midstream actors — *operators* in the terminology of the EUDR — are the ones who bear the burden of due diligence under EUDR (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 12(1)) and thus are de facto responsible for the dissemination of zero-deforestation requirements in supply chains. Despite the *operator* term being used in EUDR and other terms for these midstream actors in the literature, such as merchants, intermediaries, brokers, etc., I use another widely used term trader (Grabs et al., 2024) as my study operates more within the SSCM field, rather than in the legal one. It is not to be confused with the *trader* term in the EUDR legal text, which refers to the actors further downstream in the value chain, whose commercial activity involves transactions

with the relevant commodities or products after they first entered the EU market by operators (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 2(17)).

The primary data collection was limited due to several reasons. First, I had very few pre-existing contacts in the coffee industry, none of which was directly involved in green coffee sourcing or sustainability. Second, due to resource constraints, no traveling was available to collect the data in person. This circumstance could have limited the sample and interviews depth since doing any kind of business face-to-face is more common in Ethiopia and wins one's trust (employee of an Ethiopian coffee-exporting company, personal communication, January 29, 2024). Also, the study coincided with the end of harvesting and the beginning of the contracting season for coffee in Ethiopia (Project Origin, n.d.), which involves stakeholders such as producers and sourcing managers traveling to farms to select coffee lots (employee of an Ethiopian coffee-exporting company, personal communication, January 29, 2024). Therefore, many of them were hard to get an interview with either because of the busy schedule, or due to lack of mobile network reception in the regions where farms are located. The lack of internet coverage and mobile phone devices in possession also impeded establishing contact with smaller farmers. A major factor limiting the Ethiopian stakeholders' (especially smallholder farmers') participation was the language barrier. Since I had no knowledge of the official or other local languages spoken in Ethiopia, English was the only means of communication with the local stakeholders. Its speakers were limited mainly to the employees of coffee trading firms or international NGOs. Since their job involves dealing directly with the farmers, much of the data on producers' attitudes is based on their testimony but is, therefore, aggregated in nature.

1.4 Ethical considerations

The thesis project was conducted independently, no external funding was received.

Prior to interviews, participants were sent consent forms that included a description of the types of data collected, the ways it would be stored, used, and processed, and a more detailed description of the study (see Appendix 1 – Consent form template). If a signed form could not be secured for some reason, oral consent was received immediately before the interview.

The participants' anonymity was preserved to ensure no harm was caused by their participation in the study. The respondents were identified by the nature of their work and their employers' position regarding the research object. The potentially most vulnerable participant group – smallholder farmers, were not interviewed directly; only aggregated information on their perceptions was collected. Therefore, no harm can be expected to them as a result of the study.

The interview recordings and transcripts were stored on a personal computer's hard drive, protected by a password.

1.5 Audience

The audience of this research is defined by its dual nature, being situated in the field of sustainability strategy and policy implementation. Therefore, it is expected to be of interest to corporate sustainability managers, responsible sourcing managers, procurement specialists of commodity traders, NGOs' employees, and industry associations working with the relevant topics. On the other hand, policymakers working in the field of zero-deforestation and zero-forest degradation policies are also a relevant audience. This is particularly due to the novelty of the mandatory due diligence approach including the traceability requirements, which in part motivated this study. Lastly, this study can be of interest to academics in the field of SSCM interested in the factors influencing the process of sustainability strategies proliferation in supply networks.

1.6 Disposition

The rest of this thesis proceeds as follows. Chapter 2 presents a literature review of the existing knowledge on voluntary initiatives and public policies that aimed to curb deforestation, as well as current studies on EUDR, and explains the complex adaptive systems (CAS) conceptual framework employed in this study. Chapter 3 describes the research design, materials, and methods used in this thesis. Chapter 4 summarizes the findings acquired from the data collection and analyzed through the CAS framework. Chapter 5 discusses the findings against the existing scientific knowledge in the relevant SSCM and policy fields. Finally, chapter 6 concludes this thesis by answering the research questions and interpreting the significance of the results in the light of practical application and further research.

2 Literature review

2.1 Current knowledge related to the implementation of supply-chain initiatives

In this section, I will examine what is known about the implementation of public and private supply chain initiatives to stop deforestation. More specifically, I will focus on studies investigating companies' approaches to implementing such initiatives and behavior emerging in response to them in supply chains. This section aims to distill the existing knowledge from the academic literature to explain how emergent behavior in supply chains influenced the policies' implementation process and what underlying factors caused this behavior and shaped the process.

Following the order of my RQs, I will first review the literature on private initiatives, which is more focused on patterns of their implementation from the perspective of companies and their supply chains. Then, I will present the findings from the literature on the implementation of public policies, which tend to discuss their application on a more general level – in the context of sectors of regional or national economy or specific commodities that fall under the scope of regulation.

2.1.1 Private supply-chain initiatives

Long before public policies such as EUDR, companies announced their engagement in various private supply-chain initiatives to halt agriculture-driven deforestation. Bager and Lambin (2022) counted more than 500 agri-food firms that announced such **zero-deforestation commitments (ZDCs)** — a collective name the authors propose for these initiatives. ZDCs are part of corporate social responsibility (CSR) strategies responding to society's demands and, at the same time, “part of their growth strategies to improve branding and consumer loyalty, reduce reputational risk, increase market shares and profits, mitigate potential losses of critical environmental services, and ensure long-term supply” (Lambin et al., 2018, p. 109).

They describe four categories of ZDCs. First, collective aspirations are broadly defined shared objectives between multiple stakeholders that cannot be achieved individually by any of the participants (Lambin et al., 2018), like the 2014 New York Declaration on Forests. The next category, company pledges, are publicly declared goals to eliminate deforestation-related commodities and products from the company's operations, frequently coupled with other environmental or social criteria (Lambin et al., 2018) in supply chains, like no forced labor. The third category, companies' codes of conduct, are the sets of specific actions and practices that suppliers are required or encouraged to follow in order to prevent the use of deforestation-related products in operations. The last category, sectoral standards, are criteria for sustainability practices agreed upon by groups of companies that incentivize participation by providing market access or penalizing non-conformance by restricting it. Examples include certification schemes adopted by multistakeholder initiatives such as Roundtable for Sustainable Palm Oil.

The research on ZDCs demonstrates various approaches and patterns of strategy implementation. **Engaging third parties** is a widespread practice among companies to implement ZDCs. Bager & Lambin (2022) found that 80% of the companies from their study particularly relied on certification programs. Other actors being involved (“service providers”) typically included companies with additional technical expertise, consulting companies developing roadmaps and other documents on the strategic level of implementation, and actors with existing networks, such as NGOs, to increase the legitimacy of the measures taken among affected parties (Bager & Lambin, 2022).

In contrast, engaging directly with upstream actors in supply chains is challenging (Bager & Lambin, 2022). Instead, many companies just pass their demands upstream via first-tier suppliers and expect the lower tiers to comply without investing in capacity-building and cost-sharing schemes (Delabre et al., 2023; Jopke & Schoneveld, 2018). Smallholder engagement is prioritized the least according to Lambin et al. (2018), moreover they are especially at risk of disengagement due to a lack of resources to implement the requirements on their side and the lack of resources on the buyer's side to engage with the vast network of small farmers (Bager & Lambin, 2022). However, the described tendencies often present the perspective of downstream focal firms, which are outside of the boundaries of my study. For the midstream segment, Delabre et al. (2023) found that traders were more likely to engage directly in the supply chain, including with smallholders.

When it comes to means and pathways for implementation, **transparency**, and **traceability** in supply chains are undisputed starting points and yet the biggest challenges (Bager & Lambin, 2022; Lambin et al., 2018; Panwar et al., 2023). Supply chain transparency (SCT) is the degree to which the actor in a supply chain can access accurate “information about products, processes and flows of capital” (Bastian & Zentes, 2013, p. 554). In turn, traceability in supply chains is the ability to track and trace (Bosona & Gebresenbet, 2013) the product along the supply chain to check certain information about it, in the case of forest-risk commodities – if it comes from deforested or degraded land. However, technologies for traceability are costly both to some buyers, and even more so for suppliers (Jopke & Schoneveld, 2018). Moreover, traceability is often met with suppliers' resistance, who are unwilling to accept additional bureaucratic pressure and disclose their suppliers (Jopke & Schoneveld, 2018). Additionally, the notion of sustainability in agri-food supply chains is different between the buying firms and upstream supply chain actors and the latter might not see traceability as a solution (Panwar et al., 2023). From a technical point of view, full traceability is hard to achieve due to the additional costs of keeping separate streams of commodities originating from different sources (Jopke & Schoneveld, 2018). Most suppliers use the so-called “mass-balance systems” where the proportion of traceable commodities and the ones of unknown origin remains stable but they inevitably mix, making traceability to the farm level highly problematic (Jopke & Schoneveld, 2018).

Implementation patterns were shaped by several properties of supply networks and the external environment. First, **opacity** is characteristic of agricultural supply chains due to their multi-layered nature and geographical distance between tiers (Panwar et al., 2023). The large number of upstream actors and complex ownership structures make them hard for downstream firms to monitor, meaning that changes in sourcing practices can go unnoticed (Jopke & Schoneveld, 2018).

Second, **power dynamics** in food supply networks can be deceptive since the extent to which the buying firms can simply “push” the ZDCs' requirements through the tiers is, in fact, very limited (Jopke & Schoneveld, 2018; Panwar et al., 2023). Even though large buying firms have substantial market power, relying on it alone for deforestation-reduction strategies leads to cost- and responsibility-shifting to suppliers (Delabre et al., 2023). In response, they may switch to other markets with less stringent requirements (Lambin et al., 2018). As a result, interventions in supply networks that are too disruptive are often avoided (Jopke & Schoneveld, 2018). For instance, Bager and Lambin's (2022) study reports that 80% of interviewed firms excluded non-compliant suppliers only in case of multiple serious violations and resistance to change.

Other occurrent phenomena are **high costs** and a **lack of resources** for ZDCs implementation. Fulfilling ZDCs requires investments but allows little to be recaptured in added value, putting committed companies at a disadvantage compared to the rest of the market (Bager & Lambin,

2022). Nevertheless, while large firms allocate substantial (although not excessive) financing, smaller buyers and suppliers often do not have sufficient resources, leaving them with few options for implementation (Bager & Lambin, 2022).

Bager & Lambin (2022) concluded that the challenge was underestimated, and many commitments are made formally without the real intention of following up. As a result, many firms either missed their ZDC targets and deadlines or did not report on them, so their status is unclear (Bager & Lambin, 2022). It shall be noted though, that ZDCs research is predominantly focused on MNCs, whereas the EUDR also affects SMEs. Therefore, the generalizability of their results to the implementation of EUDR might be limited.

2.1.2 FLEGT: VPAs and EUTR

As mentioned earlier, prior to the introduction of the EUDR, the EU had implemented three main regulatory frameworks aimed at curbing deforestation and promoting sustainable forest management practices by ensuring the legality of timber in the EU's supply chains: the Forest Law Enforcement, Governance, and Trade (FLEGT) Action Plan, Voluntary Partnership Agreements (VPAs), and the EU Timber Regulation (EUTR).

The FLEGT Action Plan, initiated in 2003, represents a cornerstone of the EU's efforts to combat illegal logging and associated trade. It encompasses a comprehensive set of measures aimed at improving forest governance and enhancing law enforcement capacities in timber-producing countries while using trade regulation as a lever to prevent sourcing timber from illegal sources. At its core, the FLEGT Action Plan seeks to establish bilateral Voluntary Partnership Agreements (VPAs) between the EU and timber-producing countries. VPAs are legally binding trade agreements that set a list of requirements in exchange for securing the EU market access for these countries verified legal timber products. The requirements include shared definitions of legal timber, the establishment of timber legality assurance system (TLAS) in participating countries, transparency requirements and independent monitoring of TLAS, and the joint monitoring and implementation of VPA requirements by the EU, and a producing country's representatives from civil society, business and government.

