

The role of midstream actors in advancing the sustainability of agri-food supply chains

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Global food supply chains remain critical drivers of ecosystem degradation and social injustices. In this Perspective, we invite policy makers, civil society actors, businesses, and researchers to direct attention to the middle of global supply chains, where various actors – referred to as ‘midstream actors’– operate between agricultural commodity producers and manufacturers of food products. We highlight the power of this less visible segment (spanning multinational trading houses to small-scale aggregators of commodities) and the potential leverage that can be harnessed to improve supply chain and food system sustainability. Not engaging these actors poses a risk to supply chain policy impact.

Main

Global food supply chains are under increasing scrutiny for causing negative environmental and social impacts in some of the world's most vulnerable ecosystems.¹⁻⁸ Legislators have raised their ambition to reduce tropical deforestation, modern slavery, and other harms through environmental and human rights due diligence legislation, which has rapidly come into force in Europe and is also being debated in the United States, Canada, and Australia.⁹⁻¹⁵ Due diligence legislation requires companies to provide increasingly granular insights on supply chain traceability and to demonstrate how they prevent and remediate environmental and human rights-related risks. Effective implementation of this foreign corporate accountability legislation requires unprecedented depth of knowledge on global commodity flows and production conditions to understand the needs of producers and suppliers in changing their practices.¹⁶⁻¹⁸ A critical, yet often underappreciated, leverage point are midstream actors: situated between producers and consumers, they are involved in commodification, consolidation, and product transformation.¹⁹⁻²¹ Due diligence legislation (e.g. the EU Deforestation Regulation²²) often explicitly targets the first importer into a consuming market - the midstream actor in most cases - or gives first importers a higher responsibility for providing relevant information on product traceability and risk mitigation actions. Recognizing that midstream actors are crucial for tackling global challenges, this Perspective outlines practice-based knowledge that is derived from a collaboration between science and business with the aim to support global food system sustainability.²³

Midstream actors¹⁹ (also called or conceptualized as 'traders',^{24,25} 'intermediaries',^{26,27} 'merchants',^{28,29} 'conductors',^{30,31} 'brokers',^{32,33} 'value chain managers',³⁴ 'suppliers', or 'partners') assume the role of "storing and/or transporting and/or processing a commodity from when, where, or in what form it is not needed to when, where, or in what form it is needed."²⁸ In fulfilling these functions, they sit at a vital node in the supply chain with connections (and often physical locations) both upstream (close to production sites) and downstream (close to manufacturers and retailers), deep knowledge of production regions and consumer demands, and the ability to navigate various cultural and political contexts.^{19,21} Midstream actors are therefore well-positioned to influence the sustainability of commodity supply chains. Some midstream actors have themselves adopted sustainable sourcing commitments^{18,24,35,36} and are increasingly invested in upstream supply chain traceability – though the level of ambition and implementation varies widely.^{18,37} Even where they do not initiate sustainable sourcing initiatives, midstream actors are tasked with the roll-out of sustainability programs of their downstream, consumer-facing clients.²⁴

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The pronounced role of midstream actors calls for an in-depth understanding of their current and potential future roles as sustainability governance actors – both from an academic perspective as well as according to practitioner knowledge. What is possible to expect of ambitious companies, what context conditions are necessary, and what actions should be taken by state and non-actors along the supply chain to support midstream actors in promoting sustainability? To generate this understanding, between 2021-2022, the two first authors used a Delphi-inspired methodology to collect geographically heterogeneous expert insights on the question 'How and to what extent can traders be sustainability governance actors in agri-food value chains', with particular focus on the cocoa, coffee, and palm oil sectors. Using a 2021 research agenda published by the two first authors (Grabs and Carodenuto)²⁴ as

starting point, we conducted a structured transdisciplinary dialogue³⁸ between a total of 47 experts via three virtual events and a three-day in-person workshop. The dialogue connected representatives from midstream supply chain companies and academics representing a diversity of disciplines, including business, geography, economics, and land use sciences. Our aim was to validate the research agenda and expand on relevant insights by combining Delphi surveys (which gauged experts' agreement with relevant statements) with semi-structured in-person and online discussions.²³ We summarize our collective Perspective into seven core takeaways of relevance for policymakers, civil society organizations, midstream actors themselves, and other academics, focusing on what these constituencies should know to ensure that midstream actors can fulfill the most productive role in sustainable supply chain transformations. In our examples, we focus on the coffee, cocoa, and palm oil sectors as these are imminently targeted by many of the upcoming due diligence legislations, and hold much potential for providing nature-based solutions that meet ecological and social aims. However, it should be noted that midstream actors are equally important in many other agri-food value chains such as those of fruit, vegetables, or food staples.²¹ We highlight the complexity and heterogeneity of situations and note that there are also many examples from cases where the reduction of intermediaries can lead to a fairer distribution of benefits and more transparency. In a first step, we summarize knowledge that is important to understand how the midstream works today. We then focus on insights that allow us to think through how midstream actors could 'lead from the middle' and support agri-food supply chain sustainability.

