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New approaches to govern pineapple supply chains from Costa Rica: Towards more just and sustainable production and trade?

Nuevos enfoques para gobernar las cadenas de suministro de piña desde Costa Rica: ¿hacia una producción y un comercio más justos y sostenibles?

Novas abordagens para governar as cadeias de suprimento do abacaxi da Costa Rica: rumo a uma produção e um comércio mais justos e sustentáveis?

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Abstract

The Costa Rican pineapple sector has been one of the key economic sectors in this biodiversity-rich country and has strongly expanded in the past decades. It is an export-oriented, high-impact sector that has contributed to sustainability problems such as pesticide pollution, labor rights violations, biodiversity loss, and the displacement of local communities from their lands. This article analyzes new and innovative approaches to better govern the supply chain of this agricultural product by focusing on 1) current dynamics in the sustainability certification of pineapples, 2) new human rights and environmental due diligence (HREDD) laws from Europe to hold companies accountable for adverse impacts in their supply chains and 3) innovative approaches of solidaric circular bioeconomy that aim to use the waste from pineapple production and to add value to raw material production in the sites of production. Based on primary data including interviews and field visits in Costa Rica, the analysis highlights the perspectives of different actors involved in this supply chain and the diverse governance instruments. The potential and limitations of these approaches will be discussed, asking who benefits and who is disadvantaged by existing governance arrangements, and showing how governance instruments and the policy mix could be further improved to contribute to a sustainable and just transformation of existing production and trade systems.

Keywords: Environment, Governance, Human Rights, Responsibility, Trade Policy

Resumen

El sector piñero de Costa Rica ha sido uno de los sectores económicos clave en este país rico en biodiversidad y se ha expandido fuertemente en las últimas décadas. Es un sector orientado a la exportación y de alto impacto que ha contribuido a problemáticas de sostenibilidad como la contaminación por pesticidas, violaciones a los derechos laborales, pérdida de biodiversidad y desplazamiento de comunidades locales de sus tierras. Este artículo analiza enfoques nuevos e innovadores para mejorar la gobernanza de la cadena de suministro de este producto agrícola,

enfocándose en: 1) las dinámicas actuales de certificación de sostenibilidad de la piña, 2) las nuevas leyes europeas de debida diligencia en derechos humanos y medio ambiente (HREDD, por sus siglas en inglés) para hacer responsables a las empresas por impactos negativos en sus cadenas de suministro, y 3) enfoques innovadores de bioeconomía circular solidaria que buscan utilizar los residuos de la producción de piña y agregar valor a la producción de materia prima en los lugares de origen. Con base en datos primarios que incluyen entrevistas y visitas de campo en Costa Rica, el análisis destaca las perspectivas de diferentes actores involucrados en esta cadena y los diversos instrumentos de gobernanza. Se discuten el potencial y las limitaciones de estos enfoques, preguntándose quién se beneficia y quién se ve perjudicado por los arreglos de gobernanza existentes, y mostrando cómo los instrumentos de gobernanza y la combinación de políticas podrían mejorarse aún más para contribuir a una transformación sostenible y justa de los sistemas actuales de producción y comercio.

Palabras clave: Derechos humanos, Gobernanza, Medio ambiente, Política comercial, Responsabilidad

Resumo

O setor de abacaxi da Costa Rica tem sido um dos principais setores econômicos neste país rico em biodiversidade e se expandiu significativamente nas últimas décadas. Trata-se de um setor voltado para exportação, com alto impacto, que contribuiu para diversos problemas de sustentabilidade, como a poluição por agrotóxicos, violações de direitos trabalhistas, perda de biodiversidade e o deslocamento de comunidades locais de suas terras. Este artigo analisa abordagens novas e inovadoras para melhorar a governança da cadeia de suprimento deste produto agrícola, com foco em: 1) as dinâmicas atuais da certificação de sustentabilidade do abacaxi; 2) as novas leis europeias de diligência devida em direitos humanos e meio ambiente (HREDD) para responsabilizar empresas por impactos negativos em suas cadeias de suprimento; e 3) abordagens inovadoras de bioeconomia circular solidária que visam utilizar os resíduos da produção de abacaxi e agregar valor à produção de matérias-primas nos locais de origem. Com base em

dados primários, incluindo entrevistas e visitas de campo na Costa Rica, a análise destaca as perspectivas de diferentes atores envolvidos nessa cadeia e os diversos instrumentos de governança. São discutidos o potencial e as limitações dessas abordagens, questionando quem se beneficia e quem é prejudicado pelos arranjos de governança existentes, e mostrando como os instrumentos e o mix de políticas podem ser aprimorados para contribuir para uma transformação sustentável e justa dos atuais sistemas de produção e comércio.

