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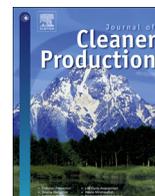
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# Environmental sustainability in industrial manufacturing: re-examining the greening of Interface's business model



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## ABSTRACT

In the face of mounting public environmental and societal concerns, firms are incorporating sustainability into their business models. However, previous research has paid little attention to how companies can renew their business model to take better account of environmental sustainability at the organizational level in their business ecosystems. This study fills this gap in the literature through a longitudinal case study of the greening of the business model of the US-based carpet manufacturer Interface. The findings delineate the change in the company's business model, stressing the role of managerial agency in organizational identity formation and in making a favorable change in the ecosystem. Hence, the study examines the links between managerial agency, organizational identity, and business ecosystems with regards to business model greening, and it discusses how shifts in managerial thinking have enabled the company to build the capabilities needed for the change. The article concludes by linking the findings to the body of knowledge on strategic change and providing a new conceptualization of a company's business model greening.

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## 1. Introduction

The global challenges associated with industrial manufacturing are multifaceted, involving economic, social, and environmental concerns (Hart and Milstein, 2003). Firms' pursuance of sustainability can be explained using a variety of motivational bases and applying a myriad of theoretical perspectives (Lozano et al., 2015). Recent research on environmental sustainability suggests that firms' engagement in green values, adoption of a proactive approach to climate change, and emphasis on sustainability are all driven by the need for a long-term competitive advantage (Esty and Winston, 2006; Holliday, 2001; Nidumolu et al., 2009). Sustainable business practices have implications for virtually every aspect of a firm's business model (Hart and Milstein, 2003), and the pursuit of environmental sustainability is linked with organizational identity. However, the links between organizational identity, managerial agency, and sustainability-driven business model change are under-examined.

Despite the substantial body of literature addressing environmental practices (e.g., Green et al., 2012; Robinson, 2004; Stubbs and Cocklin, 2008), research has neglected how firms put their strategy change into practice and connect sustainability with the way they operate in their business ecosystem (cf. Seuring and Gold, 2013). Discussion of environmental sustainability is incomplete without understanding the roles of organizational identity and managerial agency through which sustainability is instilled in the organizational practices in a business ecosystem. Hence, the present study analyzes the business model greening of the US-based carpet manufacturer Interface through a series of structured interviews, abductive reasoning, and coding based on grounded theory (Strauss and Corbin, 1998). The analysis is centered on the activities that its managers have conducted to instigate and further the business model change as well as the links between its organizational identity and the business ecosystem change. In so doing, the study highlights the process through which managers transformed Interface's business model between 1994 and 2012. The research goes beyond prior studies on Interface's transformation into a "green pioneer" conducted from the cultural point of view (Dubose, 2000; Johansen, 1998; Toktay et al., 2006).

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The paper is organized as follows. First, it reviews previous knowledge on environmental sustainability and business model change. It then describes the present study's research methods. Thereafter, the paper investigates the business model greening at Interface and links the findings to the scholarly understanding of environmental sustainability and business models. Finally, the paper concludes by suggesting future research avenues.

## 2. Linking environmental sustainability and organizational identity

Many perspectives of environmental sustainability have evolved over time. Although the environmental management literature investigates sustainability from the resource efficiency perspective (Carrillo-Hermosilla et al., 2010; Frondel et al., 2008; Potts, 2010), the strategic management literature promotes it as a means to strengthen competitive advantages while preserving natural resources for future generations (Anderson et al., 2010; Nidumolu et al., 2009). These two streams of research suggest that the benefits of integrating sustainability into corporate strategy (Amini and Bienstock, 2014), product development, and business operations include increased sales, the development of new markets, improved corporate image, product differentiation, and greater return on investment (Azzone et al., 1997; Fraj-Andres et al., 2008; Pujari et al., 2003). However, the cultural domain provides another interesting perspective on sustainability by stressing the importance of organizational identity. According to Albert and Whetten (1985), organizational identity is about self-defining “who we are as an organization” and “how we differ from other organizations”. Organizational identity has traditionally been understood to carry along continuity over time, but recent research (e.g., Gioia et al., 2013) emphasizes its fluidity and suggest that identity should change along with an organizational transformation. Although organizational identity offers useful concepts for the study of environmental sustainability (self-image, distinction from the others, continuity), its connections with business models have been notably understudied.

### 2.1. Corporate sustainability in industrial manufacturing

Sharma et al. (2010) studied the link between business and sustainability, stressing the possibility of aligning the goals of environmental conservation and profitability. Barbier (1987) and Holliday et al. (2002) argued that these goals need not be disparate and conflicting, and environmentally friendly strategies entail efficiency in the use of resources (Esty and Winston, 2006). Resource efficiency can be observed in supply chain practices (Schaltegger and Burritt, 2014) and lean operations of industrial manufacturers (Ng et al., 2015). Opponents of this view assert that sustainability strategies result in increased costs and decreased profits due to higher environmental investments. This concern might hold true, particularly in resource-intensive industries characterized by overcapacity, heavy competition, and declining margins (Palmer et al., 1995; Walley and Whitehead, 1994).

According to Reinhardt (1998), the debate needs to move away from whether or not corporations can offset the costs of environmental investments to when and on what premises environmental sustainability can be profitable. A few scholars (e.g., Heikkurinen and Bonnedahl, 2013; King and Lenox, 2002; Wagner et al., 2003) have argued that a company's environmental policy needs to be based on the economic fundamentals of the business. Orsato (2006) suggested that those fundamentals include the structure of the industry in which the business operates, the position of the business within that structure, and the organizational capabilities

possessed by the business. It can be further argued that managerial agency plays a key role in addressing these fundamentals.

In many industrial fields, addressing environmental sustainability requires changes in the institutional systems, including values, beliefs, norms, and rules (Scott, 2014), which—together with associated activities and resources—provide stability and meaning to the industrial operation. Previous research implies that changes in such institutions require the sequence of unfreezing, changing, and refreezing activities (Lewin, 1947, 1951). Lewin's model of change is often applied in research on organizational and strategic change (e.g., Sonenshein, 2010) and field-level institutional dynamics (Battilana et al., 2009). The present study applies the model as an analytical frame in structuring our analysis of the change in the case organization. However, we found that the original model is not sufficient to explain the change that pertains to business model greening, and we modified it based on our insights from the empirical analysis.

### 2.2. Managerial agency and organizational identity in the multi-layered process of business model change

Previous studies on institutional and organizational change, especially those that have investigated the role of individual change agents in the change (cf. Bandura, 2001; DiMaggio, 1988), have explicated how an organization's normative core, human agency, and environmental adaptation figure into the process. According to DiMaggio (1988), change takes place when actors with sufficient resources see in those resources an opportunity to realize interests that they value highly. A business model change can be instigated by actors who have interest in changing the way an organization operates and who take actions to leverage resources in order to transform existing business practices across the corporation and industry. Garud et al. (2002) suggested that such actors create whole new systems of meaning that tie together the functioning of disparate sets of activities. Thus, managerial agency driving business model greening provides a crucial link between environmental sustainability and the business model. Focusing on the actions of managers allows for the investigation of the deeper and more resilient aspects of social structures associated with business model change by considering the processes by which structures—including schemes, norms, and routines (cf. Scott, 2014)—become created, diffused, adopted, and adapted over time as authoritative guidelines for new practices in business.

