Factors behind sustainable business innovation: The case of a global carpet manufacturing company

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Abstract

Innovation is critical to business. Sustainability is a global challenge requiring innovation. Many organizations have publicly committed to innovate towards environmental, social and economic sustainability, but a behaviour gap remains. In order to promote the effectiveness of these endeavours, there is a pressing need to understand the conditions for successful innovation towards sustainability, backed by empirical evidence. This paper complements prior work by developing a definition of sustainability-oriented innovation (building upon definitions of eco-innovation), and by discussing observations of this activity in practice.

The paper presents an account of sustainability-oriented innovation at Interface, a global manufacturing company with radical sustainability goals. It expounds the contexts in which these innovations arose, focusing in particular on Net-Works, a radical, socially-minded fishing-net recycling programme. It was found that several unique factors contributed to success: adopting an existing route to market, partnering with an NGO, and learning from mistakes in a “safe failure space”.

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1. Introduction

1.1. Innovation for sustainability

Innovation has always been critical for long-term business success. Throughout history, organizations which have innovated successfully have typically been rewarded with growth, profits and access to new markets (Bessant and Tidd, 2007). Those organizations which fail to innovate risk being disrupted and made obsolete in a process described famously as “the perennial gale of creative destruction” (Schumpeter, 1942). A further force acting upon the global business landscape is the requirement for society to develop sustainability. Broadly, this may be interpreted as the need for society to enable continued human flourishing without subjecting nature to increasing degradation, accumulation of man-made waste, or accumulation of materials from the earth’s crust such as heavy metals and fossilized CO2 (Robért et al., 1997). In the context of the global marketplace, the need for greater sustainability is a topic which presents opportunities for innovators by rewarding a competitive edge to those adopting more sustainable practices (Konar and Cohen, 2001) and to those offering more sustainable products to their customers (Nicholls and Opal, 2005).

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Innovation which produces improved sustainability may be described as “sustainability-oriented innovation” (SOI), a term first introduced by Hansen et al. (2009). In recent decades, an increasing number of descriptive and prescriptive works have been published which focus on these kinds of innovation processes (for systematic explorations of this literature, see Adams et al., 2012 and Schiederig et al., 2012). Sustainability-oriented innovation has gained recognition as a priority area for empirical studies (Bansal et al., 2012). Contemporary researchers seek to address the research-action gap that exists in this field, and to improve upon a rather sparse and highly variable literature (Adams et al., 2012; Bansal et al., 2012). This paper extends the field with a case study of Interface, a company with a radical sustainability vision.

1.2. Sustainable business

Since the 1980s, interrelated and complementary concepts have been proposed and debated as guiding principles for industry to become more sustainable while maintaining economic competitiveness. These include Industrial Ecology (mapping material and energy flows throughout the life-cycle of products or services; Allenby and Graedel, 1993), Ecological Modernization (an approach to environmental reform which utilizes the capitalist market system; Spaargaren and Mol, 1992), the Triple Bottom Line (a framework for reporting and accounting which encourages a balance of social, environmental and economic outcomes; Elkington, 1997) and Cradle-to-Cradle Design (an approach to product and service design which minimises material waste and mimics natural cycles; McDonough and Braungart, 2002). Together, these concepts contribute to a worldview in which business managers are economically-incentivized to innovate towards sustainability. In the academic literature, the efficacy of such approaches is the subject of debate (O’Rourke et al., 1996; Mol and Spaargaren, 2000; York and Rosa, 2003).

Meanwhile, in the private sector, many of the world’s largest companies have readily adopted such a worldview; promising to promote goals such as environmental sustainability, wellbeing and social equity through their core business activities in their annual reports, with full support of their shareholders (see, e.g., CHEVRON, 2015; EXXONMOBIL, 2015; MICROSOFT, 2015). In practice, implementation of sustainability principles appears highly variable, with examples of sustainability best-practice counterbalanced by underwhelming performance and even deceptive, green-washing behaviour (Delmas and Burbano, 2011). Addressing sustainability challenges like global warming will require radical change extending beyond current efforts (Machiba, 2010). The Intergovernmental Panel on Climate Change noted that “stabilizing temperature increase to below 2°C relative to pre-industrial levels will require an urgent and fundamental departure from business as usual” (Pachauri et al., 2014). If companies are to make a substantial contribution to addressing these issues within the framework of the prevailing sustainable business paradigm, there is a pressing need for managers to better understand how to innovate successfully towards sustainability.

