From Bean to Green: EU Deforestation Regulation and the Soy Supply Chain

MASTER THESIS
FEMKE WEERDENBURG

From Bean to Green: EU Deforestation Regulation and the Soy Supply Chain

A Cross-Sectoral Analysis of Corporate Social Responsibility and Compliance with the EU Deforestation Regulation

Femke Weerdenburg

Master's thesis

Submitted in partial fulfillment of the requirements for the degree

MSc Climate Studies

Student number: 1036670

Nieuwegein, 9 November 2023

MSc Thesis Environmental Policy Group

ENP-80436

Supervisor: Dr. Ina Möller

Second reader: Dr. Ellen Mangnus

Table of contents

Acknowledgements

The realization of this thesis would not have been possible without the support of some people. First, I would like to express my gratitude to my supervisor, Dr. Ina Möller, for the supportive feedback, inspiration, and words of encouragement. Your words: 'Relax, take it easy, writing your thesis is hard work!' reminded me to enjoy the process while also taking care of myself and keep doing the things that I love.

I would also like to thank the interview respondents for their time and willingness to share their expertise about sustainability and supply chains. Your interest and inspiration added an enjoyable dimension to writing this thesis.

Finally, I would like to thank my friends and family for their support and encouragement. While most of you wondered when I would finally finish my thesis, your patience is finally rewarded.

Last but not least, I am extremely grateful for the unconditional support and love of my boyfriend, who has been there for me during the highs and lows of writing my thesis. I know that it was not easy living with me and my 'thesis dipjes', but that never stopped you from believing in me (even more than I believe in myself).

Abstract

Companies operating within the European Union soy supply chain are responding to the EU Deforestation Regulation (EUDR) by aligning sourcing practices with the recently implemented regulatory requirements. The EUDR targets high-risk commodities, such as soy, involving stakeholders like traders, feed and agricultural companies, meat and dairy producers, and retailers. These companies are translating regulatory requirements into corporate social responsibility (CSR) policies, emphasizing sustainability, transparency, and responsible sourcing. Deforestation-free commitments are prominent, aligning with EUDR goals and setting ambitious target years. Traceability gains focus through third-party verification, though buying credits is not allowed under the EUDR. Collaboration is vital, with stakeholders engaging in cooperatives for collective responsibility. The power struggle between EU sustainability objectives and corporate interests is evident in policy implementation, with lobbying and shaping policies in favour of agribusiness. Differentiated supply chain types reveal unique dynamics, emphasizing major soy traders' influence in open supply chains and the importance of transparency and localization in closed and organic supply chains. Global supply chains face complexities, and collaborative efforts offer promise in addressing deforestation challenges.

Keywords: EU Deforestation Regulation (EUDR), soy supply chain, sustainability, CSR policies, power struggle

List of acronyms

ABCD	ADM, Bunge, Cargill & Dreyfus
ADM	Archer Daniels Midland Company
CBL	Centraal Bureau Levensmiddelenhandel
	(Dutch Food Retail and Food Service Association)
CoC	Chain of Custody
CSDDD	Corporate Sustainability Due Diligence Directive (EU)
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive (EU)
ECSR	Environmental Corporate Social Responsibility
EEA	European Environment Agency (EU)
ESG	Environmental, social and governance
EU	European Union
EUDR	European Union Deforestation-Free Regulation
FAO	Food and Agriculture Organization (UN)
FEFAC (SSGs)	European Feed Manufacturers' Federation (Soy Sourcing Guidelines)
IP	Identity preservation
LDC	Louis Dreyfus Company
LUC	Land use change
Nevedi	Nederlandse Vereniging Diervoederindustrie
	(Dutch Feed Industry Association)
RTRS	Round Table on Responsible Soy
SDG	Sustainable Development Goals (UN)
SMEs	Small and medium-sized enterprises
WWF	World Wide Fund for Nature

List of figures

List of tables

Foreword

As part of the MSc Climate Studies, I had the opportunity to do an internship and be part of the sustainability team of the biggest Dutch food retailer in the Netherlands. The retailer is a supermarket brand of one of the world's largest food retail groups, which owns multiple supermarket chains in Europe, Asia, and North America. During the internship, I gained knowledge in sustainability reporting, such as calculating, disclosing, and reporting CO2e emissions, engaging suppliers in the supply chain and communicating the results. I also got an understanding of setting realistic sustainability goals and targets, and the dynamics within and between companies in the retail supply chain. This internship experience sparked an idea in me to use the knowledge I gained to use as the basis for my master's thesis research.

1. Introduction

The cultivation of soybeans has been intricately linked to deforestation in South America, a concern that resonates far beyond the region's borders. Export-driven agriculture to regions such as Asia and the European Union has been largely responsible for forest loss in South American biomes such as the Amazon and the Cerrado. To tackle this issue across a wide range of commodities that have a high risk of deforestation, the European Union has recently implemented the Regulation on deforestation-free products, or the EU Deforestation Regulation (EUDR).

1.1. Introduction to the Soy Supply Chain and Environmental Regulations

1.1.1. Soy as a critical commodity

Soy is particularly interesting given its environmental impacts: the production of soybeans is highly dependent on land use, fertilizer, and pesticides. One of the main drivers of soybean-driven deforestation is the high demand, particularly for the livestock industry, including poultry, pork, and cattle. Soybean meal is widely used in animal feed because it is high in proteins, necessary for the growth and development of animals ((FAO, 2003). In addition, it is also a cost-effective and high-quality ingredient, making it an attractive option in animal feed. As indicated by Ritchie & Roser (2021), 77% of global soy is used to feed animals, especially for poultry and pork.

The United Nations projects that the global population could exceed 10 billion by the year 2100 (UN, n.d.-b). Consequently, the demand for food will also increase, putting more pressure on the environment and the Earth's natural resources. Moreover, this trend is further intensified by a shift in dietary preferences, particularly in the direction of animal-based proteins such as meat and dairy, especially in Southeast Asia (Lee & Hansen, 2019; Voora et al., 2020). As a result, more soybeans are needed to feed the livestock industry, increasing soybean cultivation.

1.1.2. Soy and plant-based diets

On the contrary, in Europe and other developed nations, a notable shift is occurring towards adopting plant-based diets, characterized by the increasing popularity of meat substitutes and plant-based milk alternatives (Voora et al., 2020). Soy is an important staple in a plant-based diet due to its high versatility and nutritional benefits such as its high protein content (Rizzo & Baroni, 2018). Furthermore, transitioning from animal proteins to plant-based proteins would also enhance sustainability. Research indicates that adopting this dietary change could lead to a substantial reduction in an individual's carbon footprint, ranging from 61 to 73% (Poore & Nemecek, 2018).

Moreover, this shift not only reduces greenhouse gas emissions but also lowers land use and water consumption in comparison to animal agriculture (Hayek & Dutkiewicz, 2021).

Noticeably, the EU's Farm to Fork Strategy (2020) recognizes the need to move to a more plant-based diet to make food consumption more sustainable and reduce environmental impacts (European Commission, 2020). However, the European Union is receiving resistance from the livestock industry and meat and dairy companies concerning their climate legislation (Lazarus et al., 2021; Scott-Reid, 2023).

1.2. Environmental Challenges and Sustainability Concerns

The relationship between soy production and deforestation has become a significant environmental concern in the last few years. As one of the world's largest agricultural commodities, soy plays an essential role in several industries, such as food, feed, cosmetics, and biofuels. However, the expansion of soy cultivation has been associated with widespread deforestation in key regions, particularly in the Amazon rainforest and other sensitive ecosystems in South America (Fehlenberg et al., 2017). Barona et al. (2010) argue that soybean cultivation is an indirect cause of deforestation. This is because soybeans are grown in regions previously used for cattle ranching activities, which displaces pastures further into forested areas. In essence, croplands are replacing pasture, leading to a major underlying cause of deforestation.

1.2.1. Deforestation in South America

Biomes such as the Amazon, the Cerrado and the Gran Chaco are at high risk of soybean expansion and deforestation practices (Figure 1). Deforestation is defined by the FAO as "*the conversion of forest to other land use independently of whether human-induced or not*", whereas the forest must cover 0.5 hectares, have a minimum of 10% canopy cover and trees must reach a minimum height of 5 meters (FAO, 2022). Deforestation is often the result of land use change (LUC), which is an anthropogenic process where the natural landscape is alternated to fulfil its functional role in supporting economic activities (Paul & Rashid, 2017).

Figure 1: Map of South American biomes. Source: Union of Concerned Scientists (2015)

However, under the current scope of the EUDR, approximately 75% of the Cerrado and one-third of the Gran Chaco remain excluded, since a large area does not fall under the classification of 'forest'. These regions consist of a mix of forest, savannah, and other wooded lands (APIB, 2022; Richens, 2022)Similar to the EUDR, the Cerrado is not covered in the Soy Moratorium (Soterroni et al., 2019), which is an agreement between commodities traders that aims to eliminate deforestation from soybean supply chains. The Soy Moratorium has generally been regarded as successful in its efforts, to reduce deforestation rates in the Amazon (WWF, 2021b). Researchers and civil society groups have been advocating for the expansion of the Moratorium to other biomes, such as the Cerrado and Gran Chaco (Soterroni et al., 2019; WWF, 2016). Without a broader scope and implementation of these policies, it is likely that deforestation will shift to other regions, displacing environmental problems (Ritchie & Roser, 2021).

1.2.2. Legal deforestation, illegal deforestation, and political leadership

Deforestation occurs in various forms, both legal and illegal. In Brazil, the Forest Code mandates that landowners preserve a certain percentage of their land as a legal reserve, with the Amazon requiring an 80% legal reserve, while other biomes have lower requirements, such as the Cerrado's 35%. However, there are loopholes in the law that can reduce these percentages, facilitating further deforestation (Freitas et al., 2018). Compliance with the Forest Code remains a challenge according to Ro (2023).

When Bolsonaro became president in 2019, deforestation rates saw a considerable increase (Figure 2). The government has taken measures to undermine environmental regulations, such as weakening enforcement and reducing the size of protected areas (Abessa et al., 2019). Budgetary constraints have also impacted Brazil's ability to combat deforestation.

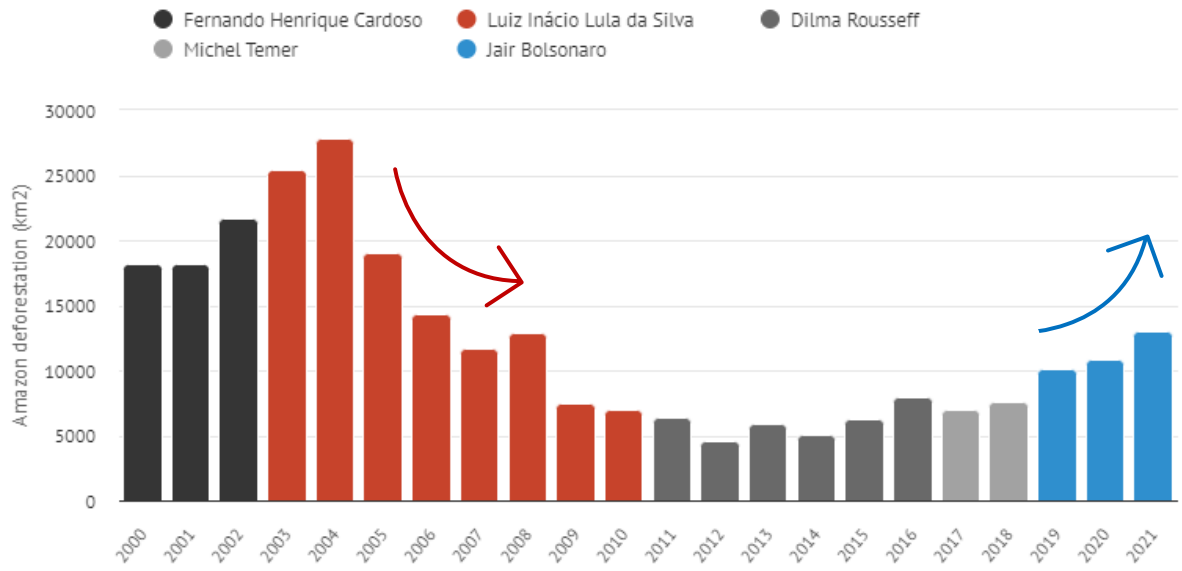

Figure 2: Deforestation rates under Lula and Bolsonaro. Source: CarbonBrief (2022)

Former President Bolsonaro's budget cuts resulted in a 24% reduction in the environment ministry's funding, making it the smallest budget allocation in two decades. Such limitations have significant repercussions for enforcing environmental regulations and protecting against illegal deforestation (Rodrigues, 2021). During COP26 (2019), Brazil announced to speed up its zero illegal deforestation target from 2030 to 2028. This decision, though aimed at reducing illegal deforestation, sparked controversy as it implies the potential legalization of currently illegal activities (Rodrigues, 2021).

In 2023, Lula was re-elected as President of Brazil, and during his first six months in office, deforestation rates decreased by 34% compared to the previous year (Hernandez, 2023). This demonstrates the influence of political leadership on environmental policies and their impact on deforestation patterns.

1.2.3. Role of the Netherlands

The Netherlands plays a significant role as being the largest importer of soybeans within the EU (CBS, 2023). This can be largely attributed to the strategic importance of the Rotterdam Port, which serves as a major hub for import and export activities. Additionally, the Netherlands is also Europe's largest meat exporter (CBS, 2021), and the second largest exporter of cheese products (OEC, 2021). Since the Netherlands is a major player in meat and dairy exports, it deals with the challenges of sustainability, regulatory compliance, and corporate interests within the soy supply chain. Because the Netherlands holds a significant position within the soy supply chain, the scope of this research is expressly focused on companies operating within the Netherlands and the European Union, categorised into four sectors: traders, animal feed production, meat & dairy production, and food retail.

1.3. The EU Deforestation Regulation (EUDR)

The EU Deforestation Regulation (EUDR) is a legislative framework aimed at halting deforestation through supply chain transparency and due diligence practices. It represents a significant regulatory development with the mission of sustainable sourcing. Under the new regulation, companies are required to verify that their products do not originate from deforested land. Furthermore, companies must provide evidence of the legality of their practices (European Commission, 2023c). The aim of the initiative is to bring EU consumption related to deforestation to a minimum and promote sustainable supply chains (European Commission, 2021). The EUDR includes seven commodities that have a high risk of deforestation: palm oil, cattle, soy, coffee, cocoa, timber, and rubber (including its derived products).

1.4. Corporate Social Responsibility (CSR) policies

In response to global concerns about environmental sustainability, companies are integrating social and environmental concerns in their corporate sustainability practices, which is part of the broader concept of corporate social responsibility (CSR). Addressing social and environmental concerns in business operations has become increasingly important for companies, as many companies in the soy supply chain have adopted CSR policies to mitigate their environmental impact.

The growing importance of corporate sustainability practices is driven by the rising expectations of stakeholders, investors, consumers and the wider public. Simultaneously, the tightening of social and environmental regulations by governments and international organizations has intensified the pressure on corporations to align their practices with sustainability goals and environmental legislation (Babiak & Trendafilova, 2011).

Since soybean cultivation and regulatory compliance are intrinsically linked to EU environmental regulations, interesting dynamics occur in how these regulations are embraced, interpreted, and implemented by various actors within the supply chain. CSR policies shape and are shaped by environmental regulations, creating a two-way interaction between two powers: on the one hand the regulatory power of the European Union, and on the other hand the corporate power of agribusinesses.

1.5. The Power Struggle and Corporate Lobbying

The agricultural sector holds a central place in the world economy by supplying food and raw materials to sustain the global population. However, it is also one of the sectors contributing to environmental degradation, including land use, water consumption, deforestation, and greenhouse gas emissions (OECD, n.d.). As governments and international bodies have introduced stricter environmental regulations to address these challenges, corporations in the agricultural sector often engage in lobbying efforts to influence the outcomes of these regulations. This process consists of moves and countermoves between governance institutions and corporate actors (Danielsen, 2005).

In general, corporations lobby to influence the debate and to advocate for less stringent regulations, often through associations and interest groups. The soy industry's lobbying against environmental regulations, such as the EUDR, sheds light on the complex power dynamics at play, highlighting the importance of understanding how these efforts impact the implementation of sustainability practices (Grey, 2018). This lobbying, however, is not limited to the designing and deciding stage of a regulation; it can also show as resistance to implementing regulations after their inception.

1.6. Research aim and questions

This study seeks to investigate the current compliance of corporate sustainability policies with the European Union Deforestation Regulation (EUDR) within the context of the soy supply chain. In doing so, the research aims to identify any initiatives, targets, or companies that surpass regulatory requirements. Three key areas will be explored for potential non-compliance: the commitment to deforestation-free supply chains, the establishment of a 2020 cut-off date, and traceability levels.

Understanding the effects of the EUDR on companies operating in the soy supply chain serves several purposes. Firstly, it helps identify the challenges and opportunities faced by companies in implementing environmental regulations. Secondly, it provides insights into the extent of sustainability commitments within the soybean sector. Finally, it contributes to a broader understanding of achieving corporate sustainability goals in the context of external regulatory legislation. Additionally, this research recognizes the importance of understanding supply chain dynamics for enhanced performance and long-term sustainability. Given the complex nature of supply chains, including various stakeholders from farmers to retailers, the study seeks to comprehend the intricate relationships and interdependencies among these supply chain actors. Special emphasis will be placed on the role of traceability and collaboration within the supply chain. Ultimately, the findings of this study are intended to make a meaningful contribution to the field of sustainability research. They will offer valuable insights to inform policymakers and business owners, facilitating the promotion of CSR policies and methods aimed at enhancing sustainability within supply chains and business operations.

Furthermore, this study intends to unravel the complex social dynamics that arise at the intersection of private Corporate Social Responsibility (CSR) and public EU policymaking. By exploring the influence between these powers, the research aims to shed light on how they affect and co-create one another.

The study also recognizes the significance of industry pushback against environmental regulations and the EUDR, particularly within the soy supply chain. It aims to provide a comprehensive understanding of how these efforts impact sustainability practices throughout the entire supply chain. The theoretical interest lies in the multidimensional nature of the power struggle between regulatory authority and corporate influence. This struggle encapsulates various aspects of governance, regulation, and corporate behaviour. Analysing the power struggle offers a deeper understanding of the broader implications for global supply chains and environmental sustainability.

The central research question of this thesis is formulated as follows:

How do companies in the soy supply chain operating in the EU translate the EU Deforestation Regulation into their Corporate Social Responsibility policies, and how do corporate interests and regulatory pressures influence this translation process?

To formulate an answer to the main research question, several sub-questions have been designed to support the main research question:

1. What are the key regulatory provisions and requirements of the EU Deforestation Regulation in relation to the soy supply chain?
2. How do Corporate Social Responsibility policies of soy traders, animal feed companies, meat/dairy producers and supermarkets that operate in the EU conform to the EU Deforestation Regulation?
3. How do stakeholders perceive the EU Deforestation Regulation and how do they think the implementation will impact soy supply chain dynamics, including the influence of power dynamics and corporate interests within the industry?

This thesis is structured as follows: *Chapter 2* provides an explanation of the conceptual framework, which helps organize and guide the research process. Here the key concepts and variables will be presented concerning the research problem and aim. Concepts that are covered include supply chain dynamics, CSR, the regulatory authority of the EU and corporate interests from the agribusiness sector. *Chapter 3* presents the methodology chapter. It includes an explanation of the research approach and methods used, as well as explaining the scope and limitations of the study. *Chapters 4, 5 and 6* elaborate on the results of this research. The key regulatory provisions and requirements of the EUDR are discussed in Chapter 4. The subsequent chapter researches sustainability in the soy supply chain by analysing CSR policies including food retailers, meat and dairy companies, companies in the agriculture and animal feed sector, and lastly, the four largest soy traders. Their CSR policy analysis centers around three different key facets: deforestation-free commitments, deforestation cut-off dates and traceability commitments. Chapter 6 investigates the potential impact of the EUDR on supply chain dynamics according to stakeholders, where four different supply chains are recognized: open, closed, organic and global supply chains. The research is discussed in *Chapter 7,* along with a reflection on the results and recommendations for further research. The last chapter, *Chapter 8,* contains the conclusion of this thesis.

2. Conceptual framework

This chapter delves into key concepts such as supply chains, Corporate Social Responsibility, the "Brussels Effect," corporate political activity, and the critical role of traceability and certification schemes. Through the exploration of these fundamental concepts and theories, this study seeks to explore how the power struggle between the EU and corporate interests plays out across various facets of the soy supply chain, with a particular focus on the interplay between the EU Deforestation Regulation and Corporate Social Responsibility (CSR) policies.

2.1. Understanding the (soy) supply chain

The soybean supply chain consists of roughly four stages: (1) agricultural production, (2) crushing/refining, transport, trade & distribution, (3) processing & manufacturing and (4) retail & consumption. A simplified visualisation of the soy supply chain can be seen in Figure 3.

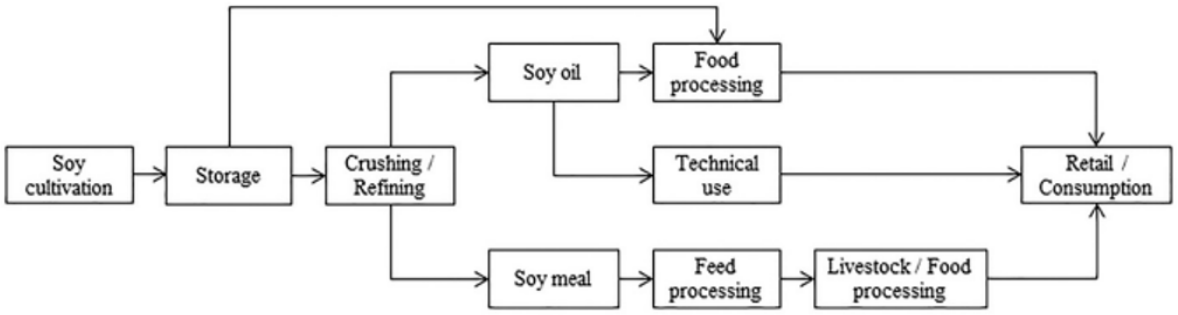

Figure 3: simplified schematic of the soy supply chain. Source: Hinkes & Peter (2019)

In this study, four supply chain categories have been identified: (1) open supply chains, accessible to all stakeholders, (2) closed supply chains, restricted to a specific group, often through partnerships, (3) organic supply chains focusing on the exclusive production and distribution of organic products, and (4) global supply chains extending beyond EU borders, entailing international trade relations and patterns. Certainly, it is important to recognize that there are lots of similarities that can be observed in all four types of supply chains. This differentiation will be used in Chapter 6 and provides valuable insights into how the four supply chain types influence sustainability commitments. This understanding is fundamental for analysing companies' responses to environmental regulations and their efforts to comply with the EU Deforestation Regulation.

All supply chains start with the production and cultivation of a raw material. In the case of soy, countries Brazil and Argentina have grown to be major suppliers of soybeans. Consequently, this growth has led to the rise of agribusiness firms in the area. Brazil, in particular, has emerged as a crucial global hub for agrifood commodities, ranking as the second-largest exporter of soybeans, soy meal, and soybean oil (Wilkinson, 2009). Foreign capital plays a critical role in shaping Brazil's agrifood system, serving as a fundamental component for its success (Wesz et al., 2021). In essence, transnational corporations play a major role in financial Brazil's soy production.