In parallel, the EU Timber Regulation (EUTR), adopted in 2013, is a mandatory policy preventing the placement of illegally harvested timber and timber products on the EU market. EUTR imposes mandatory due diligence obligations on the EU traders placing timber and timber products on the EU market. Under the EUTR, traders are required to exercise due diligence by ensuring that the imported product does not contain illegally logged timber. This is achieved by risk assessment and mitigation measures, in essence allowing to prove the legal origin of the timber by credible documents. The EUTR is to be repealed by the EUDR from 30 December 2024 (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 37(1)) since the legality principle was incorporated in the EUDR's legal framework, and timber was also included in its scope.

There has been a significant amount of literature on FLEGT since the enactment of its instruments, although not excessive when it comes to implementation and supply chain stakeholders' responses to the policy requirements. Below, I summarize the academic papers focused on this subject or at least explicitly mention the relevant findings in the results.

The most relevant study is by Acheampong & Maruydi (2020) investigates the Ghanaian and Indonesian timber producers' practices and motivations for bypassing the FLEGT requirements. Based on 300 interviews with supply chain actors about their experiences and expectations of FLEGT implementation in their countries, the study found several dominant patterns of emergent behavior to bypass the regulation. In particular, the producers avoided

legality verification by diverting the exports to domestic or foreign markets with less stringent monitoring, or quitted the timber business altogether. Increase in trade with Asian markets was found to be especially booming, e.g. wood products exports from Ghana has tripled in five years (Acheampong & Maryudi, 2020). Meanwhile, the producers who continued the trade with the EU, developed strategies to circumvent legality verification, such as manipulations with timber legality documents and combining timber with other materials in production (Acheampong & Maryudi, 2020).

Acheampong & Maruydi (2020) also argued that these responses were in part shaped by certain normative factors. FLEGT requirements were seen as overly burdensome and costly, felt forcefully imposed, and, in Ghana's case, lacked legitimacy due to the perceived corruption of the regulatory institution charged with the implementation. At the same time, contextual (or external) factors, including the demand for timber domestically and in Asian markets, also defined the dominant producer's responses to divert trade from the EU market.

In another producer country-focused paper by Parztsch et al. (2023) researched the gap between supply chain laws (including EUTR) regulative uptake and practical implementation in Indonesia and the Democratic Republic of Congo (DRC). The authors underscore the role of context-specific factors shaping the patterns of the policies proliferation. Firstly, it is the growing consumption domestically and on Asian markets, allowing the diversion of trade from the EU, which proved to be a popular legality avoidance mechanism. Second, in both countries, the stakeholders viewed the policies as an interference with their sovereignty and the expression of post-colonialism. Indonesian industries responded with their own systems of legality verification. In DRC, however, the responses were leaning towards circumvention of the regulations largely due to the interests of armed groups and corrupt officials benefitting from the illegal timber trade. In both cases, legality verification was mostly endorsed by bigger companies that saw a chance to outcompete the smaller ones, splitting the market into two export streams varying in timber legality levels.

In an earlier article, Roe et al. (2014) investigated the influence of timber legality policies, including EUTR and the US Lacey Act, on Vietnamese roundwood timber manufacturers and traders. This quantitative questionnaire-based study concludes that larger EU- and US-focused firms reacted by reorienting wood sourcing to low-risk regions and adopting certification. Meanwhile, smaller firms could not compete and continued to trade roundwood from risky sources, diverting trade to less regulated markets. In effect, the market was found to have become segmented into two supply chains: low-risk and high-risk. Speaking particularly of EUTR, it was the most recognized timber legality policy among all, yet 43% of the respondents were not aware of it (Roe et al., 2014), mostly because they traded with non-EU markets.

Another work by Köthke & Sotirov (2024) investigates EUTR compliance pathways and underlying motivations in the downstream part of the timber supply chain. Their mixed methods study is notable for capturing perceptions of German timber economic agents during both the early and "mature" implementation stages from 2013 to 2021. Among the categories of agents they researched the most relevant to the boundaries of this thesis are the timber traders (midstream actors). According to the study, the factors influencing compliance to a high degree were external societal pressure and belief in the necessity of law abidance, coupled with the imminence of sanctions for non-compliance. Conversely, economic factor was a weak incentive since most traders shared the opinion that EUTR offered nothing in return for increased administrative burden and the associated costs. Interestingly, 58% of surveyed traders did not comply with the EUTR due to unawareness (Köthke & Sotirov, 2024).

Two other studies are focused on the implementation of EUTR in Romania from the perspective of local timber-producing industry. Raluca & Nichiforel's (2011) quantitative study researched the perceptions of business sector and forest administration stakeholders on then-a-perspective of establishing the due diligence system under EUTR. They found that the timber sector already covered by VSS was likely to lead the due diligence system implementation in Romania in the pursuit of competitive advantage. Among the results, it is worth noting the majority (57%) hadn't heard of the regulation at the time (Raluca & Nichiforel, 2011). Others expressed concerns of increasing production cost and bureaucracy and expected difficulties in proving the legality. The second paper by Gavrilut et al. (2016) focuses on the the role of Forest Stewardship Council (FSC) certification's role in EUTR implementation and is based on the data from questionnaires and semi-structured interviews. The authors note that FSC adjusted its standards and argue that it has prepared the stakeholders for the EUTR requirements. Most suppliers (41%) did not observe any impact of EUTR on their operations at the time, possibly due to FSC certification (Gavrilut et al., 2016). Nevertheless, some of the respondents listed the need for additional financial and human resources on their side as the factors that might have an influence on company management. More than 50% of respondents also pointed out the lack of information and guidance on the EUTR requirements as the main hurdle to implementation (Gavrilut et al., 2016).

Overall, the studies revealed some reoccurring patterns in the responses of different countries' producers to FLEGT. Particularly, they show that the timber industry responded with market segmentation in compliant wood destined for the EU and non-compliant wood diverted to alternative markets. The supply network actors tended to have low awareness of the FLEGT requirements and perceived them as burdensome, bureaucratic, costly, and imposed. Their reactions to circumvent or avoid the legality of due diligence were also shaped by the availability of domestic and Asian markets for timber with lax regulations.

2.1.3 EUDR

Regulatory approach and main elements

The EUDR builds on the experience of the EUTR and aims to overcome its weaknesses (Köthke et al., 2023). Below I will introduce the main approach of the EUDR and its core elements in more detail.

First, EUDR continues the EUTR's approach, building on the prohibition of non-compliant products from entering the EU market and the due diligence principle (Köthke et al., 2023). Prohibition clause effectively means that if a commodity or a product is not compliant with the requirements set out by the respective regulation, its placement on the EU market is prohibited. However, the EUTR only mandates legality requirements for timber, i.e. that it was harvested, produced, and further handled in the compliance with all applicable laws. The EUDR, in turn, integrates environmental and social sustainability criteria into the requirements and extends its reach to address deforestation linked to the production and trade of additional commodities such as soy, palm oil, beef, and coffee.

The EUDR's prohibition clause consists of three requirements. In particular, the entry to the EU market is permitted only for the products that: (1) are deforestation-free, and (2) have been produced in the accordance with the legislation of the producing country (similar to the EUTR), and (3) are covered by a due diligence statement (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 3). The deforestation-free requirement mandates that the plot of land, which a relevant commodity or a product containing relevant commodities originates from, was not deforested after the cut-off date 31 December 2020. The due diligence requirement ordains that every relevant product must be checked against the set of criteria prior to the placement on

the EU market. By signing and submitting the due diligence statement traders attest to compliance of the products with the three EUDR requirements, presuming that all necessary checks have been carried out and confirm the compliant status (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 4(3)). The prohibition clause shall apply to all relevant products placed on the market from 30th December 2024 (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 38(2)).

The due diligence system (DDS) that traders must establish under the EUDR consists of three key elements.

1. Information requirements: To demonstrate that a product is deforestation-free, traders must state the country and region of production and provide geolocation coordinates of the plot of land where the production took place. Proof of legality, e.g. documents proving the right to use the production area, are also part of information requirements.

2. Risk Assessment: Traders subject to the regulation are required to conduct comprehensive risk assessments to identify and evaluate the risks of deforestation associated with the production and trade of specified commodities. Risk assessments should consider various factors, such as presence of forests and indigenous people, rates of deforestation in the region, complexity of supply chain, and state of corruption, law enforcement, armed conflicts, among others (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 10). By analyzing relevant data and information, such as satellite imagery, land use maps, and socio-economic indicators, traders can identify high-risk areas and activities within their supply chains. Only products associated with no or negligible risk can be placed on the EU market (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 10(1)).

One of the key elements of risk assessment is also a level of risk assigned to the country of production (or its part): high, low or standard. The higher the level of risk, the more stringent risk assessment rules apply. However, at the time of publication of this thesis the risk categories were not yet assigned, so all countries, including Ethiopia were deemed as being standard-risk in accordance with article 29(1) of the EUDR.

3. Risk Mitigation Measures: Based on the findings of the risk assessment, traders are obligated to implement risk mitigation measures to ensure at least negligible level of associated deforestation risks. These measures may include requiring additional documents, performing audits and surveys and other measures allowing to rule out possible deforestation risk. The EUDR also encourages traders to act preventatively by engaging with suppliers and investing into more responsible production practices (Regulation (EU) 2023/1115 on Deforestation-Free Products, 2023, art. 11(1)).

As demonstrated by the summary above, the due diligence system mandated by the EUDR requires collection, analysis, and assessment of more types of data relative to its predecessor EUTR.

Existing research

As mentioned earlier, due to the recent introduction of the EUDR, empirical research on the topic is scarce. Therefore, in this paragraph, the focus will be mainly on the existing preliminary implementation process' assessments of the EUDR's deforestation-reduction requirements.

The first on the list is the European Commission's impact assessment on demand-side measures to address deforestation (hereinafter — impact assessment or **IA**) conducted by Bougas et al. (2021) as part of the policymaking process for EUDR. The report focuses primarily on future

regulation objectives and identifying the best available policy options to achieve them. Nevertheless, it contains sections dedicated to the implementation potential of each proposed measure.

First, human and financial resources are required for the due diligence system establishment. IA particularly notes **increased costs** for traders for due diligence procedures, which, coupled with SMEs' unfamiliarity with them, can force the latter to switch to sourcing from countries classified as low-risk to avoid the administrative burden of enhanced due diligence (Bougas et al., 2021). Additional costs in collecting information for due diligence may hurt the upstream segment of the value chain even more, especially producers in smallholder-dominated supply networks, to the point that compliance without external support would not be possible (Bougas et al., 2021). On the upper side, suppliers with existing sustainable production could benefit from EUDR, gaining a competitive advantage (Bougas et al., 2021). However, the share of sustainable production (e.g. certified) varies significantly across crops, with no crop exceeding 40% globally (Bougas et al., 2021). Overall, the non-homogeneity of the intervention's impacts "due to the multiple supply chains and specifics of commodities and associated products considered" (Bougas et al., 2021, p. 25) is acknowledged in the report as its limitation, so the assessment operates at a very general level. Meanwhile, the implementation process can vary significantly even within one country or region. The respondent from the stakeholder consultation highlights that producers may face implementation problems due to the non-alignment of EUDR with local legislation, varying jurisdictional approaches and policies, as well as authorities' views on combating deforestation (Bougas et al., 2021).

It shall be noted that only 5.9% of participants from the Global South participated in public consultation for IA, with Africa represented by Cameroon only (0.4% of respondents). Major coffee-producing countries did not include Africa and were represented only by Latin America (Brazil and Peru).

On a national level, EUDR implementation potential was studied by Cesar de Oliveira et al. (2024) in Brazil. In this mixed methods study, using stakeholder surveys, sectoral analysis of each commodity, and a literature review, they came up with a compliance likelihood index for each commodity sector. Cesar de Oliveira et al. (2024) found that the local coffee industry is likely to be best prepared as indicated by high scores in most criteria that constitute the index. First, the **high share of production exported** in general (64%) and specifically to the EU is viewed as a motivating factor for the coffee industry to pursue compliance (Cesar De Oliveira et al., 2024). Second, the **high coverage of VSS** (33%) such as Rainforest Alliance is believed to facilitate the implementation process due to the high level of VSS standards' alignment with the EUDR (Cesar De Oliveira et al., 2024). Importantly, the share of smallholder coffee farmers, which is associated with many layers of intermediaries and resulting supply chain complexity (Cesar De Oliveira et al., 2024), in Brazil is relatively low — 34.1% of the total producing area, as referenced by the authors from IBGE (2019). Therefore, the dominance of larger farms coupled with the concentration of areas of cultivation in only a few regions (Cesar De Oliveira et al., 2024) shall allow for easier rollout and monitoring of the subsequent environmental programs. Finally, in Brazil, coffee is the crop with the **lowest levels of associated deforestation** among the analyzed commodities (Cesar De Oliveira et al., 2024), meaning that most of the exports are likely to pass the risk assessment stipulated by EUDR without additional mitigation measures.