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DIAGNOSTIC OF THE MIDDLE OF THE SUPPLY CHAIN

A first step in creating change is to thoroughly understand the present. We focus on recommendations for academics and policymakers who aim to get deeper insights into global supply chain complexity. At the same time, these insights already allow glimpses into what strategies may or may not work in harnessing the strength of midstream actors to support agri-food supply chain sustainability.

Recognize the diversity of midstream actors

The midstream segment of the supply chain is characterized by its diversity. It is critical – yet extremely challenging – to appreciate this diversity amongst midstream actors operating in idiosyncratic contexts and handling distinct combinations of commodities at various stages of value addition, as well as the wide range of functions they perform. To illustrate, the language used to refer to this midstream space ranges from pejorative terms such as coyotes (in the case of informal coffee traders), to middlemen (a gendered term that is going out of fashion), to merchants (alluding to the colonial history of many of these actors). Previous research has distinguished the categories of multinational traders that tend to trade multiple commodities and have sourcing operations in multiple countries; national-level exporters that “tend to be specialized in one commodity and operate in one or several producing regions”; connective businesses that facilitate ‘direct trade’ relationships of high-value, single-origin goods; and independent intermediaries that “connect (especially small-scale) producers to the first level of aggregation and processing for export”.²⁴

However, rather than referring to these actors as ‘traders’ as originally proposed,²⁴ practitioners prefer speaking of supply chain ‘managers’ or ‘facilitators’, as this nomenclature opens up the thinking on the range of tasks they actually perform. Such tasks include a wide range of activities related to commodity movement and transformation (e.g. transportation, storage, stock management, processing, product differentiation, price discovery), but also farmer support functions (including input provision, pre-financing, provision of farmer trainings on good agricultural practices and sustainability schemes, and providing rural producers with market access)²¹ as well as functions related to supply chain information management (e.g. data collection and management, traceability assurance, compliance assurance, certification management, due diligence and risk assessment, and transmitting information about demand for and supply of various types of goods across the supply chain). Trading companies also play a key role in introducing and establishing new forms of technology, such as satellite monitoring of deforestation, and are responsible for alignment and quality control of external service providers. Thus, midstream actors have been seen to ‘plug the holes’ in the supply chain system (e.g. providing advice and training where governmental extension services do not reach; addressing farmer demand for inputs) to make the supply chain work and provide what other actors do not. Only a small share of midstream companies are purpose-driven social enterprises that give equal weight to their social or sustainability mission and their business mission (though such businesses do exist^{39,40}). Still, the rise of civil society and policy concerns over the sustainability of production practices means that this topic has become a key concern. Increasingly, midstream actors develop, disseminate, communicate, and negotiate sustainability policies with their suppliers and subsequently monitor their implementation and work on improving the suppliers’ performance. Sustainability activities of large trading houses may additionally include traditional CSR, the participation in precompetitive platforms and initiatives, the rolling out of third-party and multi-stakeholder certifications, the implementation of lead company schemes, as well as the development of own-company sustainability initiatives and producer empowerment programs.²⁴

Yet, not every actor is equally positioned to take on sustainability functions. Figure 3 takes inspiration from a kaleidoscope to reflect how various actor attributes (e.g. ownership, quality focus, access financing, and level of vertical integration) can be combined in different ways. These differences in attributes are linked to relative strengths and weaknesses that should be respectively harnessed or acknowledged, rather than overlooked, when aiming to engage midstream actors in making supply chains more sustainable. For instance, trading houses that do not buy directly from farmers will be hard-pressed to roll out sustainability programs and may find it more difficult to credibly verify alleged malpractices at the farm level.⁴¹ Companies that rely on external loans may be less able to invest in producer outreach than those with high levels of capitalization. The question of whether companies focus on mainstream or specialty quality products may influence both the volumes they trade and therefore exert influence over (as bulk quality makes up the largest share of production volume), but also the quality differential they may generate at the downstream end of the chain and pass along to upstream actors. And informal intermediaries may have strong rapport and influence in local communities, but do not have the knowledge or connection to consuming markets to teach farmers about sustainability expectations.

