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Linkages between EU Deforestation-Free Regulation and Traceability Tools: An Exploration from the Honduran Coffee Sector

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INTRODUCTION

Under the new EU deforestation regulation (EUDR), dated 31/05/2023, coffee producers and other producers of other significant commodities —cocoa, oil palm, rubber, soya, cattle, and wood— will have to comply with three aspects to export their products into the European Union. These aspects are i) Deforestation-free; 2) Production under the relevant legislation of the country of production; and 3) Due diligence statement. (Council of the European Union, 2022).

These conditions are designed to minimize the European Union's impact on global deforestation and forest degradation, and to reduce its contribution to greenhouse gas emissions. Understanding this regulation, set to be enforced by December 30th, 2024, is crucial for coffee farmers who may face challenges due to the regulation's definition of deforestation, which includes forest-to-agroforestry conversion (Naranjo et al., 2023). For the Honduran coffee sector, where coffee is the primary agricultural export crop, with over 120,000 coffee farms making a significant contribution to a third of the agricultural GDP (IHCAFE, 2021), comprehending this regulation is essential.

In examining the aspects of the EUDR, we encounter a complex interplay of definitions, actors, and processes that necessitate in-depth exploration to grasp their nuances and specific challenges. A transversal aspect involves how all the new information requested by this regulation is going to be collected, cleaned, integrated, stored, analyzed, reported, audited and updated. This paper aims to illuminate these processes by focusing on the existing and potential linkages among three traceability tools currently under development in the Honduran coffee sector.

This report explores three questions:

- What are the main aspects of the EUDR, and what potential challenges might arise?
- What are the features and challenges of three traceability tools being used in Honduras?
- How could these traceability tools be utilized (or not) in the context of the EUDR?

This report is based on an examination of the new regulation and sixteen interviews with industry experts, users, and company representatives actively involved in creating and testing traceability platforms. It also includes insights from users of these platforms, as well as cooperatives, exporters, and major coffee traders, who are all key actors mentioned in the preceding paragraphs and are at various stages of implementation. This report is based on insights from two technical papers: one that outlines the pertinent questions to pose about digital traceability tools to grasp their social implications (Melo-Velasco, 2023), and another that qualitatively explores three existing traceability platforms in Honduras (Padilla-Quiñonez, 2023).

This paper is organized into four sections. The first section includes conceptual elements that will be used throughout the document, along with the main characteristics of the coffee sector in Honduras. The second section offers an overview of the EUDR, focusing on its main definitions, requirements, and the current understanding of its governance process, concluding with a summary of aspects that remain unclear. The third section examines the features and implementation processes of three traceability tools currently under development in the Honduran coffee sector, particularly exploring their functionality and data management. In the final section, we explore the potential linkages between the traceability tools

and EUDR requirements, reflecting on the possibilities and uncertainties surrounding the implementation of the data processes required by the EUDR.

Conceptual Framework

Social implications of digital agricultural technologies

Technology is never neutral. How it was developed, by whom, who will use it and how it will be used is influenced by the interests and goals of those in the position to make decisions about it (Bronson, 2022). Social scholars have pointed out how the paths of new technologies can reproduce global asymmetries, the imbalances of power related to decisions on data ownership, and the lack of policy interventions on digital technologies implications (e.g., Rotz et al., 2019, 2019a; Jakku et al., 2019; Hackfort, 2021; Klerkx, et al, 2019; Ayris & Rose, 2023).

A practical way to see and organize social implications is through three large and interlinked aspects: i) inclusion and exclusion; ii) data ownership, accessibility, sharing, and control; and iii) power distribution.

Inclusion and Exclusion: This factor is concerned on who is going to be able to access these technologies. Digital gap encompasses disparities in technology access and availability, sociodemographic influences on technology usage, and varied capacities to benefit from technology use (Ragnedda and Gladkova, 2020). Recognizing inclusion and exclusion involves acknowledging the role of social, spatial, and economic inequalities in digital technology access.

Data governance and Interoperability: Key questions on governance includes Who makes decisions and how; who designs and consults; how users are defined and engaged; the logic behind profitability; envisioning farmers' development; pricing strategies; considering future scenarios and their impacts; and policies on data ownership and privacy. The answers to these questions reflect underlying values and interests, influencing whether certain stakeholders are empowered or marginalized. (Melo-Velasco, 2023a)

Data is central to this economy, but not all data is the same. Maru et al., (2018) identify four data streams in farming and two types of challenges: in access —availability, accessibility, usability, reusability) and sharing (privacy, ownership, monetization, monopoly).

Localized data (data on on-farm, for example soil data, seed and fertilizer used and production practices). Sharing challenges.

imported data (off-farm data for on-farm use, for example market prices, climatic information). Access challenges

Exported data (data produced and gathered on the farm but intended for external use). Typically, this data is processed, compiled, or merged with additional data from other sources. It is utilized by a range of actors and stakeholders, including governments and private entities. Sharing challenges.

Ancillary data (generated on and off the farm, mainly for external use. It includes government and research data). No access or sharing challenges.

Interoperability is a significant element within data governance. Glaros et al. (2023) describe interoperability as the ability of various technologies, even when developed by distinct com-

panies or organizations, to communicate and interact with each other. In the context of coffee traceability, interoperability might manifest as a scenario where a tracking system developed by one company can seamlessly exchange and interpret data with a quality control system created by another. For instance, a farmer using one platform to record crop details could have this information automatically integrated and understood by a retailer's inventory system, despite being from different developers.

Interoperability is not only a technical decision. Technical challenges in data openness and interoperability are generally less complex than cultural or legal issues, including intellectual property, confidentiality, farmers' rights, and sensitive information (Devare et al, 2022).

Distribution of power: Power implies unequal relation influenced by personal attributes, institutional positioning, and historical and cultural contexts (Roscigno, 2011). How power operates crosses the question for who is include/exclude and how digital tools are being governed. Power dynamics in this context could manifest in three ways: shaping narratives about technology (discursive power), influencing the design and market placement of technologies, and understanding the consequences of shifts in relationships, particularly in terms of control and value extraction within the food system (Prause, Hackfort, and Lindgren, 2020).

Traceability and Global Traceability Standard (GS1)

The Codex Alimentarius Commission defines traceability as the ability to track the progress of a food item through production, processing, and distribution stages, used for managing food hazards, providing accurate product details, and ensuring authenticity (FAO, n.d.). This is crucial for enhancing consumer safety, optimizing supply chain efficiency, and building consumer confidence. Environmental benefits include minimizing food waste, eliminating unsustainable practices, and supporting certifications like USDA Organic and Fair Trade (Padilla-Quiñonez et al, 2023).

Effective traceability systems require cross-functional capabilities for data storage and sharing across jurisdictions, maintaining a standardized language for reporting. The Global Traceability Standard (GS1) system provides globally unambiguous identification keys, fostering communication between companies and advancing supply chain management. Implementing traceability in business processes relies on a common language across organizational departments, with Critical Tracking Events (CTEs) representing key lifecycle events and Key Data Elements (KDEs) describing instances of CTEs in five dimensions (Who, What, Where, When, Why). This approach is essential for successful data capture solutions and seamless business process integration (GS1, 2017).

ISO and various standard bodies, including the World Trade Organization, acknowledge GS1 standards; therefore, they have become prevalent in tightly regulated sectors like healthcare, fresh foods, and food service (GS1, 2017). An illustrative instance of such regulatory mandates is the recently enacted Food Traceability Rule by the Food and Drug Administration (FDA) in the United States. This rule is one of the most comprehensive sets of traceability regulations globally, extending and complementing the existing Food Safety Modernization Act (FSMA). The EUDR represents Europe's foremost traceability regulation in recent times.