However, the study also identified several implementation hurdles. As referred by the authors from the research by Piao et al. (2019), difficulties exist in getting technical assistance for VSS adoption in remote regions. This can be indicative of potential problems in establishing traceability systems for EUDR. Overarchingly, enabling enhanced **traceability** and

transparency is identified as the single biggest challenge due to a large number of smallholder actors in Brazilian coffee production crop-wide and the supply chain complexity associated with it (Cesar De Oliveira et al., 2024). The study points out another potential challenge of **infrastructure bottlenecks** for the segregation of EUDR-compliant and non-compliant crop flows (Cesar De Oliveira et al., 2024). Brazil's experience separating gen-modified crops from 'conventional' ones, also indicated **increased costs** for the producing country's supply chain actors (Cesar De Oliveira et al., 2024).

In the East African context, the impacts of EUDR were the subject of a non-peer-reviewed study by Marcotte-Ouellet (2023). In her Master's thesis, she assesses the regulation's performance potential in Uganda by qualitatively investigating the compliance readiness of its coffee industry. The part of this stakeholder interviews-based study dedicated to EUDR's implementation suggests it may face severe difficulties. The author's analysis reveals that **ensuring traceability** is perceived as the biggest challenge for compliance. The study estimates that less than 10% of the coffee is currently traceable nationwide and points out that the information in the national farmers' registry is limited (Marcotte-Ouellet, 2023). Among other potential hurdles are the **high cost** of relevant technology, **narrow timeframe** for adaptation, **uncertainty** in interpretation, and **lack of information** about implementation and monitoring (Marcotte-Ouellet, 2023). Marcotte-Ouellet's (2023) research also revealed concerns about the potential **shifting of costs** to suppliers, as well as the farmers' questioning of the realness of the requirements and consequent cautiousness in providing information. At the same time, the zero-deforestation requirement was not found to be a major concern due to the low share of deforestation associated with coffee in Uganda, as perceived by the stakeholders (Marcotte-Ouellet, 2023). Interestingly, the interviewees hardly mentioned EUDR's legality requirements, which the author attributes to low awareness at the time of the study (Marcotte-Ouellet, 2023).

2.1.4 Key findings from the literature review

There are several prominent trends surfacing from the reviewed literature on company's approaches and public supply chain policies implementation to tackle deforestation. First, companies saw existing VSSs and certification as starting points for their efforts. Working through them, other service providers and NGOs with existing network and capacities was more preferable than engaging with supply chain actors directly.

When it comes to the implementation of public policies such as FLEGT and EUDR, many similarities were discovered in perceptions of affected stakeholders. Most frequently they were met with unawareness and lack of guidance, which might signal low availability of information. Bureaucracy and increased uncompensated costs were also often associated with these regulations, along with the lack of legitimacy and neo-colonial patterns.

The responses in supply chain differed on the scale from acceptance to evasion. On the one hand, the prominent trend was to divert exports to less regulated markets or domestically, which was possible due to growing consumption outside the Global North. On the other hand, many market agents who were better prepared thanks to certification saw compliance with the regulations as an opportunity to outperform (usually smaller) competitors. This resulted in a segmentation of export flows into compliant one catering to the regulated markets and another, serving other destinations. The context that shaped this patterns was varying levels of law enforcement, lacking infrastructure for ensuring traceability, difficulties the companies faced in engaging in supply chain due to its opacity, influence of armed conflicts and corruption schemes interested in preserving the status quo.

In the coming chapters I will investigate how Ethiopian stakeholders' perceptions of the EUDR implementation feed into these observed trends and compare the findings.

2.2 Conceptual framework

For the theoretical framework I depart from the notion of the intrinsic complexity of food supply chains that often tap in their upstream segment to a large base of small-scale farmers (Grabs et al., 2024). For coffee supply chains this is especially the case since most of the coffee worldwide is sourced from *smallholder* farmers. As stated by Touboulie et al. (Touboulie et al., 2018), a truly holistic perspective of environmental strategies' proliferation in supply chains understanding the dynamics of this dispersed supply base is crucial. However, a buying firm and a farmer are typically linked through several layers of intermediaries. Therefore, supply chains require not only upstream, but a multi-tier perspective. Following Choi and Hong's (2002) suggestion, in this thesis I use the term "supply network" as one better reflecting the structure of multi-tier supply chains. In turn, supply networks can be defined as the multitude of supply chains through which products and services flow from source to end customer (Harland, 1996).

To account for supply networks' complexity, a complex adaptive systems (CAS) framework was used by several authors in academic literature. After first being applied to supply networks in a conceptual paper by Choi et al. (2001), several studies integrated CAS into a larger supply chain theory (Carter et al., 2015; Pathak et al., 2007; Surana et al., 2005). However, using the CAS as a framework to study sustainability issues in supply networks is still a novel approach, with two cases standing out. First, Nair et al. (2016) induced the emergent nature of environmental innovations in the supply networks of car manufacturers. The second one, dedicated specifically to food supply networks is a paper by Touboulie et al. (2018) which points out the patterns of emergence and non-linearity in farmers' adaptation to the environmental supply network strategy of a large agricultural buyer.

According to Choi et al., theories and models of CAS focus on "the interplay between a system and its environment and the co-evolution of both the system and the environment" (2001, p. 352). They explain the idea of the system and its surroundings influencing each other and constantly evolving using the three intrinsic CAS factors.

First is **internal mechanisms** or the system itself. It consists of **agents**, which are the entities in the system that can change the course of events meaningfully (Choi et al., 2001). Whether it is an individual, company department, or organization depends on the level of the analysis (Choi et al., 2001). In turn, agents possess **schema**, which refers to a set of values, norms, and assumptions shared in a collective (Choi et al., 2001), which influence their behavior and shape their agency. CAS theory suggests that the behaviour in a system is determined not by individual actors, but rather formed by the multitude of simultaneous actions of the agents. These properties of a system are referred to as **self-organization** and **emergence**, implying that there are patterns in behavior that are developed independently in different parts of the system and not being orchestrated by a single entity. These patterns are influenced by the system's degree of **connectivity** and **dimensionality**. The former refers to the level of communication between the agents and the latter to the degree of autonomy they have to determine the direction of their actions.

The second factor shaping CAS is **external environment**. The border between the internal mechanisms and their environment, again, depends on the level of the analysis. In any case, environments can be **dynamic** and **rugged**. The dynamism of the environment is its constant change that could take forms of changing boundaries of a system or the imposal of new rules and norms, leading to a changing schema of agents. **Rugged landscape** refers to the state of a system in the external environment ("landscape") that is hard to navigate because the optimal solution is defined by multiple factors or literally "obscured" by the "ruggedness" of the landscape. This can also mean that many local optimal solutions might exist, however being at

the point of local optima might prevent from identifying the better (or the best) optimal state of the system in the current configuration of the environment.

The third factor of a CAS theory is **co-evolution**, i.e. the idea that the system both creates the environment and is constantly shaped by it. This means that CAS exists in a **quasi-equilibrium**, balancing between stability and change, unless the pressure from the environment is so profound that it causes a **state change** of CAS (followed by a new quasi-equilibrium). When the change in CAS occurs, it is characterized by **non-linearity** due to CAS' composition of many interconnected actors, resulting in a disproportion between inputs and output, and making it impossible to predict the reaction of CAS to a disturbance exactly. Despite the exact change *path* being unpredictable, the patterns of CAS behaviour can be observed, making CAS future **non-random**.

The main components of the CAS framework are displayed in the figure 1-1 below.

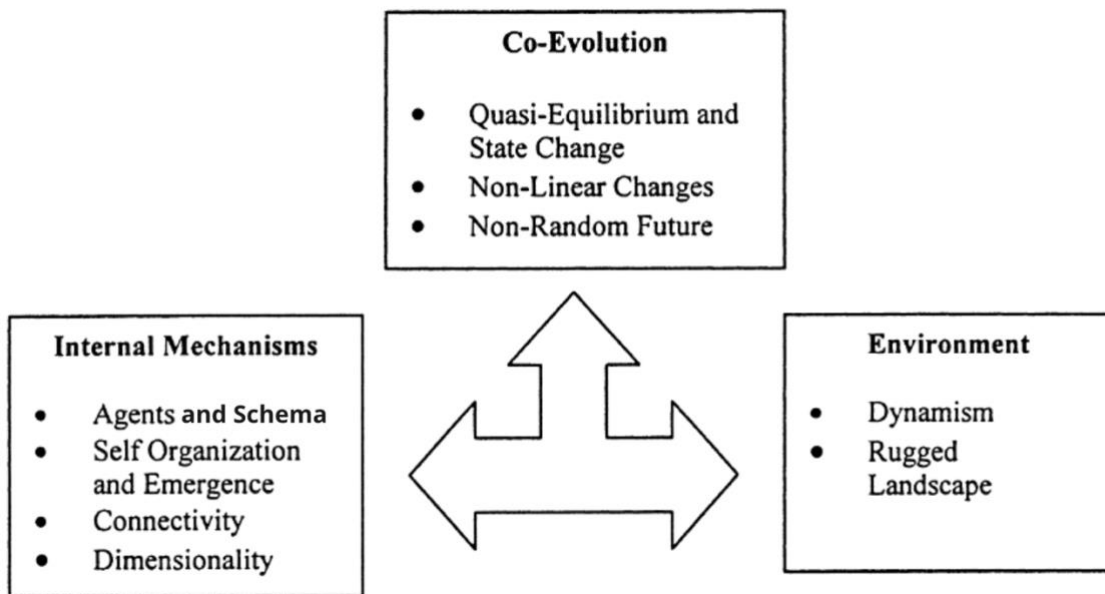


Figure 2-1. Components of CAS framework. Adapted from Choi et al. (2001)

3 Research design, materials and methods

3.1 Research design

This thesis employs a qualitative approach based on the nature of the research questions, more specifically, their roots in the perspectives of supply chain actors. Other factors influencing the choice are the novelty of EUDR as a phenomenon and its limited exploration, which also favors a qualitative approach (Creswell & Creswell, 2017).

The primary data is collected via semi-structured interviews with supply chain actors and enriched by the perspective of NGO experts who were considered to have the influence on the supply network according to the chosen conceptual framework. Primary data was triangulated with other sources, such as industry reports and other grey literature, where available, to provide a more objective view of the studied phenomena and put the interviewee's perceptions in a larger context of the studied industry and geography.

The research design is based on a model supply chain of Ethiopian coffee to the EU as presented in chapter 2. Then, companies belonging to each tier were identified, and multiple interviewees from each were contacted. Although these interviewees might not necessarily be connected in reality, this approach was deemed acceptable. First, information on suppliers can be proprietary, especially in larger corporations. Second, in agri-food supply chains spot buying is a common practice, especially in case of shortages (Jopke & Schoneveld, 2018), i.e. sourcing from a supplier giving the best offer, rather than from a long-term one. Therefore, companies in a sample hypothetically could be a part of one supply network. To ensure the heterogeneity of the sample, firms of different sizes (MNCs and SMEs) and market segments (commercial grade coffee and specialty coffee) were contacted.

3.2 Methods used to collect data

Primary data was collected via semi-structured interviews, which were conducted online using Zoom and Google Meet. One participant opted to answer the questions by email due to a busy schedule.

The identification of the relevant stakeholders was performed as follows. First, based on the model supply chain of Ethiopian coffee to the EU, a stakeholder map was drafted. Stakeholders were then selected based on their position in the supply network, starting with traders who are legally bound by EUDR and ending with the producers upstream, who are supposed to provide the input data for the EUDR due diligence process and are, therefore, the final recipient of the traders' sustainability strategies. Another targeted group of stakeholders were non-supply network individuals and organizations potentially possessing first-hand knowledge of the coffee industry and the environmental, social, and political situation in Ethiopia. These included NGOs, agritech companies, academia, and industry associations.