Palavras-chave: Direitos humanos, Governança, Meio ambiente, Política comercial, Responsabilidade

Introduction

Costa Rica is the largest exporter of pineapples worldwide. In European markets such as Germany, approximately 75% of all imported pineapples are from Costa Rica and imports of this fruit have quadrupled in the past two decades (Zahn et al. 2022). Pineapple has established itself as Costa Rica's third most important export commodity, and the production of pineapple has seen a 700% growth over the past fifteen years (León Araya, 2021, p. 107; Green Commodities Programme, n.d.). While Costa Rica has often been presented as being particularly advanced in terms of environmental and human rights protection, the large-scale agricultural production of pineapples has been associated with severe adverse impacts, which have concentrated in local producing regions. Among them are the pollution of water and soils by pesticides, which have also caused negative impacts on human health (see Gorris and Vargas; Wilke et al. within this special issue), and the violation of labor rights, such as the rights of migrant workers coming from Nicaragua.

Sustainability certification standards have long been presented as a promising solution to existing sustainability challenges. While certifications still play an important role in the governance of global supply chains, their shortcomings have been comprehensively discussed in scholarly literature, both in general (LeBaron et al., 2017; Ponte, 2019) and in Costa Rica's fruit supply chains in particular (Gansemans, 2019). Relatedly, it is currently possible to observe a shift away from sustainability

certification to the development of new governance approaches. Building on international soft law,[1] especially the United Nations Guiding Principles on Business and Human Rights (UNGPs) and the OECD Guidelines on Multinational Enterprises, the European Union (EU) and Member States have adopted new laws based on human rights and environmental due diligence (HREDD) approach (Gustafsson et al., 2023). These laws obligate companies to assess and address environmental and human rights risks in their global supply chains. Due to the recency of these new rules, there have been very few empirical studies on their implementation and consequences for diverse stakeholders in producing countries to date. At the same time, actors from producing sites of agricultural commodities have developed innovative approaches for making agricultural supply chains more sustainable, for instance by creating circular economy solutions, enhancing bioeconomy projects, or by fostering the production of 'socio-biodiversity supply chains' (e.g., Amores-Monge et al., 2022; Salvador et al., 2022; Russo Lopes, 2023).

Three different types of governance approaches for sustainability in the pineapple supply chain between Costa Rica and Europe are analysed. After providing new insights into leading sustainability certification standards, the implementation of HREDD laws is first discussed and then new approaches to a solidarity-based circular economy led by the Technical University of Costa Rica (UTN) are analyzed. Based on primary data including interviews and field visits in Costa Rica, the analysis highlights the perspectives of different actors involved in this supply chain and the diverse governance instruments. The potential and limitations of these approaches will be discussed, asking who benefits and who is disadvantaged. It is shown how governance instruments and the policy mix could be further improved in order to contribute to a sustainable and just transformation of existing production and trade systems.

1 In contrast to hard law (legally binding contracts), soft law has no direct legally binding effect.

Governing global supply chains: Towards human rights and environmental protection?

Previous literature has comprehensively discussed the challenges to governing multinational enterprises and global supply chains. Multilateral solutions for protecting human rights and local environments in such transnational contexts have been weak and fragmented, mainly consisting of soft law norms, such as the Sustainable Development Goals (SDGs), the UNGPs and diverse OECD Guidelines. Domestic laws and law enforcement have been crucial, but to differing extent insufficient for regulating the sustainability performance of suppliers. In many countries, responsible state agencies lack autonomy, political will, capacity and/or power to enforce stringent human rights and environmental rules, especially when important economic interests have been involved (Bebbington et al., 2018; Gansemans, 2019; León Araya, 2021). While voluntary sustainability standards have flourished and aimed to compensate for existing governance gaps, their effectiveness has been limited by structural constraints of the audit regime, practical challenges to monitor complex impacts on the ground, limited uptake of certified products in many economic sectors and a segmentation of markets between more and less sustainable products (see, for instance, Bastos Lima & Schilling-Vacaflor, 2024).

Against the background of increasing evidence of governance and accountability gaps in our global economy, civil society organizations, supported by scholars and policymakers, have pressured to bring the state back into regulation of global trade. As a result, a trend towards the introduction of new regulations for the supply chain is being observed, particularly in the countries of the Global North and especially in Europe. Among these laws are the French Duty of Vigilance Law (LOI n° 2017-399 du 27 mars 2017 relative au devoir de vigilance des sociétés mères et des entreprises donneuses d'ordre, 2017), the German Supply Chain Due Diligence Act (Gesetz über die unternehmerischen Sorgfaltspflichten in Lieferketten, 2021), the Norwegian Transparency Act (Act relating to enterprises' transparency and work on fundamental human rights and decent working conditions, 2021), the EU Regulation on Deforestation-free Products (Regulation [EU] 2023/1115 of the European Parliament and of the Council, 2023) and the EU's Corporate Sustainability Due

Diligence Directive (Directive [EU] 2024/1760 of the European Parliament and of the Council, 2024). With reference to the UNGPs, these laws require companies to assess environmental and/or human rights risks in their supply chains, to adopt prevention and mitigation measures, to track the progress of adopted measures, to implement grievance mechanisms, to consult stakeholders and rightsholders and to report upon their due diligence efforts. While it is still early to assess the results and consequences of these legally binding measures for different groups of stakeholders in diverse sites of production, the first implementation processes in the fresh pineapple supply chain in Costa Rica will be highlighted.