Background: A brief characterization of Coffee in Honduras

In Honduras, coffee is the primary agricultural export crop, with over 120,000 coffee farms contributing significantly to a third of the agricultural GDP (IHCAFE, 2021). Most of the coffee is grown under shade. The Honduran Coffee Institute (IHCAFE) is a nonprofit association that acts as a regulatory body overseeing Honduran coffee production. Producers and exporters must register with IHCAFE to gain authorization for coffee exports, a requirement designed to ensure industry regulation and empower IHCAFE to manage various aspects such as quality control, regulatory compliance, and comprehensive data collection.

The European Union is the country's largest coffee export market, closely followed by the United States (IHCAFE, 2021). Capitalizing on international trade opportunities, Honduras secured its position as the seventh-largest export market through the Free Trade Agreement signed with the Republic of Korea in 2020 (USDA, 2021).

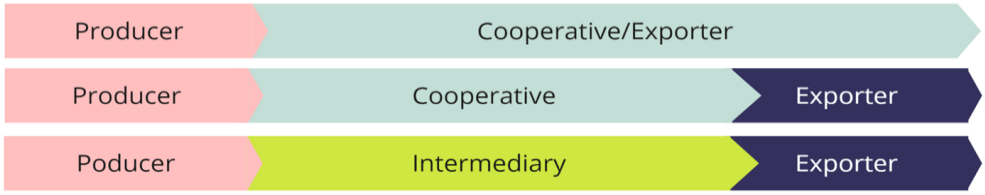
In Honduras, the coffee supply chain is intricately structured, with three primary sales channels identified by Ceballos-Sierra (2022): intermediaries, cooperatives, and exporters. Coffee can be aggregated in collection centers either by private aggregators, cooperatives, or intermediaries. Smallholder farmers in Honduras typically refrain from direct sales, relying instead on intermediaries and cooperatives for approximately 31% of transactions, with local intermediaries known as "coyotes" playing a significant role. Despite criticism, these intermediaries absorb the challenging costs associated with contracting, such as searching and monitoring small quantities of coffee from geographically dispersed farmers.

According to Álvarez (2018), the producer-intermediary-exporter circuit accounts for 80% of the coffee movement, while the remaining 20% involves direct sales from producers to export companies or through cooperatives. Cooperatives, acting as intermediaries, establish connections with the international market by selling to export companies.

The coffee industry involves the terms "beneficio húmedo [wet mill]" and "beneficio seco" [dry mill]. In wet processing, coffee is transformed into parchment form, while dry processing is typically found on larger farms due to specific requirements. Only a minimal percentage (1%) of coffee is directly exported, with intermediaries acquiring coffee, often in wet parchment form. Some intermediaries handle the drying process, store the coffee, and initiate consolidation efforts before transport to an export company. Wet processing is a crucial phase in the post-harvest stage. This is particularly important since 77% of unorganized producers lack the necessary infrastructure to preserve bean quality. Small quantities of coffee are stored until enough are accumulated, justifying transportation to collection centers (Álvarez, 2018).

Regarding purchasing, cooperatives and producer organizations buy from 15% of small-scale and 20% of medium-scale producers, irrespective of affiliation. Interestingly, most (83%) of large-scale producers choose to market their coffee through intermediaries representing export companies (Álvarez, 2018). Figure 1 illustrates the different market linkages available for Honduras coffee producers.

Figure 1: Market linkages of Honduran coffee supply chain



Source: Authors

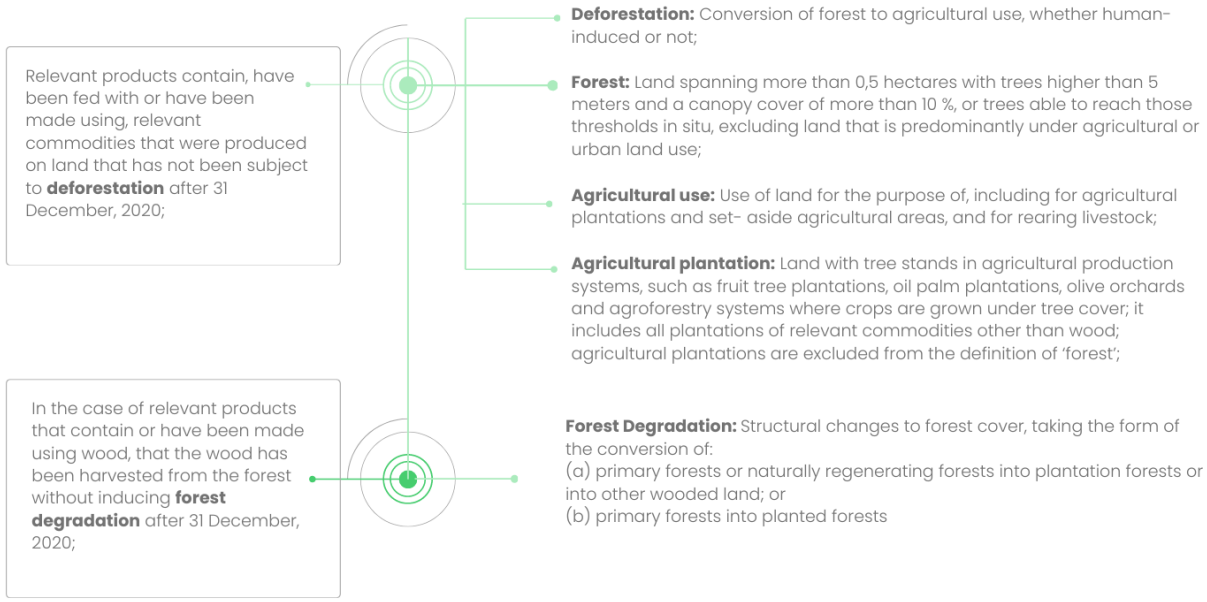
Honduras coffee sector is not new to digital traceability tools. The country has evolved into a testing ground for software developers, who have strategically established operations to gain insights into the intricacies of the coffee value chain.

DECIPHERING THE EUDR: AN OVERVIEW OF WHAT, WHEN, WHO, AND HOW - CURRENT INSIGHTS

What is Deforestation-free, and when is the cut-off date?

According to this regulation, deforestation-free means that commodities "were produced on land that has not been subject to deforestation after December 31st, 2020." For products that contain or have been made using wood, "the wood has been harvested from the forest without inducing forest degradation after December 31st, 2020". (Council of the European Union, 2022). The chosen cut-off date aligns with the international commitments outlined in the SDG and the New York Declaration on Forests. Figure 2 summarizes the main definitions within the EUDR, including definitions of deforestation, forest, agriculture, agricultural plantation, and forest degradation.

Figure 2: Main concepts in EUDR on deforestation



Source: Authors based on EUDR

These definitions have some challenging aspects. In general, while the definition of deforestation was taken from FAO, different countries might have different definitions at the national level that can make compliance a difficult task (Carbon Brief, 2023).

Naranjo et al., (2023) pointed out that EUDR classifies forest-to-agroforestry conversion as deforestation, facing challenges in accurately distinguishing between the forest canopy and coffee agroforestry using remote sensing. These regulations encompass both native and planted trees in the definition of 'naturally regenerating forest.' The coffee sector is concerned about the precision of spatial resolution in identifying coffee plantations, which are often complex, small (less than 0.5 hectares), and can be confused with other land covers or crops in remote sensing analysis. Coffee agroforestry systems compound this complexity, encouraged for sustainability, and often meet the forest classification criteria due to their canopy cover and tree height. The need for a nuanced understanding and application of regulations in the context of coffee and other agroforestry systems is underscored by the potential misinterpretation of canopy changes in existing agroforestry systems. This misinterpretation, particularly in the case of coffee planted before the December 31st, 2020, cut-off, can wrongly classify such changes as deforestation.

What is Compliance with relevant legislation?

The regulation stipulates that for compliance, commodities must be produced under the "relevant legislation of the country of production." This pertinent legislation encompasses a range of legal aspects, spanning social, economic, and environmental considerations (See. Figure 3).