When examining transnational cooperations in the soy market, it becomes evident that there are four soy traders that dominate the market: Archer Daniels Midland (ADM), Bunge, Cargill, and Louis Dreyfus Company (LDC) (Wesz Jr, 2016). The first three companies assessed are headquartered in the US, and the last in Rotterdam, the Netherlands. All four companies engage in business with the European Union and are therefore obliged to adhere to the rules of the EUDR. As key players in the global soy trade, they play an important role in ensuring traceability and sustainability deeper in the supply chain.

As opposed to trader companies like LDC and ADM, companies at the end of the supply chain must involve all suppliers upstream in their sustainability commitments (Figure 4). Furthermore, companies are also pressured by their direct end consumers, regulators, and NGOs, which have high expectations for them to have sustainable business practices (Foerstl et al., 2015). Likewise, downstream companies in the supply chain are liable and held responsible for their environmental impacts, which can even impact their sales performance or reputation (Kovács, 2008). Since companies further down the supply chain are not directly in the public's eye, they may face less pressure to have strong CSR policies.

In order to have successful sustainability commitments in the entire supply chain, businesses must collaborate with both upstream and downstream stakeholders. Walton et al. (1998) observe: "... *companies must involve suppliers and purchasers to meet and even exceed the environmental expectations of their customers and their governments*". According to Saunders et al. (2015), it is essential that businesses engage their suppliers early in environmental sustainability issues since it would likely benefit their performance. Taking on a collaborative approach is essential to address the EUDR's requirements for traceability and sustainability.

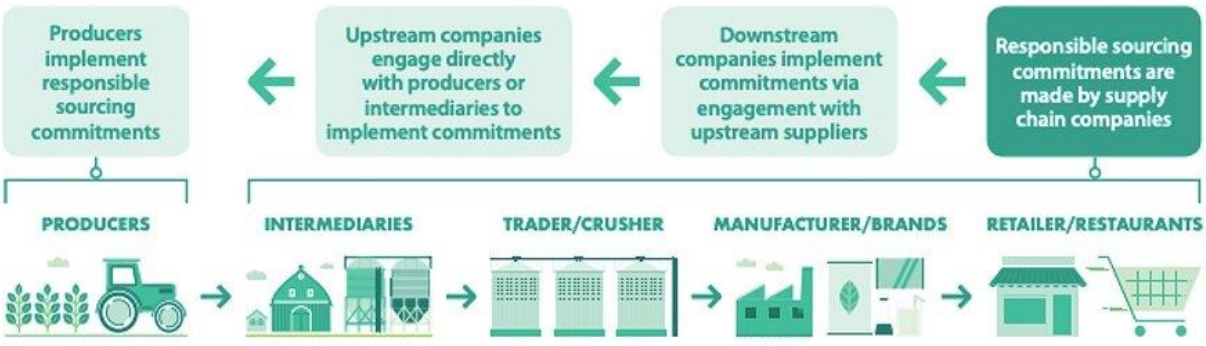

Figure 4: The soy supply chain. Source: the Soy Toolkit

2.2. Private and Public Authority

Corporate Social Responsibility policies set the foundation for responsible business behaviour and help corporations to comply with the objectives of the EU Deforestation Regulation. This is where private end public authority interact , as seen in Figure 5.

Corporate sustainability policies are part of the broader concept of Corporate Social Responsibility (CSR). The European Commission has defined CSR as (European Commission, 2006):

> *"Corporate social responsibility (CSR) is a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. It is about enterprises deciding to go beyond minimum legal requirements and obligations stemming from collective agreements in order to address societal needs. Through CSR, enterprises of all sizes, in cooperation with their stakeholders, can help to reconcile economic, social, and environmental ambitions."*

CSR can be considered a wide concept, given the many definitions and varied interpretations. As explained by (Crane et al., 2008), the concept of CSR spans across multiple disciplines, from sociology to law and from political science to history. The wide range of theoretical perspectives and conceptual frameworks contributes to the absence of a coherent paradigm of corporate social responsibility. However, six core characteristics of CSR can be distinguished (Crane et al., 2008; Hamidu et al., 2015):

1. Voluntary
2. Internalizing or managing externalities
3. Multiple stakeholder orientation
4. Alignment of social and economic responsibilities
5. Practices and values
6. Beyond philanthropy

While CSR is mainly focused on the *social* effects on society, Environmental Corporate Social Responsibility (ECSR) is fundamental in today's climate. According to Nie et al. (2019), it is becoming more important to address environmental concerns in CSR policies, given that society also imposes stronger expectations on businesses. The nature of a business' ECSR policy depends on its size and the sector in which it operates. However, there are some standardised efforts that can be part of the policy: managing waste and recycling, decreasing energy and water consumption, and reducing greenhouse gas emissions of its operations (Hopper, 2021).

2.2.1. CSR and the EU

According to Moon et al. (2009), Corporate Social Responsibility holds the potential to stimulate corporate involvement in the adoption and integration of EU strategies. Furthermore, it can effectively contribute to the seamless incorporation of sustainability efforts and international development, as highlighted by Albareda et al. (2007) and Barkemeyer (2009). Research on the relationship between governments and CSR has revealed the emergence of public sector roles of governments: legislative, facilitating, partnering, and endorsing roles (Aaronson, 2002; Albareda et al., 2007). When governments take on these roles, they establish an environment that promotes CSR among businesses. While the European Union is not considered a government, it does transcend national borders and influences its member states towards sustainable practices.

2.3. The Brussels Effect

The economic and regulatory power that the EU has, is also referred to as the "Brussels Effect". This term is used to describe the aspect of *unilateral regulatory globalization*, which is defined by Bradford (2012) as: "*when a single state is able to externalize its laws and regulations outside its borders through market mechanisms, resulting in the globalization of standards"* (p. 3). The Brussels Effect denotes the regulative global power that the EU is exercising through its legal institutions and standards, and how this translates to global markets. The EU is the deciding factor in many sectors, such as food, medicine, chemicals, and privacy. The creation of these globalized standards causes a domino effect of non-EU countries implementing EU regulations (Bradford, 2020).

As corporations and the EU collaborate to pursue mutual goals, CSR emerges as an indispensable mechanism for cultivating sustainable and responsible business practices across both organizational and societal dimensions. The success of the European Union in achieving its objectives, such as the Green Deal and the UN Sustainable Development Goals (SDGs), is intricately linked to the achievement of effective CSR policies within companies. In other words, the EU's own success relies heavily on the successful implementation of CSR policies by companies.

The EUDR is a prime example of the EU's ability to set global standards in sourcing practices. It pushes companies to adopt sustainable sourcing practices for high-risk commodities and expects to set the trend towards sustainable sourcing methods for the entire global supply chain. Suppliers must comply with the new regulation or be excluded from the market (Partzsch et al., 2023). As a result, the EU's market power influence has the potential to drive significant changes in shifting global consumption patterns (Bradford, 2012), which illustrates the influence of the EU in pushing through its environmental objectives.

2.3.1. Power struggle

As the European Union sets its ambitious agenda to reshape global supply chain sustainability through the EUDR, a complex interplay arises between regulatory bodies and corporate interests. This tension between these two powers occurs in different stages of policy, e.g., in the development, adoption, implementation, enforcement or review phase. Within the first phase of the policy development, corporations may engage in lobbying activities to shape the policy, depending on the industry's interests (Sheingate et al., 2017). During this phase, corporations express their concerns about feasibility, costs, and its impact. After the policy has been approved and adopted by the legislative bodies, corporations have to implement the regulation and meet the regulatory requirements. Depending on their performance, corporations might need to make significant changes in their existing practices and supply chain structures, which can be a financial or logistical challenge. As a result, some corporations can resist or challenge the regulation, which may lead to opposition, litigation, or refusal to comply with the regulatory requirements (Jansen, 2017). It is crucial to understand this power struggle between regulatory bodies and corporate interests and how this impacts sustainability practices within the supply chain.

2.3.2. Corporate political activity and lobbying

One example of corporate interests is the power of agribusiness firms. In recent years, corporations have effectively advocated for their central role in shaping the future of food systems. Corporations have facilitated the establishment of public-private partnerships and 'multi-stakeholder' roundtables, including the roundtable of responsible soy. These initiatives have not only legitimized corporations' involvement but have also granted them privileged access to the decision-making process (IPES-Food, 2023). This trend underscores the significance of understanding how corporate influence is integrated into discussions on responsible sourcing practices within the soy supply chain, particularly within the context of the EU's Deforestation Regulation.

How businesses engage with political and regulatory processes to advance their interests is explained by using corporate political activity (CPA) theory. Analyzing the strategies and tactics employed by

agricultural corporations in response to the EUDR can provide insights into how corporate actors navigate the political and regulatory landscape. Mialon & Mialon (2018) distinguish six strategies used by the food industry to influence public policies: (1) information and messaging, (2) financial incentives, (3) constituency building, (4) legal strategies, (5) policy substitution, and (6) opposition fragmentation and destabilization. Perhaps the most used strategy is the first strategy, information, and messaging, which includes lobbying and framing debates on the effects of the industry. An example can be found in a study by Lazarus et al. (2021). The study revealed that there is compelling evidence of political influence carried out by the ten largest meat and dairy companies in the US. For instance, all of these companies have invested in research aimed at downplaying the link between animal agriculture and climate change. Furthermore, they have actively influenced climate-related policies and discourse in their favour, spending millions of dollars on lobbying and undermining the association between livestock farming and climate change. Additionally, these companies have been at the forefront of opposition to climate policies, putting up a fight against climate policies (Lazarus et al., 2021).

Industries often employ lobbying efforts seeking less stringent regulatory requirements and weaker environmental policies. Polk & Schmutzler (2005) noted in their research that representatives from industries with a high environmental impact tend to advocate for a relaxation of environmental policies. Lobbying also occurs in the context of deforestation and GHG emissions reduction efforts. Remarkably, opposition to such efforts emerges prominently from agribusiness companies, particularly from companies involved in the meat and dairy industry.

Another example is the 2023 IPCC report. Delegates from meat-producing countries Brazil and Argentina influenced the final text of the report, removing language that promoted plant-based diets (Scott-Reid, 2023). This meddling demonstrates the extent to which certain industries can project their influence over matters of global concern.

Soy industry giants, including Cargill, Bunge, and ADM, have also engaged in lobbying to counter deforestation regulations and to weaken the draft of the EU's Deforestation Regulation (Boren, 2022; Nelsen, 2022). These companies have raised concerns over the potential consequences of such regulations, claiming that it could lead to an increase in food prices and shortages. They further argue that compliance with these regulations is both technically and practically unfeasible. Interestingly, such opposition is not confined to the EU alone; it manifests globally. The soy industry's lobbying against environmental regulations and the EUDR demonstrates industry pushback, emphasizing the

importance of understanding how these efforts impact sustainability practices within the entire supply chain.

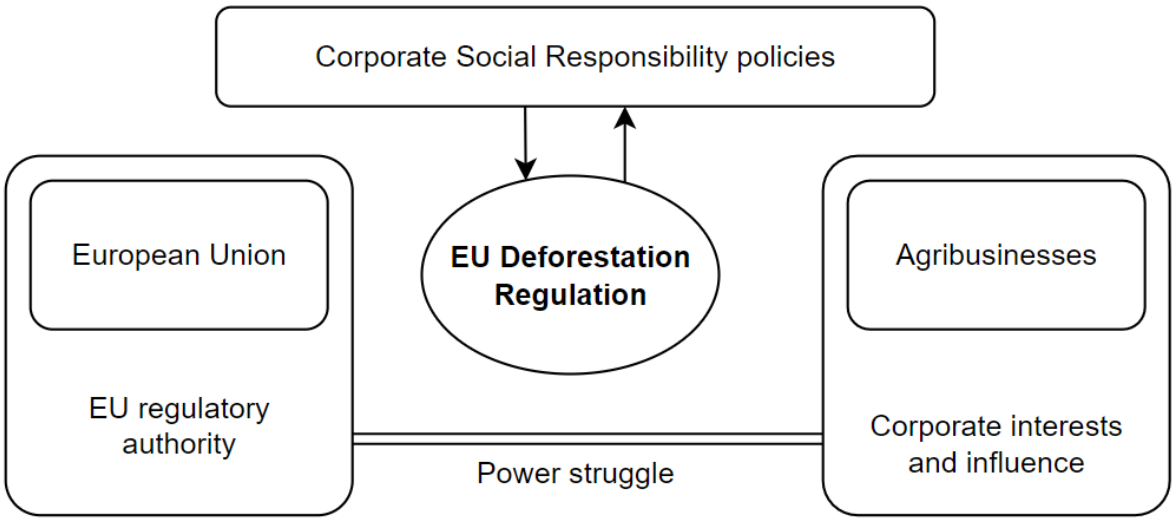

Figure 5: Overview of the concepts relating to the public and private power struggle.

2.4. Traceability, certification schemes and corporate governance

This power struggle between regulatory bodies and corporate interests comes into play in the process of achieving transparency, particularly regarding traceability, due diligence, and certification (Figure 6). These interrelated components play essential roles in the successful implementation of sustainable sourcing practices required by the EUDR.

In the case of traceability, the EUDR requires that every actor in the supply chain can trace the product back to its origin. The EU pushes corporations to reach this high level of traceability, while businesses in the agricultural sector often exhibit resistance to this requirement. The corporations' motivation to have traceability systems is primarily driven by external (regulatory) pressures rather than an intrinsic motivation (Heyder et al., 2009). The resistance from these corporations can be assigned to concerns related to data sensitivity and data sharing (COCERAL et al., 2022; Froehlich et al., 2022), revealing complex challenges that emerge in balancing regulatory requirements with corporate interests.

Certification schemes involve third-party assessments to validate a company's commitment to specific standards, such as deforestation-free sourcing. Compliance with these schemes signifies a strategic move by corporations to demonstrate alignment with the EUDR. However, in the case of deforestation-free soy, many corporations depend on buying RTRS credits to claim deforestation-free soy. While this process is a step in the right direction, it does not guarantee sustainably sourced

soy since it uses the mass balance chain of custody model. The use of this model contradicts EUDR requirements, resulting in a growing tension within certification schemes.

The dynamic interaction between the EUDR, Corporate Social Responsibility policies, traceability and certification schemes in the soy supply chain captures the power struggle between the EU regulatory authority and the influence of agribusiness corporations. These domains serve as critical points of conflict and negotiation, where the EU aims to enforce its sustainability and deforestation-free objectives, while corporations aim to navigate these regulations while safeguarding their business interests. The complex interactions within these areas indicate the broader struggle between regulatory power and corporate influence, highlighting the challenges and opportunities in achieving sustainability goals in the soy supply chain.

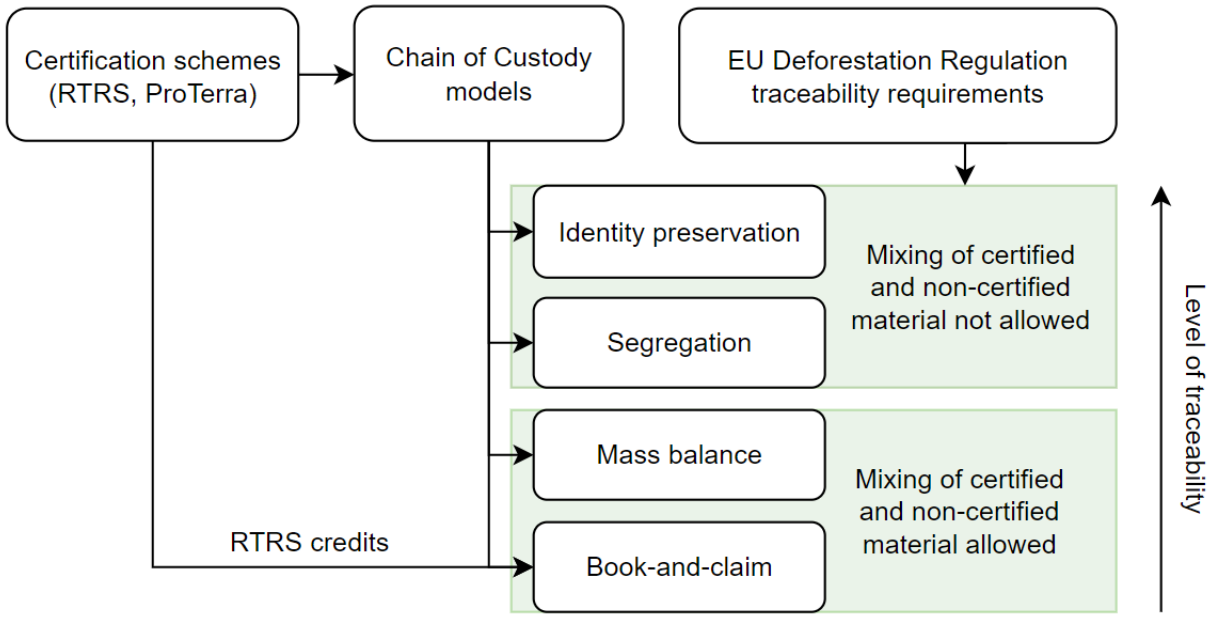

Figure 6: Overview of the concept 'Traceability'.

3. Methodology

The purpose of this chapter is to describe the methodology used to research how the new EUDR is shaping and shaped by CSR policies. The chapter provides an explanation of the scope and various aspects related to the data collection, such as research instruments utilized, how information was gathered and how interviews were conducted. Furthermore, this chapter also provides a description of the data analysis methods employed in this study. This includes identifying categories and classifying information through coding and organizing large amounts of raw data. The limitations will be discussed at the end of the chapter, which provides context for the research process and its potential constraints.

3.1. Scope

The scope of this research primarily focuses on the Netherlands. The Netherlands holds a significant position as the largest European importer of soybeans, palm oil, and cocoa in 2022. This is largely due to Rotterdam port, which serves as a major gateway for further exportation. It's important to note that a substantial portion of these imports is destined for foreign markets (CBS, 2023). This research includes interviews conducted with Dutch companies and document analysis encompassing key players within the supply chain, which is not limited exclusively to Dutch firms.

Furthermore, this study focuses on soy production in South America, with particular emphasis on Brazil, Argentina, Bolivia, Uruguay, and Paraguay. Having some of the highest tropical deforestation rates in the world (WRM, 2023), these countries are major players in global soy production and are recognized as high-risk areas for deforestation due to agricultural expansion.

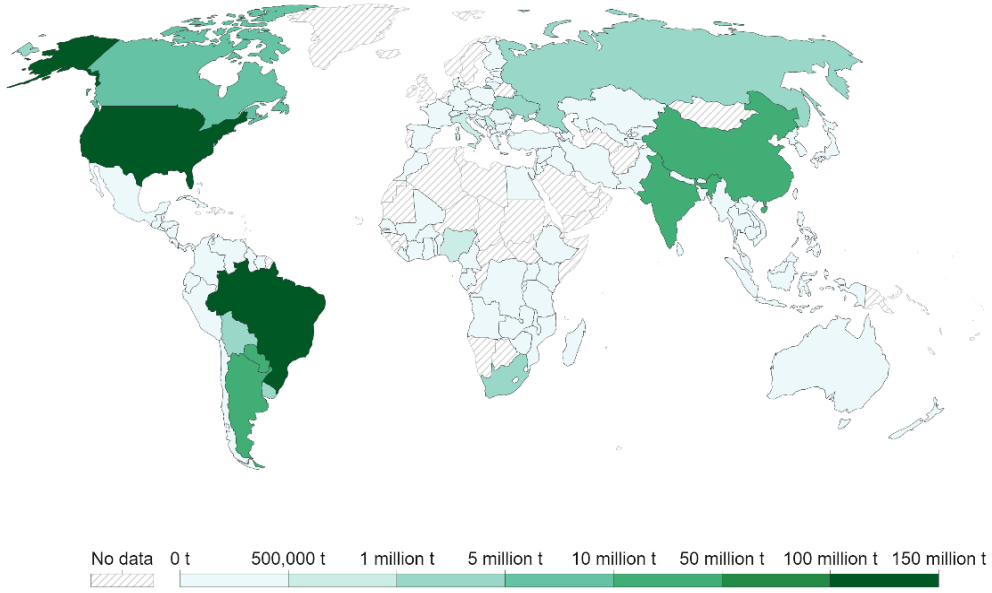

Figure 7: World map of soybean cultivation in tonnes (2021). Source: FAO (2021)

However, it is important to acknowledge that soy production is not limited exclusively to South America. While South America is a global hotspot for soy production, it is important to recognize that soybeans are cultivated in other regions as well. As seen in Figure 7, countries including the United States, China, and India also contribute to global soy production. Therefore, it is essential to consider the broader context of global soybean production while examining the specific dynamics and environmental risks associated with soy production in South America.

3.2. Data collection

3.2.1. Literature review

A comprehensive literature review was conducted using various academic sources and databases, such as Google Scholar, Scopus, and EUR-LEX (a website containing numerous public documents of the EU). The focus is to identify relevant scholarly articles, reports, and policy documents related to the European Union's Regulation on Deforestation-free products and its content. By doing so, the literature review provides a foundation for understanding the current state of knowledge, existing policies, and key issues related to the research topic. The first sub-question about the provisions and requirements of the EUDR was answered by means of this literature review. Furthermore, the data from the literature review will complement the information gathered by the CSR document analysis and the interviews.

3.2.2. CSR document analysis

This study adopts an exploratory research approach with a qualitative analysis to examine sustainability reporting (corporate social responsibility). Data sources primarily consist of secondary data, including annual reports, sustainability reports, and sourcing policies/guidelines publicly available on the respective company websites. This data is used to answer the second sub-question.

Companies are selected based on sector, size, and location. The research sample comprises CSR policies from traders, animal feed companies, meat and dairy producers, cooperatives, federations, and supermarkets that operate within the soy supply chain in the European Union.

The data points that were extracted from the documents include indicators listed in the Table 1 below:

Table 1: Indicators to analyse and compare corporate sustainability policies

Theme	Indicator
Goals and objectives	Commitments + timeframe Sustainability reporting
Scope and coverage	Deforestation Conversion Cut-off date
Traceability	Commitments
Dependency	Certification schemes Cooperatives Associations

The Forest 500 Company Assessment Methodology (2019)[1] was used to shape the CSR document analysis. This project from Global Canopy ranks 350 companies and financial institutions based on commitments, implementation and reporting of several commodities that are linked to deforestation, such as beef, leather, palm oil, paper, soy, and timber (Forest 500, n.d.). The methodology was used to structure the CSR document analysis and helped assessing the overall performance of the selected companies, which provided useful datapoints for evaluating sourcing practices regarding soy.

The research sample comprises a total of 20 companies that are mostly operating within the Netherlands. An overview is listed in Annex 1. The analysis is centred around a deliberate sampling of 20 major corporations, emphasizing their importance and influence within sectors such as meat/dairy, feed production, and food retail. The policy documents selected for the analysis have publication dates between 2021 and 2023, providing an up-to-date overview of the current situation. Consequently, it is anticipated that these documents have included or considered the recent legislative developments in their sustainability reports, sourcing guidelines and policies.

3.2.3. Interviews

To answer the third and last sub-question, interviews were held with key stakeholders involved in the soy supply chain, consisting of Dutch companies operating in the European Union. A total of 5

[1] https://forest500.org/sites/default/files/2019_forest_500_company_assessment_methodology.pdf

interviews were conducted. The selection of interview participants was based on their roles and involvement in the soy supply chain. Table 2 represents the list of interviewees.