Within the EU companies, sustainability managers and/or coffee sourcing specialists with practical experience of working with the Ethiopian coffee supply chain were identified as relevant experts. For agritech, project managers in charge of the implementation of traceability solutions in Ethiopia were targeted. For international non-profits and NGOs, the executive-level employees responsible for Ethiopian operations were chosen. The search was conducted mainly through the organizations' websites and LinkedIn profiles, using the various combinations and derivatives of the keywords "sustainability", "coffee", "Africa" and "Ethiopia". The respondents were also asked for further referrals upon the completion of the interview. Two interviews were conducted with representatives of the same firm, their expertise

complementing each other due to the exposure to different aspects of the implementation of the EUDR requirements.

The interview participants were contacted through LinkedIn, Instagram, and by e-mail. A total of 8 interviews were held between 6 March 2024 and April 26 in English and Russian. Each lasted between 30 minutes and 1 hour and 10 minutes and was recorded.

3.3 Materials collected

The interviews and the description of their role and experience to provide background are presented in Table 3-1 below. Each interviewee was assigned a code from I1 to I8 for further reference in the text.

Table 3-1. List of interviewees

Respondent code	Date of the interview	Type of stakeholder	Position and/or experience
I1	6 March 2024	International NGO operating a certification scheme	Country director for Ethiopia
I2	14 March 2024	Solution provider, agritech company	C-level executive curating a digitization project with Ethiopian coffee cooperatives
I3	15 March 2024	Trader; an MNC in, commercial grade coffee	Group level Sustainability manager for responsible sourcing of coffee
I4	22 March 2024	SME trader, specialty coffee	Sourcing specialist for Africa and Asia, based in Ethiopia
I5	25 March 2024	International environmental NGO	Country representative for Ethiopia
I6	2 April 2024	SME trader	R&D Director, directly involved in sourcing from Ethiopia
I7	4 and 15* ¹ April 2024	Ethiopian coffee producer, processor and exporter, specialty coffee	Owner, 15+ years in business
I8	26 April 2024	SME trader, specialty coffee	Co-founder, directly responsible for EUDR-compliance strategy

Source: Own elaboration

3.4 Methods used to process information

The interview recordings' transcribing was performed with the support of AI-based tool Whisper Transcription. The resulting automated transcription was edited manually in case of inaccuracies.

Primary sources were analyzed and coded using NVivo software. Coding was performed inductively: first analyzing for reoccurring topics and then synergizing into top-level codes corresponding to the components of the CAS framework.

¹ the respondent answered the questions by email in two iterations

4 Findings

This chapter presents the data collected via semi-structured interviews with Ethiopian coffee supply network stakeholders. Each chapter corresponds to a relevant RQ. During the process, the CAS framework was found to be more applicable for emergent aspects and the underlying explanations, so it is only used to a limited extent in analyzing the data relevant for RQ1, compared to RQ2 and RQ3.

First, section 4.1. briefly describes the main actors involved in implementing EUDR's requirements and how they are connected to them, as well as the particular forms of action and types of behavior they express. It also presents particular challenges and drivers for their actions. Section 4.2 looks into the emerging behavior in the supply network, i.e., patterns of concrete responses to the introduction of EUDR or subsequent environmental strategies of downstream firms that appear independently across the supply network and are not orchestrated by any single agent. Section 4.3 analyzes which factors within the system and in the external environment shape the courses of action and behavior described in sections 4.1 and 4.2 and how these factors influence each other.

4.1 Implementation Approaches and Internal Mechanisms

4.1.1 Agents

As discussed earlier, traders are de-facto responsible for implementation of the EUDR in supply networks, and therefore are the main agents translating its requirements. Of all traders interviewed, all were either actively engaging with stakeholders to prepare for EUDR due diligence requirements coming into force (I3, I4, I8) or reported they already had a high level of preparedness due to their business model (I6).

The next category of agents of EUDR implementation in Ethiopia can be described as facilitators. It includes private companies, such as tech solutions providers for agricultural industry (agritech), NGOs, and public authorities (the Ethiopian government). These agents are not parts of the supply network in the sense of moving the actual shipments of coffee downstream, but they facilitate the compliance and dissemination of sustainability practices.

NGOs in Ethiopia execute broader sustainability programs and certification and were mentioned by the interviewees in the context of planned or ongoing negotiations in relation to EUDR requirements implementation (I2, I3, I4, I8). Agritech focuses on digitization projects for more effective and efficient farm management, monitoring, and trading. Lately, many of such firms started integrating EUDR compliance tools into their offering. At least three agritech projects working in Ethiopia were mentioned by interviewees (I2, I3, I4, I8). Ethiopian government, or particularly Ethiopian Coffee and Tea Authority, were mentioned by five interviewees (I1, I2, I3, I7, I8) as providing some sort of support, though without clearly defined function. In turn, facilitators mentioned being connected both to traders (I2, I5), between each other (I2), and to the next group of midstream actors (I2) described below.

The next group of agents can be categorized as transmitters and receivers of sustainability strategies. Depending on the position in the supply network, transmitter can be any intermediary between an exporter and producer. Thus, the agents at the extreme upstream end — producers — are the ultimate receivers of sustainability requirements. However, the study revealed that farmers are rarely being contacted directly by the EU traders directly. Rather, the respondents reported contacting either exporters (I3, I4, I8), or cooperative unions (I2, I8), or individual producers (I6) for further transmission of the EUDR requirements in their supply network.

4.1.2 Implementation approaches and varying connectivity

The interviews showed that the implementation actions of traders and most other agents at the time of the study were focused on traceability component of EUDR. All respondents expressed opinion it was the most critical issue at the moment. Some respondents explicitly stated that the industry is so busy with mapping its supply chain it risks overlooking other requirements of EUDR (I2, I5). Ensuring traceability in practice means collecting geolocation data of plots of coffee producers' land, i.e. a person "in the field" walking across an estate and trying to get a satellite signal on a specialized device or a mobile phone to save the coordinates (I2). The data then needs to be transferred to a trader or its service provider to be checked for mistakes and inaccuracies and then verified against the criteria stipulated in EUDR.

The traders' basic approach to collecting data, according to all respondents, was the same: contacting a first-tier supplier or a third party physically present in Ethiopia to collect the geolocation coordinates. Many traders, regardless of size and specialization, relied on certification schemes for this task since certification standards include geolocation data collection, which was highlighted by their representatives (I1, I5). Traders and NGOs views on the demand for certification in Ethiopia as a consequence of EUDR introduction differed. The NGO representative providing certification stated that they had not noticed an increase in demand, but there was a shared feeling of relief among the certificate holders that they were already largely in compliance with EUDR (I1). However, he notices that certification schemes cover only about 10% of all coffee production in Ethiopia (I1).

The difference in approaches beyond certification lies in the type of stakeholder the traders engage for data collection. The employee of an MNC interviewed revealed in Ethiopia, they were sourcing green coffee from exporters and therefore delegated the task to them since they were already a point of entry to sourcing in the country, but their staff in Ethiopia was also involved in the data collection (I3). The SMEs working in specialty reported their intermediaries were quality-focused exporters working in the outgrower scheme or cooperative unions, so they asked these partners to provide the geolocation data (I4, I6, I8). However, investigating MNCs' websites showed they were sourcing from producers in the outgrower scheme directly, too (for example: Sucafina, n.d.). Therefore, it is not the size, but rather the sourcing model that influences the approach to collecting geolocation data.

It also turns out, that on average, traders sourcing the higher quality specialty coffee had better pre-EUDR levels of traceability, meaning that they were more likely to know their suppliers beyond the first tier. SME specialty traders interviewed confirmed knowing their supply network up to a district or village it was coming from and sometimes to a plot level (I4, I8). According to one respondent, these traders can market their direct connections to the origins to obtain a premium. Here is how a respondent explains it:

Our concept is a micro roaster, our concept is, respectively, a micro farmer, a small producer, right? It's all due to the rules of the game, i.e. a small one can never compete with [major coffee trader] or with some global and multinational companies, it's impossible (...). The only thing we have left is the uniqueness, the specialty, yes, of the product. We will never be able to give a competitive price and large volumes and so on, but we can give something special, unique. And here the issue of traceability is very important, yes, as an additional value to the product. (I6, R&D Director at SME trader)

Traceability is important for specialty SMEs to ensure consistency of taste for their buyers from one harvest to another (I4, I6). They need to know where their coffee is coming from and ensure it is not mixed with coffee of unknown origin at the mill or a washing station, otherwise the

taste can deteriorate or at least will not be consistent with the profile the roasters expect. This creates incentives for traceability that are not directly sustainability-related.

In CAS terms, Ethiopian coffee supply networks have varying connectivity between the actors. For specialty coffee supply networks, it tends to be higher since it is common to know your producers and for specialty traders (and roasters) to do fieldtrips and even meet the farmers personally to strike a deal (Holland et al., 2016). For commercial-grade coffee, connectivity is lower, meaning that such traders tend to have little knowledge of their supply network beyond the exporters, let alone their exact producers. The same applies to producers: hardly any farmer knows for sure the exact trader their coffee is being shipped to.

When it comes to geolocation data verification, the interviews showed traders choosing between in-house teams and third-party solutions. A bigger trader mentioned an internal GIS team working on the task (I3), while an SME respondent admitted engaging a solution provider (I8). A solution provider representative (I2) also confirmed the interest of multiple traders but without specifics. Overall, the traders were not inclined to share their traceability and verification technology suppliers. However, traders' website search shows that some larger organizations started to showcase their collaboration with technology providers on EUDR compliance (for example, Neumann Kaffee Gruppe, 2024).

4.1.3 Perceptions of EUDR requirements: Missing or conflicting schema in supply network

While most interviewees acknowledged progress in spreading EUDR (or at least traceability) requirements, many agree that it has been slow, especially in the first months after the EUDR enactment due to mixed reactions of supply network actors (I3, I5). Their descriptions picture several trends in perceptions and views defining the proliferation of sustainability strategies in Ethiopia coffee sector.

First is a feeling of **uncertainty** in the industry many of respondents have voiced (I2, I5, I8). Even the system's agents who due to the nature of their work follow environmental policy closely (large traders, NGO, agritech) do not yet understand how the regulation will play out:

And to be honest, we still don't know the exact rules. (...) Although in the upcoming days there will be a discussion and hopefully a decision around a guidance document. (...) Basically explaining how we should interpret (...) the law and hopefully, that will bring a lot of clarity (...). (I2, C-level executive of an Agritech company)

The “need for more guidance” and the lack of clarity for implementation patterns reoccurred both on the trader level (I3, I6) and on the producer level (I7).

The further upstream in supply network, the more uncertainty blends into sheer **lack of awareness** of the EUDR regulation or its concrete requirements. At the time of the interviews in early spring 2024 almost 10 months into the adoption of EUDR, the respondents characterized the level of awareness as low (I2, I3, I4). Here is how one interviewee described the experience with local exporters:

I think now it might be a bit different, but a few months ago, the level of awareness in most origins, including Ethiopia on the EUDR was very low from the coffee sector. They had heard a little bit about it, but they (...) did not seem very concerned, not very aware of what would be the requirements, what they had to do. (I3, Group level Sustainability manager at MNC trader)

The participants also shared that **mistrust** toward the information about the EUDR requirements was not uncommon among exporters right after the adoption (I3) and can be still persistent among farmers with limited access to information (I4). A quote from a local stakeholder working in sourcing directly from producers:

So even for those who are having, like, basic education, they might say “What? What benefit I could get from this?” And then of course, you could tell them the benefit would be selling your coffee to the European market if it is in compliance with the EUDR but still (...) they wouldn't believe you actually. (I4, Sourcing specialist for SME trader)

The described atmosphere of uncertainty shows that a few simple rules (Choi et al., 2001) are yet to be established, and that the shared schema in this early stage of EUDR implementation is still missing in supply network.

Another prominent trend is the lack of legitimacy of imposing the EUDR requirements in the eyes of the local coffee industry. The traders and agritech shared that they repeatedly faced various opinions on the unfairness of the fact that the EU is telling them what to do (I2, I3). The participating producer said they did not think the EU understood the realities of coffee production in general and in Ethiopia particularly and that the same approach cannot be used in each country's unique circumstances (I7).