Hart and Milstein (2003) demonstrated that some business leaders see the deliberate greening of a business model as a moral mandate, whereas others view it as a legal requirement or a cost of doing something necessary to maintain legitimacy and the right to operate. Hence, the present study investigates whether the managerial agency in business model greening is consistent with the central features of organizational identity, such as the core values, norms, metaphors, and practices (Gioia et al., 2013). If not, it is important to know whether the organizational identity needs to change in order to allow for changes in the subsequent business model. Nevertheless, business model greening is considered to be linked with a company's founding or adopted values and organizational identity.

Organizational scholars have long emphasized the central role that organizational identity plays in providing continuity and stability in organizational processes (cf. Albert and Whetten, 1985). However, organizational identity has also been seen as a factor in continuous change (e.g., Gioia et al., 2013), and a factor that might present a necessity for change (Hannan and Freeman, 1977). In their conceptualization of organizational identity, Albert and Whetten (1985) showed that members of an organization emphasize and present a different picture of “who we are as an organization” to

each audience, thereby supporting multiple simultaneous views of the identity. Gioia and Thomas (1996, p. 375) concluded that, “to induce change, the organization must be destabilized and convinced that there is a necessity for a different way of seeing and being.”

Bearing these aspects of managerial agency and organizational identity in mind, a change can be more difficult when more social groups with heterogeneous interests are involved (Lounsbury and Glynn, 2001). Lozano (2012) emphasized that sustainability should reach across all corporate activities. Such activities deal with the directions an organization takes and the means by which it pursues its ends. Hence, the activities of managers not only induce changes in their own organizations (corporate activities), but also in the ways organizations interact in the business ecosystem (network activities). The managerial agency perspective provides a promising approach to investigate the actors, drivers, and processes of business model greening at the organizational level in business ecosystems.

### 2.3. Managing sustainable business models in a business ecosystem

The business model comprises processes and activities that convert innovation into value (Doganova and Eyquem-Renault, 2009; Rajala and Westerlund, 2007). Rappa (2003) defined the business model as the method of doing business by which a firm can sustain its operations. Conversely, business model change follows disruptions or the enactments of new activity opportunities (George and Bock, 2011). Prior studies have considered the business model as a combination of components through which a firm creates and captures value and differentiates itself from the others (Zott et al., 2011).

The present study shares the holistic view put forth by Amit and Zott (2012), who defined the business model as a system of interconnected and interdependent activities that determines the way the firm conducts business to satisfy market needs, along with the specification of which parties conduct which activities and how these activities are linked to each other. Lin et al. (2012) emphasized that, in addition to focusing on the explicit and latent needs of customers, the development of green offerings should rest upon an understanding of organizational values. This view raises the managerial challenge of designing and manufacturing an offering in a way that meets the sustainability criteria of the company and its stakeholders. Thus, environmental sustainability and the business model are linked with organizational identity, which relays “who we are as an organization” and transmits how the organization differs from other organizations in the field (Albert and Whetten, 1985; Gioia et al., 2013).

Many activities of sustainable value creation are conducted in collaboration with others in the business ecosystem (Betz, 2002). This collaboration takes place through social and both intra- and inter-organizational relationships with organizations and individuals, including partners, customers, and extra-business constituents such as competitors (Yarahmadi and Higgins, 2012). The business ecosystem consists of actor ties, activity linkages, and resource bonds that should be managed as part of the company’s business model (Banerjee, 2002) because they provide access to external resources and enable new business opportunities (Vargo and Lusch, 2008). Collaboration is essential for developing a business model for a green offering (Roy and Whelan, 1992), because it adds value to all stakeholders in the ecosystem (Hart, 2005; Porter and Van der Linde, 1995).

## 3. Research method

Given that the purpose of this study is to improve the understanding of the ways in which an industrial manufacturer can implement a sustainability-driven change in its business model, a longitudinal single case study was considered to be the best empirical approach to study the phenomenon. Hence, the study undertakes an investigation of the change in Interface’s business model between 1994 and 2012. The empirical study follows an interpretive case study design focused on improving the current understanding of the impact of managerial activities on a company’s business model greening.

The case-selection criteria included that the case company 1) should be recognized as a green pioneer in a resource-intensive industrial manufacturing industry, 2) must have reportedly infused a triple bottom line into its business model (cf. Elkington, 1994), and 3) must have shown high environmental or societal impact. Following these criteria, Interface, a US-based carpet tile manufacturer, made an interesting case for the empirical investigation. Interface commands \$1 billion in annual revenues and has more than 3000 employees. The company has been described as a pioneer in restructuring its business model around environmental sustainability (Doppelt, 2003; Griffiths, 2000).

### 3.1. Data collection

The primary data comprise eight semi-structured interviews with Interface’s senior managers from 2010 through 2012. The interviewees were in charge of various environmental sustainability activities. Each interview lasted between 60 and 180 min and took place in the United States. The identities of the informants are withheld due to confidentiality reasons. In addition, extensive secondary data were used, consisting of internal corporate documents, brochures, bulletins and annual reports, presentation materials, and information published on the company’s intranet and external websites and blogs as well as other material provided by the interviewees. To avoid subjective bias, additional insights were gathered from three industry experts. The expert interviews were conducted with three professionals working on green initiatives in different countries. One of them operates in the housing design and construction business in the US. Another is a clean energy R&D manager based in Masdar City in the United Arab Emirates who is contributing to the effort of building the greenest city in the world. The third expert has studied the evolving cultural transformation toward corporate sustainability at Interface between 1996 and 2005.

A uniform interview frame (cf. Patton, 1990) aided in the data collection on the following themes: 1) description of the company’s business model and environmental sustainability programs; 2) key greening activities, phases, and tasks performed; and 3) challenges and outcomes of greening the company’s business model. Four interviews were audio-recorded for transcription and analysis. Three interviews were not recorded out of respect for the interviewees’ preferences or because of the interview took place in a noisy public area. However, the data include detailed notes taken during each interview, and the unrecorded interviews did not lead to a systematic selection bias because they were distributed randomly across the data. The empirical data were organized according to the date of interview and the interviewee. The gained data were transcribed and coded for the analysis.

### 3.2. Data analysis

The analysis follows the process of abductive reasoning (Dubois and Gadde, 2002), building in a systematic combination of

theoretical knowledge and empirical insight. The main unit of analysis was the sustainability transformation of Interface's business model in its business ecosystem. The interviews comprise narratives from interviewed managers about the key activities and phases of the transformation and describe the interviewees' roles in the process. The analysis identified and investigated what these activities and phases meant from the perspective of the business model greening. The goal of the analysis was to make meaning out of the case (cf. Neuendorf, 2002). The section on findings in this article includes quotes from the interviews as well as from the secondary data gathered from the case.

