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CHAPTER

35 More Sustainable Supply Chains: Is the Journey More Important than the Destination?

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Abstract

Management efforts to design, develop, and operate more sustainable supply chains encompass an increasingly complex variety of social and environmental issues. More sustainable supply chains must now consider how product, operations, natural resources, technologies, and multiple tiers of organizations collectively create value for a diverse set of stakeholders. For multiple reasons, research and practice have tended to adopt an outcome-based perspective, whereby these efforts focus on a sustainability “destination,” which suffers from several shortcomings. Drawing from research in operations management, stakeholder theory, institutional theory, and innovation, this chapter posits how more sustainable supply chains might be co-defined and co-developed by emphasizing a journey that engages multiple stakeholders beyond supply chain partners. Design thinking is a very promising approach, with its iterative steps of empathy, defining the problem, ideate, prototype, and test. This journey-based perspective provides a framework for structuring engagement and encouraging openness to new observations and insights. Finally, the breadth and depth of collaboration with stakeholders, the nature of governance mechanisms, and the form and scale of resource investment all provide the means to assess the journey as it occurs.

Keywords: [supply chain management](#), [sustainability](#), [triple bottom line](#), [innovation](#), [design thinking](#)

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The need for managers to consider environmental and social issues in their firm’s supply chains is now commonplace, and a vast body of research and management literature offers insights into sustainable

strategies, practices, and metrics. But the nature of the management challenge continues to change dramatically. At one time, managers could take modest satisfaction in focusing on reducing pollutants from their plants and cutting toxic substances in their raw materials and products. Similarly, social concerns also had a narrow scope, often limited to passing facility inspections for worker protection and product certifications for safety. Rarely did these concerns extend beyond the firm's immediate suppliers. While these outcomes proved to be good starting points, recent calls to manage a much more complex variety of social and environmental issues in supply chains, viewed as more sustainable supply chains, have shifted and grown dramatically (Porter and Kramer 2011).

To their credit, many managers have moved forward in their efforts to address these important, but complicated issues. For example, facing strong pressure from consumers and nongovernmental organizations (NGOs), many firms have been attempting to eliminate the use of child labor by second- or third-tier suppliers in emerging economies, and other firms have been developing operations to recycle widely dispersed postconsumer plastic waste as they pursue a more circular economy. But clearly achieving these performance goals and providing credible evidence of doing so remain elusive, with firms often heavily criticized for shortcomings, at times based on stakeholders ratcheting up their expectations.

p. 780 In short, the focus is often very strongly on whether a firm's supply chain is meeting investor, employee, NGO, or other stakeholder goals for sustainability outcomes and on what gap remains in meeting those targets. In many respects, this outcome-oriented perspective might be compared to a supply chain attempting to arrive at a sustainability "destination" while using product- and output-oriented metrics as indicators of proximity. Getting to such a destination might take considerable time—with stakeholders becoming increasingly impatient—as firms scramble to alter their products, services and operations, as well as those of their supply chain partners.

As an alternative, emphasizing the "journey" might have considerable value for both the firm and multiple stakeholders, including supply chain partners. First, focusing on the journey might allow for better mid-course adjustments as new scientific and social evidence emerges to address the sustainability concern. Second, the inclusion of diverse stakeholders might stimulate meaningful dialogue, education, and benefits flowing in multiple directions. But diversity also raises the costs of coordination and, in fact, might seed harsh conflicts among stakeholders. Finally, a narrow focus on key metrics linked to outcomes might be augmented with a more balanced set of indicators that capture more collaborative aspects. Design thinking is one such journey-oriented perspective that holds much promise for structuring and enabling the development of more sustainable supply chains.

This chapter makes three contributions. First, our brief review of prior literature in sustainable supply chains demonstrates how much of the research to date has implicitly adopted and stressed an outcome-based perspective. This perspective is understandable given our field's general focus on objective performance. Yet, three illustrative streams of research, namely, sustainable sourcing, public policymaking, and innovation, point to another perspective: focusing on collaboration, inclusion, and openness along the journey. Thus, the second contribution is to briefly consider how each literature stream might inform a richer consideration of the factors that chart more efficient and effective development of increasingly sustainable supply chains. Third, the chapter explores how design thinking might be an excellent framework to guide management's approach when metrics can be developed to assess the quality of the journey. Thus, the journey-based perspective, as operationalized with design thinking, forms an important complement to a destination-oriented perspective.

Assessing Sustainability Outcomes

The term *sustainable development* gained increasing credence in the political and business vocabulary following the release of *Our Common Future* in 1987, and over three decades later, that definition remains a guiding beacon: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987). Criticisms about the long-term viability of consumption, along with the implications of population growth and increasing evidence of changing ecological systems—in large part a result of increased carbon emissions and pollution—have led to consumer demands shifting and firms being pressured to develop and offer more sustainable products, services, and supply chains.

One popular conceptualization in a business context is the triple bottom line (TBL), representing the three pillars, or dimensions, of sustainability: social, environmental, and economic performance (Elkington 1997). The TBL sets out an implicit mandate to manage and improve sustainability performance. As a result, we see TBL reflected in global sustainable development frameworks such as the Global Reporting Initiative and the United Nations’ Sustainable Development Goals (SDGs), both of which integrate the assessment of economic, social, and environmental impact via specific sets of outcome-based metrics. For example, the SDGs¹ strike a balance along the three dimensions of the TBL, such as promoting SDG 13 (climate action [environmental]) while advocating for SDG 2 (zero hunger [social]) and SDG 8 (decent work and economic growth [economic]). And some goals encompass more than one dimension of the TBL, such as SDG 7 (affordable and clean energy), which arguably captures all three dimensions of the TBL with clear linkages to supply chain management.

Outcome-Based Metrics

Firms are increasingly assessing and disclosing their goals and performance along environmental and social dimensions to demonstrate their commitments to sustainability. Over time, the scope of this disclosure has extended to management practices and sustainability outcomes in their supply chains, resulting in the emergence of sustainable supply chain management (Linton, Klassen, and Jayaraman 2007; Pagell and Wu 2009). Given the relative severity of the upstream environmental and social impacts in many supply chains (e.g., Clift 2003), downstream firms are held accountable and must take responsibility for the total impact created by their products and services.