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This diversity of actors and their roles on the one hand shows the importance of inter-actor collaboration (see ‘Take a systemic view’), but also that midstream actors play crucial roles – making a detailed understanding of individual supply chain contexts essential for effective policy advice. In some situations, the reduction of intermediaries can lead to a fairer distribution of benefits and more transparency. For example, coffee farmers in Colombia and cocoa producers in Ecuador have benefitted from direct trade relations,⁴² though it should be noted that even ‘direct trade’ relationships are mediated by exporters and connective businesses.^{43,44} In some cases, the existence of intermediaries benefits farmers by connecting them to markets or providing them with pre-financing. In these situations, eliminating ‘the middleman’ may further marginalize already vulnerable smallholders.^{21,41} In Indonesia, for instance, the removal of intermediaries from the palm oil value chain as a requirement for Indonesian Sustainable Palm Oil (ISPO) certification met with resistance among smallholders due to the resulting loss of ingrained social relations, transportation services, and timely payment options.^{45,46} In some contexts, such as the cocoa sector in Côte d’Ivoire and the coffee sector in Tanzania, governments have reacted to perceived inefficiencies and lack of oversight by seeking to legally prohibit first-mile intermediaries (usually individuals) that collect cocoa or coffee from smallholder farms and sell them on – in Côte d’Ivoire, these are called *pisteurs*. Yet, taking such measures without an in-depth understanding of intermediaries’ roles risks pushing such actors into illegality, making it more challenging to integrate them into sustainability efforts, or leaving smallholder producers stranded without market access. Efforts to shorten supply chains should thus carefully consider local contexts and weigh the potential inefficiencies and excessive value capture by midstream actors against the functions they fulfill. In addition, we recommend integrating existing actors more explicitly in the supply chain – e.g., via a formalization of intermediaries’ roles and responsibilities, alongside national registries – to ensure they are better able to aid in farmer outreach and traceability efforts. Finally, a deeper and more variegated understanding of midstream actors may also highlight important dynamics around gender and age differences in terms of who takes on the – oftentimes relatively lucrative – role of first-mile intermediary, and how such roles might be more equitably distributed across community members.

Take a systemic view

Though due diligence legislation and individual sustainability efforts often focus on the assumption of products traveling from actor to actor along linear supply chains, our discussions highlighted the need to recognize that there exists a ‘midstream ecosystem’ of actors that rely on each other and switch between collaboration and competition. Often, trading houses that operate at various levels of the supply chain buy and sell to one another and thus may be competitors as well as clients of each other. Large multinational trading houses frequently purchase their goods from informal intermediaries who can access more remote locations to source commodities from. For example, moving cocoa from farm to point of export in Côte d’Ivoire (a country in West Africa producing roughly 45% of the world’s cocoa) can involve up to a dozen nodes in the supply chain. These nodes include small-scale aggregators who transport cocoa from farms to informal collection points and warehouses on their backs and on motorbikes. Further downstream, the supply chain becomes more concentrated to eventually consolidate in three transnational corporations who dominate the trade of this commodity.³⁵ There is a constant passing of goods, but also information, between these actors. In turn,

the ability to communicate sustainability commitments to upstream place-based actors relies on the effective flow of feedback within this ecosystem. Although it is generally the multinational firm making sustainability commitments, they rely on myriad smaller intermediaries (especially those linked to farm-gate purchasing) to operationalize their sustainability commitments, especially commitments that are necessarily land-based such as regenerative agriculture.

At the farm gate, farmers often split their production, selling to various actors for different reasons. For instance, some volume will be sold to an informal intermediary for quick cash-on-hand, some will be sold via the local cooperative for a higher price, and the highest quality products may be diverted and sold to trading houses that focus on specialty-grade items. Similarly, a critical balancing act for trading houses is that they aim to spread risk by not relying on one single supplier or buyer, yet their business is often built on continuous and enduring buying relationships, even where in some circumstances it might make sense to switch suppliers. How durable or ‘sticky’ trade relationships are, and how they could become more durable, is an important empirical question and diverges by commodity, country, and across actors.⁴⁷

A critical implication of the midstream ecosystem is that a single actor is unlikely to be able to achieve change on the ground by themselves. Particularly smaller midstream actors have found it necessary to combine their purchasing power to convince actors on the ground to change practices, but even larger actors rely on on-the-ground and within-sector cooperation. Yet, practitioners often believe that traders are not ‘natural collaborators’, both due to inherent competitiveness but also because exceedingly close collaboration may contravene anti-trust legislation.^{48,49} Rather, collaboration is most likely when actors can gather around a strong motivating purpose. We therefore encourage policymakers and civil society actors to use systemic views and encourage on-the-ground collaboration for compliance, rather than developing single-supply chain approaches. The current experiments in jurisdictional approaches⁵⁰ seem a promising step forward, as these approaches bring together multiple traders and local governments with the aim to change policies at the state level. However, in order to scale jurisdictional approaches to the size required, corporate funding needs to increase.^{41,51} Jurisdictional efforts could also be strengthened by widening the implementation mechanisms of due diligence policies beyond supply chain traceability efforts to investments in jurisdictional monitoring and reporting mechanisms.

Acknowledge limits to and varieties of power

Many agricultural supply chains have an hourglass shape, with millions of producers and consumers sitting at both ends while relatively few commodity trading companies sit in the middle handling these products. These companies may account for a substantial proportion of the total volume and value of trade in a given commodity. Consequently, they are often perceived to hold substantial power to bargain with producers and customers and to set the agenda with respect to defining what is considered best practice for sustainability.⁵² Due to this perceived power, civil society campaigns often focus on trading houses as key targets, advocating for them to adopt sustainable policies.^{48,53} When this occurs, midstream actors are often ‘squeezed’ both by their buyers’ demands and the realities on the production side. Being ‘stuck in the middle’ can be a constriction in the sense that trading houses might have less price-setting power compared to branded consumer goods manufacturers or retailers. Rather, they often simply pass through costs and demands. They may even be restricted from sharing

information on activities and sourcing patterns executed on behalf of their clients, which limits the transparency they can show.