Two authors coded themes in the transcribed interviews and notes, thereby ensuring a satisfactory investigator triangulation (Miles and Huberman, 1994). In the process, we organized the data into consistent blocks and identified phases in the business model change. The coding included looking at the three phases of organizational and strategic change suggested by Lewin (1951). Following Lewin's conceptualization, we identified activities manifesting the desire to "unfreezing" the status quo, including, for example, the public talks by Ray Anderson (Founder and Chairman of Interface) that challenged the company to pursue a new vision, and the subsequent efforts of the management team in justifying the need to take environmental issues seriously by referring to examples of influential green companies in other industries. The second initial category of activities described the efforts to change the mindset of a larger audience within the organization, including the efforts to influence their schemes of reasoning, and the efforts to promoting green innovations by illustrating the benefits of greener solutions in real dollar and growth terms. The third initial category included activities pertaining to establishing the new ways of thinking, or in Lewin's terms, "refreezing" the new order. This phase included displaying authorization from top management for the relevant sustainability-related activities and resulted in creating a roadmap for the activities such that they were no longer bound to individuals but were instilled in the management agenda of the organization.

Our further analysis of the nature and purpose of actions and occurrences in these categories resulted in four principal categories of activities, differentiated by their general properties as advised by Strauss and Corbin (1998). The labels of these categories were i) *recognizing the potential of business model greening*, ii) *establishing the desired vision of sustainability*, iii) *reinventing the business model to leverage the green vision*, and iv) *reconfiguring the business ecosystem for sustainable business practices*.

Thereafter, manifestations of managerial agency were identified within the categories in relation to the ecosystem-related change in business practices. The outcomes were compared, discussed, and agreed among all authors, and three follow-up interviews with two of Interface's managers were arranged to elaborate the findings and verify the observed facts. This research is exploratory by nature and seeks to elicit Interface's managers' perceptions of greening their corporate business model. To make the results transferable to other contexts, the article maintains richness of the case description and transparency of the analysis (Erlandson et al., 1993). These findings should be transferable to other manufacturing companies and contexts in other resource-intensive industries.

## 4. Findings

Interface Inc. was founded in 1973 when Ray Anderson recognized the need for versatile floor coverings for the modern office environment. In the following 20 years, the company grew into the global market leader in the modular carpet tile business with healthy annual profit margins. Considering its triumphant success in the industry, the decision to make a major business model

change to become a world leader in sustainability was not predictable.

### 4.1. Interface's awakening to environmental sustainability

By 1994, Interface had little need to change for financial, competitive, or legislative reasons, but the industry was under fire from environmental activists for its environmental performance. Carpet manufacturing was highly toxic and used large amounts of petroleum derivatives, thereby producing vast amounts of waste. Customers started asking what Interface was going to do about the environmental impact of its products. As a result, Anderson initiated Interface's first environmental footprint analysis, showing that each year the firm produced:

- 10,447 tons of solid waste, meaning that manufacturing plants sent six tons of carpet trimmings to a landfill every day<sup>2</sup>
- 605 million gallons of contaminated water
- 704 tons of toxic gases
- 62,800 tons of carbon dioxide

Management decided to make a change toward environmentally sustainable business due to these upsetting figures. However, at the time, incorporating sustainability into the company's business operations required extraordinary changes, because "the factories of Interface and its suppliers extracted 1.2 billion pounds of raw materials to produce \$802 million in products" and the company produced tons of by-product waste from "wrong shipments, imperfect carpets, and clerical errors" (Anderson, 2009, p. 112). In fact, 10 percent of the company's sales went "down the drain as waste" (Anderson, 2009, p. 130). Interface needed radical alterations to its corporate vision, strategy, and business model.

Today, Interface is the global market leader in carpet tiles, with sales reaching over \$1 billion. Its "Mission Zero" strategy has achieved \$438 million savings in cumulated avoided-waste costs. Further, Interface has doubled its earnings, cut 82 percent of its greenhouse gas emissions relative to sales, and reduced its fossil fuel consumption by 60 percent (Eco Measures Report, 2010; Green Mountain Sustainability Report, 2010). These achievements were mainly the result of the successful commercialization of green innovations, despite occasional failures (Lampikoski, 2012). However, Interface's greening accomplishments still leave the company far from its desired environmental performance (Anderson, 2009).

### 4.2. Reconsidering Interface's business model change

Interface's business model greening started when management became concerned about the company's state of environmental sustainability. Following Lewin's (1951) basic conceptualization of change, the present study analyzed Interface's business model greening and identified that three stages of change were observable in the case: unfreezing the situation, moving to the desired state, and then refreezing. However, Lewin's theory was found to be insufficient for explaining exactly *how* the change occurred in practice. The analysis of the data resulted in four categories of activities that took place within Interface's business model change. Initiated by Ray Anderson's "awakening" to the need for environmental sustainability, Interface's management identified the greening opportunities in existing business operations, new product development, and supply chain activities. This process is

<sup>2</sup> A carpet sent to a landfill takes about 20,000 years to decompose. For details, see Oliva, R. and Quinn, J. 2003. "Interface's Evergreen Services Agreement," Harvard Business School Case 9-6003-112.

uniform within the unfreezing stage of the company's transformation. However, the stage of moving to the desirable state at Interface was somewhat lengthy and required the managers to establish new meanings of sustainability by making sense of their greening vision and tackling diverse challenges at different levels, paces, and places of the change process. It included two completely different types of activities contributing to the change at large: establishing the desired vision of environmental sustainability and reinventing the business model to leverage the vision. Finally, the refreezing stage included implementing the new vision and the reshaped business model as well as communicating it to the relevant parties in order to instill a strategic change in the ecosystem (see Fig. 1). The main categories of activities are discussed in detail in the following sections.

#### 4.2.1. Category I: Recognizing the potential of business model greening

At Interface, the managers contemplated the obstacles to business model greening and evaluated the necessary financial and human capital investments. They also identified core capabilities upon which the business model greening could be founded and realized that it is imperative to pay attention to the greening efforts of competitors. The management *questioned the prevailing industry logic*, given that the established industrial practices were affected by competitive and social pressures that failed to address environmental sustainability. The objective was to make Interface the company of choice for their customers and other stakeholders by *promoting the new business logic*, the “Doing Well by Doing Good” principle (cf. [Stubbs and Cocklin, 2008](#)).

To recognize the potential of greening, the managers “needed to discuss whether it [would] be possible to create competitive advantages via sustainability.” In particular, “there [was] a need to recognize the company’s stance on climate change issues, covering the actions of key competitors and influential green firms in other industries.’ Moreover, “it [was] important to collect prior eco-activities, green programs, products, policies, people, and projects under one umbrella” to define the essential (in-house or external) capabilities for advancing green initiatives. Management at Interface wanted to keep things simple and reachable by focusing on the most influential business initiatives; thus, it underscored the need to identify and understand the key “pain points” in environmental sustainability.

Early signs of progress play an important role in catalyzing change toward sustainable business. One of the interviewees pointed out that “identifying some areas for potential fast track

development may catalyze other initiatives into action.” The subsequent steps in greening can be advanced by addressing the revenue component of a business model, which defines the company's profit and cost structures. Recognizing the need to eliminate energy waste and create the potential for greening in material and energy streams transparent with monetary figures can resonate with the stakeholders' acceptance and interest in joining the green initiative. In addition, inter-organizational support was found necessary for a company's business model greening, because “the new realizations can lead to improved supply chain management practices in terms of the use of natural resources” as pointed out by one of our informants within Interface.

