

Green Innovation Games: VALUE-CREATION STRATEGIES FOR CORPORATE SUSTAINABILITY

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This study builds on insights from 49 sustainability leaders in the U.S. by examining green innovation from the game perspective. It explores how corporate sustainability can advance environmentally friendly innovations, and what managerial roles and activities are required to enable the transformation. It identifies four green innovation games characterized by different underlying value creation logics and organizational and mental barriers. The article suggests ways that can help managers to overcome these barriers and incorporate three decisive managerial roles into their corporate agenda and culture to advance corporate sustainability. (Keywords: Innovation, Sustainability, Green Manufacturing, Corporate Social Responsibility)

Environmental issues are pressuring senior executives across many industries to rethink their businesses. Since the 1990s, increased interest in environmental sustainability, triggered by numerous ecological crises and stricter environmental regulations, is forcing companies to view corporate sustainability as a strategic issue. A shift from compliance to proactive corporate sustainability is gaining ground as more companies are taking advantage of business opportunities rather than engaging in “greenwashing” and other avoidance tactics.¹ Leaders of sustainability programs in established businesses have adopted progressive environmental, ethical, and social policies.² The call for sustainability has led to institutional changes across industries and more buyers than ever are setting sustainability standards for their suppliers.³ Corporate sustainability, however, is a contentious issue. In the research literature, one line of thinking emphasizes that legislative requirements, social pressures, and economic opportunities⁴ for sustainability are key drivers of corporate innovation,⁵ whereas others claim that environmental investments inflate costs and divert management attention from more vital business goals.⁶

This study builds on insights from sustainability leaders in examining competitive strategies and managerial roles that support green innovation. In

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particular, we explored how current frameworks, including those suggested by Giovanni Azzone and colleagues, and Stuart Hart in the late 1990s, and Renato Orsato in the early 2000s,⁷ connect corporate sustainability with environmentally friendly innovations. Although these frameworks provide general guidelines for the practical application of corporate sustainability, they do not pay sufficient attention to the contingencies of different types of innovative and competitive environmental strategies and the requirements they pose for managers of sustainability initiatives. In addition to reviewing the literature on corporate sustainability, we draw on primary qualitative data collected through inter-

views with senior sustainability managers in organizations in the United States. The study is based on a content analysis of themes and issues that emerged from those interviews.

We found that several entrepreneurial leaders in established businesses have experimented with green innovation in pursuit of revolutionary business practices in their industries. The resulting innovations are often systemic and demand novel combinations of partner resources, capabilities, and intellectual capital. In addition, such leaders prefer to talk about “green innovation games,” rather than corporate sustainability transformation or processes. Previous innovation management research suggests that it is important to distinguish *evolutionary* from *revolutionary* innovations. Unlike evolutionary innovation, which introduces minor improvements to existing products or processes, revolutionary innovation is new to the market, implies greater costs in development and greater changes to the business, and can incorporate risks that may result in failure in the market.⁸ Revolutionary innovations can also create significant customer value and open up new market opportunities.⁹ Examples of revolutionary innovation include the invention of chlorination (tablets) by the U.S. Army in 1910, which enabled the use of otherwise unsafe water.¹⁰ Another example is the development of chlorine-free bleaching, which enabled the production of chlorine-free paper, radically reducing the environmental impact of the paper industry.

Many researchers and practitioners have pointed out that few companies can afford to ignore the opportunity offered by green innovation.¹¹ In their recent editorial, Jennifer Howard-Grenville and colleagues call for more research on the organizational responses to the mounting environmental challenges and note that with climate change comes much more than shifts in energy production and consumption.¹² They submit that the ongoing environmental changes will require organizations to reshape value chains and use natural resources in innovative ways. However, executives point to the lack of a roadmap to guide their responses to such calls for sustainability.¹³ Our study exemplifies the corporate sustainability practices¹⁴ of companies seeking competitive advantages associated with sustainability, and the efforts they take to manage different value-creation strategies of green innovation. In addition, unlike most empirical research in this area, we

contemplate different managerial roles required to lead revolutionary and evolutionary green innovation.

By investigating sustainability leaders among businesses based in the United States (e.g., IBM, Dow Chemical, Nike, Starbucks, and Interface), we identify four value-creation strategies for green innovation. Each of these strategies is characterized by a unique underlying logic, distinct cognitive and organizational barriers, and an emphasis on corporate development and goals.¹⁵ As suggested by the executives we interviewed, we discuss these strategies in terms of green innovation games. After describing the value-creation strategies, we suggest three managerial roles for playing the green innovation games: Unlocker, Connector, and Transformer. These roles manifest different managerial activities focused on enabling and driving corporate sustainability that aims to create competitive advantage through green innovation. By identifying these roles, senior management will be able to identify and integrate task descriptions, recruiting requirements, and corporate decision-making routines into corporate culture so that they can better support corporate sustainability.

The Call for Corporate Sustainability

The World Commission on Environment and Development¹⁶ defines *sustainability* as the ability to “meet the needs of the present without compromising the ability of future generations to meet their needs.” It has been claimed that senior executives are the key contributors to the development of corporate sustainability that pursues simultaneously “the triple bottom line” of economic, social, and environmental benefits.¹⁷ The proponents of this view have argued that the goals of environmental conservation and business imperatives need not be mutually exclusive. In regards to corporate sustainability, John Elkington¹⁸ shows that a sustainability leader can emphasize an enduring commitment to advancing environmental ideologies and principles in its business strategies and operations, while also decreasing if not eliminating the environmental and social harm caused by the production and consumption of their goods or services. Thereby, such companies shift their focus to the design of innovative products, services, and processes that contribute to sustainable development.

Previous studies have shown that corporate sustainability can provide numerous advantages beyond compliance with moral motivations.¹⁹ First, one line of thought emphasizes that sustainable companies can benefit from recruitment and retention of top talent, and improvements in employee productivity.²⁰ Second, research on environmental sustainability has shown that eco-efficiency strategies focusing on the reduction of pollution, energy consumption, and water conservation may lead to bottom-line benefits by cutting manufacturing costs and expenses at commercial sites.²¹ Third, management studies have underscored the importance of protecting company reputations against widening ethical and environmental corporate scandals.²² For example, public pressure forced DuPont, Nike, and GE to incorporate ethical and environmental considerations into their corporate strategies. Ignoring the reputational issue is hardly an option for any company, because unsustainable corporate practices may result in public protests, consumer boycotts, negative stock market reactions, and embarrassing media

attention.²³ Quite the reverse, establishing green brands may lead to increased profitability.²⁴ Nevertheless, corporate sustainability can also escalate costs and cut into profits due to increased investments in environmental initiatives.²⁵ For instance, risky investments into emerging clean technologies can result in failure, considering the recent bankruptcies of several Chinese and American solar manufacturers and BetterPlace's failed effort to create a new system to charge electric cars in five countries including the United States.

There is increasing empirical evidence of the shift towards corporate sustainability. MIT's global study in 2012 showed that 70 percent of the 3,000 managers surveyed have integrated sustainability into their corporate agendas since 2008.²⁶ The study also found that a fifth of the organizations started connecting sustainability with the innovation development once they saw the benefits that corporate sustainability brought to their company. In addition, CERES's research on 600 U.S. companies illustrates that the majority of firms are now taking steps toward corporate sustainability, but are still far from gaining differentiation advantages.²⁷ There are a few exceptions—such as Patagonia, Stonyfield Farms, and Interface—who are sustainability leaders among established businesses. Their founders incorporated sustainability goals into their business models, intending to transform their markets through revolutionary green innovations. Patagonia, for example, sells outdoor clothes and gear with a lifetime quality guarantee, Interface created the first carbon-neutral manufactured carpets, and Stonyfield Farms has pioneered markets for organic goods since the early 1980s.