Metrics are critical elements for translating a firm’s general goals into specific outcomes and they provide integral feedback for effective management (Melnik, Stewart, and Swink 2004). For example, Dell and Bayer CropScience have employed TBL metrics to improve the sustainability of their supply chains. Each firm evaluates and discloses performance metrics relevant to their specific industries, competitive settings, and supply chains to chart their progress in areas such as energy use, carbon footprint, and the presence of child labor. These metrics allow external stakeholders (e.g., investors, customers, and NGOs) to determine how each firm is performing relative to its competitors and assess if a firm has reached a desired level of sustainability.

One useful analogy is to think of these firm’s goals and commitments as “destinations,” where outcome-based metrics quantify progress toward such destinations (Lamberton 2005). Of course, the firm might or might not yet have arrived because getting to a destination takes time and requires significant changes to the design of a firm’s products and services, as well as to the operations of the firm and its supply chain partners. In practice, these destinations are usually temporary “way stations” because stakeholders or management periodically push for more aggressive goals (i.e., new destinations) based on improved scientific understanding and advancing social expectations (Martin 2002).

Annual corporate social responsibility or sustainability reports have become a common medium for firms to communicate their sustainability goals (i.e., destinations) while globally recognized frameworks push firms to focus on appropriate outcome-based metrics. For example, the Global Reporting Initiative standards (2018) contain widely adopted sustainability-related performance metrics. To simplify and systematize their use, these standards have been structured in a modular fashion with a suite of topic-specific metrics that delve into subcategories of each of the three bottom lines. Furthermore, as Table 35.1 suggests, metrics may be used to evaluate the impact of products that are produced by supply chains or the collective operational processes embedded in supply chains (Clift 2003).

To illustrate, consider Dell's efforts to increasingly disclose information about the percentage of its products that were designed for disassembly (product metric) and its supply chain emissions and reduction targets (supply chain metrics). Dell also linked reported metrics with specific SDGs (Dell 2017b). For example, the percentage of Dell's suppliers that set reduction targets and track greenhouse gas emissions was linked to SDG 13 (climate action). Furthermore, Dell transparently communicated its desired destination: its goal was for 95 percent of its suppliers (by cost) to set reduction targets and report greenhouse gas emissions.

Bayer CropScience also has identified specific destinations and communicated progress. For example, the firm aimed to eliminate child labor from its cottonseed supply chain, which was pervasive and culturally tolerated at many of the farms in India where seeds were cultivated (Subramanian, Dhanaraj, and Branzei 2010). Bayer has assessed progress directly using unannounced farm-level audits and indirectly by measuring how many children have participated in and graduated from its Child Care Program (Roy 2013).

Table 35.1. Illustrative Outcome-Based Sustainability Metrics

Product	Supply chain
• Customer privacy and data breaches • Environmentally sensitive materials used in products • Packaging materials reclaimed • Products designed for disassembly, recycling, reuse • Recycled input materials	• Basic salary of women/men • Emissions of greenhouse gases • Employee absenteeism • Employee accident rate • Noncompliance incidents with environmental regulation • Renewable energy consumption • Risk of child labor • Training on human rights • Waste generated • Water consumption

The current outcome-based approach of measuring sustainability improvements along the dimensions of the TBL provides key benefits to supply chain managers and external stakeholders. First, outcome-based sustainability metrics like those summarized in Table 35.1 are often used to capture different environmental or social impacts of a firm's business, allowing managers to assess, compare, and contrast the broad sustainability implications of design, sourcing, manufacturing, and distribution decisions (Clift 2003). Second, outcome-based metrics allow for relatively easy data collection and interpretation, which encourages benchmarking between firms (e.g., Dias-Sardinha and Reijnders 2005). Third, the data comprising such metrics are relatively self-explanatory, making it easy for firms to communicate their performance to various external stakeholders (e.g., Global Reporting Initiative 2018).

Key Deficiencies of Outcome-Based Metrics

A focus on outcome-based metrics raises many concerns that must be addressed by supply chain managers. As reviewed by Reed, Fraser, and Dougill (2006), two broad methodological paradigms underpin the identification of sustainability metrics: expert led, top-down; and community based, bottom-up. These paradigms both come with deficiencies that may be amplified when supply chain managers are tasked with selecting among sustainability metrics and coordinating their use across increasingly diverse and global supply chains. Furthermore, the focus on a few critical widely reported metrics can promote tunnel vision, which inhibits firms and their supply chains from recognizing significant intertemporal trade-offs (Klassen and Hajmohammad 2017).

Top-down approaches implementing outcome-based metrics are susceptible to problems of scale and participation. If corporate leadership is entrusted with defining and shaping its supply chain sustainability initiatives in isolation, critical issues can be missed at local supplier levels. A specific top-down vision for sustainability, along with corresponding metrics, might not resonate with suppliers if that vision does not align with important concerns in their local communities, resulting in weak supplier participation. The risk of misalignment is especially challenging in global supply chains where suppliers reside in different communities with widely varying needs. In contrast, bottom-up participatory approaches are susceptible to myopia, that is, decision-making that prioritizes short-term goals at the expense of realizing optimal long-term outcomes. However, achieving short-term goals often provides immediate and clear local benefits and, in fact, may help combat the problem of participation (Reed, Fraser, and Dougill 2006).

p. 784 In light of these shortcomings, a *balanced approach* can effectively deploy metrics involving community and higher-level actions. Adaptive learning, objectivity and ease of use of indicators, and tiered management decision-making can facilitate such an approach. First, adaptive learning (Reed, Fraser, and Dougill 2006) can improve sustainable performance, which involves iterations between using expert guidance (top-down) to develop and implement metrics, followed by community input (bottom-up) to adjust and refine such metrics. Progression over time can repeat this top-down and bottom-up interaction. This model is consistent with organizational knowledge acquisition and learning from experience (Huber 1991).