1.3. Outline of the paper

This paper contributes to the study of SOI in practice by defining sustainability-oriented innovation as the production, assimilation or exploitation of a product, process, service, method, structure or social institution that is novel in its application, and which improves economic, environmental and social outcomes throughout the life cycle of the application, compared to relevant alternatives. This definition is derived in the following section. The paper then presents an analysis of empirical evidence from a global manufacturing company, Interface. It sheds light on how SOI is practised within Interface through a detailed descriptive case study discussing the company’s environmental programme, Mission Zero, and other relevant contextual information. The noteworthy innovation project Net-Works is introduced. By examining the contexts of successful SOI at Interface, and comparing this with previous unsuccessful SOI, this paper identifies relevant factors for SOI success. This paper extends a growing body of empirical studies focusing on this topic, which together will help to answer important questions around how sustainability-oriented innovation should be undertaken. This study corroborates and enriches similar descriptive case study research by others in the field (e.g., Van Der Duin et al., 2007; Stubbs and Cocklin, 2008; Arnold and Hockerts, 2011).

2. Sustainability-oriented innovation

2.1. Sustainability-oriented innovation in the literature

Discussion of SOI is made more complex because it has been defined in several different specific ways (Carrillo-Hermosilla et al., 2010; Adams et al., 2012), as have other associated terms. In particular, the meaning of the related concept “eco-innovation” is debated (Dylick and Hockerts, 2002), with the question of the social dimension causing some disagreement (Rennings, 2000; Schiederig et al., 2012). ‘Intent’ is also an area of debate. Many authors discuss whether financially-driven improvements which happen to lead to social and environmental benefits as a by-product can be considered SOI (Kemp and Pearson, 2007; Bos-Brouwers, 2010; Carrillo-Hermosilla et al., 2010; Machiba, 2010). Innovation can be classed as incremental, such as a minor efficiency improvement, or radical, providing brand new features, dramatically increased performance or reduced cost (Leifer, 2000). Sometimes, radical innovations result in entirely new products or markets. These innovations may be classed as discontinuous or disruptive (Bessant and Tidd, 2007). The most radical forms of SOI lead to fundamental changes in both the business model and at the wider system level (Machiba, 2010; Adams et al., 2015).
Hansen et al. (2009) proposed that SOI was innovation with a “positive net effect on the overall capital stock”. The stocks referred to here by the authors are ecological, social, and economic capitals – the Triple Bottom Line (Elkington, 1997). While this stands as a broad definition for SOI, it leaves much to be inferred, such as how the innovation process itself should be defined, or the time scale to be applied. A more detailed definition for SOI ought to satisfy a number of criteria. It should encompass new ideas which come from internal sources (production of ideas) and external sources (assimilation of ideas; Kemp and Pearson, 2007). It should also include old ideas which have found a new purpose (exploitation; March 1991). It should describe a full range of innovation products, ranging from stepwise improvement on an existing design or process (incremental) to entirely new business models (radical and/or disruptive; Bessant and Tidd, 2007). It should concern any conceivable forms of innovation – products and services; processes and methods; or organizational structures and social institutions. Finally, to ensure sustainability, the definition of SOI should describe innovations which result in improved social, environmental and financial outcomes (Bos-Brouwers, 2010; Schiederig et al., 2012), or those which reduce negative impacts in these compared with other options.

2.2. Defining sustainability-oriented innovation

To define SOI within the current work, this paper modifies an existing definition for eco-innovation (Kemp and Pearson, 2007). Building on the Oslo Manual definition for innovation (Mortensen and Bloch, 2005), Kemp and Pearson define eco-innovation as being “the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives”. The authors expand upon Mortensen and Bloch by placing emphasis on assessment of the whole-life environmental impacts of the innovation, not just the short-term benefits. However, the social aspect is notably absent from Kemp and Pearson’s definition, though they include multiple references to the economic, social and environmental dimensions of sustainability in their discussion. Furthermore, some authors argue that focusing on eco-efficiency does not tackle the core problem of decoupling economic growth from environmental impact (Dyllick and Hockerts, 2002; Jorgenson and Clark, 2012; Polimeni et al., 2008).

Rather than focusing solely on eco-efficiency, sustainability-oriented innovation must leave room for innovation which leads to system-level redesign and fundamental change in operating models, including changes in social structures. When considering sustainability outcomes, the importance of an explicit social dimension in such a definition should not be overlooked (Murphy, 2012). The need for greater social equity, social cohesion, participation and awareness of sustainability are vital to the lasting success of any environmental and economic benefits which could be produced by innovation. This is a key distinction between SOI and eco-innovation; a social dimension which embeds and complements the long-term environmental benefits of the most successful sustainability-oriented innovations (Ashford and Hall, 2011). Exceptional sustainability-oriented innovations can lead to disruptive, whole-system change. It is this system-level change which is required for human society to remain within sustainable boundaries (Machiba, 2010; Adams et al., 2015).

