



# Companies' contribution to sustainability through global supply chains

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**Global supply chains play a critical role in many of the most pressing environmental stresses and social struggles identified by the United Nations' Sustainable Development Goals (SDGs). Responding to calls from the global community, companies are adopting a variety of voluntary practices to improve the environmental and/or social management of their suppliers' activities. We develop a global survey of 449 publicly listed companies in the food, textile, and wood-products sectors with annual reports in English to provide insight into how the private sector contributes to advancing the SDGs via such sustainable-sourcing practices. We find that while 52% of companies use at least one sustainable-sourcing practice, these practices are limited in scope; 71% relates to only one or a few input materials and 60.5% apply to only first-tier suppliers. We also find that sustainable-sourcing practices typically address a small subset of the sustainability challenges laid out by the SDGs, primarily focusing on labor rights and compliance with national laws. Consistent with existing hypotheses, companies that face consumer and civil society pressure are associated with a significantly higher probability of adopting sustainable-sourcing practices. Our findings highlight the opportunities and limitations of corporate sustainable-sourcing practices in addressing the myriad sustainability challenges facing our world today.**

responsible supply chain management | voluntary sustainability standards | private governance | sustainable development goals

For decades, the global community has urged companies to contribute to the advancement of a sustainable global economy (1). Companies initially responded through corporate social responsibility (CSR) initiatives to address social or environmental challenges in their own operations or in neighboring communities (2). As globalization has spread the production of goods around the world, the social and environmental impacts of consumption in rich and emerging economies has increasingly been displaced to distant locations via global supply chains. With 80% of global trade flowing through multinational corporations (3), one in five jobs tied to global supply chains (4), and over 95% of environmental impacts of food and retail companies stemming from their supply chains (5), supply chains play an outsized role in many of the most pressing social and environmental challenges (6).

The United Nations' Sustainable Development Goals (SDGs) explicitly highlight the role of corporate supply chains for a sustainable global economy (7). Supply-chain sustainability is becoming an integral part of companies' strategies to contribute to sustainable development (8–11). A 2008 KPMG survey reports that over 90% of the world's top 250 businesses employ some form of standard to regulate their suppliers' social and/or environmental behaviors (12). Similarly, sustainable certification or eco-labels have grown in popularity, with over 90% of sustainable-sourcing certifications having been created in the last two decades (8). Empirical evidence suggests that at least some companies' supply-chain initiatives have contributed to tackling sticky problems from Amazonian deforestation to improving factory workers' rights (13–15).

Despite the recent growth in companies' commitments to sustainable supply chains, we lack a comprehensive understanding of how companies are advancing supply-chain sustainability. There

have been no large-scale empirical evaluations of what sustainable development topics companies address, what practices companies commonly use, or what types of companies are implementing practices to advance sustainability in their supply chain. To address this gap, we study companies' sustainable-sourcing practices (SSPs), defined as voluntary practices companies pursue to improve the social and/or environmental management of their suppliers' activities. Such SSPs are distinct from a company's approach to addressing social and environmental impacts within their own operations and from general philanthropic initiatives that are not tied to the company's supply chain.

Our current understanding of companies' SSPs is restricted to case studies of individual companies (16–18), conceptual frameworks (9, 19), and theoretical models (20–22). The few empirical evaluations of SSPs are limited by small and nonrepresentative samples that substantially bias their results (23, 24). Scholars have suggested that SSPs will be used primarily by large companies facing consumer, civil society, investor, or government pressures (18, 21, 25–28). Other research has suggested that corporate sustainability approaches will deal only with practices relevant to companies' self-interest (25, 29). These hypotheses have not yet been tested in a representative sample (*SI Materials and Methods*).