While recognizing that a midstream position does not necessarily confer absolute power to transform complex production networks, both large and small midstream actors undoubtedly have unique abilities to influence the environmental and social impacts of commodity production. In localized contexts, midstream actors' bargaining power can be formidable, especially if they are the only actor connecting farmers to market. A critical consideration here is the actors' financial assets and whether they can offer farmers forward contracts and credit. In many commodity exporting contexts, 'cash is king' in trading and how well-capitalized a buyer is often more influential as compared to whether the company is large or small. This unequal bargaining power between midstream actors and individual producers opens up arbitrage opportunities for unscrupulous actors, but could equally incentivize best practices by responsible parties. But traders' actions may also influence perceptions on the ground in subtler ways. For instance, sustainability requirements for certain suppliers may be picked up by others and eventually become an industry standard.⁵² Farmers may also adopt sustainable practices in the hopes of becoming eligible to sell at premium prices. Midstream actors also have power in educating and influencing buyers to understand limitations on the ground. Information appears to be the most powerful tool that traders possess. Pooling and using that information to push sustainability governance initiatives forward could thus be a key way to exert influence. At the same time, recognizing the potential bargaining and agenda-setting capabilities conferred by a midstream position justifies the need to regularly analyze and check how this power is used for unsustainable or inequitable ends.

Trading companies could also turn inward to reflect on ways to change the status quo. In particular, adopting innovative pricing models such as cost-plus pricing (a pricing strategy that adds a markup to production costs to arrive at a selling price) or profit sharing (a model that aligns the interests of the producer and the intermediary by sharing the profits from a product or service) would allow for producers to be able to cover their costs and capture a higher share of profits.³⁹ Rethinking ownership structures and, in particular, exploring ways to include farmers in co-ownership of the trade or processing enterprise – as already practiced by companies such as Pachamama Coffee or Divine Chocolate – would allow for even more transformative changes in relative value distribution. Many such strategies however require a high level of trust and collaboration between the producer and the intermediary, which may be difficult to establish in a supply chain characterized by power imbalances and information asymmetries.

ACTIVATING THE MIDSTREAM FOR SUSTAINABILITY

What should key stakeholders (e.g. policy makers, businesses, civic organizations, cf. Figure 2) expect midstream actors to be able to do, and what goes beyond their abilities? And how can we move to a state where the entire midstream ecosystem is activated and leveraged to further supply chain sustainability? We recommend that companies and legislators play to midstream actors' strengths while taking other supply chain actors equally to task; companies should embrace uncomfortable transparency; and policy makers should find the right balance between regulatory carrots and sticks that support innovative action while staying alert to potential unintended consequences.

Play to midstream actors' strengths

The strength of the midstream ecosystem arguably lies in its 1) on-the-ground presence in sourcing regions while simultaneously 2) serving as connectors and translators of downstream sustainability demands and 3) aggregating crucial producer- and supply chain data.

The midstream ecosystem links remote places that are often difficult to reach for other service providers. As such, intermediaries can contribute to sustainability by not only purchasing goods, but also delivering services and information related to quality or sustainability demands to an even greater extent than they already do. They could also be brought in even more as providers of replanting material, inputs, and deliver training on financial literacy, good agricultural practices, and environmental and social sustainability. Companies that trade multiple commodities may also increase the coordination between different units in order to provide farmers with market access for more than one crop, thereby supporting on-farm diversification. Typically, well-resourced companies already have extensive experience in providing extension services and agronomic know-how, which could be leveraged to an even greater extent. This should occur alongside a strengthening of standards and guidelines to ensure companies are not providing services that only benefit their own sales, and that corporate knowledge is combined with and recognizes the value of the wider local knowledge systems operating within sourcing areas.⁵⁴

Second, considering this segment provides the crucial link between commodity producers and the downstream part of the supply chain, these actors are well-positioned to link sustainable farmers with responsible consumers. This is already happening in many instances, especially for 'specialty' segments of cocoa and coffee supply chains, where higher grade products rely on midstream actors for their marketing strategies. Midstream actors could also promote and reward farmers' intangible services such as ecosystem services, carbon fixation, and data via alternative pricing models.

Third, midstream actors already frequently assemble granular data on producer-level sustainability indicators and have a privileged position when it comes to understanding the upstream supply flows. This makes them invaluable actors to assemble traceability, transparency, and due diligence-related data. Such data plays a key role when scaling up sustainability. A potential role of midstream actors is thus not only data gathering but also the orchestration of 'good data', i.e. interoperable and high-quality data following a common vision. As monitoring and reporting on the effectiveness of sustainability measures becomes increasingly critical to demonstrate that agri-food sustainability programming is effective, it is also important to consider the position of these midstream actors when it comes to data collection and management. Some midstream actors already hold increasingly large amounts of data; and not only biophysical data on land systems but also social data such as land tenure, household conflicts, and gender considerations relevant to producer price negotiating power. These social data metrics are significant for any program that aims to make meaningful progress on human rights and socioeconomic objectives, but there are also risks involved in collecting and managing such data which may include managing sensitive personal information from producers or disclosing competitive sourcing information. Reflecting on data ownership and ways to compensate producers for their increasingly valuable data – ensuring that producers consent to data collection and offered ways to opt out – is vital to avoid negative unintended consequences. Examples of this tension include the long-term resistance from Roundtable on Sustainable Palm Oil (RSPO) member companies