While previous literature has largely focused on either state policies or private voluntary sustainability standards, actors in the Global South have also developed many innovative approaches to tackle sustainability challenges in a bottom-up manner and to add value to agricultural products and waste in sustainable ways. While still facing many practical and structural challenges, approaches for enhancing circular bioeconomy and socio-biodiversity supply chains have been developed in Latin America (Salvador et al., 2022; Russo Lopes, 2023).

Methodology & Data Collection

Data was collected in Costa Rica during the period from 19 June to 4 August 2023. The study was conducted in close collaboration with the UTN in Ciudad Quesada in the San Carlos district, near the largest pineapple growing areas in Costa Rica. The study is based on a total of twenty sources. This includes four interviews with first-order experts (FO) and thirteen interviews with second-order experts (SO). All interviews were transcribed and coded according to a coding scheme that was established beforehand. The methodology was used to analyze the impact of the governance instruments on the pineapple supply chain. Specifically, perspectives of the stakeholders were analyzed and the extent to which they influence aspects of the supply chain were considered.

The sociological concept of experts according to Kruse (2015, p. 174) distinguishes between first-order experts, who possess practical operational and process

knowledge, and second-order experts, who can contribute overview knowledge and present contexts in an abstract and reflective manner. However, this distinction is not always absolutely precise. In the present research context of the Costa Rican pineapple value chain, field workers on the pineapple plantations are to be seen as first-order experts. They have practical and direct experience of pineapple cultivation and have first-hand knowledge of the fundamental challenges and problems. Second-order experts, such as employees of the sustainability standards, managers and employees in the pineapple trade or representatives of NGOs, have generally generated an overview of the key aspects and interrelationships of the pineapple value chain through professional experience and close dialogue with stakeholders.

The main criterion for selecting the interviewees was their level of knowledge about the studied policy instruments. Thus, a considerable number of interviews were conducted with different actors involved in the sustainable governance of pineapple production. In addition, three participant observations (PO) were conducted. The primary aim of the participant observations was to generate insights into the pineapple value chain that would not have been possible through interviews and conversations alone. In addition, the observations provided insights into interactions, behaviours and a deeper understanding of the work processes in the pineapple sector.

Table 1 lists the in-text references of the respective sources of information as well as the date of the survey and the target group of the interviewees or the observation.

Table 1

Overview of interviewees.

Category	Source of information	In-text reference	Date	Location
Interviews first order stakeholder	Wela Farm Fiel Worker	FO1	01.08.2023	Heredia
	Wela Farm Fiel Worker	FO2	01.08.2023	Heredia
	Wela Farm Fiel Worker	FO3	01.08.2023	Heredia
	Wela Farm Fiel Worker	FO4	01.08.2023	Heredia

Category	Source of information	In-text reference	Date	Location
Interviews second order stakeholder	Rainforest Alliance Representative	SO1	29.06.2023	San Carlos
	Ananas Export Company S. A. Supervisor	SO2	10.07.2023	Río Cuarto
	Nicoverde Manager	SO3	11.07.2023	Pital
	Nicoverde Certification Administrator	SO4	11.07.2023	Pital
	Ananas Export Company S. A. Sustainability Manager	SO5	14.07.2023	Río Cuarto
	Hacienda Ojo de Agua S.A. Head of Environmental Management	SO6	17.07.2023	Heredia
	Wela Farm Owner	SO7	18.07.2023	Heredia
	GIZ Coordinator Business for Biodiversity	SO8	19.07.2023	San José
	Nicoverde Agronomist	SO9	20.07.2023	Pital
	Naturafarms Certification Administrator	SO10	27.07.2023	Los Chiles
	Fairtrade Represantative	SO11	28.07.2023	Köln
	Finca Once S. A. Responsible for Working Conditions	SO12	31.07.2023	Florencia
	Agriwert Agricultural Entrepreneur	SO13	09.08.2023	Hannover
Participant observations	Rainforest Alliance Workshop	PO1	28.06.2023 29.06.2023	San Carlos
	Nicoverde	PO2	11.07.2023	Pital
	Wela Farm	PO3	18.07.2023	Heredia

Background section: Pineapple production, supply chains and sustainability challenges in Costa Rica

Costa Rica's dominance in the global market for fresh pineapple is evident in its status as the largest exporter to the USA and Europe (Gansemans, 2019, p. 5; Ingwersen, 2012, p. 152). Traditional pineapple production in Costa Rica was historically located in the country's south and on the Caribbean side. However, because of the growing influence of international fruit companies, the area under cultivation has increasingly expanded to the north of the country (Humbert & Braßel, 2016, p. 17; Brown et al., 2020). The upswing in pineapple production in Costa Rica was also largely favored by the implementation of the cultivated pineapple variety MD2, which is characterized by its sweet taste and durability and enabled the expansion of pineapple cultivation

in previously climatically inadequate regions (Paniagua-Molina & Solís-Rivera, 2020, p. 228; León Araya, 2021, p. 107).