Table 2: Actors interviewed

	Company's position in the supply chain	Job title of interviewee	Location	Duration	Language
1	Animal feed manufacturer	Director marketing, communication, and sustainability	Online	45m	Dutch
2	Animal feed manufacturer	Supplier sustainability manager	Online	60m	Dutch
3	Supermarket	Sustainability manager	Phone	30m	Dutch
4	Wholesale purchasing cooperative	CSR-manager	Online	40m	Dutch
5	Wholesaler of organic foods	Quality manager	Online	40m	Dutch

The interviews were semi-structured, allowing the exploration of new insights and perspectives, which might not be the case with structured interviews. This interview method can also contribute to gaining a deeper understanding of how the research topic is situated and embedded within a specific organisational context. The topic list used as guidance during the interviews can be found in Annex 2. The interviewees were provided with some general information about the research and send a prior-informed consent form. To safely secure and save the data from the interviews and policy documents, it is stored in a OneDrive folder from Wageningen University and Research. The data will also be transferred to the ENP OneDrive for long-term storage after the thesis has been completed.

3.3. Data analysis

As part of the data analysis, the interviews were transcribed and coded to facilitate data organization, analysis, and interpretation. The transcription was done by using Pinpoint, which is a private research tool that helps collect and organize documents. Interviews were automatically transcribed by using Pinpoint's software. Nonetheless, the transcription still had to be checked by hand to address any inconsistencies and inaccuracies. The coding of the interviews was performed with the use of ATLAS.ti, which is a computer-assisted qualitative data analysis software. This will help identify recurring patterns, themes and relationships and will lead to an interpretation of the data, and the development of meaningful insights and conclusions.

For the second research question, the coding was based on the type of supply chain (open, closed, organic, or global). The supply chains were coded according to their characteristics, by making distinctions and drawing comparisons between the four types of supply chains. Some reoccurring patterns include:

- **Influence of traders**: examining how traders impacted the soybean supply chain and its sustainability.
- **Sustainability commitments**: analysing the presence and influence of sustainability commitments within the supply chain.
- **Collaborations/partnerships/best practices in the supply chain:** exploring instances of collaboration, partnerships, and best practices that emerged during interviews.
- **Proximity to the source:** considering the geographical proximity of supply chain entities to either soybean farmers or end-users and assessing its significance.

Due to the unique nature and substantial volume of Corporate Social Responsibility (CSR) documents, a manual coding process for document analysis was conducted. This approach was chosen to ensure the precise categorization of diverse information found within these documents. During the document analysis phase, each document was reviewed, identifying relevant themes, patterns, and key data points, as outlined in Table 1. Additionally, Excel was utilized as a valuable tool for visualizing and analysing the data effectively, facilitating an in-depth examination of patterns and trends.

3.4. Limitations

Since the EUDR focuses on seven main commodities and their derivatives, it covers quite a percentage of the global and European import market. This is particularly evident in the case of soybeans, the European Union accounts for around 12% of the world's soybean imports, being the second largest importer, behind China (IDH et al., 2019). By narrowing the research to the soy supply chain, this thesis will be more in-depth compared to an analysis of all seven commodities. In addition, time and resources will be allocated more efficiently, enhancing the quality of this research. However, this brings the limitation that the analysed deforestation-free commitments, deforestation cut-off dates and traceability commitments are not limited to solely soybeans but may also include other commodities. Companies can have distinct policies tailored for specific high-risk commodities. Any commitments made regarding deforestation-free supply chains can possibly not be generalized to other high-risk forest commodities (e.g., palm oil or coffee).

Furthermore, due to the recent introduction of the EUDR, there is limited historical data and information available. This short time frame can have the consequence that companies have not yet implemented the rules and requirements of the regulation. Nevertheless, companies have until December 2024 to achieve compliance, so it is apparent that companies are not currently on complying levels. Additionally, the development of compliance, reporting and traceability mechanisms is still in its early stages. Examining the presence and effectiveness of these mechanisms in the context of compliance with the EUDR might have certain limitations.

Moreover, the generalizability of this research can be restrained since it largely focuses on companies based in the Netherlands. Therefore, the findings may not be generalizable to other countries or industries. The sample size accounts for a small portion of the soy industry and may not be representative of the entire (global) supply chain.

In the context of the policy document analysis, a comprehensive examination was conducted encompassing diverse stakeholders, namely traders/operators, animal feed manufacturers, cooperatives, meat/dairy producers, and supermarkets. These actors were examined within the broader context of the soy supply chain, recognizing their interconnected roles and relationships in the production, distribution, and consumption of goods.

In order to capture diverse perspectives on the new EU legislation, a series of interviews were conducted with retailers (supermarkets, wholesalers, cooperatives) and animal feed manufacturers based in the Netherlands. These interviews served as a means to gather valuable insights and understand the viewpoints of key stakeholders within the industry. The chosen methods of data gathering may bring several limitations. First, interviewees may not always be accurate or honest in their responses, especially if the topic is sensitive. During my internship, I experienced that some topics or results are not to be shared publicly, and therefore there is some sense of secrecy and actively trying to withhold information regarding their sustainability activities.

Additionally, the reliability and validity of Corporate Social Responsibility policy documents could be compromised. CSR policy documents may not be accessible to the public and may be outdated, incomplete or non-existent. If reporting is not done accurately, it can limit the scope of the research. Furthermore, the selection of the sample size and specific companies for document analysis and interviews was a conscious choice and may not represent the entirety of the Dutch soybean supply chain. Additionally, document analysis inherently involves an element of subjectivity, as the interpretation of themes and patterns can vary among researchers. Despite efforts to maintain objectivity, the researcher's perspective may influence the analysis process.

4. Deforestation regulation explained: regulatory provisions and requirements

This chapter describes the key regulatory provisions and requirements of the EUDR. The purpose of this chapter is to have a knowledge basis of the principles of the EUDR to further understand and be able to answer the rest of the sub research questions and ultimately, the main research question. The chapter is structured as follows: first, a short introduction will be given to the EUDR. Subsequently, several deforestation agreements, programs and initiatives will be discussed that have led to the establishment of the EUDR. Furthermore, the scope of the legislation will be analyzed, encompassing aspects such as due diligence and compliance with local legislation. Next, an explanation of its enforcement mechanisms and the penalties associated with non-compliance. Finally, the challenges and criticism will be presented, culminating in a concluding summary.

4.1. Introduction to the EUDR

Forests play a significant role due to their importance in preserving biodiversity, supporting livelihoods, maintaining essential ecosystems, and acting as important carbon sinks. Deforestation, however, poses a serious threat by contributing to both biodiversity loss and climate change. This occurs as deforestation releases stored carbon into the atmosphere while reducing the capacity to absorb carbon dioxide, ultimately accounting for 11% of global emissions (Wilkes, 2022). It is estimated that the Amazon rainforest stores around 76 billion tonnes of carbon in its trees, acting as a major carbon sink (WWF-UK, n.d.).

The European Union contributes to deforestation through its consumption patterns, particularly concerning specific commodities like timber, rubber, palm oil, coffee, cacao, soy, and cattle. This is especially evident in the expansion of agricultural production, which involves converting forests into cropland and livestock grazing (Velasco et al., 2023).

The implementation of anti-deforestation policies is crucial for the EU to achieve its ambitious goal of reaching climate neutrality by 2050, as well as fulfilling its commitments under agreements and policies like the Paris Agreement and the EU Green Deal. Despite efforts to reduce its impact, the EU remains a substantial driver of deforestation due to its consumption of commodities that have a high risk of deforestation (European Parliament, 2023). According from a report from WWF, the European Union was responsible for 16% of worldwide deforestation in 2017, deforesting 203,000 hectares of land and releasing 116 million tonnes of CO2 in the atmosphere (WWF, 2021a). According to an impact assessment conducted by EU, it is estimated that the EU would be accountable for 248,000 hectares of forest loss annually, if no regulatory intervention were to be

implemented (European Council, 2022). Therefore, it is important that the European Union implements and enforces legislation which tackles the problem of deforestation worldwide.

4.2. Evolution of the EUDR

With the acceptance of the EUDR, the regulation repeals the 2013 **EU Timber Regulation** (EUTR). Similar to the EUDR, the EUTR sets obligations for timber products imported to the European Union. Additionally, it also required that operators conduct due diligence and to implement some level of traceability throughout the supply chain. The main objective of the EUTR was to prohibit the placement of illegally harvested timber on the EU market (European Parliament, 2010). The main differences between the EUDR and the EUTR, is that the deforestation regulation has an expanded range of products, the requirement of providing geolocation data, an expanded risk assessment, and lastly, a different scope of legality. The EUDR also includes human rights, anti-corruption laws and labour rights, as the operator must comply to international law and the laws of the country of production (European Council, 2022).

In addition to the EUTR and the EUDR, the European Union is involved in various other agreements and initiatives that aim to address the issue of deforestation. Bager et al. (2021) have identified 86 policy options in which the European Union attempts to address deforestation. The most relevant policies and agreements are listed below:

1. **EU FLEGT Action Programme (2003)**

   The Forest Law Enforcement and Governance (FLEGT) is a programme where the EU concludes Voluntary Partnership Agreement (VPA) with timber producing countries. Countries currently involved are the Central African Republic, Ghana, Cameroon, the Republic of the Congo, Liberia, and Indonesia. This bilateral agreement between the EU and the exporting country aims to reduce the EU's import of illegally harvested timber (Bager et al., 2021; NVWA, n.d.).

2. **New York declaration on Forests (2014)**

   The New York Declaration on Forests (NYDF), signed by EU member states, is a voluntary and non-legally binding declaration that vows to reduce deforestation by 50% in 2020 and to eliminate it by 2030. It also commits to restore 350 million hectares of forest, reducing carbon emissions and strengthening forest governance (Forest Declaration Assessment, n.d.).

3. **SDG target 15.2 (2015-2030)**

   The Sustainable Development Goals (SDGs) are a collection of seventeen goals designed to create a more sustainable world by 2030. The targets were adopted by all 193 United Nations member countries. The goals span a broad spectrum, including the elimination of poverty and

hunger, fostering sustainable economic growth, and protecting the environment (UN, n.d.-c). Deforestation is also included in the SDG, in target 15: "*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*". More specific, target 15.2: "*By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally*" (UN, n.d.-a). The 2020 target has not been met (European Parliament, 2023).

The European Union has a history of engaging with multiple agreements and initiatives aimed to reduce deforestation. While some of these policies only focus on illegally harvested timber, or solely on production in developing countries, it demonstrates the EUs commitment to halt deforestation and promote sustainable forest management as a major importer of timber products. The EUDR goes further by expanding the scope to other forest-risk commodities and tightening due diligence requirements.

4.3. Overview of the EUDR

The European Union's Regulation on Deforestation-free products was adopted by the European Parliament on April 19th, 2023, and entered into force on June 29th, 2023 (Figure 8). Operators and traders then have 18 months to implement the new rules. The main objective of the regulation is to ensure that products placed on the EU market do not contribute to deforestation.

4.3.1. Scope

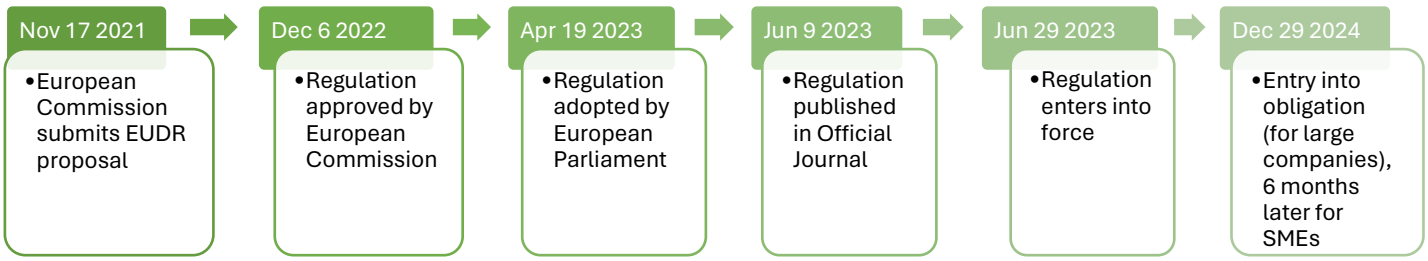

Figure 8: Timeline of the EUDR

The EU Deforestation Regulation includes seven commodities that have a high risk of deforestation: palm oil, cattle, soy, coffee, cocoa, timber, and rubber, as well as their derived products, as seen in Table 3 (European Commission, 2022b). The scope of the EUDR includes products produced within the EU and products that are imported to the EU.

Table 3: Commodities included in the EUDR and their derivatives

Commodities	Examples of derived products
Palm oil	Palm kernel oil, glycerol
Cattle	Meat, leather
Soy	Soybean meal/flour, soybean oil
Coffee	Coffee, coffee husks and skins
Cocoa	Chocolate, cocoa butter
Timber	Furniture, paper
Rubber	Tires, tubes

Since cattle falls under the scope of the EUDR, the EU obliges operators to ensure that the animal feed is also certified as deforestation-free (European Parliament, 2023, p. 7).

> *"To ensure that this Regulation achieves its objectives, it is important to ensure that feed used for livestock falling within the scope of this Regulation does not lead to deforestation. [...] Operators should ensure, as part of their due diligence system, that the feed is deforestation-free."*

The EUDR covers illegal deforestation as well as legal deforestation, with a cut-off date of 31-12-2020 (European Parliament, 2023, p. 16). This means that commodities produced on land associated with deforestation after this date are prohibited and not considered deforestation-free. If the land was deforested before this date, the product or derivative is labelled deforestation-free.

The scope of the EUDR only covers the definition of forests, which is defined by the EU as: *"land spanning more than 0,5 hectares with trees higher than 5 metres and a canopy cover of more than 10 %, or trees able to reach those thresholds in situ, excluding land that is predominantly under agricultural or urban land use"* (European Parliament, 2023, p. 15). Therefore, other ecosystems such as grasslands, wetlands, savannahs, and peatlands are not included in the scope of the EUDR. The Commission will assess expanding the scope of the EUDR to 'other wooded areas' (in 2024) and to other commodities and natural ecosystems (in 2025) (European Parliament, 2023, p. 14):

> *"Moreover, no later than two years after that date of entry into force, the Commission should evaluate and, where appropriate, present a legislative proposal on, extending the scope of this Regulation to other natural ecosystems, including other land with high carbon stocks and with a high biodiversity value such as grasslands, peatlands and wetlands."*

4.3.2. Due diligence and local legislation

In accordance with the EUDR, corporations are obligated to adhere to a set of regulations and guidelines. First of all, companies are required to implement new due diligence rules that prove that their products do not originate from deforested land, for example by providing traceability documents and data such as geographical coordinates and supplier information. Since the product must be traceable back to the plot of land, Chain of Custody (CoC) models mass balance and book-and-claim are not allowed under the EUDR (CoC models are further explained in Chapter 5). Furthermore, the EUDR requires the certified product to be segregated from non-certified product, hence, mixing is not permitted. As a result, only the Chain of Custody models identity preservation and segregation are permitted under the EUDR, as seen in Table 4 (European Commission, 2023b).

Table 4: Permitted Chain of Custody models

Chain of custody model	Allowed under the EUDR?
Identity Preservation	✓
Segregated	✓
Mass balance	✗
Book-and-Claim	✗

Countries of origin are ranked as low, standard, or high risk by the European Commission, based on deforestation and forest degradation risk[2]. For relevant products from low-risk countries or parts thereof operators should be allowed to exercise simplified due diligence. The due diligence statement consists of three elements:

1. *Information requirements:* description of product, quantity, country of production, geolocation coordinates of plots of land (/polygons), verifiable information that the product is deforestation-free and is in accordance with the legislation

2. *Risk assessment:* the presence of forests and indigenous peoples, concerns (corruption, data falsification, lack of law enforcement, violations of human rights, conflicts, or sanctions), complexity of supply chain and risks of non-compliance. Operators should mitigate risks where possible.

3. *Risk mitigation measures:* operators should adopt risk mitigation procedures and measures: independent surveys/audits, policies, controls, and procedures to mitigate risks. Operators are allowed to place relevant products on the market if there is no or only a negligible risk of the product (European Parliament, 2023).

[2] The list of classified countries will be published by the European Commission no more than 18 months after 20 June 2023.

Second, companies also must prove that the relevant commodities have been produced in accordance with the legislation of the country of production (Littenberg & Elliott, 2023). These laws can be regarding (European Parliament, 2023, p. 17):

- Land use rights
- Environmental protection
- Forest-related rules
- Third parties' rights
- Labour rights
- Human rights protected under international law
- The principle of free, prior, and informed consent (FPIC)
- Tax, anti-corruption, trade, and customs regulations

4.3.3. Enforcement and penalties

The EUDR will be enforced by competent authorities in the Member States of the EU. The national authorities will conduct checks on operators and traders. Checks will vary depending on the risk level assigned to the production country. This approach entails stricter monitoring for high-risk countries and less stringent measures for low-risk countries. Furthermore, the Commission will develop a centralised information system, which will be accessible to the national competent authorities and customs authorities. On this system, operators are expected to submit their due diligence statements and custom declarations (European Parliament, 2023).

Penalties are applicable if a trader or operator does not comply. Penalties include fines (proportionate to the environmental damage and economic benefit), confiscation of the product, confiscation of revenues, temporary exclusion from public procurement processes, temporary prohibition from placing goods on the market, and prohibition from exercising simplified due diligence (European Parliament, 2023).

4.4. Challenges and criticism

4.4.1. Scope and inclusivity

One of the main criticisms of the EUDR is its geographical scope. While the legislation covers large parts of the Amazon, other ecosystems such as the Gran Chaco and the Cerrado are not included, because they do not fall under the definition of 'forests'. Therefore, ecosystems such as savannahs, grasslands, peatlands, and wetlands are not included in the scope of the EUDR. There is a possibility that the geographical scope is extended in the next revision of the regulation (2024 and 2025).

While the EUDR focuses primarily on deforestation and forest degradation, sustainability goes beyond deforestation and transcends multiple (environmental) issues. This single-issue approach represents only one aspect of environmental sustainability. Issues such as resource management, water and air pollution, biodiversity and habitat destruction are overlooked. Besides, because of the environmental focus of the EUDR, social and economic aspects are overlooked. This may divert attention from other sectors that contribute to unsustainable practices and displace environmental issues to other regions.

Another point of criticism is that the EUDR is taking on a Eurocentric approach (Garcia & Pauwels, 2022). The legislation imposes standards that mainly focus on high-risk countries in the Global South, and losing sight of the Global North's own significant and often disproportionate use of natural resources (Kumeh & Ramcilovic-Suominen, 2023). The Global North, including EU member states, has historically been a major consumer of products linked to deforestation. By forcing regulation on producers in the Global South, the legislation can have an adverse effect on its effectiveness and deflect attention from the Global North's consumption patterns. Additionally, it's crucial to recognize that deforestation is not exclusive to the Global South; it also occurs within European borders (e.g., Sweden and Russia) and North America (e.g., Canada and the United States) (Skene, 2023). The existence of deforestation and forest degradation activities in these areas underscores the importance of acknowledging the environmental impact and sustainability challenges within the Global North.

On top of that, the financial sector is not included in the EUDR. Several European banks have sent an open letter to the EU for the inclusion of the financial sector in the EU Deforestation Regulation. The financial institutions state that the industry is still contributing to deforestation through funding activities linked to deforestation, and there are no sustainability due diligence requirements in place for the sector (Triodos Bank, 2022). The commission reasoned their decision that there are existing initiatives that ensure sustainable financing, such as the EU Taxonomy Regulation, the Corporate Sustainable Reporting Directive (CSRD), the Corporate Sustainability Due Diligence Directive (CSDDD) and the Sustainable Finance Disclosure Regulation (SFDR) (Simon et al., 2023).

4.4.2. Implementation and enforcement

The requirements set in the EUDR can lead to several trade barriers. Firstly, implementing sustainable forest practices, certification and traceability systems can lead to an increase in production costs for producers, particularly in developing traceability and monitoring systems. Traceability and verifiability of complex supply chains might be challenging, given the extra costs and time needed, often necessitating third-party certification. Secondly, meeting these technical requirements can be challenging for smaller farmers with fewer technical and economic resources, limiting their

participation in global markets. Lastly, non-compliant product may face restrictions or bans when entering the EU market, limiting operators' and traders' access to these markets.

The enforcement of the regulation can also bring certain challenges. Since the scope of the EUDR covers seven commodities and their derivatives, several complex supply chains emerge. Ensuring that each ingredient of a product complies with the regulation can be challenging and may be requiring extensive documentation and verification. Furthermore, border control and customs can also be resource-intensive. Particularly given that the EU member states have organize this themselves, which can also lead to differences between member states in terms of enforcement.

The impacted industries such as the meat and dairy sectors have also expressed their criticisms. These industries downplay the role between animal agricultural and climate change, as well as spending millions of dollars on lobbying (Lazarus et al., 2021). Similarly, the ABCD are also questioning the feasibility of the EUDR, arguing that it is both practically and technically unfeasible, excluding smallholder farms that cannot implement the requirements.

In conclusion, the European Union Deforestation Regulation represents a significant step toward addressing the critical issues of deforestation, biodiversity loss, and climate change caused by the EU's consumption and trade patterns. This legislation expands on previous initiatives and agreements, covering a wider range of high-risk commodities and imposing due diligence requirements on operators and traders. While the EUDR is a worthy effort to combat deforestation, it faces challenges and criticisms related to its scope, inclusivity, and potential trade barriers.

5. Sustainability in the soy supply chain

This chapter will start with an elaboration on the concepts of traceability and certification schemes. Furthermore, the results are divided in three themes: deforestation (and conversion)-free commitments, deforestation cut-off dates and level of traceability commitments. By analysing 20 companies and their deforestation commitments, this study highlights progress and challenges in achieving sustainability goals in the soy supply chain across multiple sectors.

5.1. Traceability frameworks

Chain of Custody (CoC) offers different ways of ensuring traceability and sustainability credentials of certain products in a supply chain. Four chain of custody models are recognized:

1. First, there is the CoC model of Identity preservation (IP) (Figure 8). This model is the most demanding, since an ingredient from a single source must be kept separate from other ingredients, regardless of their certification status. This entails the requirement for documentation from each batch of individually sourced certified material (Efeca, 2020). As a result, the IP model offers the highest level of traceability, but also poses challenges due to the extensive demand for information and resources (Daphne, 2022).
2. The next model is the Segregation chain of custody model (Figure 9). Like identity preservation, it offers a high level of traceability. However, the difference is that materials with similar certification standards can be mixed together. In this case, it is allowed to mix a batch of certified material from one farm with other quantities of certified material. The model ensures that certified and non-certified products are kept physically separate (ISEAL, 2016).
3. The third CoC model is Mass balance (Figure 10). Contrary to IP and Segregation, the mixing of non-certified and certified product is allowed. One condition is that the input quantities have to match the output quantities, either based on percentages or on volume (ISEAL, 2016). The Mass balance model loses sight of full traceability but is easier to implement due to its low barriers and high flexibility (Daphne, 2022).
4. The last CoC model is referred to as Book-and-Claim, also known as certificate or credit trading (Figure 11). Unlike the other three models, this model does not involve a physical segregation of certified and non-certified materials. Sustainability certificates are bought by companies through online trading platforms. Consequently, the product is decoupled from the physical flow of materials, resulting in a lack of physical traceability (ISEAL, 2016). Furthermore, companies can make sustainability claims even if the actual product is not certified (Daphne, 2022). This system is used by many manufacturers to meet sourcing targets, since it has the lowest barriers to enter.