Our comprehensive literature review and interviews with 49 senior managers responsible for corporate sustainability and innovation initiatives among sustainability leaders in the United States suggest that companies seeking competitive advantages through green innovations must solve a variety of problems. First, our analysis of the interview narratives highlights that an evolutionary innovation is rarely sufficient to transform a firm into a green innovation leader in its field. Second, we found a need for a deeper understanding of the different types of green innovations given that they seem to have diverse logics, each calling for different managerial activities that serve distinct goals in meeting a company's environmental challenges. Third, different managerial roles are needed to support organizational learning in specific value-creation strategies for green innovation that will help organizational actors to abandon established paradigms and beliefs that prevent innovation.²⁸ Fourth, managerial activities play a key role in infusing business goals with corporate sustainability. For this purpose, managers must identify the critical cognitive and organizational barriers to advancing corporate sustainability. Finally, our study underscores that senior managers have a key role in fostering revolutionary innovations that can simultaneously contribute to both corporate sustainability and financial profitability.

Based on empirical findings, we name and explore three managerial roles—the Unlocker, the Connector, and the Transformer—all of which are essential in solving the problems of green innovation. Before describing these managerial roles, we clarify the contingencies of the diverse games of green innovation, and explain why differing value-creation types of green innovation necessitate different managerial activities. In so doing, we analyze the key cognitive and organizational barriers

to experimenting with green innovations, and exemplify successful and unsuccessful cases of green innovations launched by the investigated businesses.

A Games Perspective on Green Innovation

Compared with the traditional and well-established concept of innovation,²⁹ green innovation is a new term lacking a standardized definition. Claude Fussler and Peter James³⁰ define *green innovation* to include “new products and processes which provide customer and business value but significantly decrease environmental impacts.” Other researchers build on the World Commission on Environment and Development’s³¹ classic definition of sustainable development and consider green innovation as a “means of boosting a firm’s competitiveness while maintaining the environment and its valuable resources for the future generations.”³² According to an OECD report published in 2009, *green innovation* differs from *generic innovation* in two significant ways.³³ First, green innovation focuses on shrinking a firm’s environmental footprint as a means of enhancing competitiveness while maintaining the environment and conserving its valuable resources for future generations. Second, green innovation is not limited to innovation in products, processes, technologies, marketing methods, managerial practices, or organizational methods; it also includes innovation in social and institutional structures.

Sustainability leaders pursue the above-mentioned outcomes through two common types of green innovations: evolutionary, step-by-step improvements, which represent a starting point for most of the businesses; and revolutionary innovations, which are rare and hold higher risks of failure than evolutionary innovations, but also may deliver superior business and environmental outcomes. Current research on green innovation has not clearly differentiated evolutionary from revolutionary innovation. However, in the traditional innovation literature these modes are not only distinguished³⁴ but seen as significantly different in terms of their managerial requirements.³⁵ This gap directed our research on the value-creation strategies for green innovation, the construction of the proposed green-innovation games framework, as well the analysis of our cases. The leaders we interviewed highlighted their experiences of developing both successful and unsuccessful green innovations and described the key differences between managing evolutionary and revolutionary green innovations.

Through a literature review, we examined prior strategic frameworks of corporate sustainability.³⁶ Particular attention was given to whether and how these frameworks examined value-creation strategies in the context of different types of green innovation. Although these frameworks offer taxonomies for general environmental strategies,³⁷ and offer general ideas for developing and managing corporate sustainability strategies,³⁸ they do not specifically address the needs and specific characteristics of different types of green innovations, nor do they consider the specific managerial roles within the different innovation approaches per se. In constructing our analytical framework, we build on the conceptualization by Stuart Hart and Mark Milstein, which suggests general sustainability strategies for stakeholder value creation.³⁹ Their key point is that, through eco-efficiency strategies, firms can create

value by reducing the level of material consumption and pollution associated with industrial operations.⁴⁰

By focusing exclusively on efficiency, Hart and Milstein's conceptual model does not, however, cover all potential green innovation strategies. Our study extends their work by addressing revolutionary innovations that involve links between breakthrough technologies and business models. Moreover, our model is designed particularly for managing different green innovations. To extend prior research, we connect key mental mindsets, challenging organizational issues, and critical managerial roles to highlight the key differences between managing evolutionary and revolutionary green innovations. Moreover, we challenge the sequential-process model suggested by Ram Nidumolu and colleagues for advancing green innovation.⁴¹ In so doing, we suggest that diverse innovation games are not necessarily sequential; they may be pursued in parallel, be partly overlapping, and be even initiated independently of each other. Consequently, a firm may choose a value-creation strategy based on its strategic context, scope of environmental activities, strengths, and managerial vision.

The Four Green Innovation Games

Our findings lead us to distinguish four types of green innovation games: Rationality, Collaboration, Radical, and Clarity. The game metaphor was chosen for its managerial appeal: several of the executives we interviewed used it to illustrate their actions concerning their companies' green strategies. The metaphor also builds on the game analogy and language—such as gamers, winners, losers, rules, and bets—as used by some strategic innovation scholars.⁴² Allan Afuah refers to strategic innovation as “a game-changing innovation in products, services, business models, or positioning vis-à-vis competitors to improve performance.”⁴³ He defines a *strategic game* as a set of activities that creates and captures value in new ways and that determines a firm's performance in the face of a strategic innovation. When a company performs new value-chain activities, or performs existing ones differently, it is playing new games. Hence, new games offer an opportunity to build new resources and capabilities, or translate existing ones in new ways, to create the potential to build and exploit first-mover advantages, as well as to trigger reactions from new or existing competitors.

As Table 1 shows, the Rationality and Collaboration games address evolutionary green innovations, whereas the Radical and Clarity games address more revolutionary green innovations. The key point is that each game entails specific barriers and managerial requirements.

The Rationality Game: Value Creation through Eco-efficiencies and Evolutionary Green Innovations

The Rationality game is practiced by the majority of companies taking their first steps in corporate sustainability. The emphasis is on improving cost efficiencies and productivity through eco-efficiency strategies. Most of the green innovation activities focus on autonomous, incremental improvements in products and processes, featuring energy efficiency as well as accumulated cost savings. Many entrants to

TABLE I. Summary of Green Innovation Games and Their Distinctive Characteristics (continued on next page)

Characteristics	Rationality Game	Collaboration Game	Radical Game	Clarity Game
Type	<ul style="list-style-type: none"> Evolutionary autonomous innovation 	<ul style="list-style-type: none"> Evolutionary systemic innovation 	<ul style="list-style-type: none"> Revolutionary autonomous innovation 	<ul style="list-style-type: none"> Revolutionary systemic innovation
Dominant Logic of the Game	<ul style="list-style-type: none"> Productivity improvement through better practices, processes, and technologies Resource efficiency by reducing waste, energy, water use, and CO₂ emissions within one's direct influence 	<ul style="list-style-type: none"> Improving partner interaction to scale up eco-efficiency Reshaping value exchange (e.g., enabling sustainable sources of raw materials) 	<ul style="list-style-type: none"> Exploration for new value-creation logic and business models Seeking opportunities for disruptive technologies 	<ul style="list-style-type: none"> Defining new meanings for corporate sustainability Legitimizing new value-creation logic within firms, ecosystems, and industries
Barriers to Playing the Game	<ul style="list-style-type: none"> Lack of urgency Misperceived costs of greening Moving beyond one percent 	<ul style="list-style-type: none"> Networking and learning to play with outsiders Trust and the fear of losing control Lack of network orchestration skills 	<ul style="list-style-type: none"> Lack of funds and skills Lack of permission to try and fail Inadequate conditions for radical experimentation 	<ul style="list-style-type: none"> Lack of strong storytellers and visionaries Uninspiring purpose and vision Lack of endurance
Outcomes of the Game	<ul style="list-style-type: none"> Cost reductions in operations Highlighting existing or latent green attributes in one's product portfolio Launching simple business practices and methods 	<ul style="list-style-type: none"> Increased co-operation with customers, suppliers, NGOs, and policymakers Co-creating new standards for an industry, resulting in an overflow of competing standards Leapfrogging competitors in regulatory changes Opportunities for collaboration and competition 	<ul style="list-style-type: none"> Improved profit margins via category-changing innovations Entry into new markets before competitors New combinations of social, environmental, and financial benefits. New business models (e.g., monetization of services rather than products) 	<ul style="list-style-type: none"> Reinvented vision, mission, and purpose of a firm Changing the rules of an industry Institutionalizing sustainability within a field First mover advantages (e.g., technological leadership) and disadvantages (e.g., costly education of market)