to share concession boundaries, and the cocoa industry's reluctance to share farm maps in West Africa. Collaboration – both between midstream actors but also with producer country governments – is a crucial step to address these challenges.⁵⁵ This collaboration could involve government-led safeguards, incentives for data sharing, and co-designing legislation to promote fair and safe data-sharing processes.⁵⁶

Take other actors to task

Midstream actors are essential sustainability implementers, but they cannot do it alone. Markets and governance are required, as reflected in the recent efforts to enact supply chain due diligence legislation. Indeed, while some trading houses are actively creating sustainability policies for their supply base, others focus on implementation, not governance. External governance systems such as multi-stakeholder initiatives may help. In addition, downstream buyers, state and non-state actors play important roles in enabling midstream actors to contribute to supply chain sustainability governance.

However, the most direct way to enable sustainable practices by mid-stream actors is for commodity exporting countries to strengthen environmental and human rights policies at origin. Many companies welcome improved governance at origin to set a more level playing field. Additionally, markets need to demand more stringent sustainability measures and prices need to reflect that. This could be aided by countries adopting true cost accounting measures as part of economic monitoring systems.⁵⁷ The significance of price should not be understated, as low prices paid to producers are a major obstacle to achieving sustainable supply chains. In turn, practitioners perceive that their power to invest in the supply chain in pre-processing, improved prices to growers, and traceability is mainly coming from changes in the consumer market. Without demand for sustainable products from consumers – more easily encouraged by retailers and consumer goods manufacturers than midstream actors – it is difficult for traders to cover the higher costs of sustainable production. In addition, the clients of midstream actors also need to overcome their own internal divisions, as they frequently send mixed signals – with procurement departments demanding lower prices, and sustainability departments demanding higher standards.

Second, without a supportive legal framework in both consuming and producing countries, midstream actors may find themselves beholden to various interests and struggle in balancing the realities in the supply chain and in-country context with demands from consumers and downstream businesses. This may lead to squeezing midstream actors out of the market and thus losing many of the specific skills and attributes that they offer for achieving more sustainable supply chains. On the one hand, greater standardization of voluntary practices, for instance via external reference frameworks, would allow midstream actors to credibly showcase their comparative contributions and be compensated for them, for instance via sustainability-linked financing. Examples of voluntary accountability frameworks that midstream actors could use include the Accountability Framework, a consensus-based set of norms, definitions, and guidance to achieve ethical supply chains in agriculture and forestry, and the Science-Based Targets for Nature (SBTN) which aim to align business practices with science-based targets for biodiversity and natural resources. Public regulatory frameworks and legislation can also direct midstream actors in a way that might prove more effective than voluntary approaches. The rise of due diligence legislation such as the EU Deforestation Regulation or the EU Corporate Sustainability Due

Diligence Directive are an important step in that direction, although practitioners caution that such laws need to be aligned with the realities of sectoral market practices in order to be feasibly implemented.

Embrace uncomfortable transparency

A critical lesson from the specialty coffee industry is that discomfort – and, in particular, ‘uncomfortable transparency’ – often leads to change. In the coffee industry, the establishment of the Specialty Coffee Transaction Guide as an overview of which prices were being paid for which quality of coffee pushed companies to provide unprecedented levels of transparency, including on how much they are paying for their products along the chain. The publication of the guide created a new playing field and allowed the industry to establish novel reference points that became more relevant than the futures market.

Actors in the specialty cocoa sector have also experimented with the idea of what Uncommon Cacao calls ‘radical transparency’, in which transparency is provided not just for the origin data, but also the sales data that demonstrate the transactions between producers and traders and the producer price received. In that way, the ultimate goal is to use transparency as a platform to enable broader conversations around producer profitability.

The value of transparency is arguably the resulting accountability, or at least the potential for accountability. At the same time, information has traditionally been seen as a competitive resource, and uncomfortable transparency may require a deeper culture change. While civil society can advocate for greater transparency, producer and consumer governments play a key role in creating and maintaining transparency norms, facilitating access to data on supply chains and socio-environmental infringements.^{17,41} The midstream sector in general, and the largest bulk traders in particular, tend to be risk averse and would likely be hesitant to disclose more than absolutely necessary, especially if it opens them up to potential legal ramifications. It is therefore essential that legislators involved with designing legislation to force transparency and accountability take care to avoid creating incentives to hide non-compliance. One way of encouraging transparency might be to reward the disclosure of on-the-ground challenges via opportunities to co-develop improvement projects.