Figure 3: Main elements in EUDR on relevant legislation

Source: Authors based on EUDR

This broad array of subjects required for compliance with relevant legislation encompasses responsibilities that fall under various public institutions. For instance, in Honduras, these aspects involve the mandates of entities such as the Secretary of Agriculture, Secretary of Natural Resources, Secretary of Human Rights, and the Tax Agency, among others.

The suggested compliance with relevant legislation has some challenging aspects for coffee production and countries in Central America. Honduran coffee production relies mainly on family–based labor, and it has been estimated by the United States Department of Labor (2020) that nearly 158,000 children are engaged in child labor in Honduras, and more work in agriculture than in any other sector. While there is no specific data on how many children are engaged in Honduras coffee production, in 2020, the country was included in the list of goods produced by child labor or forced labor, elaborated by the US Department of Labor, particularly for coffee, lobsters, and melons. (Department of Labor, 2020). Moreover, robust institutions with vigilant enforcement need to be established to ensure compliance with child labor prohibition laws. Central American countries are expected to encounter challenges as they must substantially strengthen national actors and forge partnerships to monitor and ensure compliance with local labor regulations.

What is included within the Due diligence Statement?

Commodities entering the European Union should be covered by a due diligence statement summarizing the fulfillment of the above requirements. The due diligence has three components:

1. A collection of specific information (see table 1).
2. Risk mitigation measures and
3. Risk assessment measures.

Table 1: Information requirement for the due diligence statement

Data Type	Description
Description of Products	Trade name, type of relevant products; for wood-based products, common and scientific name of species; list of relevant commodities or products used.
Quantity	Quantity of relevant products in kilograms of net mass; supplementary unit per Harmonized System code where applicable; alternatively, in net mass, volume, or number of items.
Country of Production	Country where the relevant products were produced, including specific parts if relevant.
Geolocation of Production	Geolocation of plots where commodities were produced; date/time range of production; specific requirements for cattle and other products; disqualification criteria for deforestation or forest degradation.
Supplier Information	Name, postal address, and email address of the supplier of the relevant products.
Recipient Information	Name, postal address, and email address of the business, operator, or trader to whom the relevant products have been supplied.
Deforestation-Free Verification	Conclusive and verifiable information proving that the relevant products are deforestation-free.
Compliance with Legislation	Information confirming that commodities comply with the legislation of the country of production, including rights to use the production area.

Source: Authors based on EUDR

In this specific list of data, the highlighted aspects represent critical elements of data collection and traceability: geolocation of plots, and verification of compliance with deforestation-free standards and legislation. These data points encounter privacy-related sharing issues, particularly concerning data security, unauthorized access prevention, data minimization (collecting only necessary information), and ensuring compliance with relevant data protection laws and ethical standards. All these aspects pertain to the production area and encompass sensitive information for a farmer, such as the location of their production and their performance in terms of deforestation-free verification or legislative compliance, which can impact their competitive edge in commercial transactions.

Another critical element concerns the content of these data and the actors who represent this information or who need to connect it or upload it to a platform. Table 2 illustrates the types of actors involved at each step, considering the context of Honduras.

Table 2: Types of data encompassed in due diligence of the EDR and potential involved actors in the Honduran coffee value chain

Data Type	Description	To whom does the data refer?	Who collects the information?	Who uploads the information?
Description of Products	Coffee (green)	Producer / Coop / Collection centers	Producer / Coop / Collection centers	Coop / Collection centers/ Exporter
	Roasted	Processors	Processors	Processors
	Coffee husks and skins containing coffee in any proportion	Processors	Processors	Processors
Quantity	Quantity of relevant products in kilograms of net mass; supplementary unit per Harmonised System code where applicable; alternatively, in net mass, volume, or number of items.	Producer / Coop/ Collection centers Exporter	Producer / Coop/Exporter	Coop / Exporter
Country of Production	Country where the relevant products were produced, including specific parts if relevant.	Producer / Coop / Collection centers	Producer / Coop	Coop / Exporter
Geolocation of Production	Geolocation of plots where commodities were produced	Producer(s)	Coop (Technician)	Coop (Technician)
	Date/time range of production	Producer(s)	Coop / Collection centers	Coop / Collection centers
	Disqualification criteria for deforestation or forest degradation.	Unclear	Unclear	Unclear
Supplier Information	Name, postal address, and email address of the supplier of the relevant products.	Coop/Collection centers/ Exporter	Coop/Collection centers/ Exporter	Coop/Collection centers/ Exporter
Recipient Information	Name, postal address, and email address of the business, operator, or trader to whom the relevant products have been supplied.	Exporter	Exporter	Exporter
Deforestation-Free Verification	Conclusive and verifiable information proving that the relevant products are deforestation-free.	Unclear	Unclear	Unclear

Compliance with Legislation	Information confirming that commodities comply with the legislation of the country of production, including rights to use the production area.	Unclear	Unclear	Unclear

Source: Authors

How is the definition of countries' risks of non-compliance determined?

Besides this data, due diligence will incorporate a risk component, which is a sensitive aspect within this regulation (article 23). According to this regulation, countries will be classified into three risk categories —high, low, and standard— due to "*an objective and transparent assessment by the Commission, taking into account the latest scientific evidence* and internationally recognized sources." The classification will mainly consider (a) deforestation and forest degradation rates, (b) agricultural land expansion for key commodities, (c) production trends of these commodities and products.

Starting in June 2023, all countries are categorized as standard risk, indicating that they do not fall into the 'high-risk' or 'low-risk' categories. The European Commission is spearheading a country benchmarking initiative, scheduled for release "no later than December 30, 2024" (Article 29), assigning each country a low or high-risk designation. This risk assessment aims to assist authorities in monitoring and enforcing compliance within the scope of this regulation.

Different research and environmental organizations offer comments and suggestions regarding this crucial process. Bellfield, *et al* (2023) in a policy briefing published by Trase —Stockholm Environment Institute and Global Canopy— and Proforest offer a set of recommendations on the framework and methodology to inform the design of the EUDR benchmarking system. Their recommendations include benchmarking deforestation risk by specific commodities at national and subnational levels to support the EU's Deforestation Regulation effectively. This approach identifies low-risk areas for streamlined due diligence and pinpoints high-risk areas for increased scrutiny. Risk classifications should be commodity-specific, based on each region's share of commodity deforestation relative to global or national totals, ensuring fairness and consistency.

On November 2023, thirty international conservation organizations, including Greenpeace and WWF, sent an open letter highlighting this aspect and emphasizing the need for this benchmarking to be grounded in clear, objective, and scientific criteria, ensuring a transparent process. They caution against allowing external considerations to influence this process, particularly those that do not accurately reflect the risks of deforestation or forest degradation in producer countries (Anders Handeln Austria, Attac Austria, ClientEarth, et al. 2023).

This issue is critical due to its dual impact: firstly, the direct link between increased risk levels and the complexity of exporting, and secondly, the potential effects of this assessment on international cooperation funding and market distortions that may result from politicizing the benchmarking process. As of December 18th, 2023, the FAQ section indicates that the development of the benchmarking system will be transparent. Further details on the system's operation are expected in 2024. Importantly, the Commission plans to proactively engage in discussions with countries potentially classified as high-risk before finalizing this classification. The aim of these dialogues is to help reduce their risk levels.

Who is responsible for ensuring compliance with this information?

This regulation will require companies placing the listed commodities on the EU market to conduct strict due diligence. The regulation refers to operators and traders —differentiating between SMS and non-SME— and offers particular guidelines in terms of requirements and timelines.

Non-SME Operators and Non-SME Traders, encompassing all natural or legal persons and supply chain participants respectively, are required to complete due diligence as per Article 8. SME Operators, defined as Small and Medium-sized Enterprises, must fulfill full due diligence for certain product parts not already covered by another legal person's due diligence process, with exemptions in place for products already subjected to due diligence. This requirement becomes applicable for small and microenterprise Operators from mid-2025. SME Traders, also Small and Medium-sized Enterprises, are exempt from due diligence obligations but must maintain records of supplier and client information, including names, addresses, and contact details. This record-keeping obligation also commences from mid-2025 for small and microenterprise Operators.