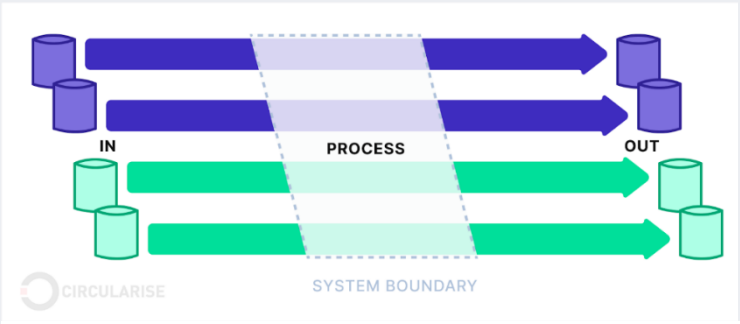

Figure 9: CoC model of Identity preservation. Source: Circularise (2022).

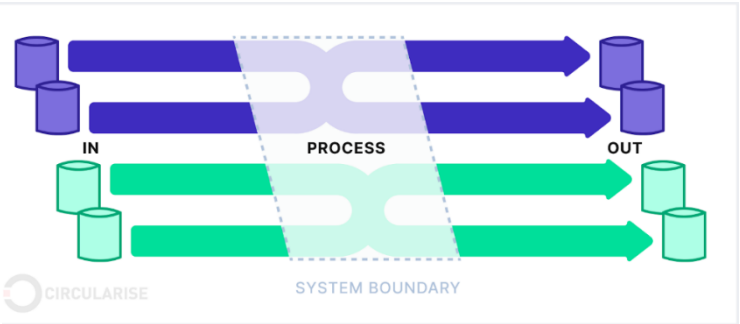

Figure 10: CoC model of Segregation. Source: Circularise (2022).

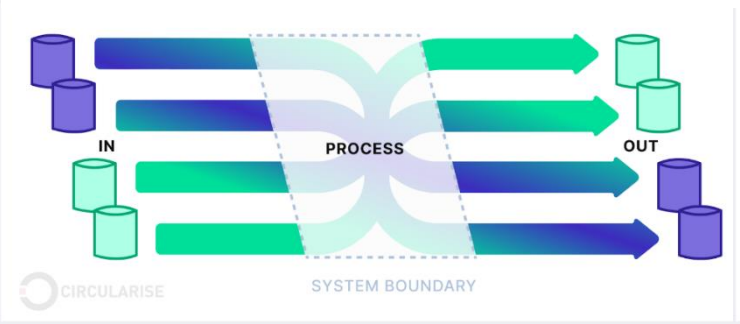

Figure 11: CoC model of Mass balance. Source: Circularise (2022).

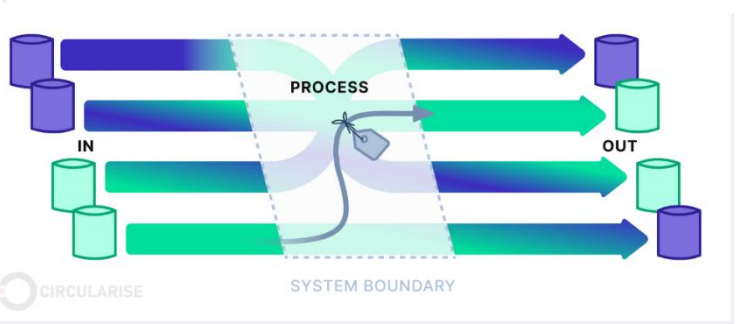

Figure 12: CoC model of Book-and-claim. Source: Circularise (2022).

The four Chain of Custody models offer different approaches to achieve sustainable sourcing, with varying levels of detail and traceability. The differences and similarities among all these models are illustrated in Table 5.

Table 5: Comparison of the four CoC models

	Identity preservation	Segregation	Mass balance	Book-and-claim (certificate/credit trading)
Full traceability	✓	✓	✗	✗
Barriers	Very high	High	Low	Very low
Buying certificates or credits	✗	✗	✗	✓
Mixing of certified and non-certified material	✗	✗	✓	✓

5.2. Certification schemes

Chain of Custody models facilitate the methods to implement traceability in the supply chain. These methods enable certification schemes like RTRS and ProTerra to set the standards for responsible soy production. This type of third-party verification provides a framework for companies to meet the requirements of the EUDR in ensuring traceability and establishing deforestation cut-off dates.

5.2.1. RTRS

Founded in 2006, RTRS (Roundtable on Responsible Soy) is a certification scheme promoting sustainable soy and corn production worldwide (Figure 13). RTRS applies to all kinds of soybeans, including organic and GMO. Farmers comply voluntarily, receiving price premiums for credits. It's a management tool, recognized globally, for human consumption, animal feed, and biofuels. Open to all producers, RTRS supports responsible supply chains while claiming to ensure transparency. It promotes eco-friendly, socially appropriate, and economically viable practices in soy production. RTRS also claims to ensure zero deforestation and zero conversion soy production (RTRS, n.d.). Although RTRS is the most used certification scheme when it comes to soy, it is only covering an estimated of 2% of the global soybean market (Garrett et al., 2019). Around two-thirds of all RTRS certified soy are destined for the Dutch market (IDH et al., 2019).

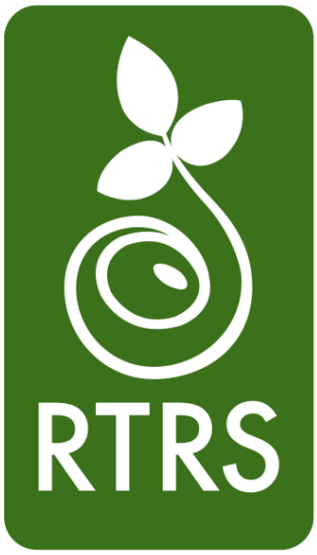

Figure 9: RTRS logo. Source: Impakter (n.d.)

RTRS-certified soy is usually traded as *credits* (book-and-claim). One RTRS credit is equivalent to the volume of 1 ton of RTRS-certified soy. These credits are registered to on an online platform and can be bought by different organisations (RTRS, n.d.). However, the challenge with credits lies in their detachment from the physical flow of soy. As a result, the soy is part of a non-segregated chain and becomes untraceable. Credits are bought by companies to offset the environmental problems caused by the soy they actually consume. In other words, a buyer can purchase credits from a certified producer while sourcing soy from any other producer (Staricco, 2021).

Beside RTRS's efforts to make the soy supply chain more sustainable, NGOs such as Greenpeace and GMWatch have criticized the organisation. The main criticism concerned RTRS's failure to drive significant improvements in the supply chain, e.g., the reduction of deforestation rates or pesticide use. Additionally, RTRS is still allowing genetically-modified soy to be certified as 'responsible' despite the use of chemicals and their adverse health effects on local communities (Corporate Europe Observatory, 2012; Robinson, 2021).

5.2.2. ProTerra Standard

The ProTerra Foundation commits to full traceability and transparency by offering third-party certification for feed and food production systems (Figure 14). It aims to promote good agricultural practices, traceability, environmental protection, and socially responsible business practices (ProTerra, 2019). In contrast to RTRS, the ProTerra Standard focuses only on non-GMO ingredients and physically segregated soy supply chains. However, ProTerra also supports the Chain of Custody model of mass balance, which is not a physical segregated flow of materials (ProTerra, 2021).

Figure 10: ProTerra logo. Source: ProTerra Foundation (n.d.)

ProTerra can be considered the stricter of the two standards and also provides a higher premium for farmers who meet the criteria. However, since the criteria are harder to meet, it is more feasible for farmers to opt for RTRS. One of the main reasons farmers may choose RTRS over ProTerra is the limited access to fully segregated soy flows and the restriction of non-GMO crops imposed by the ProTerra standard (Garrett et al., 2013).

5.2.3. Relevance to EUDR compliance

Certification schemes such as RTRS and ProTerra provide a framework for companies to meet some of the key requirements of the EUDR, such as traceability and set deforestation cut-off dates. The EUDR does recognize the use of certification schemes, but stresses that these tools are complementary to, not replacements for, the responsibility of operators to conduct due diligence and risk assessments (European Parliament, 2023, p. 9):

> *"In order to recognise good practice, certification or other third-party verified schemes could be used in the risk assessment procedure. They should not, however, substitute the operator's responsibility as regards due diligence."*

While the EUDR does allow the use of third-party verification schemes, the Chain of Custody models mass balance and book-and-claim are not permitted. Both these models are employed by RTRS and ProTerra also supports the mass balance CoC model. For companies engaged in sustainable sourcing and seeking compliance with the EUDR, this means they must ensure that their sourcing practices comply with both the certification standards and the traceability requirements of the EUDR. While certification schemes offer a valuable tool, it's the responsibility of the operators to integrate these standards within the regulatory framework of the EU Deforestation Regulation.

5.3. CSR policies: deforestation (and conversion)-free commitments

Considering deforestation-free supply chains, the EU Deforestation Regulation obligations apply from December 29th, 2024.

The transition towards deforestation-free supply chains, as required by the EU, presents a complex and challenging task for various stakeholders within the supply chain. Different sectors and companies have set different timelines for achieving deforestation-free supply chains (Figure 15). Some, like the food retail sector, have set relatively near-term goals for 2025, while others, particularly some of the major soy traders, have more extended timelines, with one aiming for 2030.

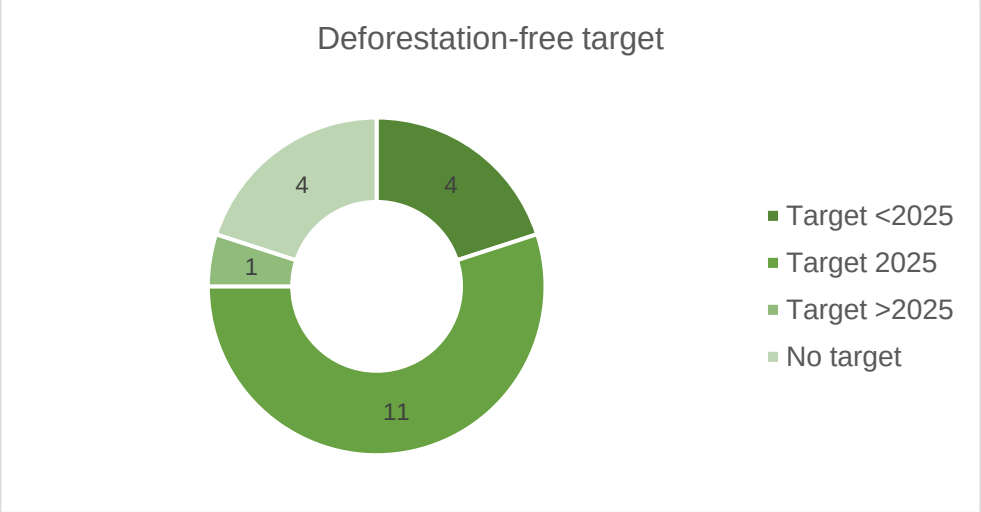

Figure 11: Circle diagram of companies and their deforestation-free commitment target dates

Food retail

When looking at the food retail sector, many supermarkets in the Netherlands have decided to unite their efforts through Centraal Bureau Levensmiddelenhandel (CBL), which is the branch organization for Dutch supermarkets and food service companies. Earlier this year, CBL has published a statement for its ambition to have deforestation- and conversion-free soy supply chains in 2025 (CBL, 2022a). However, most supermarkets are still purchasing RTRS credits (or equivalent) to offset volumes of unsustainable sourced soy. CBL admits (CBL, 2022c):

> *"Yet this incentive (RTRS credits) does not appear to be sufficient to halt developments and accelerate the transition to a sustainable soy chain. That is why a next step is necessary."*

Meat and dairy

When it comes to the meat and dairy sector, the end dates are less clearly defined. For example, Plukon, the largest processor of poultry meat in Europe, claims to ensure deforestation-free supply chains and compliance with the EU legislation (Plukon, 2023), but does not elaborate on how and when they aim to reach this goal. Furthermore, when looking into Plukon's CSR report from 2022, they state to have 29% RTRS certified soy and 23% ProTerra certified soy. This leaves 48% of their soy supply unaccounted for (Plukon, 2023).

Dairy company Arla has published a general statement on their position on soy back in 2019, stating that the soy used in their animal feed has been RTRS certified since 2015 (Arla, 2019). However, in their 2023 climate ambition they declare (Arla, 2023):

> *"We are working towards a deforestation free commitment on feed and are currently involving the feed industry and NGOs in the process, to ensure we will be able to provide traceability and 100% deforestation-free feed for our cows in the future."*

Although their 2019 statement is promising, it falls short of their 2023 climate ambition. Arla is relying solely on buying RTRS certificates to have deforestation-free soy in their cow feed.

The deforestation-free commitment from Vandrie Group is based on the FEFAC (The European Feed Manufacturer's Federation) Soy Sourcing Guidelines (SSGs) (VanDrie Group, 2022). These guidelines contain criteria on social and environmental issues, representing the requirements for responsible soy in feed. The FEFAC SSGs involve 18 sustainability schemes and programmes, none of which exclude legal deforestation. Furthermore, only 10 out of 18 include illegal deforestation in their criteria (Milieudefensie, 2021). Vandrie Group also refers to RTRS as a way to guarantee deforestation-free soy (VanDrie Group, 2022). Nonetheless, RTRS cannot fully guarantee that certified soy is physically deforestation-free since it hardly represents physical flows.

Agriculture and animal feed

Next to the food retail and the meat/dairy sector, there is the agricultural and animal feed sector. These companies are usually the link between the traders and the farmers, and therefore largely control what type of soy eventually comes on the market. Overall, similarly to the meat and dairy companies, corporations in the agriculture and animal feed sector rely on certification schemes to ensure deforestation-free sourcing of soy.

Feed company Nutreco has established a deforestation-free commitment for 2025. However, they are much more transparent in their sustainability report with regard to the manner in which their

sourcing practices are executed (Table 6). Nutreco does mention the EUDR in their 2022 sustainability report and is expecting that Class D soy has moved to Class A by the end of 2024, relying on the fact that deforestation-linked soy will be phased out over time (Nutreco, 2023).

Table 6: Nutreco soy sourcing performance (Nutreco, 2023, p. 47)

Class	Definition	Share of soy (%)
Class A	Certified, segregated supply chain	56
Class B	Certified, either mass-balance or credits with clear cut-off date	14
Class C	Certified, but no clear cut-off date	0
Class D	Without certification, but traceable	29
Unknown	Not possible to trace origin	<1

Agricultural and horticultural cooperative AgruniekRijnvallei sets its commitments through Nevedi, the Dutch animal feed association. Their sustainability commitments are based on buying RTRS credits and following the FEFAC SSGs, similar to VanDrie Group. Furthermore, feed company ForFarmers have committed to 100% responsibly sourced soybean meal by 2025. However, in their 2021 sustainability report, they define 'responsibly' as "*buying certificates that have passed the benchmarking process against the baseline criteria established in the FEFAC SSGs*" (ForFarmers, 2022).

Traders

Lastly, there are the four biggest traders, also known as the ABCDs. These traders dominate the soy market, due to their global presence and networks of suppliers, processors, and customers. Overall, they influence pricing, supply and demand, market dynamics and international trade flows. Many companies depend on those four companies to achieve their sustainability goals.

Traders Archer Daniels Midland company (ADM), Bunge, and Louis Dreyfus Company (LDC) have deforestation-free commitments for 2025 (ADM, 2023; Bunge, 2023; LDC, 2023). Despite Bunge's sustainability efforts, the soy trading company has been called out for their involvement in conflicts relating to land rights and for being repeatedly linked to deforestation: 60.000 hectares of forest were lost between 2019 and 2021. Similarly, Cargill has been linked with more than 66.000 hectares of deforestation within the same time period (Milieudefensie, 2021). Moreover, Cargill has the worst deforestation-free commitment of the four, having a deforestation-free supply chain by 2030 (Cargill, 2023).

5.4. CSR policies: deforestation cut-off dates

The cut-off date set by the EUDR is December 31st, 2020. That means that the commodity has not been subjected to (legal or illegal) deforestation after this date.

Half of the analysed companies have aligned their deforestation cut-off dates with the requirements established by the EUDR, setting them for 2020 or earlier (Figure 16). Notably, several major soy traders have chosen cut-off dates after 2020, whereas downstream suppliers have adhered to the 2020 or earlier deadlines. Additionally, there are instances where companies have not disclosed any specific cut-off dates, and in the case of Nutreco, there are multiple cut-off dates, depending on the soy class.

Based on the data, seven companies have refrained from explicitly disclosing deforestation cut-off dates within their sustainability reports or sourcing guidelines. This absence does not necessarily imply the absence of a cut-off date; rather, it can also suggest that they either have not provided information regarding it or rely on the cut-off date specified by a certification scheme, such as RTRS. Given that RTRS imposes two distinct cut-off dates, it is complicated to track down which date applies to which batch of soy. Additionally, a cut-off date is not applicable to purchasing credits, as it operates independently from the physical material flow.

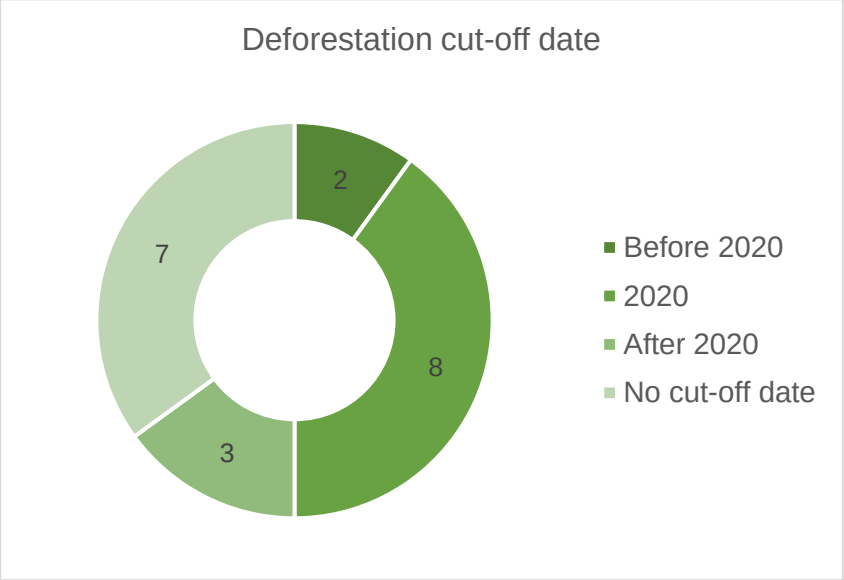

Figure 12: Circle diagram of companies and their deforestation cut-off dates

Food retail

Similarly to the deforestation-free commitments, all supermarkets have decided to follow the same path when setting a cut-off date for deforestation-free soy. The branch organization published the following ambition (CBL, 2022a):

> *"The Dutch supermarkets therefore express the ambition to have only soy in the chain by 2025 use that is demonstrably free of deforestation and conversion from January 1st, 2020."*

Meat and dairy

The meat and dairy sector are less united on having a collective cut-off date. Meat and dairy companies Vion, Plukon, Arla and VanDrie group, do not specifically mention any cut-off dates in their sustainability reports. However, all companies claim to be RTRS certified, relying on RTRS cut-off dates. The RTRS certification scheme works with two cut-off dates, with the first one being May 2009, after which it is prohibited to clear or convert native forests, riparian vegetation, natural wetlands, steep slopes, and areas designated for native conservation and/or natural/social protection. And the second, which is June 2016, where the RTRS broadened the scope to 'all-natural land', also including grasslands, savannahs, prairies, and woodlands (EFECA, 2018).

Nonetheless, within the "Beter Voor Kip, Natuur en Boer" initiative by Albert Heijn, the supermarket has established a collaboration with poultry farmers, including Plukon. An essential criterion underpinning this initiative requires the sourcing of soy utilized in the poultry's feed, which must be conversion and deforestation free, with a cut-off date of August 1st, 2020, combined with RTRS certification (Albert Heijn, 2022a).

Companies Unilever and FrieslandCampina have very specific cut-off dates mentioned in their CSR reports, with Unilever establishing a cut-off date as early as 2015 (Unilever, 2020). However, this only concerns their own supply chains, and they may apply other cut-off dates in specific cases (Unilever, 2020). FrieslandCampina has set a 2016 deforestation cut-off date for their soy, as stated in their Zero Deforestation Policy (FrieslandCampina, 2022):

> *"[Suppliers must] ensure FrieslandCampina's direct and indirect supply does not originate from a converted natural ecosystem as protected by this policy, based on a cut-off date of 31 December 2016".*

Agriculture and animal feed

Similarly to the meat and dairy companies, the agricultural sector and feed companies have diverging deforestation cut-off dates. Royal Agrifirm and the FEFAC soy sourcing guidelines have set cut-off dates no later than 2020, in accordance with the EUDR (Agrifirm, 2022b; FEFAC, 2022). In the case of Nutreco, the cut-off date depends on the categorized class of sustainably sourced soy, as described in Table 6. While class A and B require defined cut-off dates, class D does not require any certification and therefore has no defined cut-off date (Nutreco, 2023). However, this depends on the class and the certification scheme.

Corporations ForFarmers and AgruniekRijnvallei do not mention specific deforestation cut-off dates. ForFarmers mentioned in their sustainability report (ForFarmers, 2022):

> *"ForFarmers considers soy meal sustainable when certificates are bought from soy programmes that have successfully passed the benchmarking process against the baseline criteria established in the FEFAC Soy Sourcing Guidelines."*

The cut-off date depends on the sustainability program and certificate of the soy. Therefore, no specific cut-off date can be determined. Furthermore, the FEFAC SSGs does include a 2020 cut-off date in their guidelines concerning land conversion, but this is a 'desired' criteria, rather than an obligatory element (FEFAC, 2021). The FEFAC SSGs do require a cut-off date for illegal deforestation, but do not explicitly include legal deforestation.

Traders

When examining the soy traders, they all execute different deforestation cut-off dates, with some side notes. For example, all four traders have committed to the Soy Moratorium, which implements a cut-off date of 2008. However, this agreement only covers the Amazon region, excluding other South American biomes. Therefore, there is no established cut-off date for regions such as the Cerrado, where the traders are active and still conduct business. LDC has recently adopted cut-off dates for palm and soy on their website, stating (LDC, 2022):

> *"Going beyond recent sectoral commitments and roadmaps, at LDC we have adopted the following reference dates: November 2016 for palm, and January 2020 for soy and other commodities."*

Moreover, according to Bosselmann & Dolmer (2022) the cut-off dates from LDC and Bunge only include land that is illegally deforested, leaving out legal deforestation. Additionally, the geographical scope of the reference date is unclear, possibly leaving out ecosystems such as the Cerrado savannahs.

5.5. CSR policies: traceability commitments

Lastly, there is traceability, which is defined as "*is the ability to identify, track and trace elements of a product or substance as it moves along the supply chain from raw goods to finished products*" (Daniel, 2020). When examining traceability commitments, it's important to recognize that there are no inherently incorrect approaches, as everyone may have their unique way of realizing them. While it is obligatory to implement due diligence rules under the EUDR, the regulation leaves plenty of room for a company's own interpretation. More due diligence and sustainability reporting this is further developed the recently adopted Corporate Sustainability Reporting Directive (CSRD) and Corporate Sustainability Due Diligence Directive (CSDDD). Although all three legislation share common goals of promoting CSR and sustainability, they vary in scope, approaches, and specific requirements (Table 7).