TABLE I. Summary of Green Innovation Games and Their Distinctive Characteristics (continued from previous page)

Characteristics	Rationality Game	Collaboration Game	Radical Game	Clarity Game
Examples	<ul style="list-style-type: none"> ▪ 3M's Pollution and Prevention program ▪ Nokia minimizing its packaging for mobile phones ▪ General Motors' factories reusing and reselling waste from operations ▪ Investing in green technologies (e.g., wind or solar power or replacing fluorescent lamps with LED) 	<ul style="list-style-type: none"> ▪ Sustainable Apparel Coalition increasing environmental and social transparency in material sourcing and use ▪ Product (RED) establishing a marketplace of brands to eliminate HIV/AIDS. ▪ Coca-Cola-WWF collaboration to reduce water consumption in Coke's manufacturing process 	<ul style="list-style-type: none"> ▪ Waste Management's zero-waste challenge ▪ GE Ecomagination and IBM Big Green programs for commercializing green innovations ▪ Virgin Airlines experiment to use aviation fuel with half the carbon footprint of current alternatives 	<ul style="list-style-type: none"> ▪ Interface's Mission Zero 2020 program ▪ Tom's Shoes One for One business model ▪ Storyfield Farm pioneering market for organic produce ▪ Unilever's 2020 Living Plan

corporate sustainability start the Rationality game as a reaction to their competitors' environmental engagements or to comply with environmental legislation. They experiment with and launch simplified environmental practices, processes, and methods and invest lightly in clean energy sources such as wind and solar power. Some firms may charge a premium for environmentally friendly products, thereby facing the risk of locking their offerings out of the mainstream markets.

The key cognitive barriers reported by managers when playing the Rationality game include the lack of urgency, misperceived costs of greening, and moving beyond one percent of their product line.

Lack of Urgency

Managers tend to think there is little need for an environmental turnaround strategy if the current business model keeps working. They believe that changes could undermine the company's short-term profitability goals, irritate investors and stakeholders, and lead to unwelcome price rises that might jeopardize the company's competitive position. They will consider a profound change only if the organization is facing an ethical, environmental, or financial crisis. The lack of urgency may pertain to an institutionalized logic of operation that often obstructs change.⁴⁴

Managers can avoid this pitfall by engaging in one or more catalyzing activities. First, managers should comprehend the consequences of action as opposed to inaction. Some companies consider environmental issues as a threat and do only the bare minimum to comply with environmental regulations and policies.⁴⁵ They can become targets for environmental activists and lose their potential advantage to environmentally proactive competitors. As suggested by institutional theory,⁴⁶ managers need to enlist the personal commitment and involvement of the top management to catalyze organizational changes. Recently, Nike's CEO Mark Parker and Virgin Group's founder Sir Richard Branson, both of whom are committed to doing good for the environment, have made sustainability part of the core vision of their companies' strategy and of their personal scorecards.

Misperceived Costs of Greening

According to environmental consultant Andrew Winston, many business managers assume that greening only represents a cost.⁴⁷ Therefore, they analyze the outcomes of clean technology investments in terms of traditional, short-term financial measures. At the same time, they ignore the long-term intangible benefits of sustainability, such as employee retention and engagement, talent attraction, and brand enrichment. This inconsistency can lead to greenwashing, which gives a deceptive or misleading picture of the company's environmental friendliness. Although sustainability could be seen as a persistent work "for good," managers often view it as an isolated set of activities pertaining to corporate effort of "being less bad."⁴⁸

The executives we interviewed for our study reported that their companies could evade misperception of costs by avoiding short-term thinking, by considering greening as a long-term opportunity, and by valuing both tangible and intangible values when making critical investment decisions. 3M's Pollution Prevention Program, Rank Xerox, and Dow Chemical Company have shown evidence of the

positive link between environmental and economic performance.⁴⁹ In addition, small things matter when they are scaled up. In 2003, General Motors received thousands of cardboard boxes daily from its suppliers and paid for them to be hauled away. Since 2007, when the company adopted a new business strategy of rolling out zero-waste goals to all of its manufacturing plants, it has made \$2.5 billion by reselling its cardboard for re-use in other industries. Similarly, Nokia minimized its packaging for cellphones in 2007 and since then has saved more than 500 million euros.

Moving Beyond One Percent

Organizations that consciously pursue environmental issues face a dilemma: if they start by “greening” one percent of their products, what about the remaining 99 percent? One of the managers that we interviewed suggested that “one percent is certainly not enough to merit the label of being a green company.” In addition, companies offering only premium-priced green products may find themselves trapped into serving merely the wealthiest and smallest customer segments.⁵⁰ In 2000, British Petroleum launched a \$200 million ad campaign, “Beyond Petroleum,” which was designed to position the company as environmentally friendly. The company could not convince markets of its green program, because it fell into the one percent trap and its green product revenues accounted for a negligible fraction of its total revenues. Our interviewees underscored that, to avoid the one-percent trap, managers need to study strategies that have worked in other companies and industries. They need to demonstrate what actions the organization will take to solve its environmental challenges. When GE announced its Ecomagination program in 2006, skeptics dismissed the effort as a polished marketing campaign. Nevertheless, by 2011, the program had accumulated \$105 billion in revenues and a portfolio of more than 142 green products through investments of over \$5 billion in clean technology research.⁵¹

The Collaboration Game: Value Creation by Scaling Through External Partnerships

Recent research emphasizes the growing role of co-operative arrangements in advancing systemic green innovations.⁵² The Collaboration game emphasizes evolutionary innovation within the value system of known business partners. This game may also include far-reaching and ambitious collaboration with suppliers, partners, and other stakeholders, and its players seek to motivate, influence, and interact with partners to adopt and scale up environmental practices, processes, and methods. Some reputable companies such as Intel, IBM, and GE have established ambitious collaboration forms within and across industries, which enable them to progress with green innovation and shape the evolving standards and legislative measures in locating new business opportunities. Examples include IBM’s Smarter Planet program for “greening” the global cities and GE’s Ecomagination Smart Grid—the open innovation challenge for global entrepreneurs. We identified three barriers to entering and playing the Collaboration game: networking and learning to play with outsiders; trust development and the fear of losing control; and the lack of network orchestration skills.