Second, indicators should be both objective, presenting an unbiased representation of a given sustainability outcome, and easy to use (Reed, Fraser, and Dougill 2006). However, a natural tension can occur between these two criteria, and oftentimes trade-offs must be made when selecting appropriate indicators. An appropriate trade-off will result in an indicator that allows a reliable estimate of the underlying sustainability performance, while also broadly communicating the measurement with minimal cost. For example, while management and stakeholders might want to know exactly how many instances of child labor occur in Bayer's cottonseed supply chain, a comprehensive continuous review of thirty thousand farms in rural India is technically challenging, time-consuming, and very costly. Therefore, a small number of unannounced audits is a strong indicator. Furthermore, the number of children that graduate Bayer's Child Care Program is also informative of the degree to which alternatives are in place for at-risk children (Roy 2013).

Considered broadly, outcome-based sustainability metrics—and the destinations that they represent—are not solutions, but rather represent tools that measure progress along a few narrow, predefined dimensions. These tools must be used as part of a larger supply chain strategy to generate environmental and social value. Yet, as a firm proceeds along a sustainability journey, it must be wary of new problems that might arise as a result of the complex interdependencies between metrics that may not be readily apparent. Fixating on outcome-based metrics can lead to unintended consequences resulting from complex interlinkages between sustainability metrics, which in turn obscures the underlying causes of a problem, and ill-advised prescriptive target setting can occur.

For example, through its core Child Care Program, Bayer increased access to education as part of its strategy to eradicate child labor from its supply chain. However, tracking metrics related to education alone could prove problematic because the underlying causes of child labor were complex and multifaceted. In 2001, an estimated 12.6 million children were working in India, with roughly 20 percent of the country's economy reliant on their labor and many desperately poor parents needing the income generated by their children (Subramanian, Dhanaraj, and Branzei 2010). Therefore, focus on one "good" sustainability target (e.g., increasing enrollment in education or graduation rates) might well reduce the family income of very poor households. Alternatively, price targets for harvested cottonseed could be adjusted upward to allow farmers to hire adults at higher wages, rather than children.

p. 785

The very different journeys Bayer and Dell have taken toward more sustainable supply chains, detailed later, emphasize that metrics must be complemented with effective management processes. In some respects, principles underlying quality management provide a fitting analogy for recognizing the dangers of focusing on outcome-based metrics that hope to "inspect in" sustainability. Instead, the process must be well managed to avoid problems, or at least respond to problems after their timely detection. For sustainability, that process is a journey as more sustainable supply chains materialize; outcome measures provide one way to chart progress, but on their own they do not provide prescriptions for how to more effectively reach a sustainability destination.

Understanding the Journey

In addition to employing the use of outcome-based sustainability metrics, management is recognizing the significance of better understanding how a firm might pursue sustainability-related goals and direct how those outcomes are achieved. It is helpful to consider three illustrative streams of research and business practices that demonstrate the criticality of a journey toward more sustainable supply chains: sustainable sourcing, public policymaking, and innovation. Process-related aspects of these topics determine how products and supply chains—as well as their surrounding industrial and social systems—progressively evolve to incorporate more meaningful social and environmental attributes, ultimately improving outcomes.

Sustainable Sourcing

Looking upstream in a supply chain, sustainable sourcing is defined as managing all aspects of suppliers to maximize TBL performance (Pagell, Wu, and Wasserman 2010) and considers both monitoring and collaboration with suppliers. Before considering each aspect, it is helpful to note that monitoring consists of gathering, processing, and verifying information about the sustainability-related aspects of supplier practices and performance. In contrast, collaboration emphasizes proactive education, training, dialogue, and continuous improvement that mitigates supplier-related sustainability shortcomings and improves performance. Well-crafted practices of monitoring and collaboration can induce both controlled and emergent environmental and social improvements (Touboulic, Matthews, and Marques 2018). Still, the literature finds that buying firms design and execute these processes in a variety of ways (Wilhelm et al. 2016), often achieving little success, at least based on outcome measures, such as pollution, eco-friendly products, and compliance with regulations (Villena and Gioia 2018). Thus, similar to quality inspection, we see the need for frameworks and process-based metrics that can more precisely guide and assess the development and underlying practices of sustainable sourcing.

Drawing from environmental management studies (Luyet et al. 2012; Reed 2008), the degree of inclusivity is an important factor that discriminates among the practices that buying firms use for both monitoring and collaboration. Looking first at monitoring, inclusivity refers to the degree to which a variety of diverse stakeholder groups are engaged in the design and execution of gathering data and verifying information from suppliers (Gualandris et al. 2015). With low inclusivity, the buying firm autocratically designs and executes data gathering, processing, and verification. Unfortunately, empirical research has shown that this approach tends to result in an expensive cat-and-mouse game that often fails to incentivize better social and environmental outcomes among suppliers (Locke, Qin, and Brause 2007).

Firms can increase inclusivity by interacting with multiple stakeholders to varying degrees, who, in turn, can play different decisional and operational roles in the supplier monitoring process. A buying firm might cooperate with competitors to homogenize their multiple supplier codes of conduct and share audit findings to avoid duplication of effort for common suppliers. For example, AT&T, Vodafone, and other operators in the information and communication technology industry have been working together under the Joint Auditing Cooperation² to design and execute a common methodology that assesses and verifies their complex supply chains. Here, monitoring becomes a market force that attempts to legitimize specific sustainability standards and incentivizes supplier disclosure about their environmental, social, and governance performance (Jira and Toffel 2013). Illustrative of higher inclusivity, several buying firms in North America have partnered with the Sustainable Purchasing Leadership Coalition³ to redesign and standardize their sourcing metrics and criteria.

Collaboration with suppliers is another pathway to close gaps between customer expectations and supplier performance identified through monitoring. Instead of curtailing business with noncompliant suppliers, collaboration leverages the expertise and direct involvement of the buying firm to build, expand, and deepen the supplier's social and environmental capabilities. With low inclusivity for collaboration, the buying firm designs and executes its own training and educational activities. As inclusivity expands, suppliers themselves are allowed or encouraged to take a more active role in the design and execution of interfirm collaboration. For design, buying firms can engage with large suppliers to codevelop novel collaborative tools. For example, in 2015 the British Telecom Group mobilized a small number of key suppliers for consultation about the development of the Best Future Supplier Forum,⁴ a novel e-tool that could ideally allow for lateral learning among suppliers and sub-suppliers in diverse information and communication technology subindustries. For execution, recent literature highlights suppliers' double-agency role, a phenomenon that sees direct suppliers cascading a buying firm's collaborative activities to sub-suppliers (Wilhelm et al. 2016). With high inclusivity, a large variety of diverse stakeholder groups work together. For example, Nike worked with NGOs, such as MicroBenefits,⁵ to give tips to suppliers' workers on how to manage their work and protect their health and safety.