Table 7: Comparison between the CSDDD, CSRD and EUDR

Legislation	Primary objective	Scope	Compliance
CSDDD (directive)	Emphasizes due diligence to identify, assess, prevent, and mitigate environmental and human rights risks	Whole value chain	Carry out due diligence
CSRD (directive)	Report on social and environmental risks, encouraging transparency	Whole value chain	Report risks and measures taken (without specifying specific outcomes)
EUDR (regulation)	Deforestation-free supply chains and protection of human rights	Seven commodities + derivatives	Products must be deforestation-free, comply with local legislation and respect human rights.

The EUDR requires a certain level of traceability for products from high-risk countries. One example, the product must be traceable to the plot of land of production with the help of geolocation or satellite imagery.

As companies are making efforts to increase traceability, they are partnering with technology platforms and utilizing tools like blockchain and satellite monitoring to enhance transparency in their supply chains. However, there are differences in the depth and focus of these traceability initiatives, with some sectors, such as food retail and traders, making more progress than others. As the demand

for transparent and sustainable sourcing practices continues to increase, it is essential for all supply chain actors to work collaboratively to achieve comprehensive and robust traceability systems.

Food retail

The majority of companies in the food retail sector implement due diligence processes, mostly focusing on identifying risks such as environmental damage and human rights violations. By assessing these risks, companies can determine whether or not they want to purchase goods from a supplier (in case of any grievances).

The food retail sector has several approaches to increase traceability. Supermarket Albert Heijn has been working on increasing traceability in the soy supply chain by executing a pilot with True-Code.org (Albert Heijn, 2023). True code is a platform that enables suppliers to get more insight into the supply chain of high-risk commodities. Its main goal is to share and verify information within the supply chain, without compromising data sensitivity and privacy. True code also focuses on products that have a significant risk of deforestation and assists suppliers in attaining transparency from their traders and cooperatives (True Code, n.d.).

In 2021, supermarket cooperative CBL has pledged for traceability of high-risk commodities (CBL, 2021). Nevertheless, in 2022, they also expressed criticism in a position paper when the EUDR was recently proposed. Specifically, they addressed challenges associated with tracking individual batches for small-holder farms and called for an efficient and inclusive traceability system (CBL, 2022b). Superunie, Plus, and Lidl have made noteworthy advancements in enhancing transparency and traceability within their operations. However, it's important to note that these improvements have not been specifically focused on the soy supply chain.

Meat and dairy

The meat and dairy industry have different methods to reach higher traceability levels. Both Plukon and Vion are vague in communicating their traceability efforts or goals. Vion is claiming to be working on it, while Plukon has developed a supplier portal. In this portal, direct suppliers and poultry farmers can exchange information, mostly focused on food safety and animal welfare. Even though it contributes to product traceability, it does not go to the lengths of tracing soybeans in the poultry's feed. However, Plukon states that it is able to sometimes trace some of its raw material back to the plot of land, as mentioned in their sustainability report (Plukon, 2023, p. 34):

> *"Plukon knows the feed suppliers and their suppliers, as a result of which the raw materials used in the production of the feed can sometimes even be directly traced back to the farmland."*

Unilever claims to be 'committed to maximising transparency and traceability' and admits using traceability certifications. For high-risk commodities, they require traceability to farm, plantation, or forest management unit (Unilever, 2020). However, Unilever does not provide any further details on progress or plans on traceability in their soy supply chains. Dairy company Arla mentions the concept of traceability once in their climate ambition, which is the same statement as their deforestation-free supply chain commitment. Arla claims to be working on providing traceability of feed in the future, though specific details are not provided (Arla, 2023). However, on Arla's website, traceability is primarily associated with food safety rather than sustainability (Arla, n.d.). The dairy product, for example milk, is being traced back to the dairy farm and the specific cow that produced the milk, rather than tracing the origins of the soybean used in the cows' feed.

Similar to Plukon, VanDrie group is also relying on traceability certificates to get to the origin of their products. However, only the commodity of palm oil is mentioned in their CSR report, leaving out soybeans (VanDrie Group, 2022).

FrieslandCampina has published traceability data in their 2022 annual report of palm oil, pulp, and cocoa. Nevertheless, they have decided to remove soy from the scope, as it sold its animal nutrition business in 2021 (FrieslandCampina, 2023). FrieslandCampina does have a target on traceability on their website that includes soy (FrieslandCampina, n.d.):

> *"Our aim is for 95% of key raw materials to be traceable back to source by 2025. The materials in scope are palm oil, soy, pulp and paper, and cocoa purchased by the company."*

While the statement on their website aims for 95% traceability, the 2022 Zero Deforestation Policy has the intentions to reach 100% traceability in 2025 (FrieslandCampina, 2022, p. 4):

> *"Work towards 100% of FrieslandCampina's direct and indirect supply from high risk (and low risk) areas is traceable from the farm or plantation to FrieslandCampina's processing plants, using a verifiable robust chain of custody system, to be achieved ultimately 31 December 2025."*

Likewise Arla, FrieslandCampina has also launched traceability technology that allows its consumers to trace dairy back to its origin. Specifically, in the case of Friso baby formula milk, it can be traced back to the dairy farm and production facility (Friso, n.d.).

Agriculture and animal feed

The agricultural sector and the animal feed businesses rely more on external sourcing guidelines. Agrifirm, ForFarmers and AgruniekRijnvallei all refer to certifications based on the FEFAC SSGs to achieve some level of traceability. Agrifirm offers insights into achieving traceability through one of three methods: compliance with FEFAC SSGs for soy, supplier schemes with batch-level tracking, or third-party verification (Agrifirm, 2022b). However, Agrifirm has released the following statement after finishing their pilot with FrieslandCampina (Agrifirm, 2022a, p. 3):

> *The last years, Royal Agrifirm Group received indications that clients are investigating to phase out soy completely because of sustainability issues. Market intelligence however shows that most soy is not linked to deforestation and that full traceability is almost realized by traders.*

Initially, Agrifirm asserts that the majority of soy production is not linked to deforestation, and subsequently, they anticipate that soy traders ensure full traceability.

FEFACs own position regarding traceability solely revolves around advocating for increased traceability lacking specific details on the path to achieving this goal (FEFAC, 2022). Nutreco has traced their soy and palm commodities back to the country of primary production (Nutreco, 2023).

Traders

The four major soy traders have published a wide variety of data regarding their traceability levels in direct and indirect supply chains. ADM has reached 100% traceability in both their direct and indirect supply chains across Argentina, Brazil, and Paraguay. ADM employs remote satellite monitoring to track the origin of soy back to the field it was cultivated (ADM, 2023).

In 2020, Bunge has successfully achieved 100% traceability within their direct supply chains. However, for their indirect supply chains, this is around 80%, with the goal of reaching 100% by 2025. Bunge uses location details such as GPS coordinates and satellite imaging to pinpoint the physical location of the soy farm on the map and verify if it can be classified as deforestation-free. Bunge states in their sustainability report (Bunge, 2023, p. 51):

> *"Our monitoring system is industry-leading in terms of its scale and depth and is only possible due to the strong relationships we have developed with suppliers over the past century and our use of third-party satellite imaging technology over the farms in our growing database."*

Likewise Bunge, Cargill also claimed to have achieved 100% traceability in their Brazil direct supply chains. Cargill does this by polygon mapping, as explained in their 2022 report (Cargill, 2023, p. 29):

> *"We geolocate farms in our supply chain by mapping their boundaries and creating polygon maps. We overlay these maps with geospatial data from satellites, including from the World Resources Institute's (WRI) business tool, Global Forest Watch Pro, and deforestation-alerting tools. This helps us assess changes in land use and forest cover when they happen and respond with appropriate interventions."*

While the 100% traceability only applies to soy from indirect suppliers from Brazil, Cargill has not reached full traceability in other South American countries, including Argentina (88.6%), Paraguay (82.5%), Uruguay (54.8%) and Bolivia (39.5%). Cargill does not provide data on traceability percentages of indirectly sourced volumes of soy. However, they have released percentages of direct and indirect suppliers of soy (Table 8) (Cargill, 2023):

Table 8: Percentage of Cargill suppliers by volume. Source: Cargill, (2022)

	Brazil	Argentina	Paraguay	Uruguay	Bolivia
Direct	58%	54%	58%	80%	100%
Indirect	42%	46%	42%	20%	0%

LDC has reported to have 84% traceability in their direct Brazil supply chains. They have set targets to achieve 100% traceability levels in high-risk areas this year. About their indirect supply chains LDC states (LDC, 2023, p. 93):

> *"Regarding indirect suppliers, we initiated a new engagement process by providing technical support for our partners to improve their supply chain traceability and due diligence process. This engagement process is due to conclude by 2023."*

The graph in Figure 17 illustrates the percentage of companies within the sector that have committed to achieving deforestation-free status by 2025 or earlier. It is notable that over half of the companies in these sectors have made such commitments. Additionally, the graph provides insights into the portion of the sector that established deforestation cut-off dates prior to 2020. Remarkably, all companies in the food retail sector have set cut-off dates in 2020, whereas half of the companies in the other sectors have not done so. Furthermore, a significant proportion of these companies rely on the purchase of credits to compensate their unsustainable soy sourcing. This doesn't signify that these companies are entirely dependent on credits, but rather that they use this certification to offset a portion of their uncertified sourced soy. Notably, supermarkets such as Lidl, Plus, and Albert Heijn all utilize a blend of certified (and segregated) soy as well as uncertified soy. Moreover, the soy can potentially originate from various sources, either spanning different geographic regions (such as Europe and North America) or deriving from diverse certification programs (for instance, RTRS and ProTerra). When making sector-to-sector comparisons, the food retail industry is performing equally, whereas significant variations exist among the other sectors.

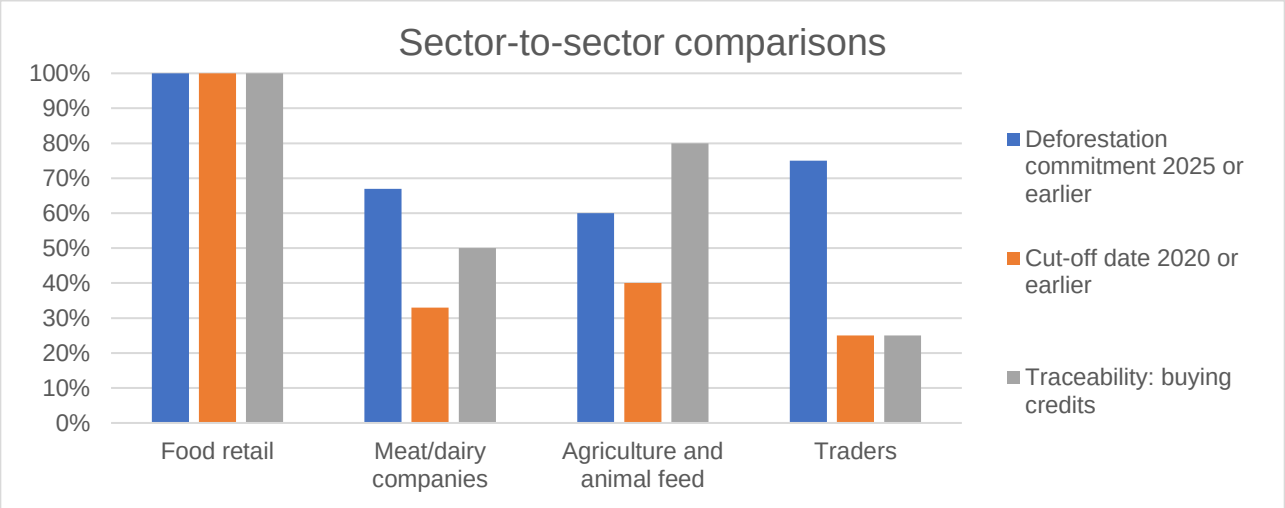

Figure 13: Performance of different sectors on deforestation-free commitments, cut-off dates and traceability

To conclude this chapter, the food retail sector is united in its efforts and aligns their policies through CBL for deforestation-free commitments and setting cut-off dates. However, they are not that specific when it comes to giving details about how to achieve full traceability and transparency. In the meat and dairy industry, some companies have specific cut-off dates, while others rely on RTRS certification. Similar in the in the animal feed and agricultural industry, companies are relying on FEFAC SSGs for having cut-off dates and sufficient traceability levels. Soy traders have relatively less ambitious deforestation targets, but they have made progress with tracing direct soy suppliers in South America. An overview of all the tables and data used in this chapter can be found in the Appendix.

6. Stakeholder perspectives on the impact of EUDR

This chapter aims to explore the potential impact of the European Union Deforestation Regulation on supply chain dynamics. It is structured into four sections: (1) open supply chains, (2) closed supply chains, (3) organic supply chains and (4) global supply chains. These sections delve into various aspects related to the implementation of the regulation, focusing on specific characteristics and stakeholder dynamics within the supply chain. In this chapter, data was collected through conducting interviews with relevant participants who operate in the Dutch soy supply chain.

6.1. Open supply chains

The open supply chain can be viewed as the standard supply chain, which applies to most operational processes within the supply chain, involving a number of stakeholders from production to retail. The focus of this supply chain is primarily within the Dutch borders, with a strong emphasis on domestic operations instead of international trade. Furthermore, the supply chain welcomes new participants, creating an inclusive environment for those seeking to join and do business.

Within the open supply chain, several topics have come to light, which will be discussed below:

- the significance of large traders in the soy industry
- the importance of traders' decisions in achieving sustainability goals
- the need for collaboration among different players in the chain
- the distance from the source affecting knowledge and awareness

6.1.1. Traders in the soy industry

When looking at the soy supply chain, it becomes evident that a substantial portion of soy is imported and controlled by four major traders, also known as the ABCD (ADM, Bunge, Cargill, and Dreyfus) (Int. 1; Peine, 2013). These four companies have an immense influence over the global soy market and control an estimated of 75% to 90% of the global grain trade (Murphy & Burch, 2012). Therefore, these traders are effectively establishing a stronghold that impacts numerous stakeholders within the supply chain. Their activities shape the dynamics of the entire industry, making others dependent on their actions and efforts. According to interviewee 4, *"they are an important link in the chain"*.

As a consequence of the ABCD's dominance, a complex interdependency develops. This interdependence is not limited solely to market dynamics but also extends to sustainability efforts. The ABCD traders can substantially influence the demand for sustainable and deforestation-free soy, acting as a gateway for suppliers to get access to deforestation-free soy. Encouraging these major

traders to embrace sustainable practices and adopt deforestation-free soy becomes a primary concern (Int. 2). More detail on how these traders do this is covered in Chapter 5.

While ADM, Bunge and Cargill are headquartered in the United States, they still need to provide a due diligence statement stating that their products are compliant with the EU deforestation regulation. The regulation applies to every company that exports a high-risk commodity into the European Union, whether based in the EU or not.

However, industry groups that represent cereals, oils and animal feed sectors have pushed the EU to alleviate its anti-deforestation measures. COCERAL, comprising members like ADM, Bunge, and Cargill, together with FEDIOL and FEFAC have called for more lenient chain of custody models. In their published position paper, they argue that segregated supply chains are not feasible and opt for mass balance traceability systems instead. Furthermore, the high requirements for traceability come with confidentiality concerns, such as data sensitivity and the disclosure of sources and volumes (COCERAL et al., 2022).

Nico Muzi, former Europe director of Mighty Earth, reacts (Boren, 2022):

> *"While most soya coming into Europe is deforestation- and conversion-free, the remaining 10% is the problem. And traders refuse to clean up that remaining 10%. Mass balance is pure greenwashing and a non-solution to the problem of deforestation."*

6.1.2. Collaboration in the supply chain

Given the multitude of stakeholders involved in the supply chain, fostering collaboration becomes necessary to achieve smooth and efficient operations. By collaborating, stakeholders can share best practices concerning the implementation of sustainable practices. One example is the Soy and Palm Oil Ingredients Sourcing Policy from Nutreco, which has been made publicly available (Nutreco, 2020). The policy outlines criteria and standards for traceability and selecting soy and palm oil suppliers. Another example is the protocol for Sourcing physical deforestation- and conversion-free soy for use in the animal feed from Agrifirm (Agrifirm, 2022). The information, which has also been made public, is freely available for other parties seeking to adopt deforestation- and conversion-free soy in their practices.

Next to sharing best practices, supply chain stakeholders are also ensuring sustainability through collaborative efforts in cooperatives or industry associations. They play a vital role in promoting sustainability and creating collective responsibility. By joining forces, businesses can collectively address environmental challenges and improve efficiency in doing so.

Two examples of cooperatives in the food industry are Superunie and CBL (Centraal Bureau Levensmiddelenhandel). Superunie represents 12 independent supermarkets in the Netherlands, whereas CBL represents a broader range of supermarkets and food service companies. Superunie serves as a collective platform where small supermarkets come together, primarily for joint product purchases. However, it goes beyond mere procurement and also plays an active role in policymaking, particularly in the field of sustainability. For example, setting sustainability requirements in the purchasing conditions and actively engaging within CBL (Int. 4). According to CBL, "Making the food chain more sustainable is high on the agenda" (CBL, n.d.). CBL, together with supermarkets, is committed to RTRS-certified soy, and is involved in several other (soy) sustainability activities, such as signing the Cerrado Manifesto (2017) and being part of the Dutch Soy Platform Initiative. Additionally, CBL organizes sustainability project groups, where supermarkets can engage, and exchange knowledge and ideas (Int. 3, 4).

The last example of collaboration in the soy supply chain is the Dutch association of the animal feed industry, Nevedi. Consisting of 88 companies, Nevedi aims to source their raw materials as locally as possible with the lowest possible environmental impact (Nevedi, n.d.). A member of Nevedi explained that they actively support the association by sharing extensive knowledge and contributing manpower to initiate and execute numerous sustainability projects (Int. 1). Similar to the food retail cooperatives, partnerships between businesses play a crucial role in driving sustainable initiatives and establishing a sustainable and innovative industry.

6.1.3. Proximity to the source

Another aspect is the proximity to the source. A supply chain consists of numerous stages, from crop cultivation to retail, as explained in Chapter 2.1. The position of an actor in the supply chain can impact its efficiency, transparency, and motivation. Suppliers who are close to the source can develop relationships, which allow for improved communication and product traceability. Because there are fewer intermediaries involved in the supply chain, it becomes much easier to track the movements of products. One interviewee expressed:

"The further you are from the source, the less you know about the source." (Int. 1)

This implies that actors closer to the source have greater access to information. This information is needed to provide transparency and traceability in the supply chain. When translating this to the soy supply chain, animal feed manufacturers are a few links closer to the soybean farmer compared to supermarkets (Int. 1).

On the one hand, supermarkets, being further away from the soybean farmers, may face challenges in gathering information about the soy's origin and therefore, need to rely more heavily on suppliers down the supply chain (Int. 3). On the other hand, supermarkets are closer to the end user, the consumer. This does provide supermarkets with the opportunity to be able to communicate with the public since they are the final link in the supply chain.

Interviewee 3 stated: "*Hoge bomen vangen veel wind",* which is the idea that visible companies, such as supermarkets, tend to attract more attention or criticism due to their visibility. Therefore, these companies often face increased attention due to their direct connection to the public and can be held accountable for the actions of the entire supply chain. However, Interviewee 3 also expressed that this increased focus gives them the position to ask important questions and pressure suppliers further down the supply chain.

To conclude, a handful of major traders, collectively known as ABCD (ADM, Bunge, Cargill, and Dreyfus), have substantial control over the global soy trade. Their dominance also extends to the supply chains' sustainability efforts. Encouraging these major traders to adopt sustainable practices is crucial for promoting environmental protection and responsible sourcing.

Additionally, collaboration is essential in complex supply chains. Stakeholders work together through cooperatives and industry associations, such as Superunie, CBL, and Nevedi, to address environmental challenges and improve efficiency in the supply chain. These collaborations drive positive change and demonstrate the collective influence in responsible sourcing.

An actor's proximity to the source can have impacts on efficiency, transparency, and motivation. For instance, animal feed manufacturers, which are closer to the raw product, establish stronger relationships with farmers and gain in-depth insights into the production process. Supermarkets, which are nearer to end consumers, drive transparency and sustainability from the top while facing scrutiny and pressure to advocate for sustainability.

6.2. Closed supply chains

A closed supply chain refers to a system where the majority of the production process, from sourcing raw materials to delivering the final product, is tightly controlled and limited to a select group of participants. Overall, a closed supply chain offers greater control, coordination, and security by limiting participation to a select group of trusted partners. While it may limit flexibility and innovation stemming from external collaborations, it can provide benefits in terms of quality assurance, risk management, and optimized supply chain performance. Closed supply chains from three supermarket chains will be discussed: Albert Heijn, PLUS and Ekoplaza.

6.2.1. Albert Heijn: Better for Nature & Farmer programs

Since 2017, Albert Heijn has implemented Better for Nature & Farmer programs (Figure 18), which involve closed supply chains in the Netherlands. The scope of the program includes products such as pork, chicken, dairy, eggs, and fruits & vegetables. These programs consist of a select group of farmers and growers who exclusively produce for Albert Heijn. Albert Heijns' goals include the improvement of animal welfare, promoting environmental protection and boosting the farmer's economic viability (Ahold Delhaize, 2023; Int. 3). For example, the program pays a premium of 5 cents per liter of milk to the farmer as an incentive (Albert Heijn, 2022b).

Having a closed supply chain also makes it easier to establish sustainability agreements and incorporate sustainability practices. Since supermarkets have more control over their suppliers, they can ensure certain sustainability standards, such as certifications and the requirement that products have to be deforestation-free (Int. 3). The Better for programs from Albert Heijn also have advanced the deadlines for deforestation-free and conversion-free soy, allowing for meaningful discussions and long-term collaborations with suppliers. The Better for program concerning poultry has established a deforestation cut-off date of August 1st, 2020. Albert Heijn, together with Plukon and poultry farmers are working together on making the soy components in poultry feed more sustainable (Albert Heijn, 2022a, Int. 3). The interviewee verified (Int. 3):

> *"Within the Better for programs, we can really talk to suppliers, we have long-term collaborations and we also have more transparency in the supply chain."*

Beter voor Natuur & Boer

BETER VOOR NATUUR & BOER AH.NL/BETERETEN

Figure 14: Albert Heijn's Better for logo. Source: AH (n.d.)

6.2.2. PLUS: closed supply chains for beef and pork

PLUS supermarkets have established closed supply chains for their beef and pork products. Since 2019, they have created a unique collaboration with 18 Dutch pork farmers and meat producer Vion to gain deeper insights and transparency about the origin of their meats. Before, pork meat was purchased from several flows from the Netherlands and Europe, PLUS now gets its pork from its own, closed, supply chain (Plus, n.d.). Similar to Albert Heijn, PLUS also provides economic incentives for farmers. According to PLUS (Plus, n.d.):

> *"At the beginning of 2020, we agreed on financial compensation with pig and beef farmers. This way we guarantee purchasing security and this offers farmers the opportunity to continue investing in sustainable business operations."*

Consequently, farmers have the opportunity to invest in sustainability initiatives, obtain sustainability certificates and reduce food waste. PLUS is dedicated to sourcing more of its products locally and shortening the supply chain. Not only in the case of meat but also fruits, vegetables, bread, and cheese, all of which come from regional, exclusive suppliers (Plus, n.d.).

6.2.3. Ekoplaza: closing the loop

Another supermarket that focuses on closed supply chains, is the organic supermarket Ekoplaza. One of Ekoplaza's core principles is short and closed supply chains, which it achieves by collaborating with small-scale family businesses, as opposed to large food corporations. Ekoplaza states on its website (Ekoplaza, n.d.):

> *"Your supermarket is based on transparency from field to kitchen counter. An honest collaboration with a human touch. We opt for a maximum closed cycle and source ingredients as locally as possible."*

This ethos highlights their commitment to providing customers with complete traceability of the journey of their food, from its origins on local farms to its presence on their kitchen tables. Besides maximum closed supply chains, there is also an emphasis on the value creation of waste and collaboration between suppliers (Ekoplaza, 2023).