Networking and Learning to Play with Outsiders

Besides working with existing partners, a company often needs to locate new partners with specific expertise in certain aspects of corporate sustainability. Partners are needed to implement changes in one's own practices that depend on the external providers of various resources and capabilities. Beyond novel materials and resource management practices, partners may be of help in making sense of the emerging technological paradigms and in learning about environmental issues more generally. This approach necessitates identifying partner candidates beyond the innovator's traditional comfort zone. Managers are required to establish links by learning to play with outsiders, which can be time-consuming because there are often culture clashes between organizational cultures. Therefore, the essential catalyzer strategies comprise experimentation and networking with various corporate sustainability forums, which assist in identifying the conflicting interest of potential partners. Our interviews revealed that managers should cultivate only those partners that are best suited to the organization's strategic goals and constraints, and that will open avenues to novel insights and co-created innovations.

There are numerous examples of learning to collaborate successfully with new partners. The pooling of resources through networking with unconventional partners has proven an effective solution to environmental and social problems. In the late 1990s, Unilever, one of the largest corporate purchasers of fish, combined forces with the World Wildlife Fund to establish the Marine Stewardship Council in an effort to promote sustainable fisheries globally and to protect declining fish stocks.⁵³ In a similar vein, the Product Red network connects popular consumer brands such as Nike, Apple, GAP, and Hallmark to raise awareness and funds to eliminate HIV/AIDS, particularly in Africa. Each partner marks a product with a logo, for instance (NIKE)^{RED} laces, and donates up to 100 percent of its profits to the Global Fund that supports large-scale prevention, treatment, and care programs for infectious diseases. To date, the network has raised more than \$250 million and has helped over 14 million people.⁵⁴

Trust and the Fear of Losing Control

The establishment of trust is a key condition in any network, because it precedes commitment.⁵⁵ However, relinquishing control and learning to trust new allies is difficult, because intense collaboration may expose the organization's trade secrets and make it vulnerable to competition. Consider an example: there are more than 300 eco-labels in the United States, including the Energy Star label for energy-efficient electronics.⁵⁶ The large variety makes it difficult for manufacturers to choose which national eco-label networks to join, while also making it difficult for consumers to know which labels to trust. Therefore, the Sustainable Apparel Coalition is developing a standardized eco-label for the worldwide apparel industry. This effort was initiated by Patagonia and Wal-Mart and attracted 33 members, which together account for more than 30 percent of global sales in the apparel industry.⁵⁷

The executives we interviewed pointed out that "knowledge sharing and collaboration are essential in developing new capabilities and gaining influence."

Some of the interviewees recommended building on the “give and get” philosophy instead of just hoping to invent something together. This principle was claimed to help defuse the fear of losing control.

Lack of Network Orchestration Skills

Network orchestration refers to the coordination of activities in a network of actors. According to Christoph Zott and Raphael Amit,⁵⁸ few companies are equipped to orchestrate such an activity system. The challenge is multiplied when the value system aims at leveraging revolutionary green innovations.⁵⁹ The dominant positions of Nike, IBM, and Wal-Mart may allow them to force their partners and suppliers to adopt environmentally friendlier practices. However, the exertion of power may hamper their legitimacy as a network orchestrator, because it contradicts the principles of business networking, which include indirect influencing and emphasize shared power.

The Radical Game: Value Creation by Experimenting with Revolutionary Green Innovations

The goal of the Radical game is to create revolutionary innovation with new technologies and experiment with emerging and new business models, as suggested by Nidumolu and colleagues.⁶⁰ Such an innovation may originate from a single technological discontinuity or by the acts of an individual actor. Yet, their impact may be system-wide. IBM’s Big Green program and GE’s Ecomagination program play the Radical game by pursuing corporate sustainability through disruptive innovation. Executives in charge of strategy in these organizations set ambitious development goals for employees and partners. At the same time, they facilitate and support radical experimentation by investing heavily in R&D and the deployment of innovations. The managers we interviewed stated that IBM’s strategic Big Green program has opened access to a new market, the water management business, which is a rapidly growing industry worldwide. Similarly, GE’s Ecomagination program has invested more than \$5 billion. GE has launched over 140 green products and reached \$105 billion in revenues since 2006.⁶¹ In 2012, the program accounted for an estimated 12 percent of GE’s total revenues, which equates to \$25 billion and is estimated to grow at twice the rate of the company’s total revenues through 2018.

The Radical game challenges existing mental models and institutionalized assumptions. The literature on innovation management maintains that top managers should create conditions that support simultaneous investments in potential breakthrough technologies and business models. They should also accept the high risk of these investments. Moreover, innovation research suggests that organizations should allocate resources to create or transform methods of operation despite pressure to maintain the status quo.⁶² Many managers of firms faced with declining profit margins and increased competition have found this principle difficult to implement. This challenge calls for an ambidextrous approach to innovation,⁶³ which simultaneously explores the opportunities for the future, yet aims to maintain the current performance.

The executives we interviewed reiterated the importance of experimenting with revolutionary innovation on a reasonable scale when engaging in the Radical game. Such innovation has two key advantages: it can expedite the company's transformation towards corporate sustainability and, at the same time, it has the potential to create new or transform existing institutions. Furthermore, the Radical game generates new value opportunities through access to new markets, which makes the game inherently challenging. Three pitfalls can prevent a company from playing the Radical game: a lack of funds or skills; inadequate conditions for radical experimentation; and a lack of permission to try and fail.

Lack of Funds or Skills

A company's revenues may not cover the expenses of experimentation for radical innovations. The company can also encounter resistance from its partners and may be forced to develop environmental innovations alone. Recent research on organizational ambidexterity suggests that innovators should work with external partners to simultaneously explore, share risks, and speed up development work.⁶⁴ Partners are not only likely to provide access to more complementary resources, but they can also help a company learn new ways of putting these resources to productive use. Furthermore, the use of open innovation platforms for external innovation, such as launching open idea competitions for collective problem solving, may support the development of radical innovations. The incentives used in these open innovation competitions should combine financial (such as bonuses or seed money) and non-financial rewards (such as recognition or feedback). For instance, GE partnered with venture capitalist firms to launch the Ecomagination challenge in a quest to locate and fund new million-dollar businesses in the clean energy space.⁶⁵ Moreover, some companies have established venture funds to support the development of green innovations elsewhere. Examples include green funds by Nike and Virgin Group, which finance and mentor startups in the companies' strategically relevant areas of focus.

Virgin Airlines aims at freeing airlines from dependence on fossil-based fuels. The global aviation industry's environmental footprint now accounts for 2 to 3 percent of global greenhouse gas emissions.⁶⁶ In 2006, Sir Richard Branson announced a far-reaching pledge to dedicate all Virgin's transportation and airline sectors' profits—up to \$3 billion—over the next decade for research on alternative fuel sources. He also founded two collaboration forums to promote the creative use of the allocated money. In late 2011, he announced a potential breakthrough in developing a low-carbon fuel with half the carbon footprint of conventional fossil fuels.⁶⁷ Instead of utilizing bio-based crops, Virgin's biofuel is produced using waste gases captured from industrial steel production, allowing Virgin to enter a new field: the recycling business. Virgin Atlantic Airways expects to fly commercial routes using biofuel by 2014. Similarly, European airline carriers British Airways and Lufthansa are building Europe's first sustainable jet-fuel plants.⁶⁸

Inadequate Conditions for Radical Experimentation

Managers often struggle to establish favorable conditions for high-risk experiments and fail when carrying out the change needed. As suggested by Cynthia Hardy and Steve Maguire,⁶⁹ the call for enabling catalyzers pinpoints the role of senior managers, who need to be active in setting corporate environmental goals. Moreover, they need to unlock the institutionalized ways and means and establish an open playground for radical innovation, provide the resources, and support the use of platforms for radical experiments. Moreover, they need to encourage corporate-wide innovation to reach ambitious environmental performance goals. Lynelle Cameron, Sustainability Director of Autodesk, remarked that “no manager wants to be the last one on the environmental performance list.”⁷⁰

Waste Management is the biggest waste hauler in the United States, with revenues exceeding \$13 billion in 2011.⁷¹ Many of its customers, including Caterpillar, GM, and Alcoa, have announced plans to generate zero waste from their manufacturing operations. In the long run, the success of this plan could end Waste Management’s profitable waste-hauling business. David Steiner, the company’s CEO, decided to turn the sudden threat into an opportunity and declared that the company would launch a new business model that supports their customers’ zero-waste goals. Waste Management’s new business model converts collected trash into biofuel and energy. According to Steiner, the company’s production of energy from trash exceeded the energy output of the entire U.S. solar power industry in 2010.⁷² The experiment came with great risks, because it threatened Waste Management’s existing business model. In the future, Waste Management claims to be prepared to pay for access to the most utilizable sources of waste.