We address the following questions: What SSPs currently exist, and which practices do companies most commonly use? How do these SSPs contribute to the United Nations' SDGs? What factors influence the adoption of SSPs by companies? We develop an

## Significance

**Supply chains tied to multinational corporations represent over 80% of global trade and engage over one in five workers. Supply-chain management therefore has a significant impact on key social and environmental challenges. Despite this importance, there is currently no comprehensive, empirically grounded understanding of how companies address sustainability in their supply chains. We develop a global database based on a random sample of publicly listed companies with annual reports in English to provide insight into how the private sector contributes to advancing global sustainability via their supply chains. This study provides a large-scale empirical analysis of corporate sustainable-sourcing practices across multiple sectors and geographies.**

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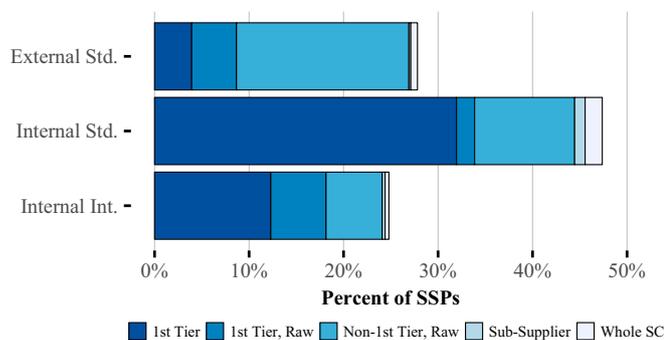
Data deposition: Data are available on the Stanford Digital Repository at <https://purl.stanford.edu/hn344kt7076>.

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**Fig. 3.** How far down the supply chain each SSP applies for each SSP group.

Asia-Oceania, being headquartered in a country with a high density of international NGOs (“HQ NGO density”), identifying environmental or social risks in the supply chain, and having a brand that is visible to consumers are significantly associated with the adoption of at least one SSP (significant at the 5% level; 42.4% of deviance explained by the model). These results are after controlling for sector, report type [sustainability report, adherence to the Global Reporting Initiative (GRI)], membership in the Consumer Goods Forum, and company profitability. In contrast, there is no statistically significant association with a larger market share, serving North American markets, serving multiple continents, or stringency of environmental regulation in the headquarter country. These results are consistent across model specifications (exclusion of companies listed on Asian stock exchanges, exclusion of producing companies, different specifications of company revenues and profitability, using additional controls) and model types (linear probability model, maximum likelihood estimation of logit model) (*SI Materials and Methods*).

The first-difference results from the logit model allow us to estimate the magnitude of these predictor variables (Table 2). These results can be interpreted as the change in predicted probability of adopting an SSP when moving from 0 to 1 for binary variables or from the 25th percentile to the 75th percentile for continuous variables, holding all else constant. For example, companies that have a strong brand are associated with a seven percentage-point increase in likelihood to adopt an SSP compared with companies that do not have recognizable brands, holding all else constant. Similarly, increasing a company’s revenues from the 25th percentile to the 75th percentile is associated with increasing the likelihood of adopting an SSP by 11 percentage points.

**Discussion**

We find that 52% of the randomly selected companies in our global sample of publicly listed companies with annual reports in English address some component of social or environmental issues within their supply chain. This result is substantially lower than estimates drawn from only the largest companies, where sustainable-sourcing coverage was estimated at over 90% among major Western firms (12). Still our estimate of SSP prevalence is likely to be biased upward, as companies without English annual reports tend to differ from companies with annual reports available in English (*SI Materials and Methods*).

In addition to a much lower adoption of SSPs than commonly discussed, we find several other limitations to current SSPs that likely affect their ability to drive change. First, our findings suggest that SSPs are most commonly adopted by downstream firms to address issues with their first-tier suppliers only. This raises concern about the potential impact of SSPs when the most pressing social and environmental practices are often taking place among subsuppliers (6, 30). Given that non-consumer-facing companies are less likely to adopt SSPs, a transmission of sustainable-sourcing requirements down the supply chain may not be occurring, leaving many of the most challenging sustainability problems unaddressed.

Second, companies are often using SSPs for only a small subset of their input materials or product lines. On one hand, a focus on key input materials, like palm oil and wood products allows companies to address the most critical inputs in their supply chains, as these commodities can have significant negative impacts (31). On the other hand, the lack of comprehensive coverage across suppliers and input materials highlights an important limitation of the reach and impact of SSPs that is rarely acknowledged in the discourse on sustainable sourcing. Companies may be unlikely to use SSPs for 100% of a product’s input materials, as consumers rarely differentiate between fully and partially sustainable products (32). Furthermore, consistent with our finding that consumer and civil society pressure significantly drives SSP adoption, companies may target their sustainable-sourcing efforts only at input materials that have been the topic of visible campaigns (33).