The proposed definition for SOI broadens the scope beyond eco-innovation to include an explicit social dimension, complementing the economic and environmental dimensions as part of the three pillars of sustainability. Here then, SOI is defined as the production, assimilation or exploitation of a product, production process, service, method, structure or social institution that is novel in its application, and which improves economic, environmental and social outcomes throughout the life cycle of the application, compared to relevant alternatives. Note here, as with Kemp and Pearson’s (2007) definition, that it is the result of the innovation, not the intent, which defines it as sustainable innovation. The proposed definition for SOI is duly compatible with the generic dimensions of the “cubic” framework for evaluation of SOI, first proposed by Hansen et al. (2009).

2.3. Contexts of SOI

A critical factor in the management of sustainability-oriented innovation is the innovative context, and how this affects the approach to innovation. In broad terms, a firm’s innovative context is the sum effect of various influencing factors at the firm-level and beyond. These include the organization’s philosophical mindset and behaviour towards innovation, its capabilities, the regulatory environment of the countries in which it operates, or the receptiveness of its customers to products with environmental and social aspects (Adams et al., 2012, 2015). The innovative context has a significant influence over how radical an innovation is likely to be. Adams et al. describe three broad firm-level contexts with increasingly systemic, socio-technical, sustainable and integrated attributes: operational optimization (level 1 SOI), organizational transformation (level 2 SOI) and systems building (level 3 SOI). The concept of these three innovative contexts by Adams et al. finds alignment with the work of other authors (Roome, 1992; Shrivastava and Hart, 1995; Tukker and Tischner, 2006; Machiba, 2010).

At the operational domain level, a firm undertakes level 1 SOI, characterized by incremental improvements towards sustainability such as process energy-efficiency or redesigned products with improved resource efficiency. Most organizations which undertake eco-efficiency-type innovation can be characterized as “level 1 organizations” (Adams et al., 2012). Level 2 SOI focuses on organization-level sustainability at a broader scope than products and services (Adams et al., 2012). This can range from standalone innovation activities at a department or division level, to firm-level and stakeholder-level activities. A typical example of this is a firm shifting from a product-based business model to a service-based business model.
Level 3 SOI refers to a highly radical context; an “ideal state” which arguably could not exist without changes in the extra-organizational institutions and factors; i.e. national policy, legal, macro-economic, regulatory, and the like (Lamming et al., 1999; Adams et al., 2015). Level 3 SOI goes beyond the creation of new products and services, placing emphasis upon system-wide innovations which affect the company, its suppliers, the marketplace and many other stakeholders. Of the studies reviewed by Adams et al. (2012), none presented empirical evidence for the existence of a radical level 3 SOI context, supporting the view that a truly sustainable firm has not yet been observed (Lamming et al., 1999; Adams et al., 2012).

3. Models for innovation

3.1. Linear models

Frequently, innovation is presented as a linear process, where new ideas are found and developed into products and services before being commercialized in the marketplace (e.g. “research, development, diffusion”). This linear conceptualization of innovation, sometimes termed a “technology-push”, is pervasive – within research policy, in economic policy and in industrial contexts (Rothwell, 1994; Godin, 2006; Bessant and Tidd, 2007). Many authors have criticized the linear model of innovation (Kline, 1985; Rothwell, 1994; Berkhout et al., 2006; Godin, 2006; Bessant and Tidd, 2007; Van Der Duin et al., 2007). Crucially, linear models do not readily account for the surrounding context of the innovation – firm-level, industry-level, marketplace, environment, society, or wider. Furthermore, a linear conceptualization of innovation does not recognize or support the crucial feedback or feed-forward (preventative/predictive) controls which enable ideas to shift radically as they develop (Koontz, 2010). The consequence of adopting a linear conceptualization for innovation is an increased risk of the innovation failing at a late stage of development, resulting in a large cost or missed opportunity (Kline, 1985; Berkhout et al., 2010).

One version which enjoys widespread popularity is open innovation (Chesbrough, 2003). Open innovation takes the linear “technology push” model, and adds on external collaborations to buy and sell ideas (through licenses, spin offs and joint ventures), reducing the risk of research failing with no route to market. This concept has been embraced by some within Interface and in other companies (e.g. Procter & Gamble – see Dodgson et al., 2006). Like the linear conceptualization, the open innovation model has also been criticized (Trott and Hartmann, 2009; Berkhout et al., 2010). Chesbrough’s model lacks feedback loops or contextual links – each of which is considered to be of fundamental importance to innovation management by modern scholars (Kline and Rosenberg, 1986; Rothwell, 1994; Bessant and Tidd, 2007). Furthermore, the author’s revelation of “external connections” for R&D based innovation has long been recognized by prior authors (e.g., Rothwell and Zegveld, 1985; Tidd, 1993; Rothwell, 1994).