#### 4.2.2. Category II: Establishing the desired vision of sustainability

After recognizing the potential of greening, managers needed to create a *transformative vision and agenda* for the change. This meant reimagining the company's purpose and way of doing business in the carpet industry by integrating environmental aspirations with economic values and the corporate culture and leadership (cf. [Anderson et al., 2010](#)). The managerial mindset at Interface first opposed incorporating environmental sustainability into the company's vision and strategy. Most of the managers viewed the new vision with hostility, confusion, and skepticism. Many deemed it merely as a passing managerial fad, given that their key competitors stayed out of the environmental sustainability space. Over time, skeptical middle managers were convinced of the efficacy of building a greener business after being presented with the substantial savings in energy, waste, and water.

Organizational sensemaking activities aim to establish a new vision. The interviewees saw a need for a *holistic vision of sustainability*, covering all areas of business. Top management at Interface brought in sustainability consultants who held workshops to catalyze out-of-the-box thinking and debate the key themes of environmental sustainability and their connections to the company's business, values, culture, and leadership. Ray Anderson invited a group of proficient externals to join the Eco Dream Team that helped create the company's new green vision over a two-year period. This vision imagined the evolution of a new commercial system in which a business would flourish by drawing on the market's power, influencing the potential and resources of a large corporation, and causing minimal harm to the environment in the process.

As pointed out by one of our informants, imagining the vision for a company requires “putting forward a mission and a roadmap that challenge the current way of operating a business.” Such a

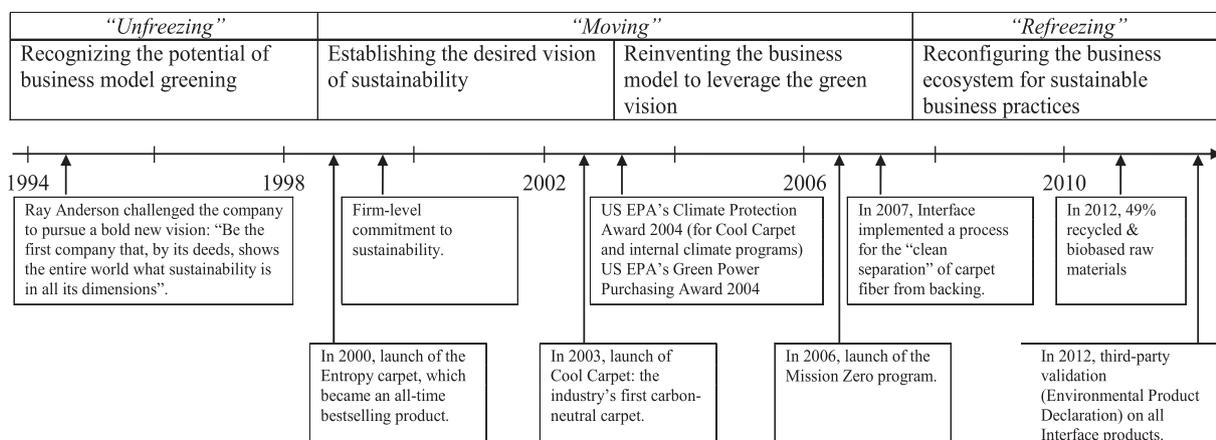


Fig. 1. Four different groups of activities are identified in the process of Interface's business model greening.

roadmap is “important to help imagine a new business ecosystem, built upon the doing good and doing well philosophy,” and brings a systemic environmental perspective to corporate greening. It can help managers envision entirely novel ways of operating and remove current constraints from the company's business ecosystem, which underscores the importance of being open to collaboration with new partners. Of note, the management at Interface pointed out the “new green business opportunities and innovations, which could be created either in-house or with external partners.”

Another aspect of organizational sensemaking regarding the vision of sustainability at Interface was the organizational identity perspective. The differentiation of Interface's value propositions from its key competitors was both important and a crucial challenge: “What if everybody in our business does the same? How does our company stand out?” This view spells out one of the key pillars of organizational identity: differentiation from other organizations. In addition, having first-mover advantages in the manufacturing industry was important; even if competitors followed Interface's example, the company could gain from its longer, accumulated experience in environmental sustainability practices.

In the mid-1990s, Interface's management became interested in service thinking—specifically, mass customization and the lease model. Interface began bundling installation, maintenance, reclamation, and other services with carpet sales, promoting the strategy with the slogan “this carpet comes installed.” Although Anderson had already introduced his vision of sustainability, the slogan showed that Interface's organizational identity was distant from an environmentally sustainable business and was centered on providing an industrial product augmented with the luxury of product-related services. Although this mission did not necessarily conflict with the principles of sustainability, the company did not manifest sustainability in its marketing communications. Today, the company articulates its vision as guidance principles, according to which Interface wants “to be the first company that, by its deeds, shows the entire industrial world what sustainability is in all its dimensions: people, process, product, place and profits by 2020” (Interface's marketing material). Our informants described that in doing so, the company wanted to become restorative through the power of influence. These observations imply that Interface's business model greening is a holistic objective. Moreover, according to the marketing material, the company's mission states that “we will honor the places where we do business by endeavoring to become the first name in industrial ecology, a corporation that cherishes nature and restores the environment.”

#### 4.2.3. Category III: Reinventing the business model to leverage the green vision

Management at Interface needed to obliterate some of the old practices to make room for the new ones. The analysis indicated that business model greening meant reshaping the critical components of the business model. The reinvention of Interface's business model included “the shaping of a revolutionary strategy and building the management's mandate to make it happen.” This shaping necessitated challenging the conventional business model in terms of products, services, and processes: “There was a need to systematically experiment and test new greener ways of conducting business.” For instance, Interface launched a novel lease-based business model to change the procurement logic among its business-to-business customers. At the time, no one had heard of office carpeting being leased.

The lease experiment was based on designing products *cradle-to-cradle*, according to which products should be remade into new products (of equal value) at the end of their lifecycle. However, the lease-based business model failed to take off due to customers'

non-supportive accounting practices, Interface's lack of a viable recycling system, and other reasons beyond the company's control. In particular, “the tax implications of having a lease, versus buying the carpet, turned out to be a big bump ... To have a lease, it has to have residual value at the end of that lease, but unlike cars, no one wants to buy your carpet after you have used it for seven years.” The failed experiment pushed Interface to further concentrate on environmental sustainability, which enabled the company to introduce some breakthrough green innovations (cf. Anderson et al., 2010; Stubbs and Cocklin, 2008). In 2006, Interface finally succeeded in pioneering the industry's first commercial recycle and reuse system with help from new suppliers.

The reinvention of the business model directs managers to ask radical questions, such as “how can a business operate without oil, water, or the use of harmful chemicals?” (cf. Winston, 2009). It forces managers to get involved, leads to intellectual debate, generates radical initiatives, and energizes the staff to solve complex problems. “Supporting business model renewal at the level of all the business model elements by leadership actions provides extensive support for individuals and teams who seek ways to renew the contemporary business practices.” In particular, managerial support is crucial in making sense of the business model change in economic terms: “It is important to illustrate the benefits of greener solutions in real dollar and growth terms for economic sensemaking and to show the intangible benefits of greening, such as corporate brand, differentiation, and customer loyalty.”