It's crucial to note that small and medium-sized enterprise operators will only need to conduct full due diligence for aspects not covered in other procedures. This highlights the importance of collaboration among stakeholders, alliances, and partnerships and the need for a system that supports interoperability and transparency among parties. During 2024, more clarity will be provided on how these alliances will take shape and what arrangements will be necessary.

Summary of key aspects to consider.

- EUDR classifies forest-to-agroforestry conversion as deforestation, facing challenges in accurately distinguishing between the forest canopy and coffee agroforestry using remote sensing.
- The suggested compliance with relevant legislation, including labor rights, has some challenging aspects for coffee production and countries in Central America. Honduran coffee production relies mainly on family–based labor.
- Three data points required in the due diligence (geolocation of plots, and verification of compliance with deforestation-free standards and legislation) encounter privacy-related sharing issues.
- Details on how is going to work the Country Benchmarking System are unclear and details will be offered during 2024.
- SME and non-SME Operators and Traders will have particular requirements and timelines.

EXAMINING TRACEABILITY TOOLS IN THE HONDURAN COFFEE INDUSTRY

Traceability tools play a pivotal role in the EUDR, serving as the conduits through which data flows to ensure compliance. In the following sections, we delve into three such tools currently being developed in the Honduran coffee sector, focusing specifically on their features, scope, and functionality.

Three traceability tools found in Honduras

In the interviews conducted for this study, was highlighted that the coffee industry in Honduras has a longstanding practice of implementing traceability systems. These systems serve the purpose of certifying coffee not only for quality but also for sustainability. Using traceability tools has become integral to the industry's efforts to ensure that coffee production adheres to rigorous standards.

Currently, different initiatives are piloting and testing different traceability tools that could be used in the context of this EUDR. In this section, we deep dive into three traceability tools utilized in the field: Trazar-Agro, GrainChain, and INATrace, and their characteristics and potentialities. This analysis is based on empirical data collected in the Santa Rosa de Copan area (Padilla-Quiñonez, 2023), combined with an examination of the governance of these platforms. Specifically, it explores the construction of their business and data governance models for the collected data (Melo-Velasco, 2023). Table 3 summarizes the characteristics of the three traceability solutions reviewed in this document.

Trazar-Agro: Developed by OIRSA —Organismo Internacional Regional de Sanidad Agropecuaria. It integrates the records of individuals, establishments, operators, and means of transportation involved in agricultural, livestock, forestry, aquaculture, and fisheries activities in the countries that are members of OIRSA. Trazar-Agro has been implemented through the Secretary of Agriculture and Livestock in Honduras, serving a significant number of more than six thousand registered farmers, with plans of offering the service to the coffee sector in the following years.

INATrace: The GIZ initiative PROCAMBIO II[1] actively supports cooperatives in Honduras by implementing the INATrace traceability solution. The primary goal is to establish transparent global agricultural supply chains that enhance the economic conditions of smallholders. INATrace has chosen Honduras as a development ground for its coffee traceability system. The cloud-based platform offers comprehensive traceability and price transparency, promoting fair compensation in the supply chain. It employs blockchain-based traceability technology to track coffee from production to final packaging. INATrace has expressed its commitment to creating an interoperable digital solutions ecosystem in agriculture through the Digital Integration of Agricultural Supply Chains Alliance (DIASCA) initiative, with the development phase scheduled from September 2022 to July 2024. A consortium, including DIASCA/GIZ, Linux Foundation/AgStack, COSA, and CGIAR, is working on a prototype for an integrated, open-source Digital Public Infrastructure (DPI) aligned with EUDR requirements.

Grain Chain: GrainChain is a US-based tech startup founded in 2013.Honduras was chosen as the company's test ground for developing a module for coffee. It was the first country in the region to adopt this technology, which can later be transferred to the rest of Central

[1] Gestión Sostenible de los Recursos Naturales con Enfoque a la Adaptación al Cambio Climático (PROCAMBIO-II) is the GIZ program to support technical support for state, local and community actors.

America due to its market's similarities. Their system can manage pre- and post-harvest processes through a cloud-based, blockchain, and IoT-enabled platform consisting of complementary products, allowing the tracking and recording of grains from production to commercialization. It records and verifies important events in the value chain, such as harvest, transportation, storage, and sale, creating a transparent and immutable history. It facilitates payments and settlement of transactions within the supply chain, with the ability to track these transactions.

Table 3: Traceability tools characteristics

	Trazar-Agro	INATrace	GrainChain
Year of starting	2010-2014 for cattle, and 2014 on for other agricultural commodities	July – October 2021	They started in 2013 with SiloSys to trace grains. In 2018 they launched GrainChain
Type of technology	Blockchain	Blockchain	Blockchain
Owner/Promoter	OIRSA	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Grain Chain LLC, Texas
Main Partners	Local governments	Neumann Foundation, Honduras Ministry of Foreign Affairs and Cooperation	Mastercard's proprietary blockchain 'Provenance', Overstock and Pelion Venture

Source: Authors

Features and Implementation Details as of Fall, 2023

The comparison of the three digital tools for coffee traceability, outlined in Table 4, shows distinct stages of development for each platform. INATrace and GrainChain have chosen the Honduran coffee value chain as their focus for developing coffee modules, currently in the trial phase with plans for an official commercial release in 2024. INATrace, designed specifically for coffee processing traceability, offers customization options to meet industry-specific needs. GrainChain, leveraging its experience in Honduras, adapts its data tracking capabilities for coffee processing traceability. Trazar-Agro anticipates the soon-to-be-incorporated coffee module containing IHCAFE's extensive data but currently lacks trial versions. However, the platform boasts well-established traceability software for livestock and fish products, meeting local regulatory requirements.

INATrace is an open-source software with no fees. GrainChain utilizes proprietary licenses, involving transaction fees and license fees per module, although the module for producers is fee-free. Trazar-Agro, conversely, does not impose a license fee; instead, the platform's usage cost is integrated into the regulatory transit fee for agricultural products across the national territory through a waybill. Regarding key features, Trazar-Agro emphasizes government support, nationwide training, and industry experience. INATrace focuses on offering free training, exploring interoperability through the DIASCA alliance, and providing consumer access to supply chain information. GrainChain prioritizes seamless integration with existing infrastructure and transparent transactions with financial institutions.

Regarding technology, Trazar-Agro can interoperate with SAP, while INATrace actively explores interoperability features. GrainChain count with integration capabilities with third-party systems, including sensors, and IT infrastructure.

Transparency and compliance strategies vary, with Trazar-Agro utilizing information for local regulatory purposes, INATrace enabling buyers to upload payment documents, and GrainChain integrating with financial institutions for transparent transactions. Looking ahead, Trazar-Agro awaits release, focusing on government support and regulatory compliance. INATrace is in the final stages of developing its coffee module, exploring interoperability, and working on a smart contract module. GrainChain, also in the final stages for the coffee module, mentions potential compliance modules but reports none as of now.

INATrace and GrainChain technologies have deployed a team of technicians dedicated to providing training and support for implementing their platforms. This support is delivered through a combination of in-person workshops and online follow-ups. On the other hand, Trazar-Agro draws on its extensive experience in incorporating traceability software into various agroindustries, leveraging government support and a technical team. This infrastructure has enabled them to reach and assist farmers nationwide since 2019, in compliance with national regulations governing the movement of livestock and other agricultural products.

According to the insights gathered from our interviews, uploading users' existing databases into the software clouds has been reported as straightforward. Specifically, for INATrace and GrainChain users, uploading preexisting databases through spreadsheets was completed within approximately two weeks. The duration of training and technical support varied, spanning one to three months, depending on the frequency of the meetings.

GrainChain provides the option to seamlessly integrate its software with financial institutions, ensuring complete transparency in monetary transactions and enabling control over allocating funds for specific purposes. This integration facilitates access to credit funds for cooperatives. Additionally, GrainChain offers an eWallet feature, allowing farmers to establish a bank account and receive immediate payments, which they can easily monitor using their cellphones. Producers highlight instant payments as a key benefit of the digital solution since it eliminates the necessity of traveling long distances to cash the traditional checks received from selling their coffee.