Pineapple production makes a substantial contribution to value creation and capital accumulation. The industry is worth USD 1.3 billion to the national economy (Green Commodities Programme, n.d.). Economic development in rural areas is stimulated by pineapple production (León Araya, 2021, p. 102). In this way, pineapple production brings dynamism to the economy of rural Costa Rica by creating employment and income opportunities through small and medium-sized enterprises that rely on it (Paniagua-Molina & Solís-Rivera, 2020, p. 229).

Pineapple production also has its downsides. Humbert and Braßel (2016, p. 3) and Brown et al. (2020) point out the dangers that pineapple production poses to people and the environment. They mention the large-scale cultivation in monocultures in conjunction with the intensive use of chemicals and pesticides, which can have worrying effects on people's health, as both groundwater and drinking water can be contaminated. The Global Nature Fund and the Lake Constance Foundation (2019, p. 7) also state that pineapple production contributes to the loss of biodiversity and damages native ecosystems. The expansion of pineapple production in Costa Rica is accompanied by an increasing displacement of small farmers and farms that are not involved in pineapple production. As a result of this trend, local food producers have decreased in numbers (Brown et al., 2020).

The pineapple supply chain is largely a direct chain that does not involve many intermediaries. The four companies Del Monte, Dole, Grupo Acón and Fyffes have been responsible for about 70% of all pineapple exports from Costa Rica, pointing to a large corporate concentration in this sector (Zahn et al., 2022). The supply chain owes its comparatively simple traceability and low complexity to these characteristics (Gansemans, 2019, pp. 17-18). Ingwersen (2012, p. 153) outlined the pineapple supply chain in the following steps: After harvesting, the pineapples are systematically checked for quality criteria, followed by cleaning, cutting, and packaging processes. The chilled fruit is then transported to the Port of Limon on the east coast of Costa

Rica, where it is transferred to container ships that transport pineapples to their distribution markets. On arrival at their destinations, the fruit is temporarily stored in distribution centers and then forwarded to retailers.

Retailers interact closely with international corporations and have a decisive influence on pricing in the pineapple sector (Zahn et al. 2022: 15). The market power of retailers leads to considerable price pressure on producers and suppliers, which they can hardly escape (Humbert & Braßel, 2016, p. 3). Reports by Oxfam[2] revealed that over the past twenty years prices paid to producers of pineapples have decreased to less than 10% of the consumer price (Zahn et al 2022). In addition to the strong price pressure, producers and suppliers are increasingly facing sustainability demands. According to Gansemans (2019, p. 3), the European market is particularly challenging due to the demanding criteria set by retailers and the regulations governing the import of goods. Certification through sustainability standards such as GlobalGap is seen as a basic requirement in the European market, while Rainforest Alliance certification is also increasingly seen as a prerequisite for a growing number of retailers (Schäkel, 2022, p. 35; Global Nature Fund and Lake Constance Foundation, 2019, p. 8).

Results & Discussion: An analysis of the potential and limitations of the different governance approaches

After outlining the key aspects of pineapple production and its associated supply chain, while also highlighting the related sustainability challenges, this section presents the results of the three selected governance approaches and discusses them in depth. The following discussion will begin with sustainability certification standards, followed by the initial implementation experiences of the new European supply chain legislation. Then, the focus will shift to bottom-up initiatives aimed at fostering a solidarity-based circular economy.

2 https://www.oxfam.de/system/files/documents/2022_oxfam_grenzenlose_ausbeutung.pdf

Sustainability certification standards

In recent years, the number of sustainability certification standards has increased markedly, and their acceptance has been driven by various interest groups. This has initiated a process of institutionalizing sustainability standards into the existing governance system (Marx et al., 2016, p. 2). For example, the interviewees see certifications such as GlobalGap and Rainforest Alliance as a necessity, without which the export of pineapples to many sales markets would not be possible. A pineapple producer explains: "If you don't have certification, the supermarket won't buy the pineapples […]. Of course, the profitability increases with certification because you know that you can sell all the fruit you produce to all the supermarkets and the supermarkets will buy that fruit. [...] In our farms there are both certified and uncertified pineapples, but now the supermarkets only buy certified ones. [...] The uncertified pineapples go to schools or hotels in Costa Rica or in other countries." (SO4).

Retailers and certifiers largely determine the framework for production techniques and criteria in the pineapple supply chain (SO2, SO8, SO13). The significance of these standards is becoming increasingly important and has developed into a decisive factor in agricultural and food policy (Tallontire et al., 2011, p. 427). A key aspect of sustainability standards is to pass on information about production conditions and supply chain features to the end consumer. This flow of information aims to influence buying decisions positively (Meybeck & Redfern, 2014, p. 7). In contrast, at the other end of the supply chain, the field workers interviewed showed a barely differentiated understanding of sustainability in pineapple production. Many of them knew nothing about the certification status of their farms (FO1, FO4).