#### 4.2.4. Category IV: Reconfiguring the business ecosystem for sustainable business practices

Interface needed new material suppliers and partners to solve the technical challenges of recycling carpets. Nylon is a key material in carpet manufacturing, but most suppliers lacked the capabilities to reuse nylon materials until the early 2000s, and nylon 6/6 was deemed impossible to recycle. Moreover, the majority of Interface's suppliers neglected its new greening initiatives or lacked funds to invest in development efforts. Carpet manufacturing is a resource-intensive business where cost savings through efficiency of operations are the primary concern, and many suppliers were afraid of that green investments could undermine this objective. Suppliers' reluctance to develop greener processes forced Interface to come up with the solution alone or locate partners who would be committed to green objectives and help the company create a new recycling system.

In the late 1990s, Interface's managers continued to reinvent the business model and reconfigure its business ecosystem while seeking green innovations on several frontiers. They focused on the recycling and reuse of technology, process improvements, manufacturing plant redesign, material recovery discoveries, and green product design by utilizing the principles of biomimicry. These endeavors required the suppliers to conform to the new standards pursued through Mission Zero, whose goal was to eliminate any negative impact that Interface and its partners might have on the environment. Interface needed to locate new partners who had the resources to assist it in problem-solving related to the recycling of nylon. Interface had invested \$5 million into its leasing experiment, but the new business model would not make financial sense without a functional closed-loop recycling system, because the company's new environmental vision prevented it from dumping the returned nylon carpets into landfills. Moreover, Interface would need to educate its salesforce, managers, and customers about the benefits of the new model.

Management might have been tempted to rush to publicly announce the company's new environmental sustainability efforts after gaining some “quick wins.” However, it is important to avoid the urgency to “oversell on the green promises” and establish a

roadmap needed in the realization of the long-term strategy and commitment to environmental sustainability: “There is a need for a top management mandate for conducting green business practices, as sustainability is not to be seen as a managerial fad, which fades away as soon as the next CEO takes over the company.” Moreover, creating a roadmap for relevant activities not bound to specific individuals is recommended, and “concrete managerial and personnel-related actions are needed to show believable responses to a specified green vision and sustainability goals.”

Finally, Interface's new green business model required securing the longevity of the eco-program by rewarding good work: “It is important to connect sustainability with performance measures, managerial performance scorecards, staff's work duties, and the existing incentive systems.” Of note, sometimes the search for the right measures in the transformation requires competition between environmental business initiatives: “Internal environmentally focused competition across business divisions may trigger collective initiative”. The greening of Interface's business model and the reconfigured ecosystem have resulted in major positive gains; its waste elimination activities saved more than \$400 million by 2010.

## 5. Discussion and conclusion

The purpose of this study was to investigate the progressive activities of Interface's business model change and shed light on the contingencies of an industrial manufacturer's business model greening. This research contributes to the current body of knowledge on how companies can infuse their business models with sustainability. The study of the US-based carpet manufacturer Interface revealed important lessons for scholars and practitioners on firms' business model greening. It confirms the links among organizational identity, managerial agency aiming to transform a firm's business model, and the business ecosystem-level implications of greening. In more general terms, the analysis revealed that the transformation is a multifaceted process, which incorporates several interconnected and overlapping phases that pose managerial and leadership challenges.

Gioia and Thomas (1996) were among the first to empirically capture planned identity change with the process of strategic change. They observed that, to induce the desired change, the organization must be destabilized and convinced of the necessity for a different way of seeing and being. Interface exemplifies the idea that a greener mindset calls for radical alterations in the routinized ways of operation to make the change happen. Its new operational philosophy manifested the principles of “reduce, reuse, reclaim, recycle, and redesign” (Anderson, 2009, p. 63). To implement these principles in practice, Interface experimented with extended product responsibility and zero waste solutions, improved the recycling of materials, eliminated the dependence on oil as a key raw material, and sought new technologies for production, recycling, and powering of its manufacturing plants.

As the collective identity of the organization changes, new behaviors associated with these values are reinforced and become embedded in the culture. Understanding is augmented by belief and commitment. New ways of thinking, believing, and doing emerge incrementally as strategic decisions are confirmed and sustainability becomes fully embraced as “the way we do things around here”. This shifting paradigm can produce innovations in technologies, sustainable business practices, and new leadership capacity. Externally, the organization needs to realize increasingly strong connections and levels of trust with its marketplace. This view is consistent with Hannan and Freeman (1977), who posited that the need for external legitimacy can inhibit identity change, but it can also present a necessity for change. The findings of the

present study support this view but provide interesting insights concerning the reinforcing role organizational identity plays in business model change. Our findings indicate that, if organizational identity is infused with environmental sustainability—that is, if people in the organization internalize the notion that the organization is environmentally sustainable and that this factor differentiates it from other organizations—the reach of environmentally sustainable practices might go far beyond the operational practices that managers can control.

Interface's business model greening comprised recognizing the opportunities and challenges of greening, engaging in organizational sensemaking pertaining to the vision of sustainability, reinventing the business model, and reconfiguring the business ecosystem for sustainable business practices. After reviewing the findings, the present study suggests that managers give meanings to the need for business model change, to the actual change processes, and to the desirable state of affairs through these actions. Although literature on change management often explicitly or implicitly endorses Lewin's (1951) three stages of change (unfreezing, moving, and refreezing), organizational change processes have more to consider. Understanding business model greening as a multi-layered and multifaceted process that includes overlapping and iterative activities helps scholars and practitioners make sense of the managerial activities that support business model greening.

### 5.1. Theoretical implications

This study makes several contributions to the research on environmental sustainability. First, it adds to the scarce theoretical and empirical research on green business models (cf. Halme et al., 2007; Stubbs and Cocklin, 2008) by clarifying the essential concerns in business model change as a manifestation of values, management principles, and cognition of the firm's operations in its business ecosystem (cf. Mason and Spring, 2011). New knowledge in this area is needed given that green business models are associated with uncertainty and volatility in business ecosystem-level operating conditions, challenging current approaches to risk management and decision making. The business model change at Interface indicated that the learning of environmental sustainability was rooted in the organization via experimental learning, team building, and participation in brainstorming workshops (cf. Anderson, 1998). The desired state was manifested by actions that support the organization's acceptance of the new conditions. Interface's top management promoted risk taking, accepted failure, and built systems for educating the staff on the sustainability vision and environmentally sustainable principles for conducting business in the partner network.

Second, the study illustrates the role of managerial agency in driving environmental sustainability and the links among organizational identity, business model change, and the implications of change to the business ecosystem. Consistent with Gioia et al. (2013), the findings suggest that change and organizational identity are associated; furthermore, sustainability-driven business model change influences the business ecosystem if it incorporates organizational identity change. In organizational identity formation and change processes, it is not enough for the leaders to “give a sense” of the company's identity to organizational members (Gioia et al., 2013). Rather, leaders must allow members to make sense of the new identity on their own if they are to adopt it. Actuating people to act for the formation of an organizational identity that is favorable for sustainability is essential for instilling sustainability-driven changes into the entire business ecosystem. Connecting organizational identity to business model greening is a novel contribution to the environmental sustainability research.