Consistent with instrumental stakeholder theory (Jones 1995), inclusive sustainable sourcing can lead to significant competitive advantage. Engagement with diverse stakeholder groups, such as competitors, NGOs, and local communities, can lead to the definition of more appropriate performance metrics and provide an early warning system for possible supplier violations. Buying firms also can benefit from resultant procedural and personal legitimacy. More specifically, by involving diverse stakeholder groups, the buying firm gains evidence that acceptable techniques and procedures were employed (i.e., procedural legitimacy) while also profiting from the capabilities and objective judgment of other stakeholders (i.e., personal legitimacy). Unfortunately, inclusivity can impose costs. For example, including diverse stakeholders can delay decisive action and introduce significant uncertainty in terms of which stakeholder groups to involve, how to encourage cooperation, and how to best structure their collective contributions (Luyet et al. 2012; Reed 2008).

Public Policymaking and Implications for Supply Chains

Existing public policies and prevailing business norms can hamper the development of more sustainable supply chains. As one lens to characterize this challenge, institutional theory recognizes that supply chains are embedded in and interact with larger industrial and social systems that are governed by formal regulative institutions, such as laws and policies, and informal institutions, such as behavioral norms (normative institutions) and mental frames (cognitive institutions), that collectively produce meaning, stability, and order (Scott 2013). Diverse stakeholders—including consumers, customers, buying firms, suppliers, and investors—seek legitimacy by conforming to the prevailing institutions that populate their industrial and social systems (DiMaggio and Powell 1983).

Although systemic change is often emergent and outside the control of any single actor (Edmondson, Kern, and Rogge 2019), related literatures provide ample evidence that governments and NGOs act intentionally to develop new ideas and reframe existing institutions to force change in the behaviors of specific stakeholder groups (e.g., Streeck and Thelen 2005), such as buying firms and their supply chain partners. In doing so, they act as “institutional entrepreneurs” who reveal the crisis, frame the issues, and mobilize support (Gualandris and Klassen 2018; Mair, Marti, and Ventresca 2012). Institutional entrepreneurs are organizations that possess strong relational skills and act as catalysts of systemic change by building alliances and coordinating their collective work (Lawrence, Hardy, and Phillips 2002).

For example, consider recent Canadian efforts to establish a national circular economy, which aims to decouple economic growth from environmental exploitation. Unfortunately, in some Canadian provinces like Ontario, roughly 75 percent of all goods end up in landfills (Knowles and Gill 2014) and the federal government is now actively working to incentivize firms and consumers to recycle, reuse, and reduce more of these goods and materials. The government has started to promulgate innovative procurement guidelines for circularity,⁶ engaged with circularity brokers like NISP Canada⁷ to deliver educational programs in critical geographical areas, and worked with the Smart Prosperity Institute to devise novel policies like the Extended Producer Responsibility (Valiante 2018), the Right to Repair (CBC 2019), and a ban on microbeads and single-use plastics (Lewis 2019). Moreover, consistent with the public policy literature (e.g., Sabatier and Mazmanian 1980), NGOs are seen as key partners to (1) define the problem to address, (2) identify other stakeholders to target, and (3) develop a causal theory that explains which institutions are causing unsustainable behaviors and what mix of legislative, advocacy, and educational activities can alter them.

One approach to policymaking is to form and leverage policy networks. These networks are agglomerates of diverse organizations—federal and provincial governments, municipalities, NGOs, trade associations, influential firms, and other co-opted stakeholders—that are connected by common interests or resource dependencies. These networks can act collectively to change the institutions that are inadvertently causing unsustainable behaviors (Doh and Guay 2006; Matland 1995; Sabatier and Mazmanian 1980). This approach resonates with the operation management literature, because a policy network is analogous to a network of service providers that collectively design and execute complex sequences of developmental activities to deliver systemic social and environmental change (Gualandris and Klassen 2018; Rodriguez et al. 2016). Thus, the degree of inclusivity for multiple organizations, NGOs, and governmental agencies and the structuring of their collective work are important factors that determine the degree of success in altering institutions and affecting stakeholders’ behavior.

Unfortunately, numerous public policy studies have demonstrated that one of the principal barriers to successful policymaking is effectively coordinating action among the many semiautonomous organizations and interest groups in a policy network (e.g., Matland 1995). For example, generic guidelines that lack clear principles for individual and collective action might not be consistently implemented into the operating procedures in all organizations in the policy network. Challenges to coordinate action become even more acute when the targeted industrial or social system is very heterogeneous (e.g., Sabatier and Mazmanian 1980): framing new policies and norms for increasingly diverse stakeholders is progressively more difficult, and devising clear guidelines for implementation can prompt a patchwork of exceptions, potentially allowing considerable discretion for individual organizations and their field personnel. To counteract this barrier, the number of autonomous organizations forming the policy network can be limited, or alternatively, a large network can be divided into subgroups to reduce the complexity and breadth of information sharing and coordination (Hooghe and Marks 2003).

Similar insights have recently emerged in the operations management literature, where the inclusion of diverse organizations and interest groups is insufficient on its own (Rodriguez et al. 2016). In the supply chains of some NGOs, for example, combinations of tactical differentiation and the deployment of diverse coordination mechanisms, supported by adequate relational and technical capabilities, helped networks of cross-sector organizations to adapt to high levels of heterogeneity (Gualandris and Klassen 2018). Tactical differentiation refers to dividing a policy network both organizationally and technically into distinctive subgroups, which reduces the information processing needs of individual organizations within the network. Differently, coordination mechanisms include clear principles for action, loosely specified plans, and direct lines of communication; such mechanisms foster the ability of the entire policy network to process information and deliver activities that are highly synergistic. As an industrial or social system becomes more heterogeneous, organizations and interest groups must operate in an agile network structure where policymaking and implementation processes are more adaptable and subgroups more dynamic.