According to Schäkel (2022, p. 151) the trend towards increased sustainability requirements, has contributed to the reduction in the number of pineapple producers, while at the same time, the farm sizes are continuously increasing. Vagneron et al. (2009) have already pointed out that the constraints imposed in the pineapple supply chain tend to push small farmers out of the market or exclude them. Scholarly literature has also debated to what extent the distribution of costs and benefits in certified supply chains is just, pointing to the frequent existence of what Ponte (2019) termed the "sustainability supplier squeeze", which means that retailers

benefit strongly from sustainable products that they sell expensively while outsourcing the costs for more stringent requirements to the suppliers.

The issue of sustainability has a strong influence on the structure of the supply chain. The attractiveness of a production location is determined mainly by its ability to generate large quantities at cost-efficient conditions in accordance with the requested sustainability requirements (Ponte, 2021, p. 56). Regarding the pineapple supply chain in Costa Rica, interviewees stated that the increased certification requirements represent considerable costs, especially for smaller companies. In particular, technological challenges such as the replacement of pesticides and the implementation of geographical information systems can be associated with direct and long-term costs for them (SO2, SO9), but expenses for social aspects are also listed as additional cost items (SO4, SO11). Furthermore, the costs of issuing the standard itself were cited as an additional burden by certified producers (SO5, SO7, SO13). However, respondents see the possibility of saving costs by using organic fertilizers and microorganisms (SO1, SO4). Respondents interpret the increased pressure to provide evidence of sustainability standards as both a barrier to market access and an opportunity for sustainable production. Certification represents an opportunity to gain access to demanding markets, thereby creating incentives for producers and businesses to implement sustainable practices (SO8, SO9, SO11).

In theory, sustainability certification can help to institutionalize the impact of sustainability goals on the structure of the supply chain and steer its development towards sustainable practices (Ramm et al., 2008, p. 3). For example, some of the interviewees see certifications as mechanisms for ensuring improved working conditions. For them, certifications help to prevent labor exploitation and ensure compliance with certain social standards (SO7, SO9, SO10). However, civil society reports have criticized that audits in Costa Rica's fruit sector have often been deficient and failed to detect workers' rights violations and malpractices in relation to the use of pesticides (Humbert & Braßel, 2016; Zahn et al., 2022). Previous research has also shown that comparatively less demanding certification standards often overproportionally gain market shares, while more stringent standards and auditors tend to struggle with limited uptake; a dynamic that constrains deeper sustainability transformation (Dietz & Grabs, 2022). In relation to the Costa Rican

pineapple supply chain, one of our interviewees argued: "You now have to ask the certifiers, the standard systems. Of course, they always have to keep an eye on the production side. A standard system also has to survive on the market. If at some point the standard sets its criteria, let's say, in such a way that production is no longer sufficiently taken into account, then it cannot remain on the market in the long term. Producers and buyers would then switch to other standards. So that's exactly how they compete, and they create attractiveness and value for all sides" (SO8).

The picture of Costa Rica's pineapple value chain illustrates that trade in goods goes far beyond a simple market-based transaction between two parties, as described by Gereffi et al. (2001). In terms of the GVC approach, the aspects discussed show a multitude of dependency relationships and North-South disparities. Dependency relationships can contribute to further increasing power asymmetries in supply chains (Grabs & Carodenuto, 2021, pp. 1322-1323). Zahn et al. (2022, p. 31) therefore see the status of sustainability standards primarily as a management tool that does not primarily contribute to promoting workers' rights. Rather, the sustainability standards reinforce a system that drives small producers out of the market. It is therefore important to show that the interests behind the maintenance of sustainability standards are essentially of an economic nature and are driven by profit-orientated, transnational companies. As a result, the governance instrument of sustainability standards significantly influences the pineapple value chain in Costa Rica but does not necessarily contribute to sustainability.

New supply chain laws from Europe: First implementation experiences

Civil society organizations from Europe, the USA, and Costa Rica have for many years campaigned for more sustainable and responsible global food supply chains. They have engaged in naming and shaming campaigns targeting large pineapple exporters and retailers alike (Zahn et al. 2022). Therein, the limitations of certification standards such as the ones led by Rainforest Alliance and GlobalGap have been prominently exposed.

HREDD laws provide transnational advocacy networks with new opportunities to denounce insufficient efforts by retailers and supermarkets to use their leverage

for pressuring or helping suppliers to uphold stringent environmental and human rights standards, for instance by filing lawsuits or issuing complaints. The French Duty of Vigilance Law includes civil liability, i.e. the option for any interested party to submit cases of alleged noncompliance of large companies to French courts. In contrast, the German Supply Chain Due Diligence Law does not establish civil liability in the case of corporate noncompliance and instead allows the issuing of complaints to the German supervisory authority, the BAFA.[3] To date, ten lawsuits are pending in French courts, but none of them refers to agricultural supply chains from Costa Rica. Interestingly, in November 2023 a transnational advocacy network of German and Latin American civil society organizations (i.e., Oxfam, the Catholic organization Misereor and the human rights organization ECCHR[4] from Germany and the trade unions ASTAC[5] from Ecuador) submitted a complaint against the German supermarkets Rewe and Edeka because of their banana supply chains from Ecuador.