Third, the findings related to Interface's vital greening activities in the course of its business model change cast new light on the transformative activities in the business ecosystem and suggest that business model greening requires questioning the established business model and changing the current way of operation. Congruent with the findings of O'Connor and Ayers (2005) concerning the competencies required in radical change, the business model transformation at Interface required extensive changes to the management practices, which are a core element in organizational identity. In addition, the findings of the present study indicate that successful change agents develop those capabilities needed to implement the desired change. Some of the managerial actions needed in renewing a business model differ substantially from those required for maintaining the existing business. Moreover, our study emphasizes that business model change is linked with organizational identity transformation, as differentiating the business from competition is one of the pillars of organizational identity. Following Gioia et al. (2013), some changes are neither planned nor involve conscious effort, but emerge as the actors in an organization make changes in response to shifts within the organization's business ecosystem.

Finally, the study contributes to the current knowledge of environmental sustainability by proposing a novel conceptualization of a company's business model greening. The main categories of activities found to be essential in business model greening include recognizing the potential of business model change, establishing the desired vision of sustainability, reinventing the business model to leverage the green vision, and reconfiguring the business ecosystem for sustainable business practices. The detailed analysis of Interface's greening provides a longitudinal view of the sustainability-driven change of a company's business model in its business ecosystem (cf. Holt, 2011). Overly simplistic phase models (cf. Lewin, 1951) are useful in providing an overview of a typical change process, but they might be insufficient in depicting the multifaceted and multi-layered processes of business model greening. The findings of the present study facilitate further research of business model change in other industries by identifying the links between a company's business model and the contingencies of the business ecosystem. In particular, our findings imply that business model greening involves different but intertwined phases of increasing the awareness of the need for change, promoting the change through rational schemes of reasoning and reinforcing identity formation, and establishing the desired schemata into the management agenda. In this way, the outcomes of this study assist scholars in recognizing the essential concerns of environmentally sustainable business models and proactively addressing critical issues across the business model greening.

## 5.2. Practical implications

The greening of a business model is a long-term process in which accumulated knowledge and experience bring forth challenges, frustration, and opportunities. Prior research has focused on how managers provide employees with information about change, exhibiting a "sender" orientation in which it is assumed that meaning is a function of how managers transfer an interpretive reality to employees (Sonenshein, 2010). This study illustrates how patterns of meaning related to sustainability are constructed and used to promote business model change. The sought-for change in the business model is possible only after the existing institutionalized logic has been decoupled and the desired state of affairs articulated. In the early stages of the business model change, the key change agents should consist of top management and the extended management team, forming dedicated task force teams that focus on selected key areas of the transformational process. At

Interface, the management team sought best practices from consultants, universities, business partners, and companies from other industries.

Endorsing and going beyond Anderson's (1998) findings, the analysis of Interface showed that the transformation toward greener business model is a multi-layered process. First, it includes the levels of *understanding* environmental sustainability, pertaining to the identification of new solutions, technologies, and thinking. These activities were labeled as organizational sensemaking about environmental sustainability. Second, Anderson speaks about *achieving* sustainability, related with achieving both tangible and intangible results. The analysis showed a gap between the desired and actual level of change, which was highlighted through technical challenges and resource disparities. The study identified activities by which managers attempt to influence the sensemaking of other actors to reach the desired state of sustainability. Prior research on organizational and strategic change (cf. Gioia and Chittipeddi, 1991; Maitlis and Lawrence, 2007) has labeled such activity as *sensegiving*. The present study argues that understanding these activities is crucial for managers if they are to promote environmental sustainability. The third level refers to *intra-organizational and external influence* through the coordination of the activities of the company's staff, suppliers, customers, and other stakeholders (Anderson, 1998). Table 1 summarizes the managerial activities according to the levels of business model greening at Interface.

As synthesized in Table 1, our findings imply that successful managerial agency in the sustainability-driven business model change consists of the activities of sensemaking and sensegiving within the organization. Investing in making sense of sustainability is needed to ensure a shared understanding of the needs for change, whereas sensegiving is about making the ends and means of change understandable for both the internal and external audiences. Also, the ecosystem-level change requires influencing partners in the business network in addition to intra-organizational actors. The lessons from the case indicate that these activities are needed to promote green innovation the way that it results in the ecosystem-related process of business model greening.

## 5.3. Concluding remarks, limitations, and avenues for future research

Without a profound understanding of how the greening of a company's business model progresses over time, managers are ill-equipped to manage the transformation. Therefore, without sufficient managerial attention to the activities of sensemaking about the vision for sustainability and sensegiving pertaining to the desired objective to instill favorable organization-level identity of environmental sustainability, business managers might fail to operationalize green business models. Consequently, they might not create competitive advantages for their investments in environmental sustainability. Hence, managers can benefit from the findings of this study by diagnosing the strengths and weaknesses of their managerial actions with regard to the process of business model greening.

This article has reported an explorative single case study in the US carpet manufacturing industry to investigate an industrial manufacturer's business model greening. Although this approach limits the possibility of generalizing the findings, the observations from the case study suggest intriguing avenues for further investigation of business model greening. Thus, there is a need for more research on the transformation and operationalization of business models toward environmental sustainability in multi-industry settings, including non-resource intensive businesses. Finally, the study explored an organization's business model greening as part

**Table 1**  
Managerial agency in the multi-layered process of business model greening.

	Categories of activities			
Levels of the process	Recognizing the potential of business model greening	Establishing the desired vision of sustainability	Reinventing the business model to leverage the green vision	Reconfiguring the business ecosystem for sustainable business practices
Sensemaking	<i>Differentiating the identity from key competitors:</i> The differentiation is crucial from the perspective of competitive strategy.	<i>Identifying the areas for potential development:</i> Gaining acceptance and support for green programs, which will catalyze other initiatives into action.	<i>Making sense of greening in economic terms:</i> Illustrating the benefits of greener solutions in terms of real dollars and growth.	<i>Allowing competition between greening initiatives:</i> Internal competition across business divisions may trigger environmentally focused offerings.
Sensegiving	<i>Acknowledging the consequences of sustainability:</i> Calculating and discussing the odds of creating competitive advantage via sustainability.	<i>Imagining the green vision:</i> Managerial agency is imperative in decoupling the prevailing operational logic to help imagine revenue streams in a new business ecosystem.	<i>Reshaping the critical components of the business model:</i> There is a need to systematically experiment and test new, greener ways of conducting business.	<i>Communicating the interconnectedness of business model in the ecosystem:</i> Aligned decisions on all business model elements help bring about the green vision.
Intraorganizational influencing	<i>Keeping things reachable by focusing on the most influential green initiatives:</i> Identifying the activities that create the greatest impact help capture value of greening initiative.	<i>Putting forward a sustainable mission:</i> Nurture favorable mindset for sustainable business model built upon the 'doing good and doing well' philosophy.	<i>Supporting business model renewal:</i> Leadership agency should provide extensive support for individuals and teams who seek ways to renew the contemporary business practices.	<i>Supporting relevant activities:</i> Legitimate support to activities that create business value to trigger responses to a specified green vision and sustainability goals.
Ecosystem-level influencing	<i>Building up collaboration with new partners:</i> Adapting to the green innovations that can be created with external partners.	<i>Reinforcing sustainability-favorable identity:</i> Collecting eco-activities, green programs, products, and policies under one sustainability identity.	<i>Highlighting the long-haul effects of greening activities:</i> "Sustainability" is not to be seen as a fad that fades away as soon as the next CEO takes over the company.	<i>Endorsing the benefits of sustainability in the ecosystem:</i> Communicating the links among pursued benefits, sacrifices, and differentiation.

of its business ecosystem. More research is needed to determine how to overcome the barriers to institutionalizing green business models across multi-actor value systems. Therefore, more research should be conducted on the specifics of institutional change.