In summary, closed supply chains among Albert Heijn, PLUS and Ekoplaza prioritize transparency, collaboration with and among suppliers, local sourcing, financial incentives for farmers, and a strong focus on sustainability. These practices reflect a growing commitment to responsible and sustainable food production among food retailers and its suppliers.

6.3. Organic supply chains

6.3.1. Organic agriculture and its environmental impacts

Over the last few decades, there has been an emphasis on organic agriculture and what potential benefits it can have for the environment. Organic agriculture is a farming method that focuses on enhancing soil health, ecosystems, and biodiversity (IFOAM, 2008). In its farming practices, it aims to minimize the use of synthetic inputs, such as pesticides and fertilizers, and does not allow the use of genetically modified seeds. Organic farming practices often result in increased soil nutrient levels and overall soil health, heightened biodiversity, greater resilience to climatic stresses, and ultimately, long-term sustainability (FAO, 1999).

The relationship between organic agriculture and deforestation is still a debated issue. On the one hand, there is the yield difference between conventional agriculture and organic agriculture, which is often referred to as the 'crop yield gap'. Organic agriculture has on average a 15% to 30% lower yield compared to conventional agriculture (Alvarez, 2022; Knapp & van der Heijden, 2018), in which case, you would need more acreage to produce the same amount of food. Moreover, the findings of Searchinger et al. (2018) suggest that because more land is needed, organic agriculture can indirectly lead to higher rates of deforestation. This phenomenon is not limited to crop cultivation alone; it also applies to livestock farming, especially in the case of grass-fed livestock. This type of animal husbandry requires more area compared to feedlots, frequently resulting in deforestation (MacDonald, 2019).

On the other hand, there are studies that say that organic farming is a viable method to feed the growing world population without the need for increased land-use. These studies look beyond land-use and yield, but also take into account other factors, such as reducing food waste, water use and reducing the consumption of animal proteins, which reduces food-competing feed from arable land (Muller et al., 2017). Furthermore, many organic farms tend to be smaller and more localized compared to large-scale conventional farms, leading to reduced transportation costs and transport emissions. Additionally, due to their local focus, organic products often have shorter supply chains, enhancing transparency and facilitating an efficient traceability process.

6.3.2. Organic quality marks and certification

Probably the most recognizable logo in food labelling is the EU organic logo (Figure 19). The white leaf on the green background must be used on all pre-packaged EU food products, which are sold within the EU. The product also has to be certified by an authorized independent authority. However, the EU organic certificate does not set any requirements for deforestation (Bionext, n.d.).

Figure 15: EU organic logo. Source: European Commission (n.d.)

Next to the organic logo of the EU, there is additional certification for organic products, like Fair Trade IBD (not to be confused with the sustainability label Fairtrade) (Figure 20). IBD is a globally accepted Brazilian certification body that certifies organic agricultural products. The Fair Trade program has included deforestation in its criteria, with a cut-off date of 2016 (IBD, 2018). Bionext states that the Chinese organic soy used in the Dutch animal feed is Fair Trade IBD certified and therefore can be considered deforestation-free (Bionext, n.d.). This organic soy does not hold RTRS certification, given that the Fair Trade IBD certification meets all RTRS requirements. Bionext, along with other stakeholders in the soy and agriculture sector, has made efforts to make the IBD certification equivalent to RTRS certification (Bionext, 2019). However, there is no data available to report on this progress.

Figure 16: Fair Trade IBD certification logo. Source: IBD (2018)

And finally, there is the Demeter certification standard, which applies to organic-dynamic agricultural practices and products like fruits, vegetables, coffee, and dairy (Figure 21). The standard follows the requirements of the EU organic quality mark but has additional requirements, including biodiversity and the use of renewable energy (Stichting Demeter, 2023). Similar to the EU organic quality mark, there are no requirements to prevent deforestation (Milieucentraal, n.d.).

Figure 17: Demeter certification. Source: Demeter (n.d.)

6.3.3. Organic soybeans

When looking at organic soybean cultivation, Table 9 shows how much the EU has imported in 2020, 2021 and 2022 (European Commission, 2022a, 2023a).

Table 9: EU imports of organic soybeans in 2020, 2021 and 2022. Source: European Commission (2022, 2023)

Exporting country	2020 imports (thousand t)	2021 imports (thousand t)	2022 imports (thousand t)	Share (%, 2022)
Togo	51.0	63.3	120.1	62.6
Ukraine	28.7	17.2	30.6	16.0
Benin	6.3	6.3	14.0	7.3
Kazakhstan	11.0	14.5	11.5	6.0
Burkina Faso	5.2	5.1	8.0	4.2
Bosnia and Herzegovina	ND	0.7	2.0	1.0
India	15.6	7.8	1.1	0.6
China	4.4	1.3	0.9	0.5
Uganda	8.8	7.4	0.8	0.4
Canada	ND	0.9	0.7	0.4
Total	**137.3**	**126.8**	**191.9**	**100**

As seen in Table 9, the amount of imported organic soybeans has increased from 137 thousand tonnes in 2020 to 191 thousand tonnes in 2022. A report from Voora et al. (2020) confirms that the demand for organic soybeans has grown over the past decade and that it is expected to increase even more. Specifically, consumption in the United States and Europe has increased, possibly relating to the increase in the consumption of soy-based products as alternatives to animal-derived proteins. However, the main focus of organic soybean consumption lies in the Asia-Pacific region, as it accounts for 61.2% of the market (Voora et al., 2020).

As depicted in Table 9, another observation is the large percentage of organic soybeans that are grown in parts of West Africa, Eastern Europe, and Asia, in contrast to South America for non-organic soybeans. More specifically, Togo is supplying more than 60% of the EU's organic soybean import. With the backing of the government, foreign investments and the mobilisation of producers, processors and traders into cooperatives, the soy industry in Togo boomed between 2012 and 2018. This growth resulted in Togo being the EU's top organic soybean supplier (Boucher, 2022).

According to the Dutch organic supply chain organisation Bionext, organic soy used for animal feed comes a large part from China, with some also sourced from Europe. Bionext claims that the soy is grown on land where no deforestation has taken place, as agricultural expansion primarily involves the transformation of conventional agriculture to organic agriculture, rather than directly converting forests into arable land (Bionext, n.d.). While Bionext may assert that organic soy cultivation does not directly result in deforestation, it's important to acknowledge that it may still contribute to deforestation indirectly.

6.3.4. Supermarkets and organic supply chains

When scaling down to the Dutch soy supply chain, organic food retailers such as Ekoplaza and Odin have similar characteristics as the closed supply chains. The main thing that distinguishes the organic supply chains is the separated flows of materials. In the case of soy, organic soy cannot be mixed with non-organic soy, which is the case for certified and non-certified soy (mass balance). Therefore, organic soy can already be seen as a segregated flow.

Furthermore, organic retailers have a limited pool of suppliers to at their disposal, compared to non-organic retailers. According to an interviewee, this limitation brings the advantage of an increased insight into the market and the ability to carefully choose its suppliers. Additionally, this is beneficial for enhancing transparency in the supply chain. Since they work with fewer and more local suppliers, organic retailers are able to communicate more about their suppliers to the final consumer (Int. 5). Some farmers even eliminate soy from their arming and animal husbandry practices. For instance, the dairy supplier of Ekoplaza exclusively raises grass-fed cows. These cows do not get any additional nutritional supplements, such as soybeans (Ekoplaza, 2023).

The interviewee also noticed a growing interest among consumers, leading to in-depth questions about their sustainability practices and responsible sourcing practices. The retailers want to demonstrate their commitments to sustainability, not only to the consumer but also to the suppliers and their suppliers (Int. 5). Consumer pressure is not only evident in conventional supply chains but encompasses all supply chains.

The questioned organic retailer has revealed not to be a member of CBL or Superunie, unlike the majority of food retailers in the Netherlands. Nevertheless, they engage in alternative forms of organization through collaborations and memberships in various organic associations. Examples include Bionext, the supply chain organization for organic agriculture in the Netherlands, IFOAM (International Federation of Organic Agriculture Movements), which advocates for organic food and farming, and OPTA (Organic Processing and Trade Association) Europe, which is a lobby group for organic processors and trading companies (Int. 5.).

To conclude, organic agriculture can have many benefits for the environment, including the enhancement of soil health, biodiversity, and overall sustainability. Some even argue that organic farming can feed the world, if combined with the reduction of food-competing feed use, reducing food waste, and transitioning from animal-based proteins to plant-based proteins. However, the indirect impact of organic agriculture on deforestation is still debated.

Noticeably, the majority of organic soybeans come from West Africa, Eastern Europe and Asia, instead of South America. While some of these countries have a lower risk of deforestation, it's essential to consider the potential indirect environmental impacts of organic soybean cultivation in these regions. Additionally, not all organic certifications and quality marks guarantee that organic produce is deforestation-free. Deforestation-free supply chains are not a critical criterion in some of these programs.

Organic retailers separate themselves from conventional retailers by promoting transparency with shorter supply chains and a more localized approach. Some farmers have chosen to completely exclude soy entirely from their agricultural methods. Not only do they reduce their reliance on soy, but also ensure full traceability to the feed given to their cows.

6.4. Global supply chains

Global trade has been an essential part of human history. Ever since the Silk Route between Europe and Asia and the construction of the Panama Canal, trade has become more intensive and interconnected than ever before. This globalization has caused the emerge of global complex supply chains, with production locations all over the world. Businesses are experiencing intricate regulatory landscapes and changing requirements regarding sustainability, especially with the recently enforced EU Deforestation Regulation. Not only for companies operating within the EU but also for companies which are doing business with the EU.

6.4.1. Level playing field

According to an interviewee, operating in multiple countries makes it more difficult to set international goals that are applicable to all its production facilities. In contrast, companies operating exclusively within Dutch or European Union borders find it comparatively easier to establish such goals. This is due to the regulatory requirements that apply to the entire EU and therefore creating a level playing field (Int 2.). The establishment of a level playing field was also highlighted in the Voluntary Partnership Agreement (VPA and EU Timber Regulation (EUTR), particularly concerning the legal and illegal timber industry. Maryudi et al. (2020) explain: "Illegal logging is said to create unfair competition for legally operating businesses, as illegal operators sidestep duties and taxes and have no obligation to invest in proper management of forests". Illegal operators neglect responsible forest management by avoiding duties, taxes, and environmental regulations, creating an unfair advantage. With the introduction of the EUDR, the level playing field remains consistent regardless of whether a company operates within the EU or outside of it. Legal compliance with the EU's environmental regulations becomes obligatory if a company wants to do business within the EU.

6.4.2. Impact on trade patterns

As a result of the EUDR, the European Union increases the demand for deforestation-free soy, while other regions such as Asia and Africa do not. This discrepancy in legislation and standards can lead to a shift in the soy market, where cultivation is moved to low-risk countries or countries with weaker regulatory regulations to bypass EU laws (Int. 1, 3, 5). Potentially, this relocation of soy cultivation can lead to an undermining of sustainability efforts. Businesses may move away from high-risk areas, which increases the demand for soy from low-risk areas. Consequently, this could create a dichotomy in the soy market. On one side, there's soy that adheres to the EUDR, primarily destined for the EU market, while on the other, there's soy that doesn't meet these regulations, primarily intended for non-EU markets, including China (Int. 2, 4).

Furthermore, companies could also reduce their soy use by substituting soybean meal in animal feed by using other feed ingredients, for example maize or canola meal. By reducing a company's reliance on soybeans, it enhances the resilience of their supply chain and can also reduce the environmental impact associated with soy production and deforestation.

When examining the relationship between environmental regulation and trade, the Porter Hypothesis asserts that environmental regulations will lead to incentives for innovation, efficiency, and competitiveness (Porter & Linde, 1995). In the context of the EU Deforestation Regulation, companies that are importing or using high-risk commodities may be incentivized to develop and implement innovative practices, technologies, and sourcing practices. The requirements set by the EU can lead to a change in global trade since companies exporting goods to the EU must adopt the EU's sustainability standards. This trend, also referred to as the Brussels Effect, highlights the EU's market power and ability to influence global trade.

Qiang et al. (2022) have conducted research on whether the Porter Hypothesis is also evident in China's economy, which they affirm. The researchers conclude that strict environmental regulations have a negative effect on export trade in the short term. However, due to innovation efficiency, this impact eventually turns positive. As a result, this effect lowers production costs and increases competitiveness and trade, facilitated by technological innovation and the internalization of environmental costs.

1.3.4. The influence of China

Notably, the soy sector in Brazil has experienced a shift, with transnational corporations emerging, effectively displacing domestic players. This transformative trend is projected to continue, with the sector rapidly evolving towards oligopolistic conditions, ultimately becoming dominated by global corporations (Wilkinson, 2009). Over the last few decades, China has become a new focal point for Brazil's agricultural exports, primarily due to its heavy dependence on soy imports driven by the increasing urban middle class, urbanization, and exponential economic growth (Giraudo, 2020). Currently, China accounts for more than 60% of global soy imports, and this share is expected to steadily increase further (Donly, 2023). Global traders are increasing their investments in crushing facilities in China and as a result, China is becoming the basis for soy meal exports to the rest of Asia, acting as a regional exporter (Wilkinson, 2009).

However, a Rabobank study has revealed that China's soybean imports will eventually decline in the 2030s. Reasons for this decline include slower growth of the livestock industry, enhancement in agricultural practices, and a decrease in the soy ratio in animal feed compositions (Chiang & Pan, 2023).

As of 2023, China and Brazil have revealed a collaborative effort to end illegal deforestation and related trade activities. While this does not exclusively target legal deforestation and high-risk agricultural commodities like soybeans, it is considered a step in the right direction. This collaborative effort is seen as a necessary turning point in the preservation of Brazil's forests and in tackling deforestation, particularly given China's substantial influence over agricultural operations within the Brazilian Amazon (Astrini, 2023).

In conclusion, the globalization of global supply chains led to the emergence of complex and interconnected relationships between importing and exporting countries. The introduction of the EUDR seeks to establish a level playing field by enforcing consistent regulatory requirements across the EU, ensuring uniform adherence to environmental standards. The Porter Hypothesis states that stricter environmental regulations can drive innovation, efficiency, and competitiveness.

This legislation is expected to influence global trade patterns, as countries like Brazil and China might follow. Nonetheless, there is the potential risk of soy cultivation shifting from high-risk to low-risk areas and to countries with lenient environmental regulations, undermining sustainability efforts. As it turns out, China is expected to play a crucial role in global soy supply chains, given its influential status as the world's biggest importer of soy. Collaborative efforts like combating illegal deforestation in the Amazon can be regarded as a positive and progressive development in sustainable forest management.

7. Discussion

This chapter starts by answering the research questions formulated in Chapter 1. Subsequently, the results are put in a wider context, and the implications will be reviewed, highlighting its strengths and weaknesses. Next, reflections on the conceptual framework and methods are discussed. Finally, this chapter provides some recommendations and suggestions for further research.

7.1. Research questions and interpretation of the results

How do companies in the soy supply chain operating in the EU translate the EU Deforestation Regulation into their Corporate Social Responsibility policies, and how do corporate interests and regulatory pressures influence this translation process?

7.1.1. Key regulatory requirements and provisions of the EUDR

The EU Deforestation Regulation has three main requirements: firstly, the products placed on the market have to be deforestation-free. This means that a product is considered deforestation-free if it was produced on land that was deforested before the 31st of December 2020. Any deforestation or forest degradation activities after this date are not considered deforestation-free and are not allowed on the EU market. The regulation covers seven high-risk commodities: cattle, cocoa, coffee, palm oil, rubber, soy, and wood, including their derivatives. Second, the products have to be produced in accordance with the relevant legislation of the country of production. This includes land rights, environmental protection, labour rights, human rights, and other principles, regulations, and laws applicable to the product's country of origin. The last requirement is that the products are covered by a due diligence statement. The due diligence statement includes (1) a collection of all relevant information, (2) a risk assessment that addresses deforestation risks and other non-compliance concerns, and last, in case of a non-compliance risk, and (3) a risk mitigation procedure. Furthermore, corporations have to prove that their product does not originate from deforested land by providing traceability documents, where the CoC traceability model has to be a segregated flow of material (either IP or Segregation).

7.1.2. CSR policies and compliance with EUDR

Twenty companies and their Corporate Social Responsibility (CSR) policies were analysed on three aspects: deforestation-free commitments, deforestation cut-off dates, and traceability. Moreover, to capture the entire supply chain, the twenty companies were divided into four sectors: food retail, meat and dairy, agriculture and animal feed, and soy traders.

Deforestation-free supply chain targets: Among the 20 companies studied, just four have established deforestation-free targets prior to the year 2025. Interestingly, over half of these companies have set 2025 as their target date. Nevertheless, while this may initially appear ambitious, it is worth noting that the EUDR has insisted on a deadline of December 2024. Consequently, even a target date of 2025, which might seem near, could be considered too late to meet the EUDR's requirements. Additionally, it's important to emphasize that a 2025 target does not necessarily signify January 1st but can encompass the entirety of the year, including December 31st. This underscores that aiming for the end of 2025 still falls a year behind the EUDR's stipulated timeline. The results highlight the complexity of setting and achieving deforestation-free commitments, as well as the lack of alignment between corporations. The commitments show that there is resistance from some agribusiness corporations to fully adhere to the EUDR's requirements, illustrating a power struggle between EU regulatory power and corporate interests.

Deforestation cut-off dates: half the companies analysed have set deforestation cut-off dates for 2020 or earlier, aligning with the requirements of the EUDR. However, it is concerning that 7 out of 20 companies in the study do not have any established cut-off dates. The absence of a cut-off date raises concerns about the feasibility of achieving deforestation-free supply chains. Some explanations include the possibility that companies have indeed set cut-off dates, but have chosen to not disclose them publicly, or that companies rely on certification schemes rather than independently setting a date. It is also possible that the cut-off date depends on the type of commodity involved, contingent on the company and what sector it operates in. Lastly, it is plausible that there is a complete absence of an established cut-off date.

Traceability: the EUDR mandates that traders and operators of high-risk commodities provide the geolocation of the plots of land where the commodity was produced. The EU accepts geographical coordinates or polygon data, as well as remotely sensed information such as air photos and satellite imagery (European Commission, 2023). An alternative method is the use of blockchain technology to ensure traceability. Blockchain is already viewed as a potential game changer in managing supply chains. It can be seen as a digital record-keeping technology that consists of a 'chain of blocks' of different parties in that supply chain, with a focus on authenticity and data integrity. This technology has gained considerable attention in various industries, including food, and logistics, as it provides a secure and transparent way to trace the movement of products from the origin of the product to the end consumer. Despite its potential, adoption of the technology remains limited. Several factors could contribute to its limited adoption, including the high implementation costs, constraints linked to financial and technical capacities and privacy concerns.

The research encountered several traceability initiatives in the soy supply chain, particularly in relation to meat and dairy products. Some of these companies offer their consumers the ability to trace the product back to its 'origin'. For instance, in the case of eggs, cow's milk and baby formula milk, consumers can use a unique code to identify the specific chicken that laid the egg, or the cow that provided the milk. Typically, these initiatives provide information about the farm or production location. Interestingly, these traceability efforts are primarily directed towards tracing the product back to the animal and do not extend as deeply into the sourcing of the animal feed. This is likely due to the focus on the 'farm to fork' concept, where the focus is not on animal nutrition. Several reasons can contribute to this phenomenon: firstly, there could be a lack of consumer interest, which leads to companies prioritizing 'food' instead of 'feed' traceability. Second, the regulatory requirements in these sectors largely focus on traceability in relation to food safety. For example, the requirement of being able to recall or withdraw unsafe food in case of hygiene issues or foodborne illnesses such as salmonella, listeria, or E. coli. Last, tracing the animal's feed is much more data-intensive and complex, which can often involve multiple ingredients from various sources, presenting challenges for companies.

Definition of sustainability and deforestation-free: the research has identified that a significant portion of companies in the soy supply chain use some sort of certification scheme, primarily RTRS or ProTerra. The difficulty lies in the view that certified soy automatically translates sustainable (or deforestation-free) soy. This assumption is employed by animal feed companies in the Netherlands and members of Nevedi who claim that they are using 100% 'responsible' soy. However, due to the absence of fully segregated flows, there is no guarantee that the soy in the feed is genuinely sustainable soy and free from links to deforestation. In this case, buying credits is essentially an equivalent of sustainable soy and not actually the real deal. The reality is determining the origin of soy, along with its potential links to both legal and illegal deforestation, remains a complex challenge. Another challenge arises from the divergent perspectives on sustainability between the European Union (EU) and certification schemes. These entities often hold conflicting definitions of what qualifies as sustainable. What adds to the challenge is that the scope of the EUDR only covers forested areas such as the Amazon, and leaves out large parts of the Cerrado and the Gran Chaco. Specifically, these areas are vulnerable to deforestation because of rapid agricultural expansion and weaker environmental protection mechanisms.

Furthermore, it is still legal according to Brazilian law for companies to legally deforest a portion of their land, which further complicates the definition of deforestation-free soy. There is also the issue of illegal deforestation, which is often associated with forestry crime, land grabbing and environmental violations. To clarify, deforestation-free is considered deforestation-free if the land has not been

deforested after 2020. However, it's important to emphasize that deforestation-free does not necessarily equate to sustainability, as the forest has already made way for agriculture before the cut-off date.

7.1.3. Stakeholder views on supply chain dynamics

Stakeholder dynamics in the supply chain: the findings of the research highlight the increasing importance of sustainability and responsible sourcing practices within the soy supply chain. It underscores the value of collaboration, transparency, and adaptability to navigate the regulatory landscape and to keep up with consumer expectations.

- **The ABCDs:** the four big soy traders are expected to play a pivotal role in shaping the demand for sustainable and deforestation-free soy. An important factor in compliance will be encouraging these traders to comply with the EUDR and provide a solid foundation for the rest of the supply chain.
- **Better together:** supply chain stakeholders have recognized that collaboration is essential to achieve sustainability goals. This can either be done by sharing best practices, forming cooperatives or industry associations, and fostering a collective responsibility.
- **Proximity:** the proximity of an actor to the source or to the end consumer is a critical factor for getting information, transparency, and stakeholder pressure. On the one hand, actors closer to the source have greater access to information and can provide better traceability and transparency in the supply chain. On the other hand, supermarkets, although further from the source, have a direct connection to consumers and can use their visibility to influence suppliers and address sustainability concerns.
- **Global trade**: the introduction of the EUDR will control what is imported and exported out of the European Union, which may lead to shifts in global trade patterns. The production of high-risk commodities could relocate to low-risk regions or to regions with weaker environmental regulations. However, the Porter Hypothesis implies that the EUDR could spark an innovation effect, which triggers technological development and efficiency in the supply chain. The question remains if the EUDR will achieve the intended outcome envisioned by the EU, namely that it will have a trickle-down effect on the broader global market.
- **Supply chain types**: it is important to acknowledge that different types of supply chains (open, closed, organic, global) are impacted differently by the EUDR. Their unique characteristics highlight the need for tailored sustainability strategies and approaches to be compliant with the regulation.

- **Power struggle**: The main power struggle that is observed by stakeholders is the dominance of the large trading companies, as they significantly shape the dynamics of the entire industry. These actors are represented by industry groups and engage in lobbying activities to advocate for a more lenient chain of custody system.