INATrace is enhancing its capabilities by developing new functionalities, including recording field polygons and satellite-based forest monitoring, to ensure compliance with the EUDR

Table 4: Overview of Coffee Module: Features and Implementation Details (Fall 2023)

Platform	Trazar-Agro	INATrace	GrainChain
Coffee module	Not released	In final stages	In final stages
Cost	Cost is included in the fee of the transport document. Free training	No fees and free training	No cost for producers. License fees for other modules. Training included with license.
Database Upload Method	Spreadsheet upload	Spreadsheet upload	Spreadsheet upload
Pre-existing database migration timeframe	Not specified	1 to 2 weeks of data upload, 1-3 months of training	15 days for data upload, 1 month of training
Support and Training	Experience in other agroindustry's; Government support; Nationwide farmer visits and training since 2019	Workforce for training and support; In-person workshops; Online follow-ups	Workforce for training and support; In-person workshops; Online follow-up
Interoperability	It can interoperate with SAP	Developing interoperability features through the DIASCA alliance	Integrates with third-party systems, sensors, and IT infrastructure
Experience and Initiatives	It has worked with tracing other agricultural products in the territory since 2018.	Testing demo versions in Honduras since 2021, and has a previous trial experience with Rwandan coffee	Testing coffee demo version in Honduras since 2020. It has a commercial version for grains.
Transparency	Information is used by authorities to verify local regulations. Data is not open to the public.	Buyers can upload corroborative payment documents to offer proof and backing for their transactions. Consumers can access supply chain information and transactions.	Integrated with financial institutions to ensure transaction transparency. Offers an instant and transparent payment system. Developing a smart contract module.
Regulation compliance	Data collected is used to fulfill Agricultural Health and Sanitary regulations	The data collected can be used to fulfill the due diligence requirements available	Mentions it can develop compliance modules, but has reported none

Source: Authors

Software data collection

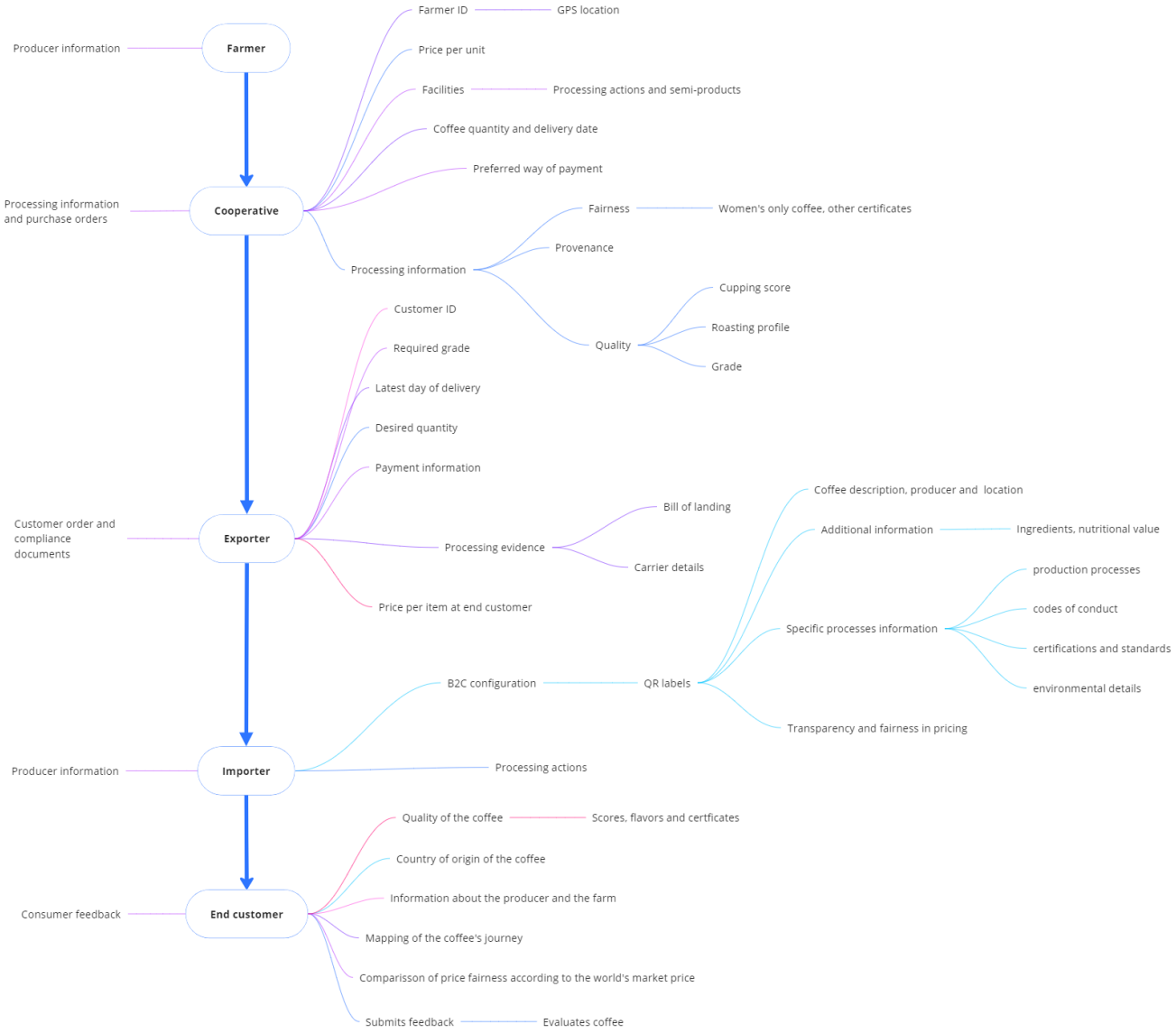
The data collection within each platform is similar, even though each tool may collect different types of information. To illustrate the scope, type of data, and its producers, Figure 4 presents the data flow for INATrace. It's worth noting that certain features are yet to be launched due to the ongoing implementation timeframe.

This flow demonstrates the intention to achieve farm-to-cup traceability, allowing various actors along the chain to upload information. For instance, the end consumer of a cup of coffee in Europe can scan a QR code, learn about the price paid in the context of current market prices, and provide feedback to the producer. This distinctive feature of INATrace is created to make value chains more transparent and fairer.

Conversely, in the case of GrainChain, the platform allows configuration of what information the end consumer can see through the QR code, but the consumer cannot provide feedback. The data from financial transactions are transparent to the involved actors (producer, cooperative, and financial institution), with each actor deciding what data can be shared within the chain.

In the case of OIRSA, they verify the origin and compliance with the sanitary regulations of the country, aiming to regulate the movement of these goods so they can be marketed in the national market and with OIRSA countries. This information is more for the use of health authorities and is not aimed at the end consumer.

Figure 4: Data flow example of Honduras' experience with INATrace as for Fall, 2023



Source: The authors, with information from INATrace user's manual.

Interoperability

All three software solutions provide modules accessible through websites and downloadable apps, supporting offline use. They leverage Blockchain technology to ensure secure, transparent, and tamper-proof record-keeping. GrainChain offers interoperability capabilities and integration with third-party systems, sensors, and existing IT infrastructure. Trazar-Agro has revealed it can interoperate with SAP. INATrace states it is exploring its interoperability features through the DIASCA alliance, but as of Fall 2023, it is still in its development phase.

Data privacy

In terms of data security, both GrainChain and INATrace prioritize the protection of user data, as evidenced by their data privacy statements that assure users of their commitment to not share, rent, or sell account information without user consent. INATrace allows to upload of a data-sharing agreement for the value chain which is signed by all stakeholders. Trazar-Agro mentions that it does not collect any data in its app but offers no further information about its data privacy measures.