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## References

- Albert, S., Whetten, D.A., 1985. Organizational identity. In: Cummings, L.L., Staw, M.M. (Eds.), *Research in Organizational Behavior*, vol. 7. JAI, Greenwich, CT, pp. 263–295.
- Amini, M., Bienstock, C.C., 2014. Corporate sustainability: an integrative definition and framework to evaluate corporate practice and guide academic research. *J. Clean. Prod.* 76 (1), 12–19.
- Amit, R., Zott, C., 2012. Creating value through business model innovation. *MIT Sloan Manag. Rev.* 53 (3), 41–49.
- Anderson, R., Amodeo, M., Harzfeld, J., 2010. Changing business cultures from within. In: *The Worldwatch Institute*. W.W. Norton, NY, pp. 96–102, 2010 State of the World Report.
- Anderson, R., 2009. *Confessions of a Radical Revolutionist*. St Martin's Press, New York.
- Anderson, R., 1998. Mid-course Correction. *Towards a Sustainable Enterprise: the Interface Model*. Chelsea Green Publishing Company, White River Junction, VT.
- Azzone, G., Bertele, U., Nogi, G., 1997. At last we are creating environmental strategies which work. *Long. Range Plan.* 30 (26), 562–571.
- Bandura, A., 2001. Social cognitive theory: an agentic perspective. *Annu. Rev. Psychol.* 52, 1–26.
- Banerjee, S.B., 2002. Organizational strategies for sustainable development: developing a research agenda for the new millennium. *Austral. J. Manag.* 27 (1), 105–117.
- Barbier, E., 1987. The concept of sustainable economic development. *Env. Conserv.* 14, 101–110.
- Battilana, J., Leca, B., Boxenbaum, E., 2009. How actors change institutions: towards a theory of institutional entrepreneurship. *Acad. Manag. Ann.* 3 (1), 65–107.
- Betz, F., 2002. Strategic business models. *Eng. Manag. J.* 14 (1), 21–28.
- Carrillo-Hermosilla, J., Del Rio, P., Konnola, T., 2010. Diversity of eco-innovations: reflections from selected case studies. *J. Clean. Prod.* 18 (10–11), 1073–1083.
- DiMaggio, P.J., 1988. Interest and agency in institutional theory. In: Zucker, L. (Ed.), *Institutional Patterns and Culture*. Ballinger Publishing Company, Cambridge, MA, pp. 3–22.
- Doganova, L., Eyquem-Renault, M., 2009. What do business models do? *Innovation devices in technology entrepreneurship*. *Res. Policy* 38, 1559–1570.
- Doppelt, B., 2003. *Leading Change toward Sustainability: a Change-management Guide for Business Government and Civil Society*. Greenleaf, Sheffield, UK.
- Dubois, A., Gadde, L., 2002. Systematic combining: an abductive approach to case research. *J. Bus. Res.* 55, 553–560.
- Dubose, J., 2000. Sustainability and performance at Interface Inc. *Interfaces* 30 (3), 190–201.
- Eco Measures Report, 2010. Interface Inc, Atlanta GA.
- Elkington, J., 1994. Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *Cal. Manag. Rev.* 36 (3), 90–100.
- Erlanson, D.A., Harris, E.L., Skipper, B.L., Allen, S.D., 1993. *Doing Naturalistic Inquiry: a Guide to Methods*. Sage, Newbury Park, CA.
- Esty, D.C., Winston, A.S., 2006. *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate Create Value and Build Competitive Advantage*. Yale University Press, New Haven.
- Fraj-Andres, E., Martinez-Salinas, E., Matute-Vallejo, J., 2008. A multidimensional approach to the influence of environmental marketing and orientation on the firm's organizational performance. *J. Bus. Ethics* 88 (2), 263–286.
- Fronzel, M., Horbach, J., Rennings, K., 2008. What triggers environmental management and innovation? Empirical evidence for Germany. *Ecol. Econ.* 66 (1), 153–160.
- Garud, R., Jain, S., Kumaraswamy, A., 2002. Institutional entrepreneurship in the sponsorship of common technological standards: the case of Sun Microsystems and Java. *Acad. Manag. J.* 45 (1), 196–214.
- George, G., Bock, A.J., 2011. The business model in practice and its implications for entrepreneurship research. *Entrep. Theory Pract.* 35 (1), 83–111.
- Gioia, D.A., Chittipeddi, K., 1991. Sensemaking and sensegiving in strategic change initiation. *Strat. Manag. J.* 12, 433–448.
- Gioia, D.A., Thomas, J.B., 1996. Identity, image, and issue interpretation: sense-making during strategic change in academia. *Adm. Sci. Quart.* 41, 371–403.
- Gioia, D.A., Patvardhan, S.D., Hamilton, A.L., Corley, K.G., 2013. Organizational identity formation and change. *Acad. Manag. Ann.* 7 (1), 123–193.
- Green Jr., K.W., Zelbst, P.J., Meacham, J., Bhaduria, V.S., 2012. Green supply chain management practices: impact on performance. *Supply C. Man. An Int. J.* 17 (3), 290–305.
- Green Mountain Sustainability Report, 2010. Green Mountain Energy Company 2011.
- Griffiths, A., 2000. New organisational architectures: creating and retrofitting for sustainability. In: Dunphy, D.C., Benveniste, J., Griffiths, A., Sutton, P. (Eds.), *Sustainability: the Corporate Challenge of the 21st Century*. Allen & Unwin, St. Leonards Australia, pp. 219–235.
- Halme, M., Anttonen, M., Kuisma, M., Kontoniemi, N., Heino, E., 2007. Business models for material efficiency services: conceptualization and application. *Ecol. Econ.* 63 (1), 126–137.
- Hannan, M.T., Freeman, J., 1977. The population ecology of organizations. *Am. J. Sociol.* 82 (5), 929–964.
- Hart, S.L., 2005. *Capitalism at the Crossroads: the Unlimited Business Opportunities in Solving the World's Most Difficult Problems*. Wharton School Publishing, Philadelphia.

