



The Role of Food and Beverage Companies in Transforming Food Systems: Building Resilience at Multiple Scales

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ABSTRACT

Food and beverage companies are increasingly aware of the risks posed by climate change and many are interested in addressing them by building resilience along their supply chains. Financial incentives for environmental, social, and governance criteria further motivate mitigation action by firms. To achieve sustainable outcomes, human and ecological systems must be managed for resilience. The scientific community and food and beverage firms must collaborate in the development of measurable and verifiable indicators that support adaptation and mitigation action along food supply chains. This article identifies 3 areas in which a synergistic progress would set a resilient trajectory toward sustainability: 1) incentives for sustainable intensification, 2) expanded reporting standards, and 3) pre-competitive collaborations. Incremental, clear, and measurable steps can be taken to adapt food supply chains to the pressing challenges imposed by climate change, mitigate further emissions, and bring producers and consumers along in the journey towards planetary health. *Curr Dev Nutr* 2021;5:nzab110.

Keywords: agriculture, environment, Sustainable Development Goals, food systems, industry, climate change, resilience

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Abbreviations used: COVID-19, coronavirus disease 2019; F&B, Food and Beverage; FSMA, Food Safety Modernization Act; GHG, greenhouse gas; SBT, science-based target; SDG, Sustainable Development Goal.

Introduction

Our world is increasingly warmer, crowded, and volatile. There is an urgent need to manage greenhouse gas (GHG) emissions towards net-zero to avoid reaching global warming beyond 1.5°C and prevent multiple system failures (1). Food chain activities—including agriculture and land use, storage, transport, packaging, processing, and retail and consumption of food products—are responsible for 28% of anthropogenic GHG emissions every year (2). Yet, the most significant source of food chain emissions is not the factory, road transportation, or packaging, but rather the farm. Agricultural production accounts for 80–86% of food system emissions (3, 4). Therefore, rapid implementation of mitigation and adaptation strategies at the food production stage is fundamental for resilience across supply chains.

With their collective power over food supply chains, food and beverage (F&B) companies are in a unique position to build resilience across multiple scales at each stage of the food supply chain. The proliferation of corporate social responsibility reporting demonstrates that there is collective interest to take action and disclose progress in this area. To address sustainability goals while supporting climate-resilient practices, the risks and challenges faced by diverse actors that make up food sup-

ply chains (i.e., upstream processors, distributors, aggregators, and producers) must be known. Considering the systems nature of food supply chains, this means that building supply chain resilience is different from the resilience of its elements. This distinction has been illustrated in the context of market systems (5), where the resilience of the system and resilience of participating farmers are not necessarily the same because individual farmers could fail while the system persists. We argue that transformative food systems actions must acknowledge the tension that exists between individual- and system-level resilience by making supply chains work for their stakeholders through solutions that drive benefits at multiple scales.

Current Strategies to Make Food Production More Sustainable Face Many Challenges

Efforts to reduce GHG emissions from food production, while supporting farmer adaptation, have generally relied on public policy, certifications, and procurement strategies. Sustainable food production has been at the forefront of many development initiatives over the last 4 decades. Most recently, the United Nations Sustainable Development

Goals (SDGs) call for ensuring sustainable consumption and production patterns (SDG 12) and ending hunger and achieving food security and improved nutrition (SDG 2) through improving agricultural productivity and sustainability. Initiatives promoting sustainable intensification or climate-smart agriculture have focused on policy and program incentives for farmers, especially smallholder farmers, but their overall impact on farmer outcomes is yet to be quantified, especially in developed countries (6).

The proliferation of certification schemes has shown that consumers respond to information about food-production practices. However, these programs continue to represent a minority of production operations. Rather than transforming the way food is produced, certifications are a niche differentiator. The market for certified organic foods, for example, has seen steady increases over the last 3 decades. Still, organic-certified operations continue to make up a small proportion of the total agricultural sector. Similarly, the Roundtable on Sustainable Palm Oil (7) developed a set of social and environmental criteria for companies that produce Certified Sustainable Palm Oil, but has found that including smallholder farmers, who make up the majority of palm oil producers, is challenging (8, 9).

Ultimately, F&B companies have the power to procure foods that align with their standards of taste, quality, and food safety. Beyond these basic requirements, companies can extend these standards to cover key attributes, such as environmental and social sustainability, in order to achieve resilient outcomes over time. Regulatory standards for food safety have shown some potential to transform the food industry. In the United States, the Food Safety Modernization Act (FSMA) (10), which became law in 2011, aimed to reduce foodborne illness by setting standards for manufacturing and agricultural practices that transformed all sectors involved in the food supply chain. Compliance requirements for producers vary by operations size, making it possible to apply the FSMA standards across the sector. Still, only specific types of environmental and social impacts of food production are managed under regulatory standards (e.g., point-source emissions to air and water and occupational health and safety), while embedded environmental and social costs of production, such as upstream biodiversity loss, changes in land and water resource use, waste creation, GHG emissions, and work conditions, are managed through voluntary disclosures and programs. These important aspects of food production need rigorous attention to achieve resilient and sustainable food systems.