Data standardization

These digital software options provide functionalities for documenting information throughout the coffee processing stages, offering extensive and customizable features tailored to the user's requirements. There is no mention about the adherence of specific traceability standards from the software developers. The architecture and language used in these software can be adjusted to the user’s requirements.

Regarding delivery methods for other stakeholders in the supply chain, Trazar-Agro presently utilizes a code identification system primarily for transit authorization permits, with limited direct interaction with end consumers. However, the company plans to introduce a QR code system soon, thereby enhancing its traceability efforts. In contrast, INATrace employs a QR code for each product to provide end consumers with detailed information about the coffee's journey. Conversely, GrainChain currently does not offer a module specifically designed for end-consumer interaction. Instead, it provides a module for producers to record pre-harvest information, which can later be integrated into the overall traceability data.

Actors involved in data flow

As Table 5 shows, although producers are the primary source of information, they are not always responsible for uploading it to the platforms. This underscores the important role of cooperatives, which need technical personnel and resources to upload each of their producers' information and guarantee its accuracy. Only one of the platforms, INATrace, features a specific module for the end consumer, and GrainChain a producer suite for pre-harvest information.

Table 5: Role of each actor in the data flow

Platform	Trazar-Agro	INATrace	GrainChain
Producer	Uploads farm and coffee information	Provides farm and coffee information to cooperative or exporter	Provides farm and coffee information to cooperative or exporter
Cooperative	Uploads producer's information, geolocation, coffee quantity, quality, and agricultural health documents	Producer's information, geolocation, coffee quantity, quality, and certificates	Uploads producer's information, geolocation, coffee quantity, quality and certificates, pictures, and monetary transactions
Collector/processor	Registers product transit authorizations and checkpoints	Processing information and buying transactions	Reception, quality, and quantity measurements and organization of multiple production batches
Exporters	Verifies Agricultural Health and sanitary compliance and producer's IHCAFE registry	Receives buying order, add Bill of landing and shipping information	Buying orders, smart contracts and movement of inventory into and out of facilities, which can be fully tracked
Importers	Place buying orders and transaction information	Places buying orders and establishes product requirements and price, as well as shipping information	Connects directly with producers and place orders in the system, can view contracts and shipping information
End Consumer	There is no module for end consumers. QR code is used for regulatory compliance	Generates a QR Code with product information and coffee's journey to the end consumer	There is no module for end consumers. The QR code delivers information agreed upon by the buyer

Source: Authors

POTENTIALITIES AND UNCERTAINTIES FOR THE ADOPTION AND INTEGRATION OF TRACEABILITY SYSTEMS IN THE EUDR CONTEXT

Use in the context of EUDR Context

Among the three tools examined in this study, all possess the capability to record information necessary for the EUDR due diligence. INATrace is particularly noteworthy, as it is in the process of developing a module specifically designed to verify the origin of products free from deforestation.

Due diligence requires specific data collection and reporting, which can be uploaded to the evaluated traceability software. Table 5 describes the type of data required by the EUDR and its compatibility with digital solutions as of their development process in Fall 2023.

"Available" here means that this information can be uploaded, stored, and shared in traceability systems. Although this information is not yet open to the public, the customization option allows for sharing with customs and regulatory authorities.

Those software programs, due to their interface adaptability, have declared the capability to incorporate features according to the user's requirements to adhere to specific processes or current regulations. While these interfaces are designed for supply chain data tracking and tracing, their functionality does not extend to regulatory enforcement and deforestation-free verification needed in the EUDR regulation. However, owing to their adaptable configurations, verification documents could be uploaded and shared among stakeholders for this purpose.

Data Flow: Feedback loops and the question of backward information

In Honduras, traceability within the country integrates data from producers, cooperatives, and exporters. Here, two issues are noteworthy. First, the producers and cooperatives collect and upload production information. Second, the exporter is tasked with verifying this information before placing the products on the market. From there, the traceability is recorded and tracked outside the country (figure 5).

The current initiatives in traceability primarily concentrate on the forward flow of information within the supply chain. However, there needs to be more availability of backward information. Although INATrace has envisioned incorporating feedback from the end consumer, this feature is still in development, and it is still being determined whether this information will reach the producer.

This means that while there is systematic tracking of products from their origin to the end consumer, the reverse path detailing the journey back to the producers is not yet readily accessible. Consequently, producers face a significant challenge as they cannot receive valuable feedback directly from the buyers and end consumers. Therefore, efforts to enhance traceability should consider establishing a comprehensive feedback loop encompassing information's forward and backward flow to foster better communication and collaboration throughout the supply chain.

Currently, traceability technologies are undergoing testing phases with cooperatives, exporters, and financial institutions. However, the reach of these technologies allows for tracing beyond these links in the coffee value chain. To compare the scope of the technologies, Figure 5 illustrates the reported functionalities for each platform.

Figure 5: Scope of each traceability tool

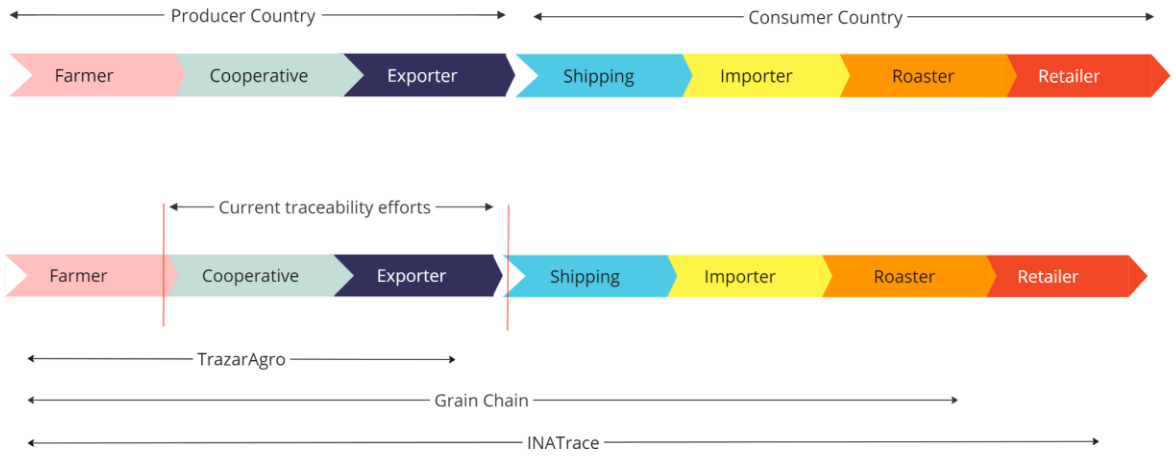


Table 6: Due diligence data compatibility with the evaluated traceability tools, as of Fall, 2023

Data Type	INATRACE	GRAINCHAIN	TRAZARAGRO
Description of Products	Available today	Available today	Available today for other products, not coffee
Quantity	Available today	Available today	Available today for other products, not coffee
Country of Production	Available today	Available today	Available today for other products, not coffee
Geolocation of Production	Available today	Available today	Available today for other products, not coffee
Supplier Information	Available today	Available today	Available today for other products, not coffee
Recipient Information	Available today	Available today	available today for other products, not coffee
Deforestation-Free Verification	Module In-progress in linkage with the EUDR Observatory	They could create a section to up-load	They could create a section to upload
Compliance with Legislation	Potentially Available	Potentially Available	Potentially Available
(a) land use rights;	Potentially Available, certificate will come from a third party – Secretary of Agriculture.		
b) environmental protection	Potentially Available, certificate will come from a third party or certification bodies – Secretary of Agriculture		
(c) forest-related rules, including forest management and biodiversity conserva-tion, where directly related to wood har-vesting;	Potentially Available, certificate will come from a third party – Secretary of Natural Resources and Environment		
(d) third parties' rights;	Potentially Available, certificate will come from a third party – Secretary of Labor and Social Security		
(e) labour rights;	Potentially Available certificate will come from a third party– – Secretary of Labor and Social Security		

f) human rights protected under international law;	Potentially Available certificate will come from a third party– – Secretary of Agriculture
(g) the principle of free, prior and informed consent (FPIC), including as set out in the UN Declaration on the Rights of Indigenous Peoples;	Potentially Available, certificate will come from a third party – Secretary of Agriculture
(h) tax, anti-corruption, trade and customs regulations	Potentially Available, certificate will come from a third party – Secretary of Agriculture

Source: Authors

The potential use of GS1

The digital software identified offer customizable features to meet user requirements in the coffee value chain, potentially aligning with EUDR and in-country regulations. Article 26 of the EUDR emphasizes data harmonization and electronic interfaces, while Article 31 empowers the Commission to define detailed data and interface functioning through implementing acts.