7.2. Reflections on conceptual framework

The conceptual framework laid a solid foundation for understanding the complex dynamics of the soy supply chain under the EU Deforestation Regulation and Corporate Social Responsibility (CSR) policies. By classifying supply chains into four types (open, closed, organic and global), the different unique structures and characteristics are recognized. However, it's crucial to critically assess whether these classifications adequately capture the intricate variations within real-world supply chains. There may be additional dimensions or factors that are overlooked and can impact the validity of the framework. Supply chain dynamics can vary depending on the relationships between stakeholders and suppliers up and down the supply chain and how they respond to environmental regulations, such as the EUDR. Furthermore, this approach also demonstrates the crucial roles played by different supply chain actors and underscores the importance of their positions within the chain. It emphasizes how companies at different points in the supply chain can collectively contribute to sustainability and transparency. Furthermore, it enhances the theoretical understanding of how supply chain dynamics vary and how different actors contribute to traceability and sustainability.

The conceptual framework also elaborated on soybean cultivation and trade, emphasising the roles occupied by the major soy traders ADM, Bunge, Cargill and LDC. Their role in traceability and sustainability is especially important, primarily because of their proximity to the source and substantial control over the supply chain (Wesz Jr, 2016). More importantly, most of the traders have been exposed to contributing to adverse impacts on forests and communities, either through their association with unsustainable sourcing practices or involvement in conflicts relating to land rights (Milieudefensie, 2021). Adopting a bottom-up approach is essential to reach maximum traceability, as mandated by the EUDR. Hence, it underscores the importance of these major traders making substantial contributions and establishing a firm, transparent foundation that can serve as a model for other suppliers to follow and build upon.

Following the position of the ABCDs in the supply chain is the understanding that each link in the supply chain has different pressures and expectations in response to the EUDR. While upstream companies, like farmers and traders, may face pressures related to their sourcing practices, land use and use of pesticides and fertilizers, downstream companies face other pressures such as consumer expectations, demand for sustainably sourced products, and other matters such as packaging and

labelling. The dynamic highlights the importance of involving both upstream and downstream stakeholders in CSR commitments and sustainability efforts. It contributes to the theoretical understanding that involving both upstream and downstream parties in CSR commitments is vital for sustainability efforts, even though they encounter different sustainability challenges and pressures.

The conceptual framework further dives into the relationship between private and public authority, regulatory requirements and CSR practices. They both have common sustainability goals, namely protecting the environment and ensuring responsible business. This synergy extends to the EUDR, which acts as a catalyst for enhanced CSR policies, aligning social, economic, and environmental responsibilities across supply chains. Moreover, the EU's own success is intrinsically linked to the effective implementation of CSR policies by companies, as these policies contribute to the EU's broader sustainability goals (e.g., Green Deal, Fit for 55, SDGs).

Elaborating further on the role of the European Union is the concept of the 'Brussels Effect', which highlights the EU's regulatory power and its ability to shape global markets and standards (Bradford, 2012). It is particularly relevant in the context of the EUDR, given the EU's goal to curb its impact on global deforestation and forest degradation. This concept also initiates the basis for the EUDR's possible effects on the supply and demand dynamics of soybeans and a potential change in global trade patterns. The regulatory authority of the EU may come into conflict with the corporate objectives of agribusiness, particularly in terms of complying with regulatory obligations and achieving full transparency (Grey, 2018). An in-depth comprehension of the resistance and the ways through which corporations impact policymaking establishes the essential context for this research and adds depth to the understanding of how corporations impact policymaking and regulatory compliance.

7.3. Reflections on methods

This research has been conducted through a literature review, document analysis and interviews with stakeholders in the soy supply chain. The literature review helped understand the existing knowledge and key issues related to the legislation and provided the necessary context for subsequent data collection and analysis regarding the EU Deforestation Regulation.

The document analysis proved useful in analysing if corporate social responsibility policies are in line with the requirements of the EUDR. The document analysis focused on three main themes: the deforestation-free commitment, deforestation-cut off dates and traceability commitments. However, it is important to note that the data collection was a resource-intensive activity. The data was perceived to be fragmented, incomplete and decentralized, resulting in information being scattered across multiple online platforms. As a result, the gathering of data was a complex task. Manual coding was employed to allow for precise categorization, but also introduced the element of subjectivity to the

research. The same goes for the selection of companies that operate in the soy supply chain. The twenty selected companies were chosen to make a faithful representation of the most influential companies within the supply chain. However, it is worth acknowledging that a different selection of companies could yield different results, and therefore, the results are not considered to be generalizable to the entire supply chain, or other supply chains. Moreover, inaccurate reporting and incomplete or outdated reports could also affect the results. As a side note, the results should not be interpreted as literal, but as a rough indication of the soy supply chain anti-deforestation efforts.

The last data collection method utilized in this research was the conduction of interviews. The research design aimed to conduct a larger number of interviews, but practical challenges arose in the process of identifying and contacting potential participants. Nonetheless, despite these challenges, the interviews that were conducted provide a qualitative depth that goes beyond analysing documents or existing literature. The semi-structured nature of interviews allowed for a dynamic exchange of information with stakeholders in the soy supply chain. Interviews were useful in shedding light on various dimensions of the research by gaining access to their experiences, perspectives, opinions, and expert knowledge. By doing so, it allowed the researcher to get valuable insights into the practical challenges and opportunities of the EUDR and sustainability efforts within the Dutch soy supply chain.

7.4. Suggestions for further research

While this research solely focuses on the EUDR and CSR policies of companies in the soy supply chain, topics such as certification, traceability, transparency, and supply chains are much broader than the scope of this study. Perhaps the most obvious suggestions are researching different supply chains/commodities, like coffee or wood, or changing the geographical scope of the research since this research is largely focused on the Netherlands. Additionally, since the EUDR is still in its early stages, it would be interesting to research its effects once it has been fully implemented in 2025 and conduct a policy evaluation some years after its realization. Topics such as effectiveness in achieving sustainability objectives, compliance rates or a potential change in global consumption and trade patterns would be interesting topics to evaluate.

This research has also discovered that supply chains consist of more stakeholders than just companies. Further recommendations are diving deeper into the roles of government, policymakers, industry groups, NGOs, and consumers, as they can be a decisive factor in the behaviour of companies. For example, it would be interesting to analyse the role of governments in providing incentives, subsidies, and capacity-building tools to ease and speed up the process of compliance. Moreover, governments could level the playing field, by implementing a true pricing or carbon

pricing system. This means that social and environmental costs are added to the market price, reflecting their 'true price'. In that case, non-certified, unsustainable soybeans would be more costly than their sustainable alternative, thus providing an economic incentive for consumers. This also brings me to the role of the consumer. The consumer largely defines the demand side of a product. If the demand for deforestation-free soy increases, the market will likely follow and increase the supply on the other side. However, as mentioned in the discussion, there is a lack of consumer interest in some traceability initiatives, which leads them to not be implemented. It would be interesting to investigate consumer preferences and their willingness to pay for sustainably sourced soy products and how that can considerably impact companies' CSR strategies and responses to the EUDR. Last, is the role of NGOs, such as Milieudefensie, Greenpeace, XR and Aidenvironment. These organisations are essential when it comes to advocacy and awareness. Through campaigns and reports, they can influence public opinion and influence consumer behaviour. Some NGOs have also engaged in independent monitoring and research and have brought to light several non-compliance and wrongdoing in sourcing practices. Their critical voice is essential to contributing to a more responsible industry and pushing environmental regulations and laws. The role of these three supply chain stakeholders is crucial in understanding supply chain dynamics and should not be overlooked.

The final research recommendation proposes to go beyond the Eurocentric perspective. Acknowledging that this research is very Western-based, it would be interesting to conduct fieldwork in soy-producing countries, especially South America. By doing so, the research could gain a more comprehensive understanding of the power dynamics, of traders, farmers, local communities, and local governments, but also between North and South. It could provide insights into differences in the perception and implementation of sustainability and environmental legislation, providing a more inclusive approach to the EUDR.

8. Conclusion

In response to the EU Deforestation Regulation (EUDR), companies operating within the soy supply chain in the European Union have undertaken comprehensive efforts to align their practices, policies, and sourcing strategies, to realize deforestation-free soy sourcing. The EUDR, introduced to address deforestation related to high-risk commodities like soy, involves a range of stakeholders, including soy traders, animal feed and agricultural companies, meat and dairy producers, and food retailers. As these companies navigate the complex regulatory landscape of deforestation-free sourcing, they have translated the regulatory requirements into concrete CSR policies and commitments that underline their commitment to sustainability, transparency, and ethical sourcing practices.

One prominent aspect of this translation process is the emergence of deforestation-free commitments across sectors. Many companies, particularly those in the soy trading and food retail sectors, have pledged to eliminate deforestation from their supply chains. These commitments are characterized by their alignment with the EUDR's goals, setting target years often by 2025 or sooner. This clear and time-bound commitment sends a strong signal that these companies are not merely seeking compliance with regulations but are actively striving to become leaders in sustainable sourcing. Moreover, the alignment with the EUDR's cut-off dates for deforestation-free sourcing underscores a sense of responsibility and compliance with the regulatory framework. Companies in the agricultural and animal feed sectors, along with food retailers, have taken steps to ensure their sourcing practices adhere to these critical milestones. A characteristic of CSR efforts in response to the EUDR is the emphasis on traceability. Many companies are trying to enhance the traceability of soy products throughout supply chains, usually through third-party verification like RTRS or ProTerra. Although the use of these certification schemes is permitted under the EUDR, the use of mass balance or book-and-claim Chain of Custody models is not allowed. This means that buying credits is not allowed, even though the majority of companies are extensively relying on this traceability model to claim sustainable sourcing practices.

Collaboration within the supply chain has emerged as a crucial aspect of CSR efforts. Stakeholders recognize that working together and sharing best practices is essential for achieving sustainability goals and ensuring efficient operations. Engagements in cooperatives or industry associations promote collective responsibility, underlining a commitment to addressing environmental challenges collaboratively. Furthermore, the EUDR's anticipated global impact on soy trade patterns cannot be understated. Companies are expected to adjust by shifting production to low-risk regions or countries with weaker regulations to comply with the EUDR. CSR policies have to navigate the changing

regulatory landscape, potentially reshaping global trade patterns and promoting innovation and efficiency in sourcing practices.

The power struggle between the EU's sustainability objectives and corporate interests of agribusinesses is evident in various phases of policy, including the implementation phase. Corporations engage in lobbying activities through influential industry groups and try to shape policies in their favor and protect their interests.

By differentiating between different supply chain types, certain unique characteristics, processes and dynamics have come to the surface. In the case of open supply chains, it becomes apparent that the major soy traders control a significant portion of the soy market. They also play a crucial role in shaping sustainability efforts within the supply chain. Furthermore, it turns out that collaboration is key in these supply chains. Stakeholders organize themselves in cooperatives and associations to demonstrate collective influence in responsible sourcing. Another form of collaboration is the collaboration within closed supply chains, which is often a partnership between retailers and a selected group of suppliers. As this offers greater control, transparency is an important criterion, as well as keeping supply chains short and sourcing as locally as possible. Adopting short supply chains and localized approaches is also characterised by organic supply chains. Organic retailers emphasize transparency as organic soybeans are already physically separated from non-organic soybeans. Additionally, some organic farmers have excluded soy from their animal feed and solely rely on grass-fed cattle. Lastly, global supply chains are characterized by complex and interconnected relationships between importing and exporting countries. The EUDR is expected to influence global trade patterns, as Brazil and China remain major players in the global soy industry. There is the risk that the EU's sustainability efforts are undermined by shifting cultivation from high-risk areas to low-risk areas or to regions with less strict environmental regulations. Nevertheless, collaborative efforts can be regarded as promising when it comes to ending illegal deforestation or promoting sustainable forest management.

9. Bibliography

Aaronson, S. A. (2002). *The European Response to Public Demands for Global Corporate Responsibility Digital trade and human rights View project Data Series View project*. https://www.researchgate.net/publication/237756003

Abessa, D., Famá, A., & Buruaem, L. (2019). The systematic dismantling of Brazilian environmental laws risks losses on all fronts. *Nature Ecology & Evolution*, *3*(4), 510–511. https://doi.org/10.1038/s41559-019-0855-9

ADM. (2023). *2022 Corporate Sustainability Report*. https://www.adm.com/globalassets/sustainability/sustainability-reports/2022-reports/adm-2022-corporate-sustainability-report_final.pdf

Agrifirm. (2022a). *Appendix 4: Stakeholder engagement*. https://www.agrifirm.com/globalassets/agrifirm-group/royal-agrifirm-group/documents/csr/csr-f009-1222nl_appendix4_stakeholder_engagement_lr_web.pdf

Agrifirm. (2022b). *Sourcing physical deforestation and conversion-free soy* . https://www.agrifirm.com/globalassets/agrifirm-group/royal-agrifirm-group/documents/csr/csr-f008-1222en_deforestation-free-soy_a4_v4_lr_web.pdf

Ahold Delhaize. (2023, March 15). *Albert Heijn welcomes third parties to its renowned Better for Nature & Farmer program*. https://www.aholddelhaize.com/news/albert-heijn-welcomes-third-parties-to-its-renowned-better-for-nature-farmer-program/

Albareda, L., Lozano, J. M., & Ysa, T. (2007). Public Policies on Corporate Social Responsibility: The Role of Governments in Europe. *Journal of Business Ethics*, *74*(4), 391–407. https://doi.org/10.1007/s10551-007-9514-1

Albert Heijn. (2022a). *CERTIFICATIESCHEMA 'BETER VOOR KIP, NATUUR & BOER' PROGRAMMA*.

Albert Heijn. (2022b, May 10). *Beter voor Natuur & Boer-programma's van Albert Heijn*. https://nieuws.ah.nl/beter-voor-natuur--boer-programmas-van-albert-heijn/

Albert Heijn. (2023). *Duurzaamheidsverslag 2022*. https://data.maglr.com/3671/issues/42515/525566/downloads/2023.04.16-ah-duurzaamheidsverslag-2022-def.pdf

Alvarez, R. (2022). Comparing Productivity of Organic and Conventional Farming Systems: A Quantitative Review. *Archives of Agronomy and Soil Science*, *68*(14), 1947–1958. https://doi.org/10.1080/03650340.2021.1946040

APIB. (2022, November 15). *On urgent protection of the Cerrado and the other natural ecosystems*. https://apiboficial.org/2022/11/16/on-urgent-protection-of-the-cerrado-and-the-other-natural-ecosystems/?lang=en

Arla. (n.d.). *Food safety and traceability*. Retrieved September 4, 2023, from https://www.arla.ph/company/healthy-living/food-safety-and-traceability/

Arla. (2019). *General statement on Arla Foods´ position on soy*.

Arla. (2023). *Our climate ambition 2023*. https://www.arla.com/49b894/globalassets/arla-global/sustainability/climate-ambition/arla-climate-ambitions-2030-and-2050-2023.pdf

Astrini, M. (2023, March 24). Xi Jinping and Luiz Inacio Lula da Silva must discuss China's role in protecting Brazilian Amazon. *SCMP*.

Babiak, K., & Trendafilova, S. (2011). CSR and environmental responsibility: motives and pressures to adopt green management practices. *Corporate Social Responsibility and Environmental Management*, *18*(1), 11–24. https://doi.org/10.1002/csr.229

Bager, S. L., Persson, U. M., & dos Reis, T. N. P. (2021). Eighty-six EU policy options for reducing imported deforestation. *One Earth*, *4*(2), 289–306. https://doi.org/10.1016/J.ONEEAR.2021.01.011

Barkemeyer, R. (2009). Beyond compliance – below expectations? CSR in the context of international development. *Business Ethics: A European Review*, *18*(3), 273–289.

Barona, E., Ramankutty, N., Hyman, G., & Coomes, O. T. (2010). The role of pasture and soybean in deforestation of the Brazilian Amazon. *Environmental Research Letters*, *5*. https://doi.org/10.1088/1748-9326/5/2/024002

Bionext. (n.d.). *Is biologische sojateelt voor veevoer mede-verantwoordelijk voor de grootschalige bosbranden in het Amazonegebied in Brazilië?* Retrieved September 16, 2023, from https://bionext.nl/wat-doen-we/advies-en-onderwijs/biologische-vragenlijn/faq/Biologisch/biologische-sojateelt-veevoer/

Bionext. (2019). *Convenant soja*. https://bionext.nl/thema-s/klimaat/soja-convenant/

Boren, Z. (2022, March 4). Soya giants lobbied against deforestation rules during COP26. *Unearthed*.

Bosselmann, A. S., & Dolmer, S. E. N. (2022). *A road to import of traceable, responsibly produced and deforestation-free soy Perspectives of Danish and European stakeholders*.

Boucher, M.-F. (2022, May 24). Soy, the magic bean of Togo's economy. *Trade for Development News*.

Bradford, A. (2012). The Brussels Effect. *Northwestern University Law Review*, *107*(1), 1–68.

Bradford, A. (2020). *The Brussels Effect*. Oxford University Press. https://doi.org/10.1093/oso/9780190088583.001.0001

Bunge. (2023). *2023 Global sustainability report*. https://delivery.bunge.com/-/media/2023-Bunge-Sustainability-Report.ashx

Cargill. (2023). *2022 ESG report*. https://www.cargill.com/sustainability/2022-esg-report

CBL. (n.d.). *Duurzaamheid*. Retrieved July 18, 2023, from cbl.nl/themas/duurzaamheid/

CBL. (2021, May 25). *CBL pleit voor EU-wetgeving om wereldwijde ontbossing aan te pakken*. https://www.cbl.nl/cbl-pleit-voor-eu-wetgeving-om-wereldwijde-ontbossing-aan-te-pakken/

CBL. (2022a). *Ambitie Nederlandse supermarktbranche: een ontbossings- en conversievrije sojaketen in 2025*. https://www.cbl.nl/app/uploads/2022/03/Ambitie-Nederlandse-supermarktbranche-een-ontbossings-en-conversievrije-sojaketen-in-2025.pdf

CBL. (2022b, March 2). *Branche- en ketenorganisaties verwelkomen verordening voor ontbossingsvrije producten*. https://www.cbl.nl/branche-en-ketenorganisaties-verwelkomen-verordening-voor-ontbossingsvrije-producten/

CBL. (2022c, March 22). *Een ontbossings- en conversievrije sojaketen in 2025*. https://www.cbl.nl/een-ontbossings-en-conversievrije-sojaketen-in-2025/

CBS. (2021, June 23). *The Netherlands is the EU's largest meat exporter*. https://www.cbs.nl/en-gb/news/2021/25/the-netherlands-is-the-eu-s-largest-meat-exporter

CBS. (2023). *Nederland grootste importeur van soja, palmolie en cacao van de EU*. https://www.cbs.nl/nl-nl/nieuws/2023/39/nederland-grootste-importeur-van-soja-palmolie-en-cacao-van-de-eu

Chiang, L., & Pan, C. (2023). *China's Soybean Import Outlook Through 2030: Is the Peak Already in the Rearview Mirror?*

COCERAL, FEDIOL, & FEFAC. (2022). *Joint Position on the Commission Proposal for a Regulation for Deforestation-free Supply Chains*.

Corporate Europe Observatory. (2012, May 22). *Roundtable on Responsible Soy - the certification smokescreen*. https://corporateeurope.org/en/agribusiness/2012/05/roundtable-responsible-soy-certification-smokescreen

Crane, A., McWilliams, A., Matten, D., Moon, J., & Siegel, D. S. (2008). *The Oxford handbook of corporate social responsibility*.

Daniel, D. (2020). Traceability. *TechTarget*. https://www.techtarget.com/searcherp/definition/traceability

Danielsen, D. (2005). How Corporations Govern: Taking Corporate Power Seriously in Transnational Regulation and Governance. *Harvard International Law Journal, 46*(2), 411–426.

Daphne, T. (2022, November 17). Four chain of custody models explained. *Circularise*.

Donly, A. (2023, September 1). Study: China soybean imports may have peaked. *World Grain*.

EFECA. (2018). *UK RT on Sustainable soya: Certification standards briefing*.

Efeca. (2020). *Soya Certification Options*.

Ekoplaza. (n.d.). *Korte keten*. Retrieved September 14, 2023, from https://www.ekoplaza.nl/nl/over-ekoplaza/vijf-keuzes/korte-keten

Ekoplaza. (2023, April 11). *Samenwerken voor een gesloten keten*. https://www.ekoplaza.nl/nl/actueel/artikel/samenwerken-voor-een-gesloten-keten

European Commission. (2006, March 22). *Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee - Implementing the partnership for growth and jobs : making Europe a pole of excellence on corporate social responsibility*. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX%3A52006DC0136%3AEN%3AHTML#:~:text=Corporate%20social%20responsibility%20(CSR)%20is,a%20voluntary%20basis%5B1%5D.

European Commission. (2020). *Farm to Fork Strategy*.

European Commission. (2021). *EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT REPORT: mininising the risk of deforestation and forest degradation associated with products placed on the EU market*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021SC0327

European Commission. (2022a). *EU imports of organic agri-food products*.

European Commission. (2022b). *Corporate sustainability due diligence*. https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en

European Commission. (2023a). *EU imports of organic agri-food products*.

European Commission. (2023b). *FAQ – EU deforestation Regulation*. https://environment.ec.europa.eu/system/files/2023-06/FAQ%20-%20Deforestation%20Regulation_1.pdf

European Commission. (2023c, June 29). *Frequently Asked Questions - Deforestation Regulation*.

European Council. (2022). *Proposal for a Regulation of the European Parliament and of the Council on the making available on the Union market as well as export from the Union of certain commodities and products associated with deforestation and forest degradation and repealing Regulation (EU) No 995/2010*.

European Parliament. (2010). *Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market Text with EEA relevance*.

European Parliament. (2023). REGULATION (EU) 2023/1115 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 May 2023 on the making available on the Union market and the export from the Union of certain commodities and products associated with deforestation and forest degradation and repealing Regulation (EU) No 995/2010. *Official Journal of the European Union*.

FAO. (1999). *Organic Agriculture*.