We also find significant diversity in the audit stringency by which SSPs are enforced, and a large number of companies provide no information on SSP audit requirements. This might reflect the lack of consensus on how best to verify compliance or the challenges that companies face with trying to ensure compliance. Previous studies have questioned the ability of third-party (34–36), second-party (37), and first-party verification (38) to effectively identify and remediate issues in supply chains. Theoretical studies have suggested that the inability to effectively monitor and punish actors based on adherence to requirements makes compliance unlikely (39, 40). There is a critical need to better understand how different types of verification, or lack thereof, influence the effectiveness of SSPs.

The United Nations’ SDGs define the global agenda for sustainability for years to come. However, we find that companies’ sustainability efforts in global supply chains are largely focused on workers’ rights and compliance with national laws. Important social (e.g., health, education, gender, inequality) and environmental (e.g., climate change, energy) issues are rarely the primary focus of SSPs. This raises concern, as companies are expected to be a major player in achieving the SDGs via their global supply chains (7). However, we also see a few leading companies finding

**Table 2.** First-difference results of the simple logit model with Lasso model selection and estimation

Variable	First difference	95% CI
<b>Independent variable</b>		
High brand value (0/1)	0.07**	0.00, 0.17
Top-10 market share (0/1)	0.00	−0.09, 0.12
Revenue: log 5-y average	0.11***	0.05, 0.18
Serves North America (0/1)	0.01	−0.04, 0.11
Serves Europe (0/1)	0.05**	0.00, 0.16
Serves Asia-Oceania (0/1)	−0.15***	−0.25, −0.05
Serves multiple markets (0/1)	−0.01	−0.12, 0.04
HQ environmental stringency	−0.02	−0.10, 0.06
HQ NGO density, logged	0.11***	0.04, 0.21
Operational risk (0/1)	0.09***	0.02, 0.17
Consumer-facing (0/1)	0.11**	0.02, 0.23
<b>Control variable</b>		
Consumer Goods Forum member (0/1)	−0.05	−0.16, 0.19
Adheres to GRI (0/1)	0.13**	0.03, 0.31
Food sector (0/1)	−0.06	−0.13, 0.03
Wood-products sector (0/1)	0.11**	0.02, 0.32
Textile sector (0/1)	0.07**	0.00, 0.20
Sustainability report (0/1)	0.35***	0.25, 0.47
Return on assets: 5-y average	0.00	−0.02, 0.04

\*, \*\*, and \*\*\* denote (two-tailed) significance at the 10%, 5%, and 1% level, respectively. Significance levels are computed by bootstrapping observations. These results can be interpreted as the change in the predicted probability of adopting an SSP when moving from 0 to 1 for binary variables or from the 25th percentile to the 75th percentile for continuous variables, holding all else constant. Binary variables are denoted as (0/1).



To determine the Lasso penalty term, we used 10-fold cross-validation. We then computed the first differences of each independent and control variable using the Lasso estimates for independent variables, control variables, and interaction terms. CIs were calculated using 1,000 bootstrap samples (with replacement).

We developed company-level variables to assess the hypotheses laid out in the literature (Table 3 and *SI Materials and Methods*). We used Bloomberg Financial Services to capture firm-level financial information.

We controlled for sector, profitability as measured by 5-y average return on assets (ROA), the presence of a sustainability report, adherence to the GRI CSR reporting standards, and membership in the Consumer Goods Forum (CGF), a major food, wood-products, and textile industry network that makes sustainability commitments. For robustness checks, we also ran models with the 2015 ROA, the 3-y ROA average, and adding in gross domestic product per capita in the country of the company headquarters (HQ GDP), with similar results.

Several omitted variables may influence results. We expect that what other companies are doing in an industry impacts decisions by companies to

adopt certain SSPs. We account for this using an industry-level Top 10 variable to identify leaders in each sector. We also expect that media attacks on individual companies influence the adoption of SSPs (10). We account for this using (i) a proxy for brand value and (ii) whether the firm is consumer-facing. Strong management commitment to sustainability may also play a role in encouraging SSP adoption (17). Given the cross-sectional nature of our dataset, we are unable to fully account for these influences. Time-series approaches would be required to isolate these potential effects.

Data from this project are available on the Stanford Digital Repository at <https://purl.stanford.edu/hn344kt7076>.

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