Lack of Permission to Try and Fail

Our interviewees insist that managers often do not acknowledge the importance of failures, because they want to avoid the embarrassment of admitting that their own efforts were unsuccessful. Accordingly, they are unable to share their valuable trial-and-error experiences across the organization. There are some empirical examples of how companies have solved this problem. Jim Hartzfeld of Interface says that senior management’s most important task in regard to green innovations is to permit unrestricted experimentation and promote the corporate sustainability agenda. His company gives strategic priority to farsighted ideas that arise from setting impossible goals.⁷³ This approach has resulted in failures, including a new business model experiment to lease carpets to its customers (Interface Lease), and successes, such as the revolutionary innovation that led to the first carbon-neutral manufactured carpet and the company’s all-time best-seller, Entropy, a carpet that owes its existence to the principles of bio-mimicry. According to CEO Dan Hendrix, half of Interface’s current business is based on Entropy’s revolutionary design.⁷⁴

The Clarity Game: Rewriting the Rules of an Industry

The Clarity game reflects the demanding contingencies of systemic green innovation. It centers on organizational sensemaking under the conditions of institutional

complexity caused by multiple actors' parallel—and even competing—logics. If played successfully, the Clarity game may change the rules of a business by creating new opportunities for competitive advantage and institutionalizing corporate sustainability within a field. Echoing Hart and Milstein's⁷⁵ argument about creating a compelling vision for sustainability, we see that the Clarity game calls for managerial activities that connect the organization's environmental vision with organizational culture, strategy, and values. Thus, the Clarity game has the potential to reshape a business and overturn the existing ways of creating and capturing value in an industry.⁷⁶

Similarly, MIT's Peter Senge urges leaders to define their "game-changing question that one's company intends to solve."⁷⁷ In our interviews, the executives claimed that top management's key jobs include clarifying the identity, brand promise, and purpose of the firm, as well as demonstrating why the environmental mission matters and to whom. Furthermore, managers need to investigate whether the company's purpose and its aims for innovations make an outstanding difference, particularly in comparison to the key competitors. Ultimately, the leaders must ask: "Would the customers care if our innovations existed or not?" They also need to articulate what the company aspires to be and how it is going to get there by harnessing both internal and external resources for creating and implementing revolutionary innovations. However, rewriting the rules of a business is a daunting task. An attempt to do so may be initiated, for example, by far-reaching questions concerning the business environment, such as the one asked by Andrew Winston: "How can our products, services, and innovations heal the environment instead of destroying it?"

So far, only a few established companies are engaged in the Clarity game and are trying to solve some of the world's toughest social and environmental problems, whether in the elimination of greenhouse gas emissions, strengthening worldwide environmental protection, or providing access to fresh water around the world. These players aim to transform their industries through a renewed purpose for being in business. This purpose may be exemplified by Patagonia, which hopes to rewrite the rules of the apparel industry through the simultaneous advancement of social and environmental goals, while balancing for financial profits. Similarly, Interface's Mission Zero goal aims to prove by 2020 that an established business in a resource-intensive industry can conduct a profitable business without leaving any environmental footprint.

Three key barriers to entering and playing the Clarity game were identified in our study: a lack of strong storytellers and visionaries, uninspiring purpose and vision, and a lack of endurance.

Lack of Strong Storytellers and Visionaries

There is a limited supply of self-driven visionary leaders who can make sense of the emerging environmental business opportunities and paradigms, and who are able to paint far-reaching visions and potentially rewrite the rules of business in their industries. A handful of lucky companies have such visionaries: Virgin (Sir Richard Branson), Amazon (Jeff Bezos), Google (Sergey Brin and Larry Page), and Apple (the late Steve Jobs).

To surmount this barrier, managers can attract and hire people for their skills. In our interviews, some executives suggested that companies “tap into the pool of serial sustainability officers, who have former experience of greening businesses, and who are willing to apply it to other industries.” Those officers would be capable of identifying the missing pieces in the new business context and clarifying the roadmap to follow. Moreover, companies can tap into talent via corporate mergers and acquisitions, or by financing and partnering with new startups and entrepreneurs.

Stonyfield Farm is a pioneer in corporate sustainability and a market-maker for organic products. It was founded in 1983 when organic food was a \$1 million industry in the United States. Today, it is a \$30 billion industry.⁷⁸ Stonyfield pioneered the production of organic yogurt in the United States and, in 2001, entered into a strategic partnership with the world’s leading dairy products corporation, Groupe Danone. In 2011, Stonyfield’s annual sales were \$360 million with a compounding annual growth rate of 23% over the last two decades. Stonyfield is now the world’s largest organic yogurt producer and the third-largest yogurt brand in the United States. Its Profits for the Planet program commits ten percent of its annual profits to environmental charities.⁷⁹ The founder of Stonyfield Farm had a long-range vision of challenging the industry’s institutionalized business practices.

Among the potential visionary leaders of large established businesses, Unilever’s CEO Paul Polman was singled out as a visionary who aims to scale environment-friendlier products to mainstream consumer markets. In 2012, Polman noted that climate change is costing the company 200 million euros (about \$270 million) annually. He announced that Unilever will no longer report quarterly earnings to shareholders and investors. This practice was seen to inhibit the advancement of the company’s long-term vision, the Sustainable Living Plan, whose goal is to source all agricultural raw materials from sustainable sources, change the hygiene habits of a billion people, and bring safe drinking water to 500 million people. Over half of Unilever’s current global sales come from developing countries that face serious natural resource constraints such as shortages of water. Given that these markets are estimated to make up 85 percent of the Unilever’s sales by 2020, the company plans to reduce the environmental impact of its products by one-half while doubling its revenues.⁸⁰

Uninspiring Purpose and Vision

This barrier means that the management fails to move away from routine sustainability statements. These statements may contain impressive intentions that are practically never carried out. To avoid this barrier, top management should concentrate on crafting a vision that is ambitious and engaging yet easy to communicate and monitor. Toms Shoes, or TOMS, is a shoe company with an engaging social vision and a differentiated value offering—the One for One movement. With every pair of shoes sold, the company donates a pair of new shoes to a child in need. TOMS products have been created to fit with different environmental ideals as well, including shoes made from recycled materials and

the creation of shoes that adhere to vegan product restrictions. Since 2006, TOMS has donated more than 10 million pairs of shoes in more than 50 countries.⁸¹

Patagonia, a California-based company with over \$540 million in sales in 2012,⁸² manufactures high-quality outdoor clothing and gear. Its mission is to build superior products, avoid environmental harm, and inspire and implement solutions to environmental crises. The company has doubled its sales and tripled its profits since 2008, despite the economic downturn that weakened sales in the clothing industry.⁸³ Patagonia uses its profits to support environmental protection and to engage with its loyal customers who are willing to pay more for their products. An early pioneer of influencing other firms to adopt transparent, environmentally, and socially conscious business models, Patagonia's long-range vision is to scale up meaningful consumption experiences. This vision was supported by offering a lifetime guarantee for all of its clothing and gear. This vision also attracts environmentally conscious talent, and the company has received more than 900 applications for a single job opening.⁸⁴

Lack of Endurance

According to the managers we interviewed, "greening is not a sprint but a marathon." Achieving a meaningful reduction in a company's greenhouse gas emissions requires patience and a long-term commitment. It was also pointed out that the culture of quarterly reporting matches poorly with the slow realization of the results of most green innovations. This mismatch may lead to frustration and can undermine the realization of far-reaching environmental visions. For instance, in automotive manufacturing, Toyota's long-term vision is to build a car that will never crash and that cleans the air as it runs.