To conclude, our synthesis of related literatures indicates that we need to pay more attention to which organizations and stakeholders are involved in policymaking and implementation, what opportunities for participation are provided, and how their actions can be leveraged and coordinated. The extent of inclusivity, differentiation, and coordination of policymaking and policy networks is critical to enabling the generation of meaningful, long-lasting improvement in key institutions and their behaviors.

Sustainable Supply Chain Innovation

Innovation is often touted as a critical enabler, and even driver, of more sustainable businesses and supply chains. In short, sustainable supply chain innovation is defined as incremental to radical change in products, operations, technologies, and management systems that positively affects multiple tiers and functions in a supply chain, thereby creating varying levels of environmental, social, and economic value for a variety of stakeholders (Gao et al. 2017). Thus, sustainable innovation merges the consideration of sustainable sourcing with the importance and complexity of involving multiple organizations and stakeholders, along with the expansion of supporting public policies. As buying firms try to innovate their (un)sustainable supply chains or establish novel end-to-end supply chains, they collaborate with various stakeholder groups to reform the surrounding industrial and social systems, especially when these systems lack adequate infrastructure (Wu and Jia 2018).

But how are managers to decide which stakeholders are good collaborators that might foster innovative outcomes? Sustainability-related innovation in supply chain management has drawn on the concepts of interorganizational complementarity and compatibility, focused largely on aligning the firm with customers and suppliers (Shou et al. 2018). Yet, if collaboration were reframed as “engagement,” additional capabilities and practices can be synthesized from the literature, including external integration through bridge building, value framing through such practices as empathizing, and systematized learning through such practices as ongoing continuous learning (Watson et al. 2018).

Social innovation provides a thought-provoking model for considering innovation in supply chains. The earliest mentions of social innovation in academic literature date back to the early twentieth century, but only since the turn of the twenty-first century has the study of the topic grown substantively (Ayob, Teasdale, and Fagan 2016). A dominant stream of work emphasizes the process of collaboration between different groups, leading to new ideas and, most important, the restructuring of relations between individuals and organizations to enable empowerment and positive societal change. In essence, innovation is coproduced by multiple stakeholders, including the expected beneficiaries of any positive change. For example, returning to Dell, one recent area of supply chain innovation has been an expanding initiative to mitigate the ever-growing problem of ocean plastics (Dell 2017a). Building on earlier efforts to replace petroleum-derived foam with bamboo, the firm’s approach was evolving from “do not harm” to actively considering how its supply chain might improve the natural environment. Through the 2020 Legacy of Good plan, Dell described how its products, operations, and management systems will create ten times the amount of “good” when compared to any negative footprint from its business (Dell 2017b). One focus was capturing and recycling plastics from poorly managed plastic waste likely destined for nearby oceans in south Asia, termed ocean-bound plastics. If a supply chain solution could be scaled, the outcome would have an enormous positive impact on ocean health and marine life (Anupindi and Hoffman 2018). In 2017, the firm pledged to increase its annual use of ocean-bound plastics in its products and openly shared details about its operational process with customers, competitors, and a broad variety of other organizations, including industry associations and NGOs.

According to Wu and Jia (2018), buying firms attempting such large-scale innovation in their supply chains must first envision a new architecture for their industrial system and, second, reshape that vision with involvement from other institutional actors. In an iterative process of assessment and (re)action, a diverse mix of institutional actors—including governments, NGOs, competitors, and industry associations—must evaluate industry-wide assets and technologies, consider who controls which assets, evaluate possibilities for value creation, and identify actions that tap into those opportunities. The buying firm, as one influential actor, can inform and contribute to this iterative process using pilot tests, as well as advocacy and educational activities, to better position its products, technologies, and management systems as helping to map a shared path toward socioeconomic progress.

For managers at Dell, developing a physical supply chain was just one critical task, requiring the firm to establish novel production facilities, supply bases, and distribution networks in south Asia. Managers also needed to influence regulative, normative, and cognitive institutions during formative phases to reduce risks. For example, the informal sector, that is, individuals who gathered waste plastic (termed *pickers*), was central to the collection of ocean-bound plastics, which added uncertainty in supply, particularly as operations were scaled up (Anupindi and Hoffman 2018). Dell also wanted to mobilize support from local institutional actors, such as governments, NGOs, and industry associations, to establish norms to avoid child labor and poor working conditions in the informal sector.

Proactively involving local institutional actors leverages the notion of shared value (Porter and Kramer 2011), whereby a diverse mix of stakeholders and Dell's supply chain partners benefit. Notably, these stakeholders also influence and shape an industry, potentially creating a virtuous circle of industry reform and development. First, institutional actors helped to identify and validate prospective suppliers, for example, by identifying and training unfamiliar plastics processors. Second, multiple concerted efforts toward rapid industrialization and institutional reform drove demand for products ↘ up and costs down—for example, through better transportation architecture and better labor practices.

In summary, three primary themes emerge from ongoing research and expanding business practice in the areas of sustainable sourcing, public policymaking, and innovation related to sustainable supply chains. First, inclusivity of a diverse mix of stakeholders can be critical for enabling both effective monitoring and productive collaboration that sense and respond to supplier problems. Second, inclusivity also can create challenges for coordinating the work of multiple organizations, NGOs, and governmental agencies. Critical questions include what degree of inclusivity is most desirable, when and how to expand or limit inclusivity as the process unfolds, how to coordinate across multiple organizations, and how to structure any collective policymaking and implementation work. Finally, emerging research suggests that altering existing institutions and employing novel stakeholder engagement approaches (beyond direct supply chain partners) can foster wide-scale changes in industrial and social systems by leveraging the creation of shared value.

Clarifying and Improving the Journey

The journey seems so simple: If a firm strategically prioritizes improving sustainability-related outcomes, expands sustainable sourcing, participates in public policymaking, and pursues supply chain innovation, then novel products, processes, and business models result. Yet, sustainability-related innovation is often much more complex and ambiguous than other forms of innovation because of the need to satisfy a wider range of stakeholders with differing priorities and potentially conflicting viewpoints, combined with greater political and scientific uncertainty (Hall and Vredenburg 2003). Just as important, benefits must be communicated to multiple stakeholders (including shareholders) using integrated financial and environmental, social, and governance reports (Eccles and Serafeim 2013). But should supply chain managers wait until after the innovation is fully formed and present in the marketplace to engage stakeholders and communicate the outcome? Or, more troubling, are “improvements” resisted at times because of opposition from stakeholders that are not supply chain partners? One only has to recall the controversy that continues to surround genetically modified organisms used in food crops (Hall and Vredenburg 2003).