Effective traceability systems require cross-functional capabilities for data storage and sharing, necessitating a standardized reporting language. The unreleased architecture and standardization of data from the EUDR pose challenges for interoperability and data integration.

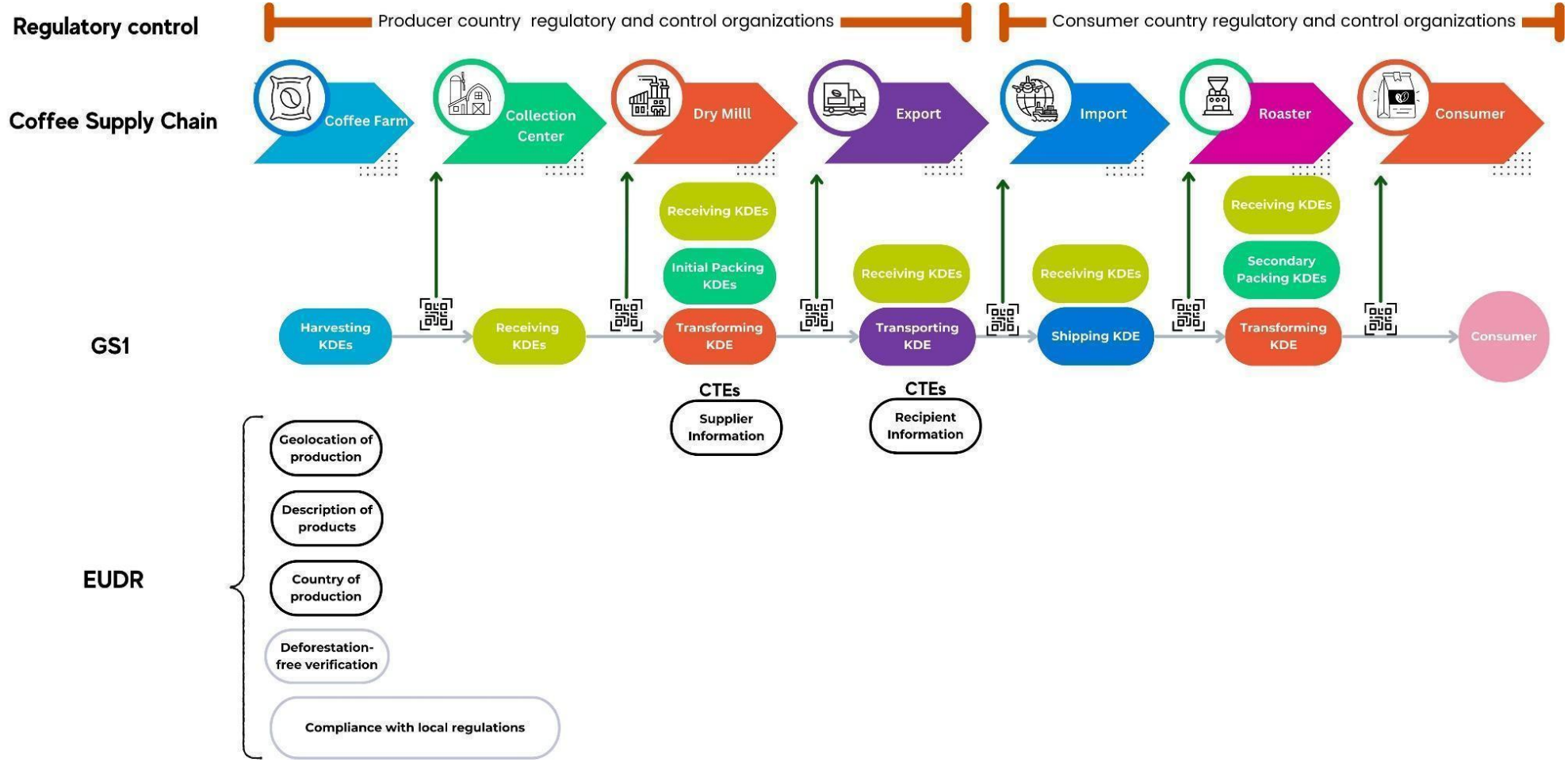
To establish a common framework for data, adopting the Global Traceability Standard (GS1) is a viable pathway. GS1 provides globally unambiguous identification keys, enhancing communication between companies and advancing supply chain management. Successful implementation of traceability in business processes relies on a common language across departments, with Critical Tracking Events (CTEs) representing key lifecycle events and Key Data Elements (KDEs) describing instances of CTEs in five dimensions (Who, What, Where, When, Why).

While EUDR hasn't adopted GS1 standards for data reporting, a list of data recording elements is required for compliance. This data could be classified following the GS1 standard of CTEs and KDEs.

Critical Tracking Events (CTEs) in the coffee supply chain, such as harvesting, receiving, milling, exporting, shipping, importing, roasting, and retailing, involve specific Key Data Elements (KDE) for effective data tracing and tracking. Operators maintain data ownership, accessible to regulatory agencies for control. Figure 6 illustrates the data flow in the coffee supply chain compared to EUDR requirements, following GS1 standards.

While traceability standards focus on data events, the EUDR mandates operators to comply with human rights, tax regulations, anticorruption measures, and deforestation-free verification. Compliance with local regulations (labeled in gray in figure 6) is not inherently integrated into supply chain traceability. However, traceability systems allow uploading and storing verification documents within their traceability code, ensuring compliance with specified requirements.

Figure 6: Data process comparison with GS1 standards and EUDR requirements



Source: Authors

FINAL REMARKS: EXPLORING POTENTIALITIES AND NAVIGATING UNCERTAINTIES

A need for a common understanding

From interviews, we identified a lack of common understanding regarding the requirements of this regulation (deforestation and forest degradation definitions) and what country actors must do to ensure compliance (due diligence compliance factors).

Differentiate between the possibility of using traceability platforms and meeting the requirements of this regulation is crucial. Traceability tools are a means to facilitate the flow of information, which helps comply with certification requirements, quality standards, and specific market demands. These tools were not designed to comply with the EUDR (except for INATrace), but they have shown the potential to incorporate its information. The EUDR sets specific demands, whose implementation will require coordination among public, private, and social actors in the country. 2024 is a crucial year for achieving harmonization in preparation for the implementation.

Role of intermediaries: Critical role and uncertainties in Adoption and Integration

Only a percentage of coffee production is handled through cooperatives. According to Álvarez (2018), this participation was at 20%. Preliminary findings by Gunawardena and Chandran (2022) estimate that approximately 35 to 40% of the coffee produced in Honduras is believed to be managed by producer groups or cooperatives or directly sold to exporters. In any case, intermediaries play a significant role in the supply chain. The way intermediaries handle their databases and plan for their integration and interoperability with upcoming digital systems, as mandated by the new regulation, is still under consideration and yet to be finalized. Given that IHCAFE contains an extensive database of procedures, intermediaries, coops, and exporters, this organization will or should have a leadership role in shaping the efforts of interoperability and information integrity.

Honduras as an experimentation field for Traceability

Honduras has evolved into a testing ground for software developers, who have strategically established operations to gain insights into the intricacies of the coffee value chain. Their objectives include implementing tailored solutions for this sector and providing financial support for the necessary fieldwork and training of coffee producers. However, uncertainties linger regarding the key stakeholders responsible for and the associated costs involved in transitioning from the pilot phase to the full-scale implementation. This ambiguity persists as the finalized digital products prepare for introduction to the market.