Similarly, in 1994, Interface's founder and CEO, Ray Anderson, initiated a strategic environmental vision to infuse all areas of his business with corporate sustainability. By then, the company had grown over 20 years to become a global market leader in carpet tile manufacturing and enjoyed healthy annual growth. It complied with the environmental legislation, yet there was no external pressure for corporate sustainability. Despite the lack of urgency, Anderson adopted a new environmental vision and a strategy that required major changes in the company's established management procedures and the introduction of significantly altered products and process technologies.⁸⁵

Interface's clarity goal is to show, by 2020, that it is possible for a large global firm to operate in the carpet business without leaving an environmental footprint. This goal requires the company to succeed in the integration of sustainability into all of its business operations and in the parallel advancement of evolutionary and revolutionary innovations. In 2014, Interface passed a 20-year milestone in its corporate sustainability program, and through its Mission Zero program, it views corporate sustainability as a long-term journey.⁸⁶ Interface's modular carpet sales rose from \$646 million in 2005 to \$953 million in 2011, and it commands a leading global market share in the carpet tile manufacturing sector. Interface's environmental strategy has resulted in several tangible results: since 1996, the Mission Zero program has doubled the company's earnings and

reduced its fossil fuel consumption, landfill waste, and water use by 60, 77, and 75 percent, respectively.⁸⁷

Management Roles for Playing the Green Innovation Games

Our study has several lessons for corporate leaders and entrepreneurs. Multiple studies underscore the role of leaders in corporate sustainability.⁸⁸ Nevertheless, not all industries or companies are capable of, or willing to, advance corporate sustainability, primarily due to the substantial investments already made in current technologies and assets. “Sustainability is not nice, nor easy,” according to environmental consultant Gil Friend.⁸⁹ Rather, it is a prolonged process in which accumulated knowledge and experience bring forth not only new opportunities but also challenges and frustrations. However, despite the economic downturn, recent research illustrates that corporate sustainability remains a strong focus for companies.⁹⁰

Our interviews underlined the importance of connecting corporate sustainability and green innovation to companies’ core business, culture, and leadership. Due to changes in competitive conditions during a company’s lifecycle, managers must allow for flexibility in traversing between economic realities and the advancement of ambitions for corporate sustainability. As several founders of environmental startups claimed in interviews, “hardly any small or large for-profit company can operate altruistically all the time.”

Yet, a critical question remains: How is it possible to overcome the multitude of challenges that inhibit the companies from taking serious steps towards corporate sustainability and in carrying out the different innovation games? Our literature review and interviews suggest that the senior management’s key tasks in enabling green innovation depend on continuously recognizing, establishing, and nurturing three managerial roles. These roles are required when entering and playing the four green-innovation games, when unlocking the existing mental models and organizational barriers to move towards more demanding levels of green innovation such as the Radical and Clarity games, and when connecting the managerial roles and catalyzing tasks to the management system of the company. Table 2 summarizes the characteristics and main functions of the proposed roles. Note that the roles are interconnected and that each role can be relevant for several games.

Unlockers Challenge the Conventional Rules of the Business

Unblockers open doors to the Rationality Game and excel in creating conditions for revolutionary experiments within it. By decoupling the company’s innovation activity from the conventional practices, the Unblockers fuel ideas that challenge existing knowledge, and they experiment with different environmental issues to identify ways that catalyze organizational unlearning.⁹¹ March Vachon, leader of GE’s Ecomagination program, characterizes an Unlocker by claiming that “there’s a theory that you have to choose between economics or environmental performance. That’s nonsense. Innovation is the way you can have both.”⁹² In order to reach its environmental objectives, a company has to engage in organizational unlearning:

TABLE 2. Core Management Roles for Playing Green Innovation Games

Role	Games in Which Particularly Relevant	Focus of Change	Examples of Essential Tasks	Characteristics
Unlockers	<ul style="list-style-type: none"> ▪ Rationality Game ▪ Radical Game 	<ul style="list-style-type: none"> ▪ Cognitive models ▪ Institutional structures 	<ul style="list-style-type: none"> ▪ Challenge the dominant cognitive frameworks and remove system constraints. ▪ Allow innovative experimentation through trial and error. 	<ul style="list-style-type: none"> ▪ Establish platforms to think and brainstorm through novel environmental lenses.
Connectors	<ul style="list-style-type: none"> ▪ Rationality Game ▪ Collaboration Game ▪ Radical Game 	<ul style="list-style-type: none"> ▪ Corporate strategy ▪ Operations 	<ul style="list-style-type: none"> ▪ Connect the environmental vision with corporate strategy, leadership, culture, and stakeholders. ▪ Bond corporate sustainability with CEO's personal agenda and gain support from senior management. ▪ Connect corporate sustainability with the organization's operations through an ambitious, yet conceivable roadmap. ▪ Link environmental goals with staff's creativity, and connect one's talent with partners, knowhow, skills, and resources. ▪ Infuse senior leaders' scorecards with environmental goals. ▪ Provide budget, outcome measures, and incentives to support development of green innovations. 	<ul style="list-style-type: none"> ▪ Connect corporate sustainability with the organization's operations through an ambitious, yet conceivable roadmap.
Transformers	<ul style="list-style-type: none"> ▪ Clarity Game 	<ul style="list-style-type: none"> ▪ Dominant operational logic ▪ Organizational culture and values ▪ Financials and revenues ▪ Use of resources 	<ul style="list-style-type: none"> ▪ Redefine the purpose of business: deliberate about whether the organization gains more by advancing its self-interest or the collective good of people and the planet. ▪ Infuse three managerial roles into the organizational culture. ▪ Ensure that the organization's actions cause no detriment to the environment. ▪ Shift from short-term, profit-driven agendas to long-haul sustainable growth plans. ▪ Focus on balancing short-term financial pressure with the pursuit of long-term green vision. ▪ Enable the right conditions, finance, and managerial mandate for breakthrough experiments. ▪ Change the operational logic from destructive use of materials and resources to regenerative use. ▪ Promote valuing of the natural resource use in the corporate accounting and financial reporting. 	<ul style="list-style-type: none"> ▪ Redefine the purpose of business: deliberate about whether the organization gains more by advancing its self-interest or the collective good of people and the planet. ▪ Ensure that the organization's actions cause no detriment to the environment. ▪ Shift from short-term, profit-driven agendas to long-haul sustainable growth plans. ▪ Focus on balancing short-term financial pressure with the pursuit of long-term green vision. ▪ Enable the right conditions, finance, and managerial mandate for breakthrough experiments. ▪ Change the operational logic from destructive use of materials and resources to regenerative use. ▪ Promote valuing of the natural resource use in the corporate accounting and financial reporting.

the abandonment of obsolete, misleading, and interlocking prior knowledge.⁹³ Unlearning reflects organizational renewal capability and improves a company's ability to innovate. It is vital when acquiring new knowledge, because it discards old routines and enables change in organizational beliefs and assumptions that it has taken for granted.⁹⁴ As one of the interviewed executives remarked, "many managers are prisoners of dominant mental models and assumptions." Therefore, acknowledging and releasing an organization from previously learned knowledge frees it to move towards revolutionary green innovation, rejecting old assumptions and models.⁹⁵

An Unlocker's key task is to move a firm from the Rationality game to experiment with the Radical game by stimulating the passion and creativity among the organization's staff and partners by creating a playground for experimentation to achieve ambitious goals. This is a critical point for both establishing valid innovation activities in the Rationality game and especially in opening access to the Radical game. As our managers remarked, these goals require passion and cannot be catalyzed by waste-minimization objectives alone.