Support innovative action via incentives

Finally, while practitioners often feel that a level playing field is needed, it is unclear whether punitive legislation is the solution. Penalization might force a culture of covering things up and pit watchdog organizations against companies in an adversarial fashion. When certain actions become illegal, companies are more likely to cover them up. Actors who are penalized may be ones who simply do not have the real power in the system, such as smallholder farmers or informal intermediaries that might get cut out of supply chains. Finding the right balance between carrots and sticks is therefore critical. Incentivization – such as via co-developing improvement projects – is likely more effective to ‘get the best to invest’ in hotspot areas rather than pulling out to reduce risk.

The challenge with investment in bold experimentation, however, is that results are highly uncertain. Traditionally risk-averse midstream actors and their investors may be deterred from experimenting with incentives in their supply chains if they will ultimately be held accountable for outcomes. In order to encourage on-the-ground action, it may be useful to frame companies as ‘experimentation partners’

and understand the challenges in moving from project to impact, while ensuring that the core focus is put on farmer resilience. In other words, sustainability must remain farmer-centric and adapted to their respective place-based context. This is especially important in the case of regenerative and net-positive agriculture projects, which require extremely localized approaches for success. Agri-food supply chains in general have unique characteristics in terms of sourcing locations, producer characteristics at origin (e.g. smallholder vs. plantations), industry history and organization, interaction with public authorities in sourcing geographies, trade regulations, and on-going efforts in private governance. This makes it difficult to create generalizable blueprints. Instead, place-based, commodity-centric solutions are required. In turn, collaboration between research and business, and cross-sectoral alignment on metrics that could be used for company evaluation, may allow for a more holistic assessment of impacts and understanding what works and what does not.

Leading from the middle

Midstream actors are already critical implementers of sustainability in global food systems, yet their role often goes underappreciated due to limited knowledge about their *modus operandi*. ‘Eliminating the middleman’ is not only an unrealistic goal but also overlooks the diverse and often unique expertise, skills, and services offered by midstream actors by virtue of their positions in supply chains, which are likely to be essential for achieving sustainability. Gaining a more realistic understanding of the potential of midstream actors aids in identifying and addressing potential trade-offs between the aims and strategies of company, civil society, and policy-maker stakeholders. More holistic policies that combine carrots and sticks, cover jurisdictions as well as supply chains, and address market failures, information asymmetries, inaccurate pricing, and under-provision of public services can help to better harness the power of this ecosystem of midstream actors to jointly solve pressing sustainability problems that other state and non-state actors will never be fully able to grasp.

Nonetheless, midstream actors cannot do it alone. They have their own business models, priorities, and historical backgrounds that have given them skills in certain areas over others. There is great diversity across actors, commodity markets, and country contexts that should be considered when setting expectations about how this segment of global supply chains can contribute to sustainability. It is important to understand the contextual reality and be both ambitious and realistic when evaluating progress and policy compliance in order to avoid unintended consequences such as the splitting of sustainable and unsustainable markets or the exclusion of origins at higher risk of social and environmental harms. Often, these higher-risk origins are exactly where investment, transparency, and collaboration are most needed to avoid further marginalizing the most vulnerable producers, or converting key biodiversity habitats. It is thus of vital importance that midstream actors use their knowledge, power, and on-the-ground networks to catalyze and support more systematic, measured, effective, and uniformly regulated agri-food supply chain sustainability.

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Reference list

1. Pendrill, F. *et al.* Disentangling the numbers behind agriculture-driven tropical deforestation. *Science* **377**, eabm9267 (2022).
2. Lambin, E. F. *et al.* The role of supply-chain initiatives in reducing deforestation. *Nature Climate Change* **8**, 109 (2018).
3. Waarts, Y. R. *et al.* Multiple pathways towards achieving a living income for different types of smallholder tree-crop commodity farmers. *Food Sec.* **13**, 1467–1496 (2021).
4. Adams, M. A. & Carodenuto, S. Stakeholder perspectives on cocoa's living income differential and sustainability trade-offs in Ghana. *World Development* **165**, 106201 (2023).
5. Busquet, M., Bosma, N. & Hummels, H. A multidimensional perspective on child labor in the value chain: The case of the cocoa value chain in West Africa. *World Development* **146**, 105601 (2021).
6. Sellare, J. *et al.* Six research priorities to support corporate due-diligence policies. *Nature* **606**, 861–863 (2022).
7. Desiderio, E., García-Herrero, L., Hall, D., Segrè, A. & Vittuari, M. Social sustainability tools and indicators for the food supply chain: A systematic literature review. *Sustainable Production and Consumption* **30**, 527–540 (2022).
8. Galford, G. L. *et al.* Agricultural development addresses food loss and waste while reducing greenhouse gas emissions. *Science of The Total Environment* **699**, 134318 (2020).
9. Schilling-Vacaflor, A. & Lenschow, A. Hardening foreign corporate accountability through mandatory due diligence in the European Union? New trends and persisting challenges. *Regulation & Governance* **online first**, (2021).
10. Weihrauch, D., Carodenuto, S. & Leipold, S. From voluntary to mandatory corporate accountability:

- The politics of the German Supply Chain Due Diligence Act. *Regulation & Governance* **online first**, (2022).
11. Bueno, N. & Kaufmann, C. The Swiss Human Rights Due Diligence Legislation: Between Law and Politics. *Business and Human Rights Journal* **6**, 542–549 (2021).
 12. Evans, A. Overcoming the global despondency trap: strengthening corporate accountability in supply chains. *Review of International Political Economy* **27**, 658–685 (2020).
 13. Brewer, E. Closed Loophole: Investigating Forced Labor in Corporate Supply Chains following the Repeal of the Consumptive Demand Exception. *Kan. J.L. & Pub. Pol’y* **28**, 86 (2018).
 14. Plouffe-Malette, K. & Brisson, H. Forced Labour and Trade: A Canada – United States Comparative Analysis. *European Review of International Studies* **6**, 84–100 (2019).
 15. Nolan, J. & Bott, G. Global supply chains and human rights: spotlight on forced labour and modern slavery practices. *Australian Journal of Human Rights* **24**, 44–69 (2018).
 16. Renier, C. *et al.* Transparency, traceability and deforestation in the Ivorian cocoa supply chain. *Environ. Res. Lett.* **18**, 024030 (2023).
 17. Gardner, T. A. *et al.* Transparency and sustainability in global commodity supply chains. *World Development* **121**, 163–177 (2019).
 18. Grabs, J., Cammelli, F., Levy, S. A. & Garrett, R. D. Designing effective and equitable zero-deforestation supply chain policies. *Global Environmental Change* **70**, 102357 (2021).
 19. Reardon, T. The hidden middle: the quiet revolution in the midstream of agrifood value chains in developing countries. *Oxford Review of Economic Policy* **31**, 45–63 (2015).
 20. Reardon, T. & Minten, B. Food value chain transformation in developing regions. in *Agricultural development: New perspectives in a changing world* (eds. Otsuka, K. & Fan, S.) 397–437 (International Food Policy Research Institute, 2021).
 21. Reardon, T., Liverpool-Tasie, L. S. O. & Minten, B. Quiet Revolution by SMEs in the midstream of value chains in developing regions: wholesale markets, wholesalers, logistics, and processing. *Food Sec.* **13**, 1577–1594 (2021).
 22. Berning, L. & Sotirov, M. Hardening corporate accountability in commodity supply chains under the European Union Deforestation Regulation. *Regulation & Governance* **early view**,.
 23. Silverman, S., Carodenuto, S. & Grabs, J. *Adventures in Transdisciplinary Translation: Co-creating and Vetting a Novel Research Agenda on Trading Companies as Sustainability Governance Actors*. (Sage Research Methods: Business, 2023). doi:10.4135/9781529628371.
 24. Grabs, J. & Carodenuto, S. L. Traders as sustainability governance actors in global food supply chains: A research agenda. *Business Strategy and the Environment* **30**, 1314–1332 (2021).
 25. Baines, J. & Hager, S. B. Commodity traders in a storm: financialization, corporate power and ecological crisis. *Review of International Political Economy* **29**, 1053–1084 (2022).
 26. Koutsouris, A. Exploring the emerging intermediation roles (facilitation and brokerage) in agricultural extension education. *International Journal of Agricultural Extension* **0**, 21–37 (2014).
 27. Serdijn, M., Kolk, A. & Fransen, L. Uncovering missing links in global value chain research – and implications for corporate social responsibility and international business. *Critical Perspectives on International Business* **17**, 619–636 (2020).
 28. Kingsman, M. J. C. *Out of the Shadows: The New Merchants of Grain*. (Independently published, 2019).