Moreover, the interviews revealed conflicting views on the coffee industry and sustainability even beyond the EUDR discussion. The sustainability professionals and SME traders' respondents highlighted that for Ethiopian farmers, coffee is a means of supporting their livelihoods, also intertwined with forest due to the tradition of agroforestry or growing garden coffee under the tree's shade (I1, I6), and therefore, serves to conserve vegetation, rather than to replace it. At the same time, in their opinion, those who are in trade (i.e. exporters, trader's procurement divisions, roasters) tend to be more opportunistic and view coffee as a commodity (I3, I6), with little interest to forest conservation in the context of coffee production. An illustrative quote:

(...) So far, the bulk of coffee in the world, it's about numbers, it's not about the drink, it's not about the trees, (...) it's trading. I mean, it's volumes and quotations and so on and so forth, right? And the bulk of exporters, that's how they look at things. So this law [EUDR] can really help some exporters to start looking a little bit in the direction of production. To see it not as trading, but (...) as cultivation, as processing and so on, but as production. So far, coffee is not about production. (I6, R&D Director at SME trader)

Thus, trade prevailing over sustainability was the historically dominant schema. Several respondents expressed the opinion that at this stage, EUDR was more of a compliance exercise to continue trade, despite playing a role to put sustainability discussion in coffee industry more mainstream (I3, I5, I6). The ongoing shift is the sign of convergence in the dominant schema between actors in the industry, as noted by one of the study participants:

We saw clearly the change over the last year in discussions with our clients with the coffee roasters mostly. Sustainability was usually one small part of the discussions. And now it's like the main topic in the agenda when we talk to them. (I3, Group level Sustainability manager at MNC trader)

4.1.4 High dimensionality as a challenge for control in supply network

Legal and standards

Legal factors were found to have the potential to influence EUDR's implementation both in various directions. On the one hand, interviewees pointed out that a specific regime of land ownership in Ethiopia is well-aligned with the requirements regarding the rights of indigenous people:

When it comes to land holding, land tenure, Ethiopia has a very strict regulation. (. . .) You cannot sell your land, but you can inherit to your children, you can divide to your family. Otherwise, land cannot be sold or [unintelligible]. This is one of the limitations, but I would see it the other way around. (. . .) If you privatize this, and if people with cash, with money, come and own your land. Actually, it goes well with EUDR requirements because we want to respect the right of indigenous people. Right according to the EUDR regulation, and our regulation also states the same. You cannot buy land from the farmers or displace them and own the land because you have the capital or the means to do so. (I1, Country Director at an international NGO)

Therefore, Ethiopian jurisdiction might be somewhat more welcoming for compliance with the EUDR's legality requirements. On the other hand, for traceability, the same land policy can be viewed as a limiting factor as reported by one of the traders:

(. . .) We have no assets in Ethiopia because, as far as I understand, for legal reasons, we are not allowed as a foreign company to have our own mills or own operations in Ethiopia. So that's why, contrary to, let's say, Brazil, Vietnam, or other key origins where we have people, in Ethiopia, we have just a few, small commercial team and sustainability people, but we don't have assets, so which makes traceability more complicated. (I3, Group level Sustainability manager at MNC trader)

That means that the Ethiopian land ownership regime, on the one hand, ensures better alignment with EUDR standards on land legality and indigenous people's rights protection, leaving less room for non-conformity due to state enforcement and effectively decreasing dimensionality in supply networks. On the other hand, it restricts the transmission of large importers' schema in the form of corporate standards to a subsidiary in Ethiopia since they cannot acquire land and infrastructure. In effect, it limits the number of options to reduce dimensionality for better expansion of the EUDR requirements in the supply network.

Power relations and Infrastructural factors

Power relations as a means of control were mentioned explicitly by several respondents (I3, I8). It's not that one or several companies were identified to exercise their market power; rather, it was a collective market power of the EU that the participants referred to. One dominant opinion was that the Ethiopian exporters either realized they had to comply to continue trading in the EU (I3, I5), or they simply had to find a solution to comply because no one wanted to lose the lucrative EU market (I6).

The role of agricultural and technical infrastructure in the Ethiopian coffee industry in enabling the EUDR requirements is a recurrent topic in many respondents' interviews. From a traceability perspective, this includes a lack of devices for geolocation collection among smallholder farmers (I2), difficulties in getting a GPS signal to collect such data (I1, I2, I5), and acquiring the correct coordinates due to many small plots of land situated closely to one another (I2), insufficient knowledge for collecting such data (I2), overall lack of qualified staff to collect and process the data (I2). Respondents also highlighted that tracking each bag of coffee and separating it at the mill or washing plant to ensure traceability is a technically challenging task (I2, I5, I6).

Also, participants pointed out that the state of agricultural technology in the majority of regions sometimes has not changed for dozens of years or maybe for a century or more, suggesting that introducing advanced traceability technology can be too much of a leap forward to realistically complete in such a short time (I2, I6).

To sum up, when combined, these factors may seriously impede the control over requirement implementation and monitoring, at least in the inception phase. Meanwhile, the EUDR, as a sustainability strategy, relies heavily on technology for control. From the CAS perspective, these technological drawbacks drive the system towards a more dimensional supply network.

4.2 Emergence and self-organization in supply networks

In this section, I will focus on three types of emergent behaviour in response to the EUDR introduction in the supply network. For this task, I developed a simple classification of responses. First is focused on sustainability strategy proliferation through mechanisms not imposed centrally by any agent. The second one is lobbying for alternative ways to ensure the goals of the strategy or postponing its enforcement. The last one is avoiding the requirements partially or completely.

4.2.1 Proliferation & facilitation

The first observed trend was the existing sustainability solutions adaptation and development specifically for the EUDR. Respondents representing these stakeholders confirmed that the EUDR introduction increased interest toward their products and sped up the adjustment of their offering for EUDR compliance (I1, I2, I5). At the same time, it triggered numerous new solutions, developing independently, sometimes standalone products for EUDR compliance (I1, I2).

The second trend was seeking new connections for the implementation of the requirements. Many respondents, especially NGOs and agritech mentioned interest from multiple agents in supply network for their solutions, but at the time of the study it was mostly in negotiations stage (I1, I2, I5). Although the interest in solutions is high, joining forces between traders or their buyers was not observed. Study participants explain it with the short timeline for the implementation (I3, I5). Here is how I3 describes the situation:

So there is a lot of effort now to map, to work with dedicated suppliers, to map the supply chains, go to the ground, collect geolocation data, because basically we need, companies need to do that. There's no one else that will do. There are in some countries some government initiative, but this is moving too slow and they won't be ready for the entry into application of the law. So that's why a bit, and that's in that sense, that's also wasted, waste of resource, because all companies go and collect, in some cases, the same geolocation data, the same farmers. There's no real, let's say, pre-competitive work. I think there is willingness for pre-competitive work. The time window between the entry into force and the entry into application was too short, really, because this takes time to reach agreement between companies and then with governments. And all companies have to rush to be ready to have enough coffee to deliver at the end of this year. (I3, Group level Sustainability manager at MNC trader)

Nevertheless, we can observe signs of new connections between agents and development of new offerings from solutions providers that are clearly not top-down initiatives and are not steered by any single agent. Instead, we see willingness for horizontal collaboration between actors not legally binded by EUDR and not dependent on any major buyer. Therefore, it can be characterized as an emergent behaviour in the CAS and signs of beginning self-organization.

4.2.2 Alternatives ways of implementation

A lot of attention at the time of the study was for the initiative suggesting the so-called territorial approach, which was mentioned by all respondents. While supporting EUDR's goal of zero-deforestation coffee, this collaboration between the Ethiopian government, an international NGO and a large MNC trader is an emergent response to perceived challenges in implementation of EUDR in Ethiopia. It departs from two points: (1) the level of post-2020 deforestation associated with coffee in Ethiopia is very low, and (2) mapping and processing land plots geolocation coordinates is technically impossible before the 30 December 2024 deadline due to vast number of smallholder farmers (I5). It suggests that the consortium joins forces and collects geolocation data on all of Ethiopian coffee-producing regions' terrain. Instead of mapping millions of smallholders, they shall verify regional scale data for post-2020 deforestation and focus only on identification of incompliance cases. The government shall commit to enforce the mitigation of minor incompliances and in exchange the EU shall declare Ethiopia deforestation-free for coffee, removing or postponing the need for plot-level traceability (I5).

At the time of the study there was no decision on the EU's side on the solution's eligibility, and some respondents doubted the perspectives since it does not align with the EUDR's requirements for "traditional" plot-level traceability, even though the declared goal of zero-deforestation is the same (I1, I2). Meanwhile, some also admitted they and others in the industry were quite hopeful of this development although they did not bet on it continued their traceability efforts (I3, I4, I7, I8).

This initiative is notable for the participation of the government, which, with the help of other agents, attempts to take the initiative in governing deforestation back to the national level. If it succeeds, this project can result in the de-facto creation of a national zero-deforestation governance regime.

Another trend appearing in the interviews were hopes for the postponement of the implementation. Although respondents have not admitted having these hopes themselves, they were referring to their knowledge of the tendencies in the industry (I3, I8). This sentiment is supported by the reported plead from the European Coffee Federation for the EU to delay EUDR's due diligence provisions (de Sousa, 2024). Nevertheless, at the time of the writing of this thesis in May 2024, the EU has not announced any such plans.

Regardless of how the EU will react, these initiatives reflect the emergence and self-organization in the system, arising from new connections between agents triggered by EUDR and resulting in new, unexpected solutions' proposal in response to its requirements.

4.2.3 Avoidance and evasion

The participants have expressed opinions on various circumvention practices that might occur as a response to EUDR's requirements inception, although only few can be observed at this stage.

First, many admitted that shifting sourcing geographies to a low-risk countries was possible (I1, I2, I4). However, the opinions on the current trend have parted. Some media (for example, Angel et al., 2023) and one of the study's respondents (I2) claimed there were hardly any orders coming into Ethiopia because of the fear that non-traceable (and potentially non-compliant) Ethiopian coffee might end up on the market after the date of traceability requirements coming into force. On the other hand, the producer and the respondents working in sourcing reported that there were no significant deviations (I4, I6, I7, I8).

When it comes to another potential pattern - shifting the trade to less regulated markets – the respondents expressed the opinion that the exporters would not want to lose the EU market (I2, I3, I6). Moreover, it was deemed doubtful that this amount of coffee can be absorbed by alternative markets (I2).

More prominent pattern that surfaced from the interviews was crop shifting. Many respondents feared that smallholder farmers, being unable to prove compliance with EUDR, will switch to other cash crops (I4, I7). Specifically, the participants mentioned khat – a popular local drug – will be planted instead of coffee (I4, I6, I7).

4.3 External factors

4.3.1 External environment dynamism

Throughout the interviews, many respondents underscored how Ethiopian context is different from other coffee-producing countries (I3, I4, I6, I7). In this section I will elaborate on how the external environment was found to influence the CAS of Ethiopian coffee supply network.

The major external factor that was brought to my attention by several respondents (I1, I4, I5) is the ongoing civil conflict in Ethiopia. The concrete consequences of this situation mentioned problems reaching some of the coffee-producing regions to gather the data for compliance (I4, I5), as well as to verify the deforestation data on the ground (I5) because of the concerns for security of the responsible personnel. I5 admitted they could not reach some of the major coffee-producing regions due to the ongoing instability in the country. A local interviewee mentioned that the current situation, could also lead to local authorities interfering with geolocation data collection:

(...) it's a civil war and then this political conflict is in most of the parts of the country that's occurring now, so maybe even if it is (...) your own farm and then you are going to take some expert who can make a mapping of your land. It should be maybe someone from the government or, if it is no expert, from the part of government. You should (...) tell them that you are going to measure or take some point... GPS point is for the purpose of certification (...), for the purpose of compliance for the EUDR, to analyze your farm deforestation. (. . .) still they may say no to you, actually, still being your farm. They may say no to you because they are there the government, (...) really having a problem with some rebel groups. So they think maybe the person is taking this GPS point to attack some part of government department or I don't know, (...) when you come to the politics (...) they take everything a bit complex. (I4, Sourcing specialist for SME trader)

And it is not just data collection, some producers struggle to harvest and sell their coffee on time because of the conflict (I5). Therefore, the instability influences the whole part of supply network in Ethiopia from producers to exporters.