The claimants argued that the supermarkets have sourced fruits from farms certified by the Rainforest Alliance, which have not paid their workers decently, obliged workers to work while toxic pesticides were sprayed on the fields and dismissed or mistreated workers who participated in trade unions and complained about malpractices. Oxfam and trade unions from Ecuador and Costa Rica had already used the grievance mechanisms of the four major German supermarkets Rewe, Lidl, Aldi, and Edeka in the summer of 2023 to inform them about workers' rights violations in their banana and pineapple supply chains.[6] However, as they observed little improvement on the ground and allegedly inadequate responses to the identified problems by Rewe and Edeka, they joined forces with other civil society organizations and sent a formal complaint to the German supervisory authority.

All supermarkets publicly responded to the allegations.[7] Aldi explained that as a consequence of the allegations, Rainforest Alliance, an importer and Aldi itself

3 German Federal Office of Economics and Export Control.

4 European Center for Constitutional and Human Rights.

5 Ecuadorian plantation workers union.

6 Together, these supermarkets dominate up to 85% of the German food retail sector.

7 Company responses can be accessed here: https://www.business-humanrights.org/de/neuste-meldungen/bananenplantagen/

made audits and inspections on involved farms and engaged in dialogues with local stakeholders. These actions resulted in action plans and a temporary blockade of imports from these farms. In Rewe's response, the supermarket stated that, in reaction to the information transmitted through the grievance mechanism, Rainforest Alliance conducted an unannounced audit on the involved farms, because of which the certification was temporarily withdrawn. Due to the withdrawal of certification by Rainforest Alliance, Rewe no longer purchases any goods from the farms at stake and it developed a corrective action plan. Edeka stated that inspections were carried out on involved farms but no evidence for the allegations could be found. The claimants criticized, that in their defense statements, both Rewe and Edeka repeatedly argued that the involved farms were all certified. The claimants criticized this position, stating that "Rewe and Edeka have so far outsourced the risk analyzes that are primarily their own responsibility to certifiers, despite the well-documented and long-criticized unreliability of their audits and certificates" (ECCHR 2023).

While the complaint against German supermarkets suggests that rightsholders from producing sites may use new HREDD laws to struggle for better environmental and human rights protection in global supply chains, it is still unclear to what extent such actions will really improve socio-environmental conditions on the ground. Our interviews in Costa Rica revealed that most interviewees involved in pineapple production and trade are not yet well-aware of the details established in new laws from Europe. It also remains to be seen whether HREDD laws will further exacerbate the trend that smaller producers are pushed out of markets. Pointing to this concern, one of our interviewees remarked: "This means that not only is a lot more work generated, but also a lot more costs, which ironically means that the very people who are supposed to be better protected are confronted with a lot more work and a lot more costs. So, these laws are not fully developed, and they partly ignore reality because they basically don't answer the question of costs. […] When these laws are formulated, stakeholders from the Global South are often not consulted and rarely taken into account. And that means that it can backfire in the end." (SO11). With reference to the soybean supply chain from Brazil, Bastos Lima and Schilling-Vacaflor (2024) have discussed the risk that new HREDD laws could foster supply chain divergence, i.e., the shipping of more sustainable products to more demanding markets such as Europe, while products from more problematic farms might stay in domestic markets or be shipped elsewhere.

While there has been little research about the implementation of HREDD laws and their consequences for diverse groups of stakeholders, it will be crucial to monitor this topic closely, with the aim of empowering rightsholders, closing loopholes and addressing unintended consequences.

Bottom-up sustainability initiatives: solidaric circular bioeconomy

A key problem of global supply chains from Latin American countries has been that they have mainly exported raw materials. Scholars have described the unequal exchanges in such trade relations, wherein negative externalities tend to concentrate in local sites of production, while most added value is being skimmed by large multinational companies and retailers (Hickel et al., 2024). Interestingly local stakeholders have developed initiatives with the aim of reversing this trend. It is striking that they often develop a distinct idea of sustainable pineapple production along the supply chain. They formulate their own approaches and concepts that both comply with existing certifications and go beyond them, with the aim of making the supply chain and pineapple production more sustainable (SO4, SO7, SO13). For example, there is a desire for stricter pesticide management than is required by current certifications (SO2). There is also the opinion that respect for the environment and the promotion of biodiversity can be in harmony with economically profitable pineapple production (SO9).

The effective management of biomass waste is a major challenge in pineapple production. In turn, through sustainable usage, pineapple biomass can become a valuable resource with considerable potential. The remains of the pineapple plant contain high-quality ingredients such as cellulose, lignin and bromelain that are theoretically suitable for various applications in the fields of medicine, food production, packaging and the textile industry and whose use is being researched (Aili Hamzah et al., 2021; Amores-Monge et al., 2022).