- Hart, S.L., Milstein, M.B., 2003. Creating sustainable value. *Acad. Manag. Exec.* 17 (2), 56–69.
- Heikkurinen, P., Bonnedahl, K.J., 2013. Corporate responsibility for sustainable development: a review and conceptual comparison of market-and stakeholder-oriented strategies. *J. Clean. Prod.* 43, 191–198.
- Holliday, C., 2001. Sustainable growth the DuPont way. *Harv. Bus. Rev.* 79 (8), 129–132.
- Holliday Jr., C.O., Schmidheiny, S., Watts, P., 2002. *Walking the talk: the business case for sustainable development*. Berrett-Koehler Publishers, San Francisco, CA.
- Holt, D., 2011. Where are they now? Tracking the longitudinal evolution of environmental businesses from the 1990s. *Bus. Strat. Env.* 20 (4), 238–250.
- Johansen, D., 1998. Interface Inc: taking the lead toward sustainability. *Corp. Env. Strat.* 5 (3), 54.
- King, A., Lenox, M., 2002. Does it really pay to be Green. *J. Ind. Ecol.* 5, 105–117.
- Lampikoski, T., 2012. Green, innovative, and profitable: a case study of managerial capabilities at Interface Inc. *Tech. Inn. Manag. Rev.* 2 (11), 4–12.
- Lewin, K., 1947. *Frontiers in group dynamics*. Hum. Rel. 1 (1), 5–41.
- Lewin, K., 1951. *Field Theory in Social Science*. Harper & Row, NY.
- Lin, R.-J., Tan, K.-H., Geng, Y., 2012. Market demand green product innovation and firm performance: evidence from Vietnam motorcycle industry. *J. Clean. Prod.* 40, 1–7.
- Lounsbury, M., Glynn, M.A., 2001. Cultural entrepreneurship: stories, legitimacy, and the acquisition of resources. *Strat. Manag. J.* 22 (6-7), 545–564.
- Lozano, R., 2012. Towards better embedding sustainability into companies' systems: an analysis of voluntary corporate initiatives. *J. Clean. Prod.* 25, 14–26.
- Lozano, R., Carpenter, A., Huisingh, D., 2015. A review of 'theories of the firm' and their contributions to corporate Sustainability. *J. Clean. Prod.* 106 (1), 430–442.
- Maitlis, S., Lawrence, T.B., 2007. Triggers and enablers of sensegiving in organizations. *Acad. Manag. J.* 50, 57–84.
- Mason, K., Spring, M., 2011. The sites and practices of business models. *Ind. Mark. Manag.* 40, 1032–1041.
- Miles, M., Huberman, A.M., 1994. *Qualitative Data Analysis: an Expanded Sourcebook 2nd Edition*. Sage, Thousand Oaks, CA.
- Neuendorf, K.A., 2002. *The Content Analysis Guidebook*. Sage, Thousand Oaks, CA.
- Ng, R., Low, J.S.C., Song, B., 2015. Integrating and implementing lean and green practices based on proposition of carbon-value efficiency metric. *J. Clean. Prod.* 95, 242–255.
- Nidumolu, R., Prahalad, C.K., Rangaswami, M.R., 2009. Why sustainability is now the key driver of innovation. *Harv. Bus. Rev.* 87 (9), 2–9.
- O'Connor, G.C., Ayers, A.D., 2005. Building a radical innovation competency. *Res. Technol. Manag.* 48 (1), 23–31.
- Orsato, R., 2006. Competitive environmental strategies – when does it pay to be green. *Cal. Manag. Rev.* 48 (2), 127–143.
- Palmer, K., Oaies, W., Portney, P., 1995. Tightening environmental standards: the benefits-cost or the no-cost paradigm. *J. Econ. Perspect.* 9 (4), 119–130.
- Patton, M.Q., 1990. *Qualitative Evaluation and Research Methods*. Sage Publications, Inc.
- Porter, M.E., Van der Linde, C., 1995. Green and competitive: an underlying logic links the environment resource productivity innovation and competitiveness. *Harv. Bus. Rev.* 73 (5), 120–129.
- Potts, T., 2010. The natural advantage of regions: linking sustainability innovation and regional development in Australia. *J. Clean. Prod.* 18 (8), 713–725.
- Pujari, D., Wright, G., Peattie, K., 2003. Green and competitive: influences on environmental new product development performance. *J. Bus. Res.* 56, 657–671.
- Rajala, R., Westerlund, M., 2007. Business models – a new perspective on firms' assets and capabilities. *Int. J. Entrep. Inn.* 8 (2), 115–125.
- Rappa, M., 2003. *Managing the Digital Enterprise - Business Models on the Web*. Online available at: <http://digitalenterprise.org/models/models.html>.
- Reinhardt, F., 1998. Environmental product differentiation: implications for corporate strategy. *Cal. Manag. Rev.* 40 (4), 43–73.
- Robinson, J., 2004. Squaring the circle? Some thoughts on the idea of sustainable development. *Ecol. Econ.* 48, 369–384.
- Roy, R., Whelan, R.C., 1992. Successful recycling through value-chain collaboration. *Long. Range Plan.* 25 (4), 62–71.
- Schaltegger, S., Burritt, R., 2014. Measuring and managing sustainability performance of supply chains: review and sustainability supply chain management framework. *Supply C. Manag. An Int. J.* 19 (3), 232–241.
- Scott, W.R., 2014. *Institutions and Organizations: Ideas, Interests and Identities*, fourth ed. Sage, Thousand Oaks, CA.
- Seuring, S., Gold, S., 2013. Sustainability management beyond corporate boundaries: from stakeholders to performance. *J. Clean. Prod.* 56 (1), 1–6.
- Sharma, A., Iyer, G.R., Mehrotra, A., Krishnan, R., 2010. Sustainability and business-to-business marketing: a framework and implications. *Ind. Mark. Manag.* 39 (2), 330–341.
- Sonenshein, S., 2010. We're changing—or are we? Untangling the role of progressive, regressive, and stability narratives during strategic change implementation. *Acad. Manag. J.* 53 (3), 477–512.
- Strauss, A.L., Corbin, J.M., 1998. *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory*. Sage, Thousand Oaks, CA.
- Stubbs, W., Cocklin, C., 2008. Conceptualizing a sustainability business model. *Org. Env.* 21 (2), 103–127.
- Toktay, L.B., Selhat, L., Anderson, R., 2006. Doing well by doing good: interface's vision of being the first industrial company in the world to attain sustainability. In: Rouse, W. (Ed.), *Enterprise Transformation: Understanding and Enabling Fundamental Change*. Wiley.
- Vargo, S.L., Lusch, R.F., 2008. Service-dominant logic: continuing the evolution. *J. Acad. Mark. Sci.* 36, 1–10.
- Wagner, M., Schaltegger, S., Wehrmeyer, W., 2003. The relationship between environmental and economic performance of firms: what does the theory propose and what does the empirical evidence tell us. *Corp. Env. Manag.* 34, 95–108.
- Walley, N., Whitehead, B., 1994. It's not easy being green. *Harv. Bus. Rev.* 72 (3), 46–52.
- Winston, A., 2009. *Green Recovery*. Harvard Business Review Press, MA.
- Yarahmadi, M., Higgins, P.G., 2012. Motivations towards environmental innovation: a conceptual framework for multiparty cooperation. *Eur. J. Inn. Manag.* 15 (4), 400–420.
- Zott, C., Amit, R., Massa, L., 2011. The business model: recent developments and future research. *J. Manag.* 37 (4), 1019–1042.