From the CAS standpoint, interference of the rebel groups or the mentioned local authorities can be viewed as a spontaneous introduction and withdrawal of the new agents in the system – depending on how active the phase of the conflict is. Changing boundaries of the system is one type of dynamism according to Choi et al. (2001).

Though less Ethiopia-specific, the ongoing evolvement of the policy landscape is an important external development, too. EUDR sets new standards for agricultural supply networks to operate, and as mentioned by the interviewees (I2, I5), they are still to be clarified. In my chosen level of analysis, policymakers are external to the CAS, so the policy itself is a new dominant set of rules in the external environment that is undergoing a change. This suggests that another type

of dynamism – new rules and norms – is also present in the environment of the Ethiopian supply network at this point. Many respondents pointed out the unexpectedness of the EUDR and the short timeframe for the implementation (I1, I2, I3, I5) that was set for compliance as the factor influencing the rushed implementation. Although the timeframe for it is the same for all countries, some agreed that in Ethiopia it was more challenging to stay within it, than in other countries, due to the smallholder dominance in production (I2, I3, I6). Also, they expected further guidance from the EU on implementation (I2, I8) shows that the policy field is still evolving. As was discussed earlier in section 4.1.3 both these factors were found to have affected the agents' schema (they thought the EU does not understand their realities) and possibly impeded the increase in connectivity (forming alliances requires time).

These findings show there is significant dynamism in the environment both on the policy level and with regards to the security situation, which can interfere with physical access to the coffee-producing areas which the policy is supposed to reach.

4.3.2 Rugged landscape

The issue of spreading EUDR's requirements in Ethiopia through supply network was found hard to disentangle from other environmental, social and infrastructural aspects of the environment surrounding it — reflecting a rugged landscape of a CAS environment.

The interviews shown that coffee producers' livelihoods are inevitably on the way of EUDR's implementation in the coffee supply network. As several respondents noted, coffee cultivation supports many people's livelihoods (I1, I4, I6, I8). A respondent notes, that forest might be converted into agriculture under the pressure of growing population and subsequent economic needs. Therefore, if a farmer, especially a smallholder was to be found non-compliant, i.e. growing coffee on deforested land, most of the time forcing them to remove the coffee trees would mean pushing them further into poverty since they have no alternative for this land. That illustrates conflicting optimal states of the policy goals of zero-deforestation on the one hand and sustaining farmer livelihoods on the other. Developing this thought further, keeping the tree would render such farmers EUDR-incompliant, effectively cutting them off from the EU market and thus also exacerbating financial situation.

However, the interviews show that the bigger challenge might be *proving* zero-deforestation rather than achieving it without disrupting the system. Some claim there is only negligible deforestation associated with coffee production in Ethiopia after the EUDR's cut-off date (I1, I5). However, if the Ethiopian supply network fails to prove it, the respondents think it can cause coffee market disruptions (I5, I6).

The participants also found the concept of zero deforestation to be problematic in the realities of coffee production in Ethiopia. It has been noted that there was a set of farming and forest management practices that require some forest disturbance. These include managing the amount of shade under which coffee is grown by cutting the canopy of surrounding trees (I1, I4). Also, some trees might need to be cut down to make room for roads or other farm infrastructure (I1), and coffee trees themselves need to be replanted every 10-15 years, or their productivity will decline (I1, I4). Many respondents feared that these actions could be falsely classified as deforestation during the data verification process due to imperfections in remote sensing tools' deforestation detection or satellite data interpretation. These practices are highly connected with the coffee taste profile (I4, I6) for which Ethiopia is famous.

This leads to the conclusion that from the CAS's perspective, the Ethiopian coffee supply network is situated in a very rugged landscape, making it difficult to find an optimal state while trying to introduce the EUDR requirements. The implementation, if not accounting for these

other local optima, risks disrupting producer livelihoods, local coffee quality, and trade connections.

5 Discussion

5.1 Discussion against current knowledge

Discussion of RQ 1: What are the approaches and patterns of implementation of companies' EUDR-driven zero-deforestation strategies on a company level?

RQ1 can mostly be discussed against the findings from the literature on voluntary zero-deforestation commitments (ZDCs) since this field of knowledge is more focused on company-level action. My research corroborates some of the previous findings on implementing zero-deforestation strategies in supply chains yet adds to the existing knowledge by introducing the perspectives of previously underrepresented types of actors.

When it comes to approaches to implementation, the three trends identified - reliance on certification, working with service providers, and supply chain engagement – support some of Bager & Lambin's (2022) findings on companies' approaches to their voluntary ZDCs.

Certification proved to be a go-to instrument for the alignment of sustainability strategies with zero-deforestation requirements due to its high alignment with EUDR requirements. The interest from stakeholders in certification as a tool supports the findings of Bager & Lambin's (2022) and Jopke & Schoneveld's (2018) studies on ZDCs implementation approaches. Moreover, the results show that certificate holders are expected to be better positioned to comply with EUDR, which echoes the impact assessment (Bougas et al., 2021) preceding the EUDR adoption, Cesar de Oliveira et al. (2024) framework, and EUTR's experience (Köthke & Sotirov, 2024). However, since no evidence of change in demand for certification were not be observed, compliance through certification cannot be viewed as a dominant strategy in Ethiopia.

Second, other third parties referred to as “service providers” by Bager & Lambin (2022) were found to be an important aid in implementation. Most traders were in need of service providers for (1) collecting and compiling data and (2) offering existing capacities and serving as “boots on the ground” in the producing country. In literature on ZDCs these solution providers — “traders” and “orchestrators” (Bager & Lambin, 2022) or “specialist consultancies” (Delabre et al., 2023) were as much used by traders as other types - “organizers”, usually NGOs and multi-stakeholder initiatives who “ensure buy-in and legitimacy across their network, reaching across the supply chain to connect businesses to stakeholders, such as consumers and local governments” (Bager & Lambin, 2022, p. 9). My research shows that under policy pressure in the early stage of implementation, the importance increased for specialist consultancies, i.e., contractors physically present in Ethiopia with access to coffee-producing regions to collect geolocation data.

Third, direct supply chain engagement was found to be primarily concentrated on Ethiopian exporters and other intermediaries such as cooperative unions. Tasked mainly with supplier mapping and geolocation data collection, these actors' showed their value in being “on the ground” and having established connections upstream. These findings are congruent with Grabs et al.'s (2024) arguments for the crucial role of midstream actors in the implementation of companies' sustainability strategies in agri-food supply networks.

Overarchingly, these approaches suggest that the implementation process is significantly skewed toward achieving plot-level traceability. While traceability was earlier recognized as a cornerstone of voluntary zero-deforestation commitments (ZDCs) (Bager & Lambin, 2022; Lambin et al., 2018; Panwar et al., 2023) and sustainable food supply chains in general (Bastian

& Zentes, 2013), it is explained by the fact that EUDR has given the traceability requirement the status of “hard law”, effectively hardening corporate accountability (Berning & Sotirov, 2023). My research shows that in the early stage of EUDR implementation, the focus not only remained on traceability but perhaps even shifted towards it disproportionately. While horizontal collaboration for EUDR turns out to be in its infancy as it takes more time, stakeholder engagement proves to be very vertical, mainly to allow for the communication of demands and the exchange of data for compliance, sometimes collecting the same data for competing businesses. This traceability-focused action is in line with Zu Ermgassen et al.’s (2024) conclusions, who aptly described this tendency as “a race for companies to trace and measure compliance at the farm scale,” overshadowing the need for landscape approaches. A side-effect of this trend is the perceived low priority of other informational requirements of EUDR, such as proof of legality and verification for the absence of deforestation, which is surprising because non-compliance with them also can result in sanctions. This observation adds to similar findings from Marcotte-Oullet’s (2023) thesis on EUDR implementation perspectives in neighboring Uganda’s coffee sector.

Discussion of RQ 2: What are the emergent aspects of EUDR-driven zero-deforestation strategies’ implementation in supply network?

To answer RQ2, the responses to EUDR inception in the supply network were analyzed using the CAS framework. Discussion is complicated by the absence of studies using it to analyze the implementation of zero-deforestation strategies or policies’ requirements in agricultural commodities supply networks. Therefore, I used the closest study by Touboulic et al. (2018) on carbon reduction strategy in food supply chains to assess my contribution to the literature on sustainability strategies in supply networks. On the other hand, policy implications are discussed against existing literature on EUDR and FLEGT.

First, the inception of EUDR fueled non-orchestrated adaptation and innovation processes in the system that facilitated the implementation of its requirements. The entry of new agents in the system (emergence of new agritech offerings) and the change of schema of existing ones (adaptation of certification and agritech solutions) was not a top-down initiative. However, it can be argued that this innovation process was the result of both the pressure in the system, i.e. traders looking for new solutions, and the dynamic environment, i.e. EUDR as the change of rules and norms. This reinforces the concept of supply network as a CAS, being both influenced by the external environment and forming it (Choi et al., 2001).

From the policy perspective, the observed adaptation of certification schemes to EUDR requirements supports the findings of ongoing convergence of private certification and public policies (Zeitlin & Overdevest, 2021) and institutionalization of the former (Berning & Sotirov, 2023; Grabs, 2020) into new global timber legality governance regime. My study shows that the convergence is going beyond legality standards and expands to aspects such as traceability and risk assessment. However, Berning and Sotirov’s (2023) hypothesis on the decline of the role of private certification due to the introduction of stricter public policies such as EUDR is not supported at this stage.

Second, the system reacted with an alternative implementation mechanism, such as the territorial approach promoted by the Enveritas, JDE Peets, and the Ethiopian government. Notably, the most prominent and ambitious attempt to advance the zero-deforestation strategy under EUDR has come from a consortium. Even though the results are yet to be seen, this is a significant shift in the system’s boundaries, moving the implementation in a new direction. Thus, my research provides further evidence of the critical boundary-spanning role of consortia as agents for the proliferation of environmental strategies (Touboulic et al., 2018).

When embedded in the larger policy perspective, the consortia's emergent response to EUDR development can be interpreted in light of existing studies on the reception of timber legality policies. Particularly, Partzsch et al. (2023) have found that timber-producing countries (e.g. DRC and Indonesia) established their own timber legality standards in response to FLEGT to preserve sovereignty in sustainable forest governance. My research supports Partzsch et al. (2023) proposition that in response to market deprivation by foreign sustainability governance regimes, national governments aim to preserve their sovereign authority and look for ways to circumvent such regulation. My thesis also adds to this knowledge, showing that this trend extends beyond timber legality policies to stricter forest-risk commodities regulations like EUDR.

Furthermore, my study adds knowledge on the practice of evasion and avoidance as a response to supply chain policies aimed to stop deforestation in several ways. On the one hand, the shifting of trade to less regulated markets has shown to be not the main pattern, contrary to many previous studies on FLEGT and other zero-deforestation supply chain initiatives (Acheampong & Maryudi, 2020; Lambin & Furumo, 2023; Panwar et al., 2023; Partzsch et al., 2023; Roe et al., 2014). My findings show that this type of behaviour can be less dominant under two conditions. First is the share of imports to the policy-implementing country is sufficiently high, so alternative markets cannot absorb these amounts of non-compliant commodities. Second is the demand for other cash crops that can sustain farmers' livelihoods. Indeed, crop shifting, especially to the local drug *kebat* and eucalyptus trees, was identified as the most likely way to avoid EUDR requirements in the Ethiopian context. Acheampong and Maryudi (2020) described similar pattern in timber producers' response to FLEGT as "quitting", implying that the economic agents switch to other sources of income. Conversely, the high share of imports of coffee to the EU was earlier considered by Cesar de Oliveira et al. (2024) as a factor increasing EUDR compliance likelihood. I explain the difference in approaches by contextual factors, specifically smallholder dominance in Ethiopian coffee production. Brazil has more large coffee plantations, where crop switching would mean cutting a large amount of coffee trees at once. In Ethiopia, with its "garden coffee" dominance, an average farmer would need to replace several trees to plant other crops instead, which is an easier task. Thus, my research adds new knowledge on the patterns influencing emergent responses among producers in various geographies and settings, particularly in smallholder-dominated supply networks with a potential of growing other crops.