Solving such complex problems requires assessing several highly interdependent factors and searching across many possible options that might affect many stakeholders. Looking for a “best” solution can be compared to managers looking for a high peak on a rugged performance “landscape” (Baumann, Schmidt, and Stieglitz 2019). Drawing from this research, four themes are informative as we consider a firm's search (i.e., journey) for more sustainable supply chains: learning modes (e.g., experiential or vicarious), problem decomposition (e.g., restricting choice and partitioning into subproblems), cognitive representations (e.g., problem structure and potential solutions), and distributed ↘ search (e.g., using parallel and coupled searches). We will return to these shortly after first exploring how design thinking can create a map for the journey.

Design Thinking and Openness

As a starting point, organizations often manage innovation and development through a knowledge funnel (Martin 2009). For example, Beltagui (2018) describes a manufacturer seeking to develop related service business models—one outcome that can yield more sustainable supply chains—where the wide end of the funnel is this unsolved, potentially poorly defined problem. Design thinking provided a process for redeploying familiar capabilities in a new, yet efficient manner to address how the firm and its supply chain might move toward servicization with refined, scalable solutions. More specifically, managers design solutions through an abductive approach by making incremental changes, assessing the outcomes, and then proposing further adjustments and refinements (Martin 2009).

Design thinking has expanded from a set of three interconnected spaces, namely inspiration, ideation, and implementation (Brown 2008), to more formally structured, iterative steps: empathize, define, ideate, prototype, and test (Doorley et al. 2018) (see Figure 35.1). Among other areas, design thinking has been applied to social innovation (Brown and Wyatt 2010). Coincidentally, language focusing on empathy has recently emerged in the eco-innovation literature (e.g., Watson et al. 2018). Specifically, design thinking recognizes that designs must adapt and evolve over time, even during development, to remain relevant; design is often a pluralistic activity that benefits from involving multiple stakeholders; and behavioral factors—not just rationality—affect the views, practices, and constraints perceived by stakeholders (Clarke and Craft 2019).

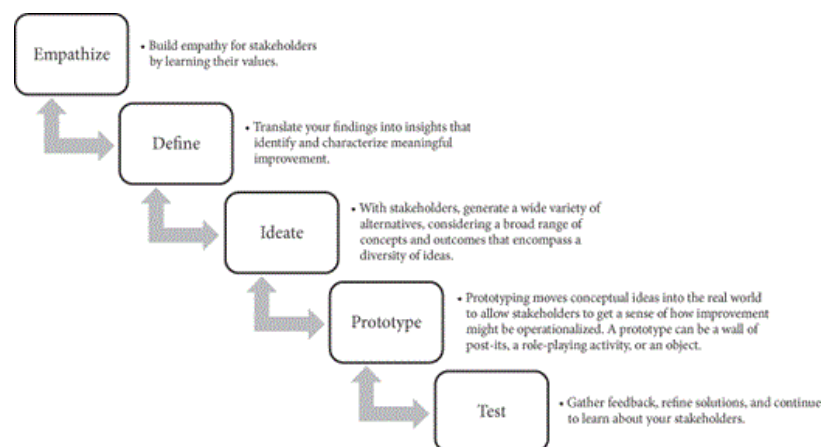


Figure 35.1. Applying design thinking to a sustainability journey.

Given the complexity of many sustainability challenges, leading firms might expand their knowledge funnel by drawing on the ideas, knowledge, and expertise of multiple stakeholders. Termed openness, multiple senior managers should be exposed to and hear external stakeholder voices to better enable a firm to absorb views and perspectives of stakeholders and to challenge internal thinking (Juntunen et al. 2019). Openness adds an important descriptive nuance to our earlier discussion of inclusivity, because openness emphasizes what can result from interactions with highly salient stakeholders beyond supply chain partners. Yet, understanding the relative saliency of stakeholders can be challenging (Gualandris et al. 2015), sometimes resulting in critical aspects being overlooked in the rush to market, as was the case with Monsanto's introduction of genetically modified crops (Hall and Vredenburg 2003). As another example, poor families need safer and more energy-efficient stoves in emerging markets, yet tend to resist imposed solutions. Thus, engaging with a diverse mix of stakeholders enables a firm to pick up weak signals from unexpected sources, thereby encouraging the timely and beneficial redirection of the journey toward sustainability (Lettice and Parekh 2010).

Ranging from limited to progressive, openness is defined by such indicators as when engagement occurs in an innovation process and what the impact of that engagement is. Openness also can be outsourced either formally or informally to supply chain partners and NGOs (Rodriguez et al. 2016), although doing so adds complexity and likely reduces dialogue and influence. For example, stakeholders might be engaged early, as new ideas are emerging; much later when detailed designs—or even plans for adoption or marketing—are being finalized; or throughout an innovation process. Accordingly, the firm can adjust both the goals and implementation surrounding a more sustainable product, service, supply chain, or business model (Hall and Vredenburg 2003). Simultaneously, and just as important, the views of stakeholders might evolve too when engaged in a multiway development process.

Examples of Journeys

If we reconsider Dell's initiative to build a new supply chain to combat ocean-bound plastics, we can see these three concepts of design thinking, openness to stakeholder engagement, and problem-solving in complex landscapes come together. The firm faced a complex institutional setting combined with a variety of pressures pushing for improvement in its supply chain for plastic packaging. The lens of design thinking offers a perspective on how to structure the journey while encouraging creative thinking (this example is drawn from a detailed case study by Anupindi and Hoffman (2018)). Initially, conversations between internal groups at Dell and an external advocate, Adrian Grenier, founder of Lonely Whale (<https://www.lonelywhale.org>), supported the joint development of an educational project about the dangers of ocean plastics. Broader conversations during that year carried this development further as Dell supply chain managers started to consider the opportunity to incorporate ocean plastics in Dell's emphasis on innovative packaging. In doing so, Dell's managers were developing empathy for how external stakeholders viewed the issue of ocean plastics while also aligning with the firm's efforts to lead on environmental issues.