3.2. Nonlinear models

In reality, innovation is more complex than a linear process (Rothwell, 1994; Cheng and Van De Ven, 1996; Berkhout et al., 2006; Bessant and Tidd, 2007). More realistic descriptions of innovation are as a non-directional process with no clear defined start, middle or end (Berkhout et al., 2006), or as a chaotic journey during which organizational learning takes place (Cheng and Van De Ven, 1996). Nonlinear models better account for the fact that pertinent feedback can come from a variety of sources, internal and external, including the users themselves (Von Hippel, 2005). This model is epitomised by the lean start-up methodology, where user innovation plays a fundamental role in an iterative cycle of product development (Ries, 2011).

One example of a non-directional process is the cyclical innovation model (CIM; Berkhout et al., 2010). This integrates the primary activities of the innovation process into a series of four connected nodes representing the activities of innovation: engineering, research and development, product design and market engagement (Bessant and Tidd, 2007; Berkhout et al., 2010). Though novel in its incorporation of the entrepreneur as a central “driving” node, the CIM is fundamentally reactionary with respect to social and environmental issues, which are supposed to percolate indirectly into consideration through the market engagement activity as the shifting demands of the consumer (Berkhout et al., 2010). Another recognized non-directional model of innovation is the chain-linked model (Kline, 1985; Kline and Rosenberg, 1986), which contrasts the linear model by highlighting the complex and iterative nature of the innovation process, the relationship between all parts of the process (R&D, design, production, marketing, etc.) and the continuous engagement with research and knowledge.

3.3. Entrepreneurship

Though the concept of an “entrepreneur” is perhaps most readily associated with start-up companies, entrepreneurship also describes the activities of highly motivated individuals within firms who act as catalysts, linking ideas with applications and striving for growth (Schaltegger and Wagner, 2011). These in-house entrepreneurs are critical for initiating and driving innovations (Pinchot, 1985). With the exception of the CIM (Berkhout et al., 2006), entrepreneurship is typically represented as a property of the whole system; embedded into (and between) each process. This mirrors the entrepreneur’s system-wide knowledge, sense-making abilities and networking effect (Bessant and Tidd, 2007; Schaltegger and Wagner, 2011).
4. Research design

4.1. Method

This research used a descriptive case study approach in order to analyse Interface’s SOI process and context, guided by the literature. The case study method was chosen for its suitability to address the research topic. A general strength of the case study research methodology is that it provides a rich contextual analysis of the unit of study, at a level of qualitative detail which cannot be replicated using quantitative or experimental methodologies (Yin, 2009). This qualitative approach is useful for answering “how” and “why” questions (Yin, 2009). In this instance, the research examined “how is sustainability-oriented innovation implemented within Interface?” The unit of analysis for this research was the co-innovation process; a global process within Interface designed to accelerate and systematize innovation projects within the company with the aim of achieving the company’s ambitious environmental goals. Studying the co-innovation process and other related innovation processes provided an overview of innovative activity across Interface.

It is important to recognize that a single-entity case study has limited application for wider generalization. Instead, results are qualitative and provide detailed insight and lessons which can be useful to infer or explain other similar, parallel events (King et al., 1994). However, caution must be taken to safeguard the reliability and validity of the case study by studying from diverse perspectives, by presenting and discussing alternative explanations for phenomena, and by grounding the research findings in theory and other relevant comparative data (Yin, 2009).

4.2. Data collection

The primary sources of data for this work were a series of interviews conducted with each member of the company’s co-innovation team; seven members in total. Interviews were recorded and transcribed to assist in analysis. In addition to these primary interviews, telephone interviews were also conducted with members of the marketing, sales, production and engineering teams, and with an external consultant who worked with the co-innovation team. Detailed observational data was collected from within the company over an 18 month period, and recorded in a journal. This period captured a change in the company’s innovation process, moving from an unstructured system towards a more structured, process-driven system. In order to explore the implementation of the new innovation policies and strategies at the operational level, several innovation workshops were attended at company sites in the UK and the Netherlands. Relevant company documents were also analysed. These included a company-produced “global innovation summit report”; a diagram showing the “co-innovation accelerator”; presentation slides, press releases, and blog posts by the co-innovation team and other Interface employees. Two videos which were produced by the co-innovation team were also transcribed. The researcher was embedded within the organization throughout the study, affording exceptional access to the team and other company members. An active dialogue was maintained with company employees and interviewees throughout the collection and analysis of the data in order to clarify inconsistencies, and to expand and develop the data. By collecting and cross-examining data about the innovation process from multiple sources, it is considered that the data collection and interpretation were likely to be an accurate representation of the reality (Yin, 2009).