Viewing the attempts to lobby the postponement of EUDR as the emergent behavior in response to the policy, my study also adds evidence of a larger trend of persisting attempts of economic agents to delay or suspend the European Green Deal measures (Eckert, 2021).

Discussion of RQ 3: What are the main factors influencing the implementation of EUDR-driven zero-deforestation strategies' in supply network?

After analyzing the implementation of EUDR-driven sustainability requirements via the CAS framework, several main factors were found to be likely to influence the process.

The early stage of implementation is characterized by the **vacuum of sustainability schema** on different levels. Similar to previous studies on EUDR and FLEGT, the producing country's upstream and midstream tiers of supply networks were characterized by a lack of awareness of the regulation (Köthke & Sotirov, 2024; Raluca & Nichiforel, 2011; Roe et al., 2014), uncertainty, and/or lack of guidance (Gavrilit et al., 2016; Marcotte-Ouellet, 2023; Roe et al., 2014) about its requirements and implementation. Also, in parallel with Touboulie et al. (2018) observations, the producers were suspicious of the real aim of the new sustainability requirements that the traders told them about and even questioned its realness. Another, more

systemic difference was the varying presence of sustainable production and forest conservation in the agenda of different actors. The bulk of midstream (trade-oriented) agents tended to view coffee in terms of trade only rather than production, with sustainability and deforestation being low-priority topics, which are not aligned with sustainability departments or individual employees of the buyers tasked with EUDR implementation. This trend supports the findings of Touboulic et al. (2018) on the deterring effect that the difference in procurement and sustainability teams' schema has on the proliferation of sustainability strategies, and zero-deforestation strategies in particular (Bager & Lambin, 2022), with EUDR following the same pattern.

These patterns were explicitly connected to difficulties in introduction and proliferation of new requirements by my study respondents. It, therefore, supports Touboulic et al.'s proposition that the **non-alignment of sustainability schema between the agents** within supply networks **decreases the likelihood that the sustainability strategy will be realized**. My thesis also extends this proposition's application to other contexts, such as supply networks not dominated by a single large buying firm and implementation of zero-deforestation supply chain initiatives.

The implementation was also subject to the influence of two internal factors: high dimensionality and varying but generally low connectivity in supply networks. For dimensionality (high degree of autonomy of actors), explanation lies in a combination of legal, institutional and infrastructural factors. Due to specific land ownership policy, large traders could not extend their control in the form of corporate standards and processes further into supply network, by acquiring farms, mills, and other intermediary infrastructure. This led them to heavier reliance on third parties and supply chain engagement (as shown above in the discussion of RQ1), increasing the number of layers and complicating control in supply network. Control in EUDR is also supposed to be enforced by means of satellite monitoring and traceability technology. But in the case of Ethiopia, low rates of technological uptake and literacy among producers, scarce and slow network connection and the lack of human resources with relevant training to collect and process the required data complicates the implementation. The number of layers and smallholder dominance in production also resulted in lower connectivity for some MNCs, i.e. not always knowing who their suppliers are beyond first tier. Against this picture, specialty SMEs had stronger connectivity in their supply networks due to *relationship coffee* models based on traceability as a competitive advantage.

In simpler terms, limited presence “on the ground” in the producer country due to legal reasons, coupled with infrastructural limitations complicated EUDR implementation process against the tight deadline for large buyers with larger supply networks. Whereas smaller buyers despite not having much market power, generally had more smooth traceability experience due to closer relationships and “data-hungry” (Touboulic et al., 2018) business models. Taking it to a more abstract level, in systems with high dimensionality, greater pre-existing connectivity provides higher potential for implementation of traceability-based sustainability requirements.

Due to different level of analysis compared to Touboulic et al. (2018) study, my research takes into account different external factors, influencing the implementation of sustainability strategies and the emergent behaviour in supply networks. The introduction of EUDR as a part of the external policy environment, especially with the deadline set for compliance, was perceived as quite unexpected and time-pressing, supporting Marcotte-Ouelett's (2023) findings from Uganda. As a result, uncertainty and sometimes panic caused by this development influenced the schema of the supply network agents, as discussed earlier in this chapter.

Conflict and political instability further complicate implementation

Equally important factor in the context of implementation is the ongoing civil conflict in Ethiopia with militant activities breaking out since 2018 in multiple regions across the country (“Ethiopian Civil Conflict (2018–Present),” 2024), including several coffee-producing ones. Despite some EU’s communication that farmers can collect the geolocation themselves, the discussion of RQ1 and RQ3 reveals that the collection of geolocation data for traceability systems is often commissioned by traders to third parties and therefore requires travel of skilled personnel to production sites that may be located in the conflict zone. Moreover, the overall emergency state can cause the local authority treat geolocation data collection with suspicion. Armed groups interests are known to interfere with implementation of FLEGT in DRC, to preserve illegal timber trade as a source of financing their operations (Partzsch et al., 2023). My research adds to knowledge on the implementation of traceability-based supply chain policies in the conflict setting. My results demonstrate that the conflict factor further complicates upstream traceability by preventing data collection or downgrading its quality. This issue has not been brought up in the reviewed literature on zero-deforestation supply chain initiatives. However, these findings are in line with the research on traceability of minerals mined in conflict zones (for example: Calvão & Archer, 2021), suggesting that conflicts as external factors may affect traceability implementation in different supply networks in similar patterns.

Finally, the implementation of EUDR’s requirements is subject to interconnections of systemic factors in coffee production that are hard to isolate, reflecting the *rugged landscape* of the external environment. The literature on EUDR underscores a challenge of smallholders to adapt due to high transaction costs (Bougas et al., 2021) and could effectively push them to marginal lands and reduce economic independence (Zhunusova et al., 2022). While my thesis presents further evidence of potential economic hardship for farmers due their potential disengagement from supply networks for non-compliance, I also put this narrative into the larger implications for production of coffee as an agricultural commodity. My study demonstrates that supplier disengagement and potential shifting of other crops as a result of EUDR implementation has the potential to lower the volumes of production of coffee itself, the overall number of producers, and thus reduce the diversity of tastes available at the origin. In other words, supply networks, especially in the midstream, are squeezed between ensuring zero-deforestation and preserving the supply and unique quality of a product that adds value, as also earlier noted by Grabs et al. (2024).

5.2 Reflecting on results

In this section, I revisit my approach to the research and reflect on the methodological choices, research questions and broader implications of my study.

The choice of CAS framework proved to be appropriate to capture the complexity of responses in supply network and its adaptation to the challenges of implementation of a new sustainability strategy and evolving policy environment (Touboulic et al., 2018). The framework allowed to capture analyse some of the early-stage emergent responses in supply network in response to EUDR requirements introduction, which was one of the goals. However, during the research process it became evident that many of the elements in CAS framework favour the analysis of less recent developments than EUDR, to draw conclusions with more confidence and to allow more evidence-based discussion, rather than based on projections. After all, “In a complex system, it is often true that the only way to predict how the system will behave in the future is to wait literally for the future to unfold.” (Choi et al., 2001, p. 356).

The qualitative design of the study of the “model” supply chain turned out to be a good fit, allowing to collect the perceptions of a various supply network actors without being confined

by the limitations of a case study approach, used previously by Nair et al. (2016) and Touboulic et al. (2018) when applying CAS to supply networks. Due to Ethiopian supply networks opacity and the remote contact to the agents within, the suppliers lower than tier 1 or 2 would be nearly impossible to contact. This rules out a single- or a multiple-case study without being embedded into this supply network, the setting that was never on the table.

The logic of the research questions proved to be justified, since the materials collected underlined the disparity between the expected implementation of the policy requirements by companies and the emergent responses in supply networks. However, after analyzing the respondents' interviews, the notion of EUDR requirements as a comprehensive corporate zero-deforestation strategy in the RQs at this point could not be supported, since traceability was almost the only topic on the agenda. However, it does not invalidate the RQs in principle, since the respondents could omit strategic efforts beyond traceability willingly (e.g. proprietary information) or not (e.g. did not see it important enough). Therefore, more research is needed to answer the RQs in a more comprehensive manner, with systemic focus on all aspects of EUDR implementation (i.e. legality due diligence, deforestation-free verification, etc.) in supply chains.

The generalisability of the results was to an extent consciously limited by the conceptual framework. Conceptualization of supply networks, as CAS explicitly states that the degree of control is limited, and therefore their behavior is hard to predict (Choi et al., 2001). Nevertheless, the same conceptual framework acknowledges that *the future is non-random* (Choi et al., 2001), so the analysis of the processes in supply networks reveals certain patterns. I would argue that the results for RQ1 are the most generalisable since they focus more on the actions to a large extent controlled by the traders. In turn, the agricultural commodities supply chains have “an hourglass shape,” meaning that traders (situated in the middle) are relatively few, while there are, by a wide margin, more downstream and upstream actors (Grabs et al., 2024). Therefore, a small sample of this study is less of a limiting factor for drawing conclusions on this group of stakeholders.

Drawing a link from RQ1 to RQ2 and RQ3, while being rooted in the data from one country and one commodity supply chain, they supplement each other to provide a bigger picture. By that, I mean that the more descriptive nature of results for RQ1 and RQ2 is explained by results from RQ3, allowing us to navigate which results can be generalized and under which circumstances. Last but not least, while comparing the results for RQ2 and RQ3 against the existing knowledge, there are many similarities with findings from the studies not focused on coffee supply chains, nor on Ethiopian (or even African) context, reinforcing the idea of *non-random future* in the supply networks (Choi et al., 2001).

Nevertheless, the results have a number of limitations, including the geography- and commodity-specific context and the implications of conducting the study remotely.

First, fewer respondents replied or agreed to an interview than it was expected; therefore, the primary data was collected not from all tiers in the supply network, and the overall sample is modest. In the case of MNC traders, service providers (for traceability and monitoring), and cooperative union representatives, many declined due to high workload and getting too many interview requests because of EUDR being high on the agenda. Besides, the respondents were limited in sharing sensitive and proprietary information about the details of their environmental strategies implementation. Therefore, they were more inclined to share the attitudes in the industry and the reactions of the stakeholders. This resulted in more saturated findings regarding views and values (*schema*) of the agents within CAS and less evidence of the role of other elements of CAS in influencing the EUDR implementation process in supply networks.

Second, the differences in network connectivity that were found to depend on sourcing models for commercial grade and specialty should be generalized with caution. Few crops have such a developed specialty market and, more importantly, capitalize on marketing the traceability to plot level as coffee does. Therefore, the example of coffee SMEs may not be applicable to other crops.

6 Conclusion

This study was conducted with the aim of formulating distinctive patterns in company's efforts to implement EUDR requirements, revealing the resulting supply networks' responses and the factors shaping them. Thereby, it set out to contribute to more informed policymaking and monitoring, as well as to corporate sustainability strategy formulation and execution in supply networks. To date, the research on the implementation of deforestation-reduction policies operationalized via supply chain due diligence in companies' multi-tiered supply chains has not received significant attention in the academic literature. This thesis addresses this gap by answering three research questions (RQs):

RQ1: What are the approaches and patterns of implementation of EUDR-driven zero-deforestation strategies by companies?

RQ2: What are the emergent aspects of EUDR requirements' implementation in supply networks?

RQ3: What are the main factors influencing the implementation of EUDR-driven zero-deforestation strategies in supply networks?