To set and enforce environmental and social standards, stakeholders in the food supply chain—including the private sector—must come together to identify adequate indicators, develop consistent measurement methodologies, and develop or extend current reporting, verification, and enforcement schemes. Dedicating time and resources to the development and adoption of environmental and social standards for food production can provide the foundation for food systems transformations. The application of these types of standards places F&B companies in a unique position to engage with their suppliers, support them in transitioning towards more resilient practices, and communicate their progress with consumers helping them make more sustainable and nutritious food choices. We propose that engaging the private sector to achieve food systems transformation requires developing common tools that can be applied by both the scientific community

and food companies in order to improve resilience across the supply chain.

F&B Companies, with Support from the Scientific Community, Can Build Food System Resilience and Sustainability at Multiple Levels

The concept of resilience—broadly defined as the ability to absorb, adapt, or transform in order to retain an original function—is often applied to measure the performance of a system in reference to a specific type of shock. In order to build resilience and achieve truly sustainable outcomes, F&B companies need to engage strategies that acknowledge vulnerabilities and foster adaptive action at each stage of their supply chains. With increased attention to environmental, social, and governance (ESG) criteria by investors, F&B companies are incentivized to report on their environmental performance (11). Many current corporate social responsibility initiatives are supported by schemes that focus on GHG emissions using science-based targets (SBTs). Growing adoption of reporting commitment schemes highlights a challenge for F&B companies: reducing GHG emissions along their supply chains requires engaging with stakeholders along the value chain, finding the right options for emissions reductions at each stage, and providing incentives for change.

Contemporary issues, such as the obesity epidemic and the coronavirus disease 2019 (COVID-19) pandemic, have also shone a spotlight on social sustainability (12, 13). However, given the complexity of social issues, strong standardized metrics and consistent reporting are needed to monitor progress on social outcomes. As the private sector begins to embrace the use of SBTs, the scientific community has a unique opportunity to synthesize current evidence and develop projects that evaluate criteria for social well-being along food value chains. There are often tradeoffs between strategies that will support aspects of environmental, human, and economic sustainability. Companies need metrics to guide policies and investment in sustainability that help them balance these tradeoffs.

Both companies and the scientific community recognize the importance of employee health and well-being to corporate financial value (14, 15). While employee health is key, and many F&B companies have started to implement and evaluate such programs internally [e.g., PepsiCo (16)], there is an opportunity for investors to consider both human and planetary health by demanding that companies also report on contributions to consumer and environmental health. This approach poses challenges and few companies have followed it. A recent report from the World Benchmarking Alliance that measured the most influential food and agriculture companies' commitments to the food systems transformation agenda found that improving nutrition poses the biggest challenge (17). Companies and their shareholders need clarity on what is required across the value chain to tackle nutrition and planetary health issues and which metrics are appropriate to track progress. This will require F&B companies to take ownership of their nutrition strategy and collaborate with other stakeholders, including the scientific community, to drive change.

The upcoming 2021 United Nations Food Summit (18) provides an opportunity for F&B companies and the scientific community to come

TABLE 1 Areas of synergy between the scientific community and the F&B industry to make progress towards food systems resilience¹

Lever	Actions by the scientific community	Actions by the F&B industry
Incentives for sustainable intensification	Research focusing on on-farm production practices can be developed within the context of supply chains and provide results that are in line with buyer information needs, such as generalizability of results across a geography or production system; impact on the productivity of a system type or agricultural region; adaptation and resilience attributes; mitigation potential; social conditions imposed by the production, use, and disposal of foods across production practices and geographies	Managing expectations with suppliers, aligning company objectives with supplier objectives, and evaluating entire supply chains can promote effective collaborations along the supply chain and provide the necessary incentives for action. Collaborations can focus on reducing upstream emissions, identifying and addressing social conditions associated with production, and evaluating nutritional attributes of current and potential ingredients
Expanded reporting standards	The SBTi has provided a reliable framework to address GHG emissions. Upcoming frameworks, such as the Science Based Targets for Nature (24) extend the focus beyond GHGs to include biodiversity and other planetary boundaries that must be sustained. The scientific community can contribute to the development of targets that can be implemented by industry and that drive improved social outcomes along the food value chain and among consumers	Widespread adoption of SBTs can promote transparency across the food value chain and provide benchmarks for the industry. Contributing to and adoption of SBTs for social and health outcomes can accelerate the refinement and widespread adoption of targets beyond those currently focusing on environmental outcomes
Pre-competitive collaborations	Impact evaluation studies of value chains, market systems, and agricultural interventions can be synthesized to provide guidance as to what types of interventions can be implemented by industry	A useful approach to ingredient supply chain evaluation includes the following (22): identifying risks across each stage of the supply chain; identifying farmers, their production practices, and their level of natural, physical and financial resilience; identifying effective interventions for the supply chain of interest; and tracking progress over time