Next, management sought to define the problem more clearly, despite seeing significant hurdles for cost and risk. Initial assessment focused on identifying the scope of the problem, drawing on academic experts. Third, the ideate step explored alternatives to capturing ocean plastics, because harvesting directly from the ocean appeared to be very expensive, inefficient, and unreliable. Harvesting plastic waste somewhat earlier in its lifecycle, when the waste was being mishandled and likely would flow into a nearby ocean, was much more feasible.

The following year, Dell's successful efforts to undertake a pilot supply chain study are comparable to the prototype step in design thinking. Based on Haiti, this pilot study was close to Dell's headquarters, which enabled strong technical support. This prototype step harvested over 7,000 kilograms of ocean-bound high-density polyethylene plastic waste, to be cleaned and processed into resin in the United States and then shipped to China to be mixed with postconsumer plastic waste before being formed into the giftbox tray for a laptop. Key lessons were learned, such as how to work with the informal economy, that is, pickers who collected waste plastic, to ensure higher efficiencies and better livelihoods. Education programs, such as local beach cleanups, also were important. Finally, the test step focused on building larger supply chains to source ocean-bound plastic waste in Indonesia and India. In addition, other stakeholders were approached, including competitors and other large users of plastic packaging, to form a consortium with bigger economies of scale, enabling the potential for much larger impact (Dell 2017a).

Similar observations, but with a few key differences, can be made about Bayer CropScience's journey to address child labor in its supply chain for cottonseed production in India. Bayer's acquisition in 2003 of an Indian firm with relatively modest market share (six percent) of cottonseed sales naively overlooked the local culture and widespread practice that accepted the use of child labor by farmers who were suppliers (this example is drawn from a detailed case study by Subramanian, Dhanaraj, and Branzei (2010)). Initial communication from Bayer stressed the firm's zero-tolerance policy for child labor; however, greater empathy was gained by understanding the scope of the problem in this social system and was informed by managers, government officials, and competitors doing business in India. Not surprisingly, many activists, NGOs, and even institutional investors were highly critical of Bayer, collectively underscoring that the firm (and other multinationals) had to abolish child labor. Just as important, stakeholders also pointed to the lack of educational options for these child laborers as a contributing factor. Ideation involved forming an initial collaborative working group, named the Child Labor Elimination Group, comprising multiple stakeholders, including Bayer CropScience, international competitors, government agencies, and NGOs. Prototyping by the Child Labor Elimination Group resulted in a three-level escalating penalty system and incentives for farmers with zero-child labor, all driven by random unannounced audits conducted by NGOs and an auditing firm. However, slow decision-making, differences in views about "best solutions," and complex coordination among stakeholders hampered progress. Bayer reportedly disliked the strong policing attitude engendered in this approach.

p. 795

Thus, further iteration to ideation yielded a solution that was directed and controlled by Bayer, albeit with involvement of different NGO partners in key roles. The new program, the Bayer CropScience Child Care Program, had a dedicated management team and an independent budget (Roy 2013). Leveraging earlier learnings, this expanded test step now relied on the three synergistic aspects: communication to farmers, expanded penalties and incentives, and educational alternatives for former laborers who were children. The NGO partners aided in supporting children to join schools, given that multiple factors contribute to their difficult family situations. This expanded program proved to be very successful, both with farmers and with many other stakeholders (Roy 2013). Thus, design thinking includes, at times, expanded stakeholder engagement, and at other times, adjustments to work toward a better outcome.

Steps toward Assessing the Journey

Reflecting further on the complex journeys that Dell and Bayer CropScience experienced as they searched for innovative supply chain solutions, we can see that much of the learning was experiential. Each of the middle three steps, namely, defining the problem, ideation, and prototyping, afforded new observations and insights that could be leveraged later. Moreover, problems were decomposed into specific areas, such as ocean-bound versus ocean-resident plastics or penalties versus education. Moreover, the problem structure and potential solutions also required significant reiteration with Bayer CropScience, shifting from a distributed collective approach to a better resourced corporate approach with direct accountability and the willingness to leverage the specific expertise of multiple stakeholders.

Design thinking and openness do not necessarily lead to consensus among stakeholders, nor do all stakeholders provide actionable helpful input. Interorganizational relationships must consider at least three critical aspects related to the journey as multiple stakeholders are engaged: collaboration, governance mechanisms, and resource investment (Neutzling et al. 2018). As summarized in Table 35.2 for both Dell and Bayer CropScience, stakeholder collaboration encompasses communication and information sharing, joint development projects and practices, and sharing of norms and values. Supplier collaboration is a reasonable initial step, but it is less useful if new supply chains are being developed, as with Dell. Moreover, working with multiple parties beyond supply chain partners can help to identify new opportunities for innovating products and operations and for smooth adoption (Melander and Pazirandeh 2019; Wu and Jia 2018). After receiving input, the collaboration might need to evolve to better position for success, for example, as Bayer CropScience transitioned from the Child Labor Elimination Group to the Child Care Program. Governance mechanisms include both formal ↵

p. 796

p. 797 ↵

p. 798 ↵

mechanisms, such as contracts, incentives, and certifications, and informal mechanisms, such self-assessment and social ties. Finally, resource investment includes partnerships with particular exchanges, financial support, knowledge-sharing routines, and perceptions of transparency and reciprocity (Neutzling et al. 2018). Each of these three aspects hints at potential measures to better assess the quality of the journey toward more sustainable supply chains.