29. Cao, Y. & Mohiuddin, M. Sustainable Emerging Country Agro-Food Supply Chains: Fresh Vegetable Price Formation Mechanisms in Rural China. *Sustainability* **11**, 2814 (2019).
30. Legun, K. & Bell, M. M. The second middle: Conducers and the agrifood economy. *Journal of Rural Studies* **48**, 104–114 (2016).
31. Schoonhoven-Speijer, M. & Vellema, S. How institutions governing the economic middle in food provisioning are reinforced : The case of an agri-food cluster in northern Uganda. *Journal of Rural Studies* **80**, 34–44 (2020).
32. Reinecke, J., Donaghey, J., Wilkinson, A. & Wood, G. Global supply chains and social relations at work: Brokering across boundaries. *Human Relations* **71**, 459–480 (2018).
33. Quiñones-Ruiz, X. F. Social brokerage: Encounters between Colombian coffee producers and Austrian Buyers – A research-based relational pathway. *Geoforum* **123**, 107–116 (2021).
34. Clapp, J. ABCD and beyond: From grain merchants to agricultural value chain managers. *Canadian Food Studies / La Revue canadienne des études sur l'alimentation* **2**, 126–135 (2015).
35. Carodenuto, S. & Buluran, M. The effect of supply chain position on zero-deforestation commitments: evidence from the cocoa industry. *Journal of Environmental Policy & Planning* **online first**, 1–16 (2021).
36. Bager, S. L. & Lambin, E. F. Sustainability strategies by companies in the global coffee sector. *Business Strategy and the Environment* **29**, 3555–3570 (2020).
37. Mighty Earth. *Cargill: Still the worst*. (Mighty Earth, 2023).
38. Norström, A. V. *et al.* Principles for knowledge co-production in sustainability research. *Nat Sustain* **3**, 182–190 (2020).
39. Bennett, E. A. & Grabs, J. Rethinking the “necessary” trade-offs of distributing value to suppliers: An analysis of the profit-sharing model. *Carr Center Discussion Paper Series* (2021).
40. Davies, I. A. & Doherty, B. Balancing a hybrid business model: The search for equilibrium at Cafédirect. *J Bus Ethics* **157**, 1043–1066 (2019).
41. zu Ermgassen, E. K. H. J. *et al.* Addressing indirect sourcing in zero deforestation commodity supply chains. *Science Advances* **8**, eabn3132 (2022).
42. Middendorp, R. S., Boever, O., Rueda, X. & Lambin, E. F. Improving smallholder livelihoods and ecosystems through direct trade relations: High-quality cocoa producers in Ecuador. *Business Strategy & Development* **3**, 165–184 (2020).
43. Holland, E., Kjeldsen, C. & Kerndrup, S. Coordinating quality practices in Direct Trade coffee. *Journal of Cultural Economy* **9**, 186–196 (2016).
44. Borrella, I., Mataix, C. & Carrasco-Gallego, R. Smallholder farmers in the speciality coffee industry: Opportunities, constraints and the businesses that are making it possible. *IDS Bulletin* **46**, 29–44 (2015).
45. Ogahara, Z., Jespersen, K., Theilade, I. & Nielsen, M. R. Review of smallholder palm oil sustainability reveals limited positive impacts and identifies key implementation and knowledge gaps. *Land Use Policy* **120**, 106258 (2022).
46. Hidayat, N. K., Offermans, A. & Glasbergen, P. Sustainable palm oil as a public responsibility? On the governance capacity of Indonesian Standard for Sustainable Palm Oil (ISPO). *Agric Hum Values* **35**, 223–242 (2018).
47. Reis, T. N. P. dos *et al.* Understanding the Stickiness of Commodity Supply Chains Is Key to

- Improving Their Sustainability. *One Earth* **3**, 100–115 (2020).
48. Grabs, J. & Garrett, R. D. Goal-based private sustainability governance and its paradoxes in the Indonesian palm oil sector. *J Bus Ethics* (2023) doi:10.1007/s10551-023-05377-1.
 49. Claassen, R. & Gerbrandy, A. Doing Good Together: Competition Law and the Political Legitimacy of Interfirm Cooperation. *Business Ethics Quarterly* **28**, 401–425 (2018).
 50. Boshoven, J. *et al.* Jurisdictional sourcing: Leveraging commodity supply chains to reduce tropical deforestation at scale. A generic theory of change for a conservation strategy, v 1.0. *Conservation Science and Practice* **3**, e383 (2021).
 51. von Essen, M. & Lambin, E. F. Jurisdictional approaches to sustainable resource use. *Frontiers in Ecology and the Environment* **19**, 159–167 (2021).
 52. Dallas, M. P., Ponte, S. & Sturgeon, T. J. Power in global value chains. *Review of International Political Economy* **26**, 666–694 (2019).
 53. Dauvergne, P. Is the Power of Brand-Focused Activism Rising? The Case of Tropical Deforestation. *The Journal of Environment & Development* **26**, 135–155 (2017).
 54. McCullough, E. B. & Matson, P. A. Evolution of the knowledge system for agricultural development in the Yaqui Valley, Sonora, Mexico. *Proceedings of the National Academy of Sciences* **113**, 4609–4614 (2016).
 55. Carodenuto, S. Governance of zero deforestation cocoa in West Africa: New forms of public–private interaction. *Environmental Policy and Governance* **29**, 55–66 (2019).
 56. Sayogo, D. S. *et al.* Challenges and requirements for developing data architecture supporting integration of sustainable supply chains. *Inf Technol Manag* **16**, 5–18 (2015).
 57. Hamm, M. W., Mueller, A., Riemer, O. & Merrigan, K. *True Cost Accounting and Dietary Patterns: A Strategy for Transformative Food Systems*. (TMG – Think Tank for Sustainability, 2022).

Figure captions:

Figure 1: Midstream actors such as trading houses take on multiple functions within the supply chain. At the same time, moving the commodity from farm-gate to export involves a diversity of actors (inset) that interact via multiple contractual arrangements in a midstream ecosystem. Own illustration (simplified; commodity-generic)

Figure 2: Seven suggestions to harness the strength of midstream actors to support agri-food supply chain sustainability

Figure 3: The actor kaleidoscope shows the diversity not just in business forms (large triangles) but also other attributes (small triangles) such as ownership type, focus on certain commodities and quality foci, etc. It should be noted that attributes are not exclusive to the business form they are closest to; there may be a range of configurations at play, similar to an imagined ‘turning of the kaleidoscope’.