¹F&B, food and beverage; GHG, greenhouse gas; SBT, science-based target; SBTi, Science-based Target Initiative.

together to address the challenges that risk the collective resilience of stakeholders along the food value chain, from farmers to consumers. We outline 3 levers to promote significant outcomes and summarize plausible action steps (Table 1):

- *Incentives for sustainable intensification:* As climate change accelerates, global population also continues to grow, and the COVID-19 pandemic has stymied progress towards ending hunger and food insecurity. Sustainable intensification of agricultural systems will be needed to meet the SDGs and build resilient food systems. The scientific community and the F&B industry can work together to develop and incentivize technological innovations and adaptations that provide efficient and sustainable yield gains, help producers mitigate and adapt to the impacts of climate change, and equitably distribute the food supply. For instance, direct collaborations between F&B companies and researchers can identify climate-smart, scalable, and sustainable agricultural practices that can close yield gaps, preserve environmental resources, and produce economic benefits. To rigorously identify the environmental impacts of these alternative practices, the application of life cycle assessment (LCA) methodologies would need to be extended in

order to allow for the discernment of impacts based on production practices and geographical conditions.

- *Expanded reporting standards:* F&B companies and the scientific community can collaborate to develop an expanded set of SBTs for the F&B sector. The SDGs recognize the intrinsic relationship between improvements in human, environmental, and economic development. SBTs for the F&B industry should extend this approach by including environmental, nutritional, health, and well-being outcomes (19, 20). Important outcomes such as the financial well-being of value chain actors, inclusivity, diversity, and consumer health provide an essential set of indicators to help the F&B sector begin to incorporate transformative action in their sustainability agenda.
- *Pre-competitive collaborations:* Among commoditized food chains, farm activities may be consolidated but are seldom exclusively linked to 1 specific company. At the farm level, farmers may be selling crops to multiple companies and, at the landscape or regional level, different companies may dominate across agricultural sectors. Initiatives to improve sustainability may therefore benefit more than 1 player. Pre-competitive partnerships can be leveraged for the development of value chain interventions among agricultural operations such that the improvements

achieved by these interventions can benefit farmers and ecosystems while reducing the overall GHG emissions of downstream F&B companies. Environmental and social commitments can be accelerated when supply chains are well understood (21, 22) and solutions are implemented in collaboration with producers and category partners.

Conclusions

With the momentum leading up to the United Nations Food Systems Summit, we call on food system leaders from across sectors to collaborate on an actionable, measurable agenda that brings all stakeholders on board. F&B companies reach millions of households each day and have the capacity to communicate the core values of a transformed food system. Incremental, clear, and measurable steps can be taken to adapt food supply chains to the pressing challenges imposed by climate change, mitigate further emissions, and bring producers and consumers along in the journey towards planetary health.

Unlike the effects of global warming, which are still invisible to many, the COVID-19 pandemic has taken center stage and forced many people to abandon ordinary life. The connectedness and inherent complexity of global food systems became a matter of public conversation as consumers and producers questioned the resilience of many aspects of food systems. In the face of multiple supply-and-demand shocks during the first stages of the pandemic, F&B companies were faced with the challenge of identifying and executing strategies to adapt and sometimes transform their business practices. This recent, visceral example serves as a prelude to the multiple, greater, and longer-lasting shocks that climate change will present in the coming decades. Therefore, there is an urgency to implement resilience strategies across levels of the food system.

To achieve system-level resilience, we need to move from food systems that are driven by individual-sector goals to systems with shared goals for sustainable outcomes. While we have laid out 3 levers that F&B companies and the scientific community can act upon to initiate this transformation, we acknowledge that, to shift the current system, systemic regime change is needed across all sectors. Developing the necessary innovations that will turn small changes into system-level transformations requires an understanding of the complexities of the social and ecological systems through which food system components interact (23). However, this systematic perspective is currently lacking in both the private and public spheres. Similarly, a mutual understanding of the priorities across food sectors—businesses, governments, academia, and nonprofits—is paramount. Effective collaborations that drive sustainability outcomes will emerge when global-level priorities can be articulated with sector-level priorities in mind. The upcoming 2021 United Nations Food Summit (18) will convene partners who are leaders in developing and adopting these collaborative and systematic perspectives. We urge F&B companies and the scientific community to leverage the summit as an opportunity to highlight areas where this work is already taking place, model successful partnerships, and share successes to provide examples upon which others can build.

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