Table 35.2. Illustrative Assessment of the Journey to More Sustainable Supply Chains

Dimension	Definition	Dell	Bayer CropScience	
			Child Labor Elimination Group	Child Care Program
Stakeholder collaboration	- Looking beyond direct supply chain partners - Communication and information sharing - Joint development projects and practices - Sharing of norms and values	- Social good activist: education - Academic team: white paper and search for solutions - NGOs: definition of ocean-bound plastics - Informal sector, for example, waste pickers - New supply chain partners - Consortium of firms using recycled plastic: expand scale	<i>“Enforcement-centric”</i> - Industry association - Two multinational competitors - Activist organizations - Government agencies - Independent auditor	<i>“Empowerment-driven change”</i> - Independent auditor - NGOs for children’s education and youth vocational training - Better understanding of cultural norms and prevailing social conditions at suppliers (i.e., farmers)
Governance mechanisms	- Formal mechanisms, such as contracts, incentives, and certifications - Informal mechanisms, such as self-assessment and social ties	- Contract for waste cleaning and processing - Information sharing about recycled content contamination and losses	- Emphasis on policing suppliers - Increasing distrust - Monthly meetings to share audit findings - Supplier penalties and incentives	- Monthly meetings to review audit findings - Expanded levels of supplier penalties - Incentives including productivity training - NGO-managed networks with multiple types of educational centers

Resource investment	• Partnerships with particular exchanges • Financial support • Knowledge-sharing routines • Perceptions of transparency and reciprocity	• Academic study • Pilot test, that is, new supply chain partner • Identifying and educating new suppliers • Targeting specific recycled material based on location	• Independent auditor for unannounced supplier (i.e., farm) inspections • Shared production plans • Shared details of suppliers	• Expanded communication to suppliers • Internal monitoring: audit team conducts more unannounced audits of every supplier (i.e., farm) • Independent auditor reviews internal audit processes and makes random checks
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Note. NGO = nongovernmental organization.

Directions for Future Research

Our synthesis of prior work and efforts to expand the discourse on improving the sustainability of supply chains clearly emphasize both the destination and the journey. Doing so prompts the need for an integrative framework that specifically outlines particular iterative steps that structure such a journey. The framework leveraged here, design thinking, is borrowed from innovation, yet might require further adaptation and modification to foster and shape management efforts to develop more sustainable supply chains. Thus, one immediate research need is the study of how these five steps might best be implemented within complex interactions between multiple tiers of buyers and suppliers, while simultaneously capturing the interests of other salient stakeholders. Possibly, the five steps of empathize, define, ideate, prototype, and test encompass all of the critical aspects. However, case-based research might uncover other intermediate steps that better describe how journeys unfold in particular industries, institutional contexts, or competitive settings. Moreover, are there particular approaches toward implementing each of these steps that lead to more effective or efficient journeys?

Supply chain managers, NGOs, and public policy experts have become increasingly sophisticated about defining and assessing sustainability-related, outcome-oriented measures, as described earlier. Similar research efforts should now be focused on journey-based measures that enable researchers and managers to characterize the steps and collective pathways that firms are taking to improve the sustainability of their supply chains. Our chapter has emphasized empathy, degree of openness, scope of stakeholder engagement, and responsiveness as particularly important dimensions to assess the quality of the journey. Yet, before we can debate the best level of each measure at each step, research is urgently needed to operationalize a variety of measures for each dimension.

Finally, while the five steps of design thinking provide an excellent starting point to conceptualize a firm's sustainability journey for improving its supply chain, firms might adopt quite different pathways to arrive at similar destinations (i.e., equifinality), or alternatively, small differences at one step might lead to dramatically different destinations (i.e., butterfly effect). For example, some firms might include external stakeholders in the define step, while others might delay engagement until the ideate or prototype step. This conjecture prompts at least two preliminary research questions: How might different journeys quantitatively and qualitatively be characterized based on documented evidence, possibly by using methods borrowed from historians; and Can a typology be developed or set of archetypical journeys be identified? Insights into these questions might offer models for managers as they strategize about *how* to improve their firm's sustainability, rather than simply focusing on what level of performance must be sought. Moreover, this empirical research would strengthen our efforts to integrate prior theoretical work. For example, both stakeholder and resource-based theories might provide insight when coupled with these field data, or alternatively, signaling theory might help to link openness and different forms of engagement with more effective journeys. From a methodological standpoint, process research (Langley et al. 2013) could offer a relevant set of analytical tools to systematize future fieldwork and extract insights that are both scholarly and practically relevant.

Conclusions

For supply chains, sustainability is clearly a multidimensional construct, often conceptualized as TBL performance, which takes into account environmental, social, and economic impacts. By reference to a bottom line, this view implies that metrics must focus on outcomes—such as carbon emissions and workforce accident rates—both to set organizational goals and to track the impact of specific products and supply chains. Yet, in many situations, these outcome-based metrics emphasize the desired sustainability destination, rather than the journey. These metrics are susceptible to decision-making that is myopic, and care should be taken to understand what short-term trade-offs might be required in resources, practices, and partnerships to achieve the desired long-term performance. To this end, outcome-based metrics might prove most effective when implemented as part of a larger sustainability strategy that incorporates aspects of expert-led and community-driven metrics selection and development processes.

If one considers the journey toward more sustainable supply chains, rather than just the destination, current literature points to multiple themes that inform this journey. Sustainable sourcing, for example, considers the degree of inclusivity in supplier monitoring and collaboration. As inclusivity expands, suppliers are allowed or encouraged to take a more active role in the design and execution of the interfirm collaboration. Moreover, the participation of focal firms in public policymaking can alter poorly functioning institutions, which, in turn, can improve the regulatory setting, for example, to support a circular economy. Third, innovative supply chains, which attempt to create value for business and society simultaneously, can benefit from broadly engaging multiple stakeholders beyond direct supply chain partners to leverage their organizational ties and expertise.

Firms emphasizing such themes to guide their journey toward more sustainable supply chains currently have little direction about who to engage with, when to engage, and how to coordinate diverse, yet potentially synergistic, stakeholders' ideas, resources, and contributions. Design thinking—with its iterative steps of empathize, define, ideate, prototype, and test—provides a framework for structuring engagement and encouraging openness to new observations and insights. It is important to stress that design thinking and openness might not lead to consensus among stakeholders nor might all stakeholders provide helpful input; instead, they can be expected to shape the journey and potentially reorient supply chain innovation toward a new destination. The breadth and depth of collaboration with stakeholders, the nature of governance mechanisms, and the form and scale of resource investment all provide means to assess the journey as it occurs, thereby ideally fostering learning and yielding a more detailed roadmap for future journeys.

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