As part of a participatory observation in Costa Rica (PO3) a pineapple farm was visited that is carrying out a pilot project in collaboration with the UTN. The aim of this project is to extract fiber from the remains of the pineapple harvest. These fibers can then be used in the production of textiles. The current scale of fiber production

is still limited and there are repeated challenges with the specially developed machinery. The owner of the farm (SO7) considers it beneficial to shift the focus from burning pineapple biomass to alternative recycling methods. She particularly highlights the extraction of fibers from biomass, which, although they only make up a fraction of the total amount, could make a meaningful contribution. In her view, a key challenge is to overcome the common practice of burning and implementing sustainable alternatives instead. This is particularly relevant as large companies and international corporations tend to resort to chemical processes and repeated burning due to their production pressure (SO7). Narh Mensah et al. (2017, p. 280) also identify socio-economic benefits in the further processing of by-products from pineapple production. The use of pineapple rind for mushroom production is seen as a way to extend the pineapple supply chain and at the same time avoid environmentally harmful disposal methods. An innovative process that has been observed in pineapple production in Nicoverde[8] is currently dedicated to the cultivation of oyster mushrooms on the remains of pineapple plants. The pilot project pursues the goal of a sustainable and solidaric circular economy (PO2).

According to Blomsma et al. (2022, p. 1059), circular economy is characterized by the creation of new value, the reduction of value loss, and the elimination of structural waste. Both the fiber extraction project (PO3) and the mushroom cultivation project (PO2) can be considered examples of circular economy. Due to the conversion of bio-based and renewable resources, it is also possible to speak of a circular bioeconomy as Tan and Lamers (2021, p. 6). Pufé (2017, p. 199) particularly emphasizes the holistic approach of using resources and leftovers comprehensively, as cascading effects can generate additional jobs and social capital, as is also the case with mushroom cultivation. Both pilot projects observed (PO2, PO3) point to the process of environmental upgrading. This refers to the orientation of the production system in a direction that aims to avoid or reduce environmental damage caused by products and processes (De Marchi and Alford, 2021).

Despite promising prospects in the new approaches, the interviewees (SO8, SO13) also point out possible risks. They mentioned that the integration of such a new business

8 Subsidiary of the Italian company Nicofrutta, which has its own pineapple production and packaging facility in the province of Alajuela in Costa Rica.

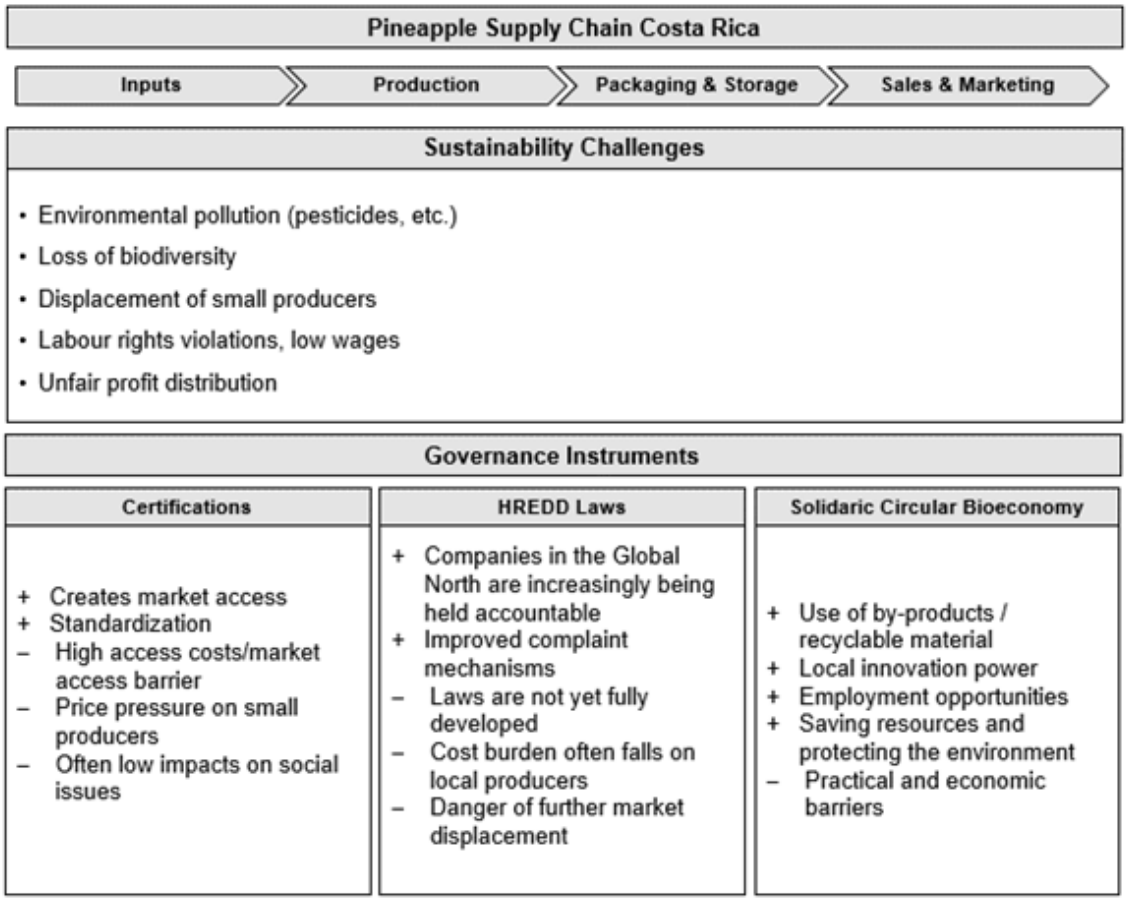
model must be carefully considered. Mushroom cultivation requires a completely new value chain and essentially represents a second core business. The profitability of these new activities is of crucial importance, as a long-term investment will only be made by the farm if it is economically viable (SO8). It is also noted that the pineapple residues are only by-products that can be usefully utilized. The treatment processes would have to be centralized, which would lead to increased costs. Solid's extraction or fiber utilization appear to make sense at a central level but could pose economic challenges due to the large transport volumes involved (SO13). Velasco-Muñoz et al. (2021, pp. 12-13) also emphasize the need to restructure value chains to develop new business models in line with circular economy and enable effective cascading use. They suggest strengthening technical advice and expanding the sharing of infrastructure and machinery. These proposals are also reflected in the upgrading processes according to Gereffi et al. (2001, p. 5), in which an expansion of the range of competencies in the value chain is necessary to achieve more efficient outputs.