FAO. (2003). *Protein sources for the animal feed industry*. https://www.fao.org/3/y5019e/y5019e00.htm#Contents

FAO. (2022). *The State of the World's Forests 2022*. FAO. https://doi.org/10.4060/cb9360en

FEFAC. (2021). *FEFAC Soy Sourcing Guidelines 2021*. https://fefac.eu/wp-content/uploads/2021/02/FEFAC-Soy-Sourcing-Guidelines-2021-1.pdf

FEFAC. (2022). *Progress report 2022*. https://fefac.eu/wp-content/uploads/2022/09/Final_Feed-sustainability-charter-annual-progress-report-2022_WEB-1.pdf

Fehlenberg, V., Baumann, M., Gasparri, N. I., Piquer-Rodriguez, M., Gavier-Pizarro, G., & Kuemmerle, T. (2017). The role of soybean production as an underlying driver of deforestation in the South American Chaco. *Global Environmental Change*, *45*, 24–34. https://doi.org/10.1016/j.gloenvcha.2017.05.001

Foerstl, K., Azadegan, A., Leppelt, T., & Hartmann, E. (2015). Drivers of Supplier Sustainability: Moving Beyond Compliance to Commitment. *Journal of Supply Chain Management*, *51*(1), 67–92. https://doi.org/10.1111/jscm.12067

Forest 500. (n.d.). *About*. A Project of Global Canopy. Retrieved July 13, 2023, from https://forest500.org/about

Forest Declaration Assessment. (n.d.). *Assessing progress toward global forest goals*. Retrieved August 31, 2023, from https://forestdeclaration.org/

ForFarmers. (2022). *ForFarmers' 2021 Sustainability Reporting* . https://www.forfarmersgroup.eu/en/bestanden/ForFarmers_Group/Annual-Report-2021-content/63935-1/FORFARMERS_Duurzaamheidsrapportage_2021-ENG.pdf

Freitas, F. L. M., Sparovek, G., Berndes, G., Persson, U. M., Englund, O., Barretto, A., & Mörtberg, U. (2018). Potential increase of legal deforestation in Brazilian Amazon after Forest Act revision. *Nature Sustainability*, *1*(11), 665–670. https://doi.org/10.1038/s41893-018-0171-4

Friesland Campina. (2023). *2022 Annual report*. https://www.frieslandcampina.com/uploads/2023/03/FrieslandCampina-Annual-Report-2022.pdf

FrieslandCampina. (n.d.). *Better sourcing*. Retrieved September 4, 2023, from https://www.frieslandcampina.com/sustainability/better-sourcing/

FrieslandCampina. (2022). *FrieslandCampina commitment to zero deforestation and zero conversion*. https://cms.frieslandcampina.com/uploads/2022/11/2022_FrieslandCampinaZeroDeforestationPolicy-1.pdf

Friso. (n.d.). *TrackEasy*. Retrieved September 4, 2023, from https://www.frisogold.com.my/trackeasy-home

Froehlich, G., Stabile, M., & De Souza, M. L. (2022). *Traceability initatives in the beef and leather value chains in Brazil*.

Garcia, B., & Pauwels, L. (2022). The Promise of Cooperation in Latin America: Building Deforestation-Free Supply Chains. *AJIL Unbound*, *116*, 360–366. https://doi.org/10.1017/aju.2022.53

Garrett, R. D., Levy, S., Carlson, K. M., Gardner, T. A., Godar, J., Clapp, J., Dauvergne, P., Heilmayr, R., le Polain de Waroux, Y., Ayre, B., Barr, R., Døvre, B., Gibbs, H. K., Hall, S., Lake, S., Milder, J. C., Rausch, L. L., Rivero, R., Rueda, X., ... Villoria, N. (2019). Criteria for effective zero-deforestation commitments. *Global Environmental Change*, *54*, 135–147. https://doi.org/10.1016/j.gloenvcha.2018.11.003

Garrett, R. D., Rueda, X., & Lambin, E. F. (2013). Globalization's unexpected impact on soybean production in South America: linkages between preferences for non-genetically modified crops, eco-certifications, and land use. *Environmental Research Letters*, *8*(4). https://doi.org/10.1088/1748-9326/8/4/044055

Giraudo, M. E. (2020). Dependent development in South America: China and the soybean nexus. *Journal of Agrarian Change*, *20*(1), 60–78. https://doi.org/10.1111/joac.12333

Grey, F. (2018). Corporate lobbying for environmental protection. *Journal of Environmental Economics and Management*, *90*, 23–40. https://doi.org/10.1016/j.jeem.2018.03.008

Hamidu, A. A., Md Haron, H., & Amran, A. (2015). Corporate Social Responsibility: A Review on Definitions, Core Characteristics and Theoretical Perspectives. *Mediterranean Journal of Social Sciences*. https://doi.org/10.5901/mjss.2015.v6n4p83

Hayek, M., & Dutkiewicz, J. (2021, November 18). Yes, plant-based meat is better for the planet. *Vox*.

Hernandez, J. (2023, July 10). Brazilian leaders praise a 34% drop in the rate of deforestation in the Amazon. *NPR*. https://www.npr.org/2023/07/10/1186692334/brazil-amazon-deforestation-lula-bolsonaro

Heyder, M., Hollman-Hespos, T., & Theuvsen, L. (2009). *Agribusiness Firm Reactions to Regulations: The Case of Investments in Traceability Systems* .

Hopper, H. (2021, April 1). *Evolving Environmental CSR for the 21st Century*. Diligent. https://www.diligent.com/en-gb/blog/environmental-csr/

IBD. (2018). *Fair Trade Certification Program*. https://www.ibd.com.br/wp-content/uploads/2019/10/8_1_3_IBD_FairTrade_Guidelines_16th_Ed_19102018_V.pdf

IDH, IUCN, & Profundo. (2019). *EUROPEAN SOY MONITOR Insights on the European supply chain and the use of responsible and deforestation-free soy in 2017*.

IFOAM. (2008). *Definition of Organic Agriculture*. https://www.ifoam.bio/why-organic/organic-landmarks/definition-organic#:~:text=Organic%20Agriculture%20is%20a%20production,of%20inputs%20with%20adverse%20effects.

IPES-Food. (2023). *Who's Tipping the Scales? The growing influence of corporations on the governance of food systems, and how to counter it.*

ISEAL. (2016). *Chain of custody models and definitions: A reference document for sustainability standards systems, and to complement ISEAL's Sustainability Claims Good Practice Guide*.

Jansen, K. (2017). Business Conflict and Risk Regulation: Understanding the Influence of the Pesticide Industry. *Global Environmental Politics*, *17*(4), 48–66. https://doi.org/10.1162/GLEP_a_00427

Knapp, S., & van der Heijden, M. G. A. (2018). A global meta-analysis of yield stability in organic and conservation agriculture. *Nature Communications*, *9*(1). https://doi.org/10.1038/s41467-018-05956-1

Kovács, G. (2008). Corporate environmental responsibility in the supply chain. *Journal of Cleaner Production*, *16*(15), 1571–1578. https://doi.org/10.1016/j.jclepro.2008.04.013

Kumeh, E. M., & Ramcilovic-Suominen, S. (2023). Is the EU shirking responsibility for its deforestation footprint in tropical countries? Power, material, and epistemic inequalities in the EU's global environmental governance. *Sustainability Science*, *18*(2), 599–616. https://doi.org/10.1007/s11625-023-01302-7

Lazarus, O., McDermid, S., & Jacquet, J. (2021). The climate responsibilities of industrial meat and dairy producers. *Climatic Change*, *165*(30). https://doi.org/10.1007/s10584-021-03047-7

LDC. (2022, December 2). *Charting the Course Toward Zero-Deforestation*. https://www.ldc.com/stories-insights/charting-the-course-toward-zero-deforestation/

LDC. (2023). *Sustainability report 2022*. https://www.ldc.com/sustainability-report-2022/

Lee, T., & Hansen, J. (2019). *Southeast Asia's Growing Meat Demand and Its Implications for Feedstuffs Imports*. https://www.ers.usda.gov/amber-waves/2019/april/southeast-asia-s-growing-meat-demand-and-its-implications-for-feedstuffs-imports/[4/6/2020

Littenberg, M. R., & Elliott, S. (2023). *The EU Deforestation Regulation Is Coming Soon - Will Your Products Be Deforestation-free?*

MacDonald, J. (2019). Does Organic Agriculture Contribute to Climate Change? *JSTOR*.

Maryudi, A., Acheampong, E., Rutt, R. L., Myers, R., & McDermott, C. L. (2020). A Level Playing Field? – What an Environmental Justice Lens Can Tell us about Who Gets Leveled in the Forest Law Enforcement, Governance and Trade Action Plan. *Society & Natural Resources*, *33*(7), 859–875. https://doi.org/10.1080/08941920.2020.1725201

Mialon, M., & Mialon, J. (2018). Analysis of corporate political activity strategies of the food industry: evidence from France. *Public Health Nutrition*, *21*(18), 3407–3421. https://doi.org/10.1017/S1368980018001763

Milieucentraal. (n.d.). *Keurmerkenwijzer*. Retrieved September 16, 2023, from https://keurmerkenwijzer.nl/keurmerken/demeter-tropische-groente-en-fruit/

Milieudefensie. (2021). *Een schimmige sojaketen*.

Moon, J., Anastasiadis, S., & Viganò, F. (2009). The potential of CSR to support the implementation of the EU sustainability strategy: editorial introduction. *Business Ethics: A European Review*, *18*(3), 268–272.

Muller, A., Schader, C., El-Hage Scialabba, N., Brüggemann, J., Isensee, A., Erb, K.-H., Smith, P., Klocke, P., Leiber, F., Stolze, M., & Niggli, U. (2017). Strategies for feeding the world more sustainably with organic agriculture. *Nature Communications*, *8*(1). https://doi.org/10.1038/s41467-017-01410-w

Murphy, S., & Burch, D. D. (2012). *Cereal Secrets: The world's largest grain traders and global agriculture*. www.oxfam.org

Nelsen, A. (2022, March 4). Agribusiness giants tried to thwart EU deforestation plan after Cop26 pledge. *The Guardian*.

Nevedi. (n.d.). *Missie en visie*. Retrieved July 18, 2023, from https://nevedi.nl/over-nevedi/missie-en-visie/

Nie, P., Wang, C., & Meng, Y. (2019). An analysis of environmental corporate social responsibility. *Managerial and Decision Economics*, *40*(4), 384–393. https://doi.org/10.1002/mde.3009

Nutreco. (2023). *Sustainability report 2022*. https://www.nutreco.com/en/sustainability/sustainability-report-library/sustainability-report-2022/

NVWA. (n.d.). *Over FLEGT*. Retrieved August 31, 2023, from https://www.nvwa.nl/onderwerpen/import-van-hout-en-houtproducten-flegt/over-flegt

OEC. (2021). *Cheese in the Netherlands*.

OECD. (n.d.). *Agriculture and the Environment*. Retrieved October 24, 2023, from https://www.oecd.org/agriculture/topics/agriculture-and-the-environment/

Partzsch, L., Müller, L. M., & Sacherer, A.-K. (2023). Can supply chain laws prevent deforestation in the Democratic Republic of the Congo and Indonesia? *Forest Policy and Economics*, *148*. https://doi.org/10.1016/j.forpol.2022.102903

Paul, B. K., & Rashid, H. (2017). Land Use Change and Coastal Management. In *Climatic Hazards in Coastal Bangladesh* (pp. 183–207). Elsevier. https://doi.org/10.1016/B978-0-12-805276-1.00006-5

Peine, E. K. (2013). Trading on Pork and Beans: Agribusiness and the Construction of the Brazil-China-Soy-Pork Commodity Complex. In H. Jr. James (Ed.), *The Ethics and Economics of Agrifood Competition* (Vol. 20, pp. 193–210). Springer. https://doi.org/10.1007/978-94-007-6274-9_10

Plukon. (2023). *CSR report 2022*. https://www.plukon.de/csr.pdf

Plus. (n.d.). *Onze ketens*. Retrieved September 4, 2023, from https://www.plus.nl/info-duurzaamheid/onze-ketens

Polk, A., & Schmutzler, A. (2005). Lobbying against environmental regulation vs. lobbying for loopholes. *European Journal of Political Economy*, *21*(4), 915–931. https://doi.org/10.1016/j.ejpoleco.2005.04.003

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Porter, M. E., & Linde, C. van der. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*, *9*(4), 97–118. https://doi.org/10.1257/jep.9.4.97

ProTerra. (2019). *ProTerra Standard: Social Responsibility and Environmental Sustainability*. https://www.proterrafoundation.org/wp-content/uploads/2020/10/ProTerra-Standard-V4.1_EN-2.pdf

ProTerra. (2021). *Chain of Custody Models*.

Qiang, O., Tian-tian, W., Ying, D., Zhu-ping, L., & Jahanger, A. (2022). The impact of environmental regulations on export trade at provincial level in China: evidence from panel quantile regression. *Environmental Science and Pollution Research*, *29*(16), 24098–24111. https://doi.org/10.1007/s11356-021-17676-z

Richens, J. (2022, June 7). EU urged to widen deforestation law. *Trase Insights*. https://insights.trase.earth/insights/eu-urged-to-widen-deforestation-law-as-ecosystems-left-at-risk/

Ritchie, H., & Roser, M. (2021). *Forests and Deforestation*. OurWorldInData.Org. https://ourworldindata.org/forests-and-deforestation

Rizzo, G., & Baroni, L. (2018). Soy, Soy Foods and Their Role in Vegetarian Diets. *Nutrients*, *10*(1). https://doi.org/10.3390/nu10010043

Ro, C. (2023, January 6). Brazil Already Has Its Best Tool Against Deforestation. *Forbes*. https://www.forbes.com/sites/christinero/2023/01/06/brazil-already-has-its-best-tool-against-deforestation/?sh=60e992671c75

Robinson, C. (2021, December 14). *Round Table on Responsible Soy has failed to stop deforestation – WWF Netherlands*. GMWatch. https://www.gmwatch.org/en/106-news/latest-news/19953-wwf-netherlands-denounces-round-table-on-responsible-soy-as-failure-in-stopping-deforestation

Rodrigues, M. (2021, December 20). To end illegal deforestation, Brazil may legalize it entirely, experts warn. *Mongabay*. https://news.mongabay.com/2021/12/to-end-illegal-deforestation-brazil-may-legalize-it-entirely-experts-warn/

RTRS. (n.d.). *Certification*. Retrieved July 31, 2023, from https://responsiblesoy.org/certificacion?lang=en

Saunders, L. W., Kleiner, B. M., McCoy, A. P., Lingard, H., Mills, T., Blismas, N., & Wakefield, R. (2015). The effect of early supplier engagement on social sustainability outcomes in project-based supply chains. *Journal of Purchasing and Supply Management*, *21*(4), 285–295. https://doi.org/10.1016/j.pursup.2015.05.004

Scott-Reid, J. (2023, April 13). Meat-producing countries muddy IPCC report's message on plant-based diet. *Corporate Knights*.

Searchinger, T. D., Wirsenius, S., Beringer, T., & Dumas, P. (2018). Assessing the efficiency of changes in land use for mitigating climate change. *Nature*, *564*(7735), 249–253. https://doi.org/10.1038/s41586-018-0757-z

Sheingate, A., Scatterday, A., Martin, B., & Nachman, K. (2017). Post-exceptionalism and corporate interests in US agricultural policy. *Journal of European Public Policy*, *24*(11), 1641–1657. https://doi.org/10.1080/13501763.2017.1334082

Simon, L., Grobusch, L., Schufft, F., Brandt, K., & Juergens, I. (2023). *Sustainability due diligence and reporting obligations for financial institutions The coverage of the financial sector across a core set of EU regulatory measures*.

Skene, J. (2023, July 11). Glasgow Forests Declaration Success Hinges on Northern Accountability. *NRDC*.

Soterroni, A. C., Ramos, F. M., Mosnier, A., Fargione, J., Andrade, P. R., Baumgarten, L., Pirker, J., Obersteiner, M., Kraxner, F., Câmara, G., Carvalho, A. X. Y., & Polasky, S. (2019). Expanding the Soy Moratorium to Brazil's Cerrado. *Science Advances*, *5*(7). https://doi.org/10.1126/sciadv.aav7336

Staricco, J. I. (2021). The Round Table on Responsible Soy's Landnahme: converting sustainable practices into tradable intangibles to protect the environment. *Journal of Cultural Economy*, *14*(5), 564–579. https://doi.org/10.1080/17530350.2020.1846591

Stichting Demeter. (2023). *VOORWAARDEN VOOR LANDBOUW, VERWERKING EN ETIKETTERING*.

Triodos Bank. (2022, November 9). *Triodos Bank supports call to include the financial sector in the EU-Deforestation Regulation*.

True Code. (n.d.). *Who are we*. Retrieved September 4, 2023, from https://true-code.org/about/

UN. (n.d.-a). *Goal 15*. Retrieved August 31, 2023, from https://sdgs.un.org/goals/goal15

UN. (n.d.-b). *Population*. Retrieved October 23, 2023, from https://www.un.org/en/global-issues/population

UN. (n.d.-c). *The 17 Goals*. Retrieved August 31, 2023, from https://sdgs.un.org/goals

Unilever. (2020). *People & Nature Policy*. https://www.unilever.com/files/origin/feb620cbd18c28406b9093144f24648a695874e5.pdf/unilever-people-and-nature-policy.pdf

VanDrie Group. (2022). *Annual CSR report 2021*. https://annualreport.vandriegroup.com/

Velasco, R. F., Lippe, M., Fischer, R., Torres, B., Tamayo, F., Kalaba, F. K., Kaoma, H., Bugayong, L., & Günter, S. (2023). Reconciling policy instruments with drivers of deforestation and forest degradation: cross-scale

analysis of stakeholder perceptions in tropical countries. *Nature*, *13*(1). https://doi.org/10.1038/s41598-023-29417-y

Voora, V., Larrea, C., & Bermudez, S. (2020). *Global Market Report: Soybeans*.

Walton, S. V., Handfield, R. B., & Melnyk, S. A. (1998). The green supply chain: Integrating suppliers into environmental management processes. *Proceedings - Annual Meeting of the Decision Sciences Institute*, *3*, 1114–1116. https://doi.org/10.1111/j.1745-493x.1998.tb00042.x

Wesz Jr, V. J. (2016). Strategies and hybrid dynamics of soy transnational companies in the Southern Cone. *The Journal of Peasant Studies*, *43*(2), 286–312. https://doi.org/10.1080/03066150.2015.1129496

Wesz, V. J. J., Escher, F., & Fares, T. M. (2021). Why and how is China reordering the food regime? The Brazil-China soy-meat complex and COFCO's global strategy in the Southern Cone. *The Journal of Peasant Studies*, 1–29. https://doi.org/10.1080/03066150.2021.1986012

Wilkes, T. (2022, June 29). Curb deforestation or you won't hit net-zero targets, U.N. group tells firms. *Reuters*.

Wilkinson, J. (2009). The Globalization of Agribusiness and Developing World Food Systems. *Monthly Review*, *61*(4). https://doi.org/10.14452/MR-061-04-2009-08_4

WRM. (2023, January 16). *South America: "Green" Destruction in the Amazon Rainforest*. wrm.org.uy/bulletin-articles/south-america-green-destruction-in-the-amazon-rainforest

WWF. (2016). *Soy Moratorium: the main global Zero Deforestation benchmark*. https://www.wwf.org.br/?54622/Soy-Moratorium-the-main-global-Zero-Deforestation-benchmark

WWF. (2021a). *STEPPING UP? THE CONTINUING IMPACT OF EU CONSUMPTION ON NATURE WORLDWIDE SUMMARY REPORT*. https://wwfeu.awsassets.panda.org/downloads/stepping_up___the_continuing_impact_of_eu_consumption_on_nature_worldwide_execsummary.pdf

WWF. (2021b, February 4). *Brazil's Amazon soy moratorium*. https://forestsolutions.panda.org/case-studies/brazils-amazon-soy-moratorium

WWF-UK. (n.d.). *The Amazon*. Retrieved September 9, 2023, from https://www.wwf.org.uk/where-we-work/amazon#:~:text=Not%20just%20for%20food%2C%20water,regional%20carbon%20and%20water%20cycles.

10. Annex

1. Overview of companies and documents analysed

Company	Type of company	Document analysed
Albert Heijn	Supermarket	Sustainability report 2022
CBL	Supermarket cooperative	2022 Manifest: Ambitie Nederlandse supermarktbranche: een ontbossings- en conversievrije sojaketen in 2025
Superunie	Supermarket cooperative	Jaarverslag duurzame handel 2022
Plus	Supermarket	Due diligence aanpak 2022
Lidl	Supermarket	Purchasing policy Voor toeleveringsketens vrij van ontbossing en conversie 2021
Vion	Meat producer	CSR report 2022
Plukon	Meat producer	CSR report 2022
Unilever	Consumer goods company	Annual report and accounts 2022 & Guidelines people & nature policy 2020
Arla	Dairy company	Our climate ambition 2023
VanDrie group	Meat producer	Annual CSR report 2021
FrieslandCampina	Dairy company	2022 Annual report 2022 Zero Deforestation Policy
Royal Agrifirm	Farmers' cooperative	Sourcing physical deforestation and conversion-free soy 2022
Nutreco	Animal feed manufacturer	Sustainability report 2022
FEFAC	Animal feed manufacturer federation	Progress report 2022 & Soy sourcing guidelines 2021
ForFarmers	Animal feed manufacturer	ForFarmers' 2021 Sustainability Reporting
AgruniekRijnvallei	Agricultural and horticultural cooperative	Jaarverslag 2021
ADM	Trader	2022 Corporate sustainability report
Bunge	Trader	2023 Global sustainability report
Cargill	Trader	2022 ESG report
LDC	Trader	Sustainability report 2022

2. Topic list interviews

Introduction / research

Corporate Social Responsibility	– Goals and objectives (mission/vision) – Addressing deforestation – Reporting and accessibility
Sourcing of soy ingredients	– Priorities – Risk assessment (high vs low) – Due dilligence – Certification (ProTerra/RTRS, book and claim/area mass balance)
Obstacles and barriers/challenges	
Opportunities and motivators	
Supply chain	– Communication with stakeholders and customers – Engagement with suppliers – Collaborative efforts or partnerships
Future of soy	– South American/European soy – Other protein-rich raw materials (beans, peas)

Wrap up

End

3. Overview deforestation-free commitments, deforestation cut-off dates and traceability initiatives

Company	Sector	Deforestation-Free Commitment Year	Cut-off Date	Traceability Initiatives
Albert Heijn	Food Retail	2025	1-1-2020	Pilot with True-Code.org, due diligence efforts
CBL	Food Retail	2025	1-1-2020	Pledged for traceability, concerns about small-scale producers
Superunie	Food Retail	2025	1-1-2020	Progress in traceability reporting, focus on cocoa
Plus	Food Retail	2025	1-1-2020	'Ken de Keten' policy, working with blockchain technology
Lidl	Food Retail	2025	1-1-2020	Increasing supply chain transparency, focus on due diligence
Vion	Meat/Dairy	2025	Not specifically mentioned	Working on systematic clarification of soy origin
Plukon	Meat/Dairy	Goal: Ensure deforestation-free supply chains	Not specifically mentioned	Transparency certificates
Unilever	Meat/Dairy	End of 2023 (2020 for soybean oil)	31-12-2015	Commitment to transparency and traceability, use of traceability certifications
Arla	Meat/Dairy	Since 2015 through RTRS certificates	Not specifically mentioned	Mentioned traceability in climate ambition, focus on food safety
VanDrie Group	Meat/Dairy	Comply with FEFAC soy sourcing guidelines and RTRS	Not specifically mentioned	Traceability certificates
FrieslandCampina	Meat/Dairy	In July 2022, adopted a zero deforestation and conversion policy	31-12-2020	Removed soy traceability from scope
Royal Agrifirm	Farmers/Feed	Same as FrieslandCampina (2022)	31-12-2020	FEFAC SSGs, third-party verification, supplier schemes
Nutreco	Farmers/Feed	End of 2025	Depending on class	Traceability on country level
FEFAC	Farmers/Feed	FEFAC SSGs	31-12-2020	Increasing traceability in compound feed production
ForFarmers	Farmers/Feed	2025	Not specifically mentioned	FEFAC SSGs
AgruniekRijnvallei	Farmers/Feed	Through Nevedi: RTRS credits and FEFAC SSGs	Not specifically mentioned	FEFAC SSGs
ADM	Traders	31-12-2025	2025	100% traceability in direct and indirect supply chains, remote satellite monitoring
Bunge	Traders	2025	2025	100% traceability in direct supply chains since 2020, GPS coordinates and satellite imaging
Cargill	Traders	2030	2030	100% traceability in direct supply chains (Brazil, 2022), polygon mapping
LDC	Traders	End of 2025	1-2020	84% traceability in direct Brazil supply chains, engagement process for indirect suppliers