6.1 Conclusion and the answers to the research questions

The *RQ1* can be answered as follows. The current approaches largely rely on third-party tools and mechanisms for implementation of zero-deforestation and broader sustainability strategies pre-dating EUDR, like eco-certification and more specialized service providers for collection and verification of the data in supply chains. The interest in service providers has increased under the pressing EUDR deadline due to the necessity to map and verify large amounts of suppliers that were previously not visible to focal firms. Collaborations with other stakeholders such as NGOs are also in demand since they possess a large network of connections and expertise at the crop origin, but their contacts with companies are mostly in the negotiations stage. When it comes to mobilizing the company's own resources for implementation, only the MNCs can afford to have in-house dedicated sustainability teams and GIS specialists and additional investments, but even they experience insufficient presence in producer regions. On the other hand, direct supply chain engagement is practiced by both MNCs and small and medium enterprises (SMEs), primarily engaging producer-country-based midstream actors such as exporters and other intermediaries to reach out and map the massive producer network. Overarchingly, the approach to implementation at the early stage is characterized by heavy prioritization of the traceability requirements of EUDR. Coupled with a tight deadline, it has further verticalized the interactions between the large EU traders sourcing predominantly from first-tier intermediaries and other actors upstream in supply networks to serve the main purpose of passing demands for traceability and transfer of geolocation data, without providing incentives or establishing cost-sharing schemes.

For *RQ2*, it was concluded that EUDR requirements implementation emerges in a multidirectional manner, not necessarily predefined by the policy. A simple classification of the emergent aspects of the implementation was developed. The first category, facilitating, consists of developments in supply networks providing tools and creating capacity for the strategy proliferation. It includes alignment of the standards of existing private sustainability schemes with EUDR, development of new offerings for EUDR compliance from stakeholders in agriculture digitization. Moreover, new, horizontal (i.e. non-focal-firm-initiated) connections between the actors in supply network were slowly establishing, like NGOs and farmers

cooperatives' unions negotiating with agritech to proactively map farmers estates to facilitate traceability. The second category, deterrence, was the reaction in supply network to influence the implementation in a way that would be more plausible for its agents. Two dominant ways of action were various groups of supply network actors (1) joining forces to negotiate the establishment of a territorial approach to achieve the policy goals, or (2) to postpone the implementation. Finally, avoidance or evasion of the requirements constitute the third category of emergent behaviour. The most possible reaction is producers, particularly smallholders, switching to growing other, non-regulated crops to sustain their livelihoods.

RQ3 can be answered as follows. The implementation process was influenced both by factors internal and external to supply networks.

Internally, the early stages of the implementation were characterized by slow dynamic due to the lack of unified *schema* (rules, norms and values) between agents in supply networks regarding the aim and mechanisms of the implementation of EUDR requirements. This aspect was preconditioned by the low awareness of the regulation, lack of guidance on compliance, and more systemic differences in dominant views of various groups on the role of sustainability in coffee industry. High *dimensionality* (the degree of autonomy of suppliers) and varying *connectivity* (the number and strength of bonds between agents) were other internal factors, particularly influencing the supply networks' "starting positions" in implementing traceability. *Dimensionality* was high due to limited presence in the producing country for legal reasons, lack of market power for SMEs, and low technological uptake and literacy. Meanwhile, *connectivity* was higher for sourcing models with more direct relations with producers and, therefore, a more streamlined supplier mapping process, and lower for first-tier-supplier-based sourcing models with higher supply network opacity.

Furthermore, the **external** environment dynamism, including the sudden change of policy background that EUDR constituted and the fluctuating security situation in the country, impeded the implementation. The EUDR introduction was unexpected and mismatched the internal state of development in Ethiopian coffee supply networks, particularly the one of agricultural infrastructure and the labor market, to manage the introduction and functioning of traceability technology. Lastly, the ongoing civil conflict interfered with data collection for traceability purposes.

6.2 Practical implications and avenues for further research

This thesis presents several implications for policymakers, practitioners, and the academic community.

Several lessons can be induced for businesses implementing EUDR or similar zero-deforestation supply chain regulations that are being discussed. The role of standalone services for traceability and satellite monitoring increases, but so does their number, which shall make their offering more accessible. Despite this, firms without strong connections in the supply network might be at a disadvantage while trying to implement the traceability requirements even with the increased offering. Data collection at origins still largely depends on suppliers. This speaks to the need to combine third-party services and supply chain engagement, as they are not fully interchangeable. However, despite the initial urge to throw all the resources into achieving plot-level traceability in their own supply network, firms are recommended to seek pre-competitive collaboration as early as possible to avoid wasting resources on "double-mapping" the suppliers. Of course, all the listed approaches require financial and human resources, and my thesis underlines once again that midstream actors are already extremely "squeezed" from both downstream and upstream. Therefore, this study draws attention to the

need for downstream firms, such as retailers and consumer brands, to allocate more resources for supplier development and cost-sharing schemes.

From the policy perspective, by demonstrating the emergent responses of the agents in the Ethiopia-EU supply network, the study has three main implications. First, the demand-side deforestation-reduction interventions might not be enough for successful implementation even in the countries highly dependent on EU's market. Without additional incentives, actors in supply chains will seek ways to avoid the requirements, so there is a need for prioritization of multi-stakeholder collaboration. The Enveritas - JDE Peets - Ethiopian government consortium's example shows there is demand for such collaborations that the EU could have taken advantage of. Second, the mentioned initiative supports the notion that traceability is not a silver bullet for stopping deforestation. Difficulties in collecting plot-level data can impede the introduction of traceability. Allowing for the option of landscape/jurisdictional approach in the policy design as a gradual introduction can make the policy implementation more flexible. Third, as banal as it sounds, context-specific factors must be taken into account during the implementation in various producing countries. Perhaps the experience of VPA in the part that involved consultations with the local stakeholders could complement the implementation of EUDR-like mandatory due diligence policies and be used as a platform to increase awareness and reduce uncertainty of the requirements which my research exposes as an impeding factor for implementation.

The academic contributions of my thesis are threefold. First, it expands the practice of application of the CAS framework to supply networks. It demonstrates that its components are appropriate for capturing the complexity of the processes in multi-tier supply networks in the context of policy requirements implementation. Particularly, by applying the concepts of internal mechanisms and the external environment of the system, I expose how their interplay impedes or facilitates the proliferation of EUDR requirements. Second, my research contributes to SSCM literature by adding knowledge on sustainability strategies proliferation beyond the first tier and adds details on the role of midstream actors as its agents. Third, it generated knowledge on the implementation of EUDR as a novel demand-side zero-deforestation policy. This was achieved by synthesizing the responses of Ethiopian coffee supply network to EUDR in the early-stage implementation and putting it into the context of existing knowledge on public and private policies on timber legality and zero-deforestation in agricultural commodities.

The limitations of this study suggest further research should fill the existing gaps by conducting more longitudinal studies by testing the possible emergent responses against the observed ones and drawing revised conclusions on underlying patterns. Further research could also employ a combination of methods, particularly combining semi-structured interviews with field observations, to get more granular primary data from all types of agents in supply networks. Moreover, quantitative research is needed to supplement the knowledge on the relative influence of various factors on requirements implementation with data quantifying and explaining interdependencies in more detail. Lastly, knowledge is needed on the implementation process in other geographies and supply chains of different commodities. Building on these results, further research will have more knowledge for assessing the effectiveness of the policy in achieving its aim of stopping agriculture-driven deforestation.

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Appendix 1 – Consent form template

-----Beginning of the form-----

The influence of European Union Deforestation Regulation on Agricultural Supply Chains: The Case of Ethiopian Coffee project

CONSENT FORM

This form is to ensure that you have been given information about the Influence of European Union Deforestation Regulation on Agricultural Supply Chains: The Case of Ethiopian Coffee (working title) project and to allow you to confirm that you are willing to take part in this research. For all activities below, please indicate which applies to you (*checked box indicates consent*):

<input type="checkbox"/>	I have been familiarised with the Influence of European Union Deforestation Regulation on Agricultural Supply Chains: the Case of Ethiopian Coffee project, I have had the possibility to ask questions and I have received satisfactory answers to my questions before being interviewed
<input type="checkbox"/>	As a research participant, I am aware of my right to withdraw participation at any time
<input type="checkbox"/>	I give my consent that the interview can be recorded in writing , translated and analysed
<input type="checkbox"/>	I give my consent that the interview can be audio- or video-recorded , transcribed, translated and analysed
<input type="checkbox"/>	I give my consent to be identified by my organization , whereas the organization will be identified by the nature, geography and scale of its operations only
<input type="checkbox"/>	I understand that the results of the research will be presented so that no information can be traced to me personally / I have been informed that pseudonymity of participants will be ensured
<input type="checkbox"/>	I give my consent that a record of my interview can be safely stored for future reference
<input type="checkbox"/>	I have been informed who will benefit from the participation
<input type="checkbox"/>	I have been informed how data will be either destroyed or reused at the end of the research
<input type="checkbox"/>	I have been informed of the secondary use of data

Note: Your participation is voluntary. As an interviewee, you do not have to answer all the questions that are asked; you reserve the right to refuse or cease participation in the interview process without stating your reason and may request to keep certain materials confidential. In addition, you have the right to review any summary or synthesis of the interview at any time up until the data is actually published.

There will be no monetary payment for participating in the research, but you will have contributed to a research project that generally aims at improving people’s lives by adhering to the climate target set in the Paris Agreement.

Please, sign below to confirm your consent – digital signatures are possible:

	Participant(s)	Researcher(s)
Name(s)		Sergei Sorokin

Signature(s)		
Date(s)		

INFORMATION SHEET

This research is a thesis project for the fulfillment of the Master of Science in Environmental Management and Policy program at the International Institute for Industrial Environmental Economics, Lund University, Sweden. It is individual work that receives no external funding and is not commissioned by any third party.

Description of the Research Project

The project under the working title “The Influence of European Union Deforestation Regulation on Agricultural Supply Chains: the Case of Ethiopian Coffee” (hereinafter the “**project**”) is designed to obtain a more nuanced understanding of how European Union Deforestation Regulation (EUDR) requirements are being received by stakeholders in agricultural supply chains at an early stage of their implementation. Therefore, it aims to inform the decisions of policymakers pertaining to the assessment, implementation, and overall design of demand-side regulating environmental policies and of the businesses adapting to them. As a result, it will provide recommendations for policy makers, actors in the coffee value chain, and will outline directions for further research based on scientific evidence on how deforestation reduction environmental strategies stemming from supply chain due diligence regulations disperse through supply networks, what constraints on their proliferation the local context might impose, and what emergent processes occur in response. Thereby, the focus of this project relies mainly on the behavior of Ethiopian supply network actors in the spheres of organization management, as well as trade and production of coffee.

Research on EUDR due to its novelty (entered into force in June 2023) is scarce, while official assessments tend to overlook the magnitude and heterogeneity of the challenges actors in supply chains of agricultural commodities may face in different national contexts. For instance, limitations in technological capacities or intricacies of land tenure. This project addresses these factors by analyzing perspectives of various stakeholders including the ones from a producer country with a complex geographical and socio-economic context — Ethiopia. The project approach recognizes the importance of the emergent aspect of environmental strategies implementation beyond the immediate reach of the buying companies at the end of the value chain.

The research results benefit the general public and society as a whole; they are not used to satisfy the special interests of individuals.

Purpose of the Interview

Therefore, as part of this research project, we invite you to an interview. We would like to learn more about:

- *The impact of EUDR requirements and/or subsequent environmental strategies of the affected firms on you or your organization and your response to them*
- *The contextual factors including drivers and challenges that influence the proliferation of the EUDR requirements in supply chains*
- *The potential side effects of sustainable lifestyles on other areas of life, such as social cohesion /solidarity and health*

The collected information will be used to produce an academic paper — a Master’s thesis. The research might result in further academic publications, online blogs, social media, other online publications, events (workshops, conferences, etc.), and other forms of communication.

Data Management

All the data for this project is collected and stored in accordance with the General Data Protection Regulation (GDPR) 2016/679 of the European Union, which entered into force in May 2018. The regulation protects individuals regarding the processing and collection of their personal data. All the research materials, including the participants' data will be securely stored for 10 years. After that time period, any personal data collected will be deleted. In addition, data will be deleted at any time on request of the participant. From the beginning of the process, pseudonymization of personal data is applied. Pseudonyms will also be used for further processing the responses. Special attention is paid to direct quotes, for which we will use indirect identifiers (such as region, role, work experience in the industry) in the transcription protocols, so that they cannot inadvertently identify respondents. At any stage of the project, the research participants have a right to gain access to their own personal data, request data correction or limitations to how their data is processed. Participants can also file a complaint about how their personal data is used.

For any inquiries regarding this research, please contact:

Sergei Sorokin

IIIEE / Lund University

Email: [email address]

-----End of the form-----