Under the EU Zero deforestation regulation, operators and traders must trace each commodity batch to its specific land plot before market placement or export, ensuring full traceability. Coffee producers in Honduras demonstrate expertise in documenting and certifying their products in alignment with international standards and local regulations. Despite this proficiency, a notable gap exists in comprehending the specific intricacies of the emerging EUDR among producers, cooperatives, and exporters.

Still, there needs to be agreements and common understandings on how much information and what information will be necessary to comply with due diligence, local regulations, and risk mitigation measures. Digital technologies for traceability are a tool for transparency, but they do not provide transparency *per se*. Therefore, data verification should be a fundamental part of meeting due diligence requirements.

Gaps in the Compliance Scheme

Honduras is a significant coffee-producing country, and its coffee industry is subject to various regulations and standards. In Honduras, the IHCAFE is the government agency responsible for regulating and

promoting the coffee industry. It plays a central role in overseeing various coffee production and export aspects. However, due diligence requires commodities to comply with human rights, labor rights, and tax compliance of the country of origin under the realm of other stakeholders.

It is unclear who will verify whether coffee meets all national regulatory requirements. Given that producers registered with IHCAFE must adhere to legal standards and statutes, those interviewed anticipate that IHCAFE will take a leadership role in supervising the national fulfillment of the EUDR.

Child labor in the coffee sector is a significant focus for international organizations. While national regulations explicitly prohibit child labor, there is a common practice of children working on family farms, which is culturally accepted and valued for knowledge transfer and cultural reasons. This poses a nuanced challenge for due diligence compliance and emphasizes the need for local authorities to exercise vigilance in addressing this issue.

There is considerable uncertainty regarding the use of satellite sensing and data analytics to evaluate deforestation risk in the coffee industry, and there needs to be more clarity on the European Union's approach to assessing this risk. Based on our interviews, the assessment of deforestation risk will likely be determined on a country-wide basis, without differentiation within individual territories. This approach could pose challenges, considering agricultural products' diverse nature and management practices.

Awareness for potential market outcomes

Regarding traceability, interviewees who have exported traceable products do not perceive a premium price due to traceability alone. The premium price is attributed to the quality of the product, such as being organic or fair trade, and traceability serves as a means of verification. Since the EUDR focuses solely on environmental issues, any price changes could be linked to shifts in supply and demand due to non-compliance with EU entry requirements. However, as there is no emphasis on price transparency, a concern among interviewees is that complying with the regulation might only increase costs.

The process of obtaining and maintaining data comes with a cost that hasn't been quantified yet, though it is unequivocally acknowledged by the stakeholders involved. Certain cooperatives involved in export activities currently do not incur extra costs when integrating traceability systems. This is attributed to their pre-existing data collection procedures aligned with various certifications (such as Rainforest Alliance, FairTrade, Organic, Manos de Mujer) and the free technical support and license use they get from the software developers. These cooperatives feature robust databases and have employed technicians responsible for georeferencing every producer in their organization. However, there needs to be more certainty about the potential cost of the traceability software once the trial phase of this technology concludes.

The initial hesitancy towards adopting traceability standards in the coffee value chain has been replaced by the imperative need to establish auditing protocols for coffee certification processes. Cooperatives are now actively adopting digital traceability tools as they streamline procedures and provide advantages for transaction control. The seamless integration of their existing databases, coupled with robust technical support, contributes to the overall satisfaction of cooperatives in using these new tools.

Producers integrated into lengthy marketing chains face an ongoing question: they sell their wet parchment coffee to intermediaries. This product then undergoes dry milling before reaching exporters. The uncertainty revolves around whether these producers can engage in traceability processes and how they can actively participate. Notably, this participation lacks a financial incentive through a differential price; it merely offers the chance to fulfill an export requirement.

Deforestation-free product compliance

In our interviews, experts in the field highlighted the lack of standardization of criteria regarding deforestation and forest degradation with other international and national regulations. While the EUDR de-

fines these criteria based on the FAO, these definitions may vary in each country. Particularly problematic is the definition of forest degradation, its scope, and the lack of criteria to reduce its risk. This lack of clarity is especially worrisome for the coffee industry, as its production occurs in agroforestry systems categorized as forest degradation.

The EUDR has announced its intention to employ satellite imaging comparisons for evaluating deforestation. This will involve analyzing vegetative cover to assess deforestation status as of December 2020. However, the entity responsible for issuing the official assessment of deforestation-free products and the mitigation measures accepted by the EU are still under consideration.

The unique nature of coffee, primarily cultivated in agroforestry systems in Honduras, poses challenges for digital imaging analysis. Misunderstanding coffee plantation management could lead to inaccurate deforestation risk assessments. For instance, the customary renovation of productive lots by around 20-30% annually in coffee plantations might be misinterpreted as deforestation or forest degradation. This agricultural practice should be evaluated with appropriate considerations. Additionally, satellite imaging may struggle to accurately identify coffee plantations due to the natural tree shade, complicating the proper identification of production sites.

MAIN TAKEAWAYS

The journey toward effective coffee traceability in Honduras involves addressing uncertainties, fostering collaboration, and adapting to the evolving landscape of international regulations, in particular EUDR. Clear communication channels, transparent standards, and strategic collaboration among stakeholders will be pivotal in shaping the future of the coffee industry in alignment with global sustainability goals. The essential takeaways are succinctly outlined below:

On EUDR in general:

1. Intermediaries play a significant role in the coffee supply chain, managing a substantial portion of coffee production. However, uncertainties linger regarding how these intermediaries will manage and integrate their databases with upcoming digital systems.
2. Despite advancements, uncertainties persist regarding the key stakeholders' responsibilities and the associated costs of transitioning from pilot phases to full-scale implementation.
3. Aligning and coordinating regulatory and control measures among different organizations or entities in the producing country is crucial for the compliance of the EUDR. This process entails coordinating control measures among different entities to establish consistency, uniformity, and cooperation in regulatory frameworks, standards, and enforcement activities. By doing so, it addresses challenging aspects of the regulation, such as compliance with national laws and human rights.
4. While adherence to the regulation does not benefit coffee prices for producers, obtaining and maintaining data incurs unquantified costs. The initial hesitancy toward traceability has shifted, with cooperatives actively adopting digital tools to streamline processes and enhance transaction control.
5. The requirement for geospatial coordinates introduces challenges in accurately assessing deforestation risk, particularly in agroforestry-based coffee plantations.

On the intersection between EUDR and traceability tools:

6. Traceability is a tool used to achieve specific goals rather than being the ultimate objective. While a traceability plan is necessary to meet market demands and adhere to regulatory controls, it may

not ensure effective verification of deforestation-free compliance for a product, nor will it fulfill the entirety of the EUDR requirements.

7. The current focus on the forward flow of information within the traceability system highlights a critical gap— the absence of readily accessible backward information flow back to the producers.
8. The data reporting and sharing could benefit the adherence to GS1 standards to facilitate seamless communication and data exchange between different systems and stakeholders within the supply chain.
9. The nuanced challenge of child labor underscores the need for local authorities to address cultural practices. The assessment of deforestation risk, including methodologies and procedures, remains unclear, raising concerns among industry stakeholders.

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The initiative is currently undertaking research testing the effectiveness and scalability of market and value chain innovations in seven countries in Africa, Asia, and Latin America. In partnership with the ISEAL Alliance, the initiative has further launched the Knowledge Platform for Inclusive and Sustainable Food Markets and Value Chains (KISM) to help farmer organizations, food businesses, governments, and practitioners make better-informed investment and policy decisions on inclusive and sustainable food value chains. The Initiative's leadership thanks all funders for supporting this research through their contributions to the CGIAR Trust Fund, and in particular also the Bill and Melinda Gates Foundation for designated funds received.

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