The implementation of these innovative circular economy models in the pineapple value chain opens the opportunity to rethink and strengthen existing governance models, especially in the context of sustainability standards and the EU's new supply chain law. The integration of these approaches could have a transformative effect on the way pineapple production is organized and regulated. Recognizing and supporting such initiatives at a political and institutional level could pave the way for a more sustainable and efficient pineapple supply chain. Governance approaches play a crucial role in this by creating frameworks that promote sustainable practices and incentivize innovation.

Figure 1 finally presents the advantages and disadvantages of the three governance instruments examined and places them in relation to the specific challenges of the pineapple supply chain.

Figure 1

Conceptual presentation of the research findings regarding the governance instruments of the Costa Rican pineapple supply chain.



Conclusions

The sustainability challenges in Costa Rican pineapple production are outlined and it is analyzed how three different types of governance instruments aim to address them. First, sustainability certification standards are presented, a private and voluntary form of governance that has been used in agricultural supply chains and food chains for several decades. Secondly, new public policies on the demand side of global supply chains, namely laws based on an HREDD approach, are highlighted and first

experiences with implementation in fruit supply chains in Latin America are presented. While these laws have emerged in response to the shortcomings of voluntary measures, it is shown that they do not replace certification standards, but that such standards continue to play an important - albeit contested - role in emerging HREDD regimes. Thirdly, bottom-up initiatives are discussed that build on a solidarity-based circular economy approach and aim to transform global supply chains by recycling and adding value to the waste products of exported fruit.

For turning pineapple supply chains from Costa Rica more sustainable and responsible, profound changes are necessary. Transnational governance instruments, such as certification standards and HREDD laws, can help to identify severe malpractices and push irresponsible suppliers out of European or global markets. In consequence of new supply chain regulations, negative externalities of global trade relations gain visibility and attention and additional opportunities to voice complaints to supervisory authorities and courts have been created. This trend might pressure certification standards to improve their systems, for example by increasingly carrying out unannounced audits on farms and becoming more rigorous in their onsite inspections. There is a risk that similar effects will occur with the implementation of emerging supply chain laws, the full impact of which cannot yet be fully assessed. It is crucial to clarify the costs and responsibilities of these HREDD laws.

Essentially, the top-down approaches of sustainability standards and supply chain laws lead to an increase in power asymmetries and dependency relationships between producers on the one hand and transnational companies and food retailers on the other. There should not be too much optimism about the transformative potential of transnational governance approaches, as companies might comply with requirements in a superficial manner and aim to shift the burden to suppliers, instead of assuming responsibility and costs themselves. Furthermore, processes of supply chain divergence can undermine the effectiveness of new rules. For becoming meaningful, rightsholders, state agencies and civil society organizations from the Global South and Global North will need to become more aware of and make use of new opportunities created by HREDD laws to voice complaints, sanction non-compliance, and provide access to remedy for victims. Further research is needed

into the extent to which actors use the new opportunities for complaints created by the supply chain laws and claim their rights.

Transnational governance approaches alone will not be able to bring about a sustainable transformation. Rather, national governance and bottom-up initiatives are needed to promote sustainable development at the landscape level in production sites, such as solidarity-based circular bioeconomy projects. The emergence of these bottom-up initiatives emphasizes that dominant production methods are problematic and that existing governance instruments along the pineapple value chain remain insufficient. It is important to shift the focus from the 'greening' of individual agricultural sectors plagued by systemic sustainability challenges to the question of how to empower more sustainable and equitable local alternatives and land use systems. Bottom-up sustainability initiatives start at the right point by enabling actors to drive sustainable development themselves and initiate empowerment and upgrading processes. However, the framework conditions for the implementation of such initiatives are often not in place, as the focus on profit and the lack of financial and human capital-related resources inhibit these processes. A paradigm shift that supports the consideration of local needs and interests, reduces power asymmetries, and creates framework conditions that promote sustainable practices would be necessary.

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