In sum, an Unlocker's role is to:

- Reveal the untapped business potential by asking demanding "what if" questions, such as "What if we could operate the business without water or oil?"
- Break resistance to corporate sustainability through individual justification and by engaging and changing one mind at a time.
- Overturn the dominant paradigm and managerial mindset via thorough redefinition of the prevailing assumptions.
- Disentangle the current constraints in the system to spot new business opportunities.
- Secure permission to step outside of disciplinary boundaries in order to unlearn, relearn, and become receptive to new influences and partnerships.
- Expose the motivation to change the game by setting seemingly impossible targets, which encourage employees, managers, and partners to reach beyond familiar boundaries.

Outsiders are often powerful Unlockers because they are not confined by the prior cognitive frames of a company. Autodesk, a design and engineering software provider, recruited its sustainability director from Hewlett-Packard's sustainability team. The incoming manager, a typical Unlocker, was able to craft and sell the environmental vision to Autodesk's CEO and senior management, and co-create an actionable roadmap because of the experience gained in previous positions and by gaining support from respected senior managers at Autodesk.⁹⁶

Conversely, intimate knowledge of company operations may also unlock new insights. For example, an employee at UPS once asked a deceptively simple question that made the company rethink their assumptions about mail delivery: Why do UPS delivery trucks in the United States take left turns? The question unlocked the company's established thinking models and led to the elimination

of left turns in route planning. The decision resulted in annual \$25 million savings in fuel, because of shorter idling and waiting times at red lights.⁹⁷

Connectors Guarantee the Survival of Corporate Sustainability Programs

In our interviews, managers described Connectors “as the glue that either makes or breaks a green program.” In other words, the Connector’s task is to combine the environmental and social mission with economic pursuits, corporate culture, organizational values, leadership models, and business strategy.⁹⁸ A visionary agenda sets the boundaries and the path for the company to follow, and bridges multiple institutional logics to the desired strategic vision. Thus, Connectors are particularly needed to open doors to outsiders in the Rationality and Collaboration games and in identifying and locating the innovative partnerships required to play the Radical game.

In sum, a Connectors’ role is to:

- Tie the environmental agenda with a systemic view, in which the organization’s inimitable assets, skills, and resources are added to those of its partners.
- Ensure that the most influential senior managers stand behind the corporate sustainability plan in their decision making and operations.
- Relate the visionary environmental roadmap with the organization’s business strategy and operations with an emphasis on ambitious objectives, measures, and incentives.⁹⁹
- Unite the functions of a Chief Sustainability Officer with those of CEO and senior managers to ensure that the environmental agenda remains viable even if key people quit, such as the CEO.¹⁰⁰

Consider Nike, where it took 10 years for the company to realize that environmental sustainability needs to be wedded to business. Environmental sustainability was formerly an essential part of Nike’s ethics and corporate social responsibility operations, but lacked a profound connection to its core business and innovation activities. Nike’s long-term vision is to create products that are decoupled from constrained resources. It incorporated this environmental vision into the agendas of managers and designers, into corporate innovation strategy, and into operations. The company launched new environmentally friendlier products including Nike Flyknit and Nike Considered shoes and a clothing line that included a World Cup soccer jersey made of recycled plastic bottles.¹⁰¹ Nike’s Sustainability Director, Hannah Jones, characterized the role of Connector by proclaiming: “If you look at innovation through lens of sustainability, you find yourself creating new and better products. You open up new markets.”¹⁰²

Transformers Enable the Entry into the Clarity Game

The key task of Transformers is to ensure that decision makers consider both the rational and emotional aspects of their critical business decisions. Transformers are important in all innovation games, but they are essential in enabling the company to engage in the Clarity game. They ensure that leaders mirror each critical business decision with the company’s core values, purpose, and vision. Managerial activities that maintain the momentum for green innovation are vital

given that managers need to navigate between the rationally bound logic of justifying investments into environmental initiatives and the emotionally bound reasoning, such as the employees' passion to make a difference.

In sum, a Transformer's role is to ensure that managers and employees:

- Understand that what the company stands for is more important than what it sells, by addressing a core question: "Are you in the business to sell more products or are you in the business to advance a greater purpose, which goes beyond a single company?"¹⁰³
- Deliberate about whether the organization gains more by advancing goals of self-interest or the collective good of people and the planet.
- Build a compelling, emotional, and differentiating story of corporate sustainability to the organization, its customers, partners, and other stakeholders.¹⁰⁴
- Ensure that the environmental vision sparks passion beyond profit generation to legitimize the pursuit of revolutionary change.
- Stabilize a company's growth aspirations to find equilibrium between short-term financial pressure and the pursuit of long-term environmental vision. For example, Interface is a publicly traded company that continues to navigate between the pressure from Wall Street, which demands attention to delivering on short-term profitability, and the pressure of advancing their environmental vision through long-term goals.
- Recognize that the use of natural resources always incurs financial or environmental expense, and modify business operations from the destructive to the regenerative use of materials and resources.

Gary Hirshberg, the former president and CEO of Stonyfield Farm, is a Transformer among executives in green business. According to *Fortune*,¹⁰⁵ this "ex-hippie, windmill builder, and anti-nuclear protestor became a passionate capitalist and CEO of a company with an ethic and business model that is unabashedly about promoting change." The company now produces the top-selling brand of organic yogurt and a top-three yogurt brand in the United States. Another example is Organic Valley, the largest co-operative of organic farmers in the United States. In 2004, it decided to stop supplying its products to Wal-Mart stores that wanted to increase their purchasing volumes. Organic Valley had limited supply potential and faced a dilemma: either to deliver to the small green grocers who had helped to grow the company in its early days, or to the big-box retailers such as Wal-Mart that were bringing organic food to mainstream consumers. Organic Valley stopped selling to Wal-Mart, citing the principle "what you stand for is more important than what you sell." Its key values espoused a stable price and business to farmers, natural food stores, and small retailers who had supported the growth of their business from the beginning.¹⁰⁶

Conclusion

Across industries, environmental issues are consistently pressuring senior corporate executives to rethink how they manage and grow their businesses to conform to increased environmental concerns, or even go beyond, to capitalize on the opportunities offered by sustainability innovations. Today, most industrial

and consumer businesses are still struggling to infuse their management agendas and innovation activity with the principles of sustainability. Our findings offer several guidelines for managers who face these challenges.

First, corporate sustainability does not offer clear heuristics for effective management, and green innovation is risky and may fail. By introducing the Rationality, Collaboration, Radical, and Clarity games of innovation, this study offers a road map for the value-creation strategies of green innovation. A profound understanding of the different green innovation games requires experience and knowledge because their underlying logics and contingencies are different. To this end, we offered detailed descriptions of the emphases and goals, foci of change, and managerial activities catalyzing each of the games. Understanding of the critical organizational barriers unique to the diverse innovation games is a key to overcoming the obstacles in the way of making corporate sustainability a competitive advantage.

To date, most companies operating in resource-intensive businesses have been active only in the Rationality and Collaboration games. Only a few companies have played the Radical and Clarity games successfully. Mastering the Radical and Clarity games is about overturning the conventional ways of creating and capturing value. The managers we interviewed stressed that a company must “pursue the right new game strategy to create and capture value, and to play the game according to its specific scope, relative strengths, and acquired knowledge in environmental issues.” These rules of game form our first guideline for integrating corporate sustainability goals with strategic green innovation.

Second, our analysis suggests that moving between these games does not always happen in a sequential manner. For example, an innovative start-up company with a visionary leader may experiment with revolutionary innovation from the outset and end up playing the Clarity game. For incumbents, creating revolutionary innovation may be harder, as illustrated by prior scholars who claim that revolutionary products rarely emerge from established businesses, reasoning that a radical new product requires an entirely new business model.¹⁰⁷ Established businesses also have an additional burden of prior infrastructural investments, assets, skill sets, and systematic management practices. For instance, Interface is an incumbent that has been able to engage in the Clarity game. This process has, however, been enduring. One of the Interface managers that we interviewed stated that it is critical to understand the emerging paradigm and mindset shifts required in gaining advantage from sustainability. The players of a green innovation game may succeed if they are able to discern the connections between the environmental issues and business imperatives, and to link these concerns with social issues. Conversely, Nike played the Rationality and Collaboration games for over a decade, yet it has increasingly experimented with the Radical game. As a Nike manager explained in our interviews, managers should “not push sustainability for sustainability’s sake, but work through it by making it a business opportunity.” Therefore, for those willing to take substantial risks, these games can be played in a parallel, overlapping, and even chaotic manner, whereas late entrants to corporate sustainability may follow a more sequential or traditional, “low risk, low investment” path, moving from Rationality to Collaboration games

and potentially to Radical and Clarity games, or they may remain within the Rationality game. These transitions present a strategic dilemma, given that a potential winner of a new game may be a company that has moved first to change the rules of the game. However, a company that comes in late may play the game better.

Finally, companies may fail to enter and play these games due to the lack of establishing and nurturing of three managerial roles: Unlockers, Connectors, and Transformers. The Unlockers generate the ideas that challenge existing knowledge, and they experiment with different green goals and locate ways to catalyze organizational unlearning and guide the firm to access the Rationality game and then advance to play the Radical game. The key role of a Connector is to identify innovative partnerships for the Radical game and combine the environmental and social mission across all of the games with economic pursuits, organizational values, leadership models, and business strategy. Finally, the Transformers are important in all innovation games, and they are essential in leading the company to engage in the Clarity game. All identified roles call for unique leadership and management capabilities, and they need to be systematically developed across the entire organization and over time. On rare occasions, an individual leader can be Unlocker, Connector, and Transformer.¹⁰⁸ More broadly, senior leaders need to align these roles across the organization's management and recruiting systems, managerial duties, and daily decision-making routines, incorporating the respective sustainability performance measures into executive compensation packages, thereby infusing the required activities gradually into the corporate culture.

Notes

1. The term "greenwashing" is used in this paper to describe the behavior by which organizations aim to adopt the externally promoted policies of corporate and environmental sustainability only symbolically. In so doing, they try to increase their chance of survival by implementing the practices that are coherent with those promoted internally by the members of the organization. Such a behavior resembles what is described by the term "decoupling" in the contexts of conflicting institutional logics by J.W. Meyer and B. Rowan, "Institutionalized Organizations: Formal Structure as Myth and Ceremony," *American Journal of Sociology*, 83 (1977): 340-363.
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9. M. Schilling, *Strategic Management of Technological Innovation* (New York, NY: McGraw-Hill Publishing, 2008).
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11. D.C. Esty and A.S. Winston, *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage* (New Haven, CT: Yale University Press, 2009); Nidumolu, Prahalad, and Rangaswami (2009), op. cit.
12. J. Howard-Grenville, S.J. Buckle, B.J. Hoskins, and G. George, "Climate Change and Management," *Academy of Management Journal*, 57/3 (June 2014): 615-623.
13. Lubin and Esty argue that most executives know that how they respond to the challenge of sustainability will profoundly affect the competitiveness—and perhaps even the survival—of their organizations. Yet, they are facing an unprecedented journey for which there is no road-map. D.A. Lubin and D.C. Esty, "The Sustainability Imperative: Lessons for Leaders from Previous Game-Changing Megatrends," *Harvard Business Review*, 88/5 (May 2010): 42-50.
14. Resource-intensive industries not only have the highest direct impact on their physical and social environments, but they lead the way in corporate sustainability, as shown by the report by K. Haanaes, M. Reeves, I. Von Streng Velken, M. Audretsch, D. Kiron, and N. Kruschwitz, "Sustainability Nears a Tipping Point," findings from the 2011 Sustainability and Innovation Global Executive Study and Research Project by MIT Sloan Management Review and The Boston Consulting Group, portions of the report have appeared in "Sustainability Nears a Tipping Point," *MIT Sloan Management Review*, 53/2 (Winter 2012): 69-74.
15. We grouped green innovation activities into four games based on the interviews. Following the guidelines by M.B. Miles and A.M. Huberman, *Qualitative Data Analysis: An Expanded Sourcebook* (Thousand Oaks, CA: Sage, 1994), we coded and typified the interview data into four consistent blocks, each representing a distinctive game. Furthermore, we asked the interviewees to comment on our interpretations of their roles in these games.
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24. See, for example, D. Pujari, G. Wright, and K. Peattie, "Green and Competitive: Influences on Environmental New Product Development Performance," *Journal of Business Research*, 56/8 (August 2003): 657-671.

25. Esty and Winston (2009), op. cit.
26. The Winter 2012 Research Report, "Sustainability Nears a Tipping Point," was published by a team from *MIT Sloan Management Review* and Boston Consulting Group, and it reports findings from the 2011 Sustainability and Innovation Global Executive Study and Research Project. More than 4,000 managers from 113 countries responded to their survey, and the report focused on nearly 3,000 executives from the commercial sector.
27. "The Road to 2020: Corporate Progress on the Ceres Roadmap for Sustainability" assesses how U.S. businesses are progressing on sustainability. This joint report by Ceres and Sustanalytics is available at <www.ceres.org/roadmap-assessment>.
28. A. Akgün, J. Byrne, G. Lynn, and H. Keskin, "Organizational Unlearning as Changes in Beliefs and Routines in Organizations," *Journal of Organizational Change Management*, 20/6 (2007): 794-812.
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97. A. Winston, interview with authors, April 4, 2011.
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102. See podcast of Hannah Jones, VP of Sustainable Business and Innovation at Nike, explaining the risks and opportunities of growing sustainably, May 27, 2012, <www.greenbiz.com/blog/2012/05/27/hannah-jones-risks-and-opportunities-growing-sustainably>.
103. For example, scholars such as P. Senge and the interviewed green business practitioners including A. Winston, A. Werbach, B. Willard, A. Lowrey, and G. Friend highlighted the importance of this question.
104. B. Willard, interview with authors, October 7, 2011. For example, investors and bankers prefer argumentation based on hard facts, such as financial figures about the savings due to green actions, and not on soft arguments that are meaningful to environmental activists, such as saving the trees saves the planet.
105. "Stonyfield generated about \$300 million in revenues last year. Its yogurt is the No. 3 brand in the United States, behind Yoplait and Stonyfield's sister brand Dannon," M. Gunther, "Stonyfield Stirs Up the Yogurt Market," *Fortune Magazine*, January 4, 2008, <http://archive.fortune.com/2008/01/03/news/companies/gunther_yogurt.fortune/index.htm>.
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