As recommended in Yin (2009), analyses of the resulting transcripts, company documents and observation notes were started during data collection. In turn, the developing analysis helped to inform later interviews and also to prompt follow-up questions with the team to clarify specific points. Qualitative groupings (codes) were developed during the textual analysis, and were applied to text excerpts using qualitative analysis software Dedoose 5.2.1. The codes were reviewed and merged to produce a logical narrative of phenomena, then analysed as a whole.

5. The case: SOI at Interface

5.1. Contexts

5.1.1. The company

Interface is a global manufacturer of modular carpet tiles. Founded by Ray Anderson in 1973, Interface has manufacturing operations spanning North America, Europe and Asia-Pacific, with 3250 employees and annual revenue of approximately $1bn. Interface has long been regarded as a radical and innovative company, particularly in the area of sustainability, where it has been recognized as one of the global leaders for more than 10 years (GLOBESCAN and SUSTAINABILITY, 2015). Interface is considered to be a prime example of ecological modernization in practice (Stubbs and Cocklin, 2008). Former CEO Ray Anderson was prominent and active at a political level. He co-chaired the US President’s Council on Sustainable Development during the Clinton administration in 1997. He also chaired the creation of the first Presidential Climate Action Plan in 2008. The company has received notable coverage for its innovation activity over the past two decades. Some of the company’s innovations have been described in the academic literature (Blue et al., 1999; Olivia and Quinn, 2003; Chan-Lizardo et al., 2011; Lampikoski, 2012; Von Stamm et al., 2014).
5.1.2. Environmental programme: mission zero

Interface’s environmental programme is called “Mission Zero”. The overall goal of Mission Zero is to eliminate all negative environmental impacts of the company by the year 2020 (Anderson, 2009). Mission Zero and the company's reputation as a sustainability leader are among Interface’s key market differentiators, and resonate strongly with the company’s primary customers (particularly the design and architecture community; Hensler, 2014). Table 1 describes the seven sub-goals of Mission Zero. The company has publicly committed to the goals of Mission Zero, which are presented as “must-do” activities. The fulfilment of Mission Zero (or not) has potentially significant implications for the company’s reputation and investment risk profile. As a priority objective for the company, Mission Zero represents a wide-ranging portfolio of innovation activity within the organization.

<table>
<thead>
<tr>
<th>Mission Zero Goals</th>
<th>Description of Goals</th>
</tr>
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<tbody>
<tr>
<td>1. Eliminate Waste</td>
<td>Eliminating waste in all forms – material waste, wasted time and wasted effort</td>
</tr>
<tr>
<td>2. Benign Emissions</td>
<td>Eliminating waste streams that have negative or toxic effects on natural systems</td>
</tr>
<tr>
<td>3. Renewable Energy</td>
<td>Reducing energy demand and substituting fossil fuels with renewable ones like solar, wind and biogas</td>
</tr>
<tr>
<td>4. Closing the Loop</td>
<td>Redesigning processes and products so that all resources used can be recovered at end of life and reused, closing the technical or natural loop (Braungart and Mcdonough, 2000)</td>
</tr>
<tr>
<td>5. Resource Efficient Transportation</td>
<td>Transporting people and with minimal waste and emissions. This includes consideration of plant location, logistics and commuting</td>
</tr>
<tr>
<td>6. Sensitising Stakeholders</td>
<td>Creating a community within and around Interface that understands the functioning of natural systems and our impact on them</td>
</tr>
<tr>
<td>7. Redesign Commerce</td>
<td>Redesigning commerce to focus on the delivery of service and value instead of material. Encouraging external organizations to create policies and market incentives</td>
</tr>
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</table>

An example of more radical innovation was Interface’s decision in 2014 to invest in a new anaerobic digestion (AD) project in the Netherlands. The AD project produced a renewable substitute for natural gas using waste from the food industry. Interface purchased the AD gas to offset its own consumption of fossil gas, enabling it to declare the Netherlands factory “off the grid” in 2014, using 100% renewable energy sources (Elkington, 2014).

The remaining Mission Zero goals (4, 6 and 7) were approached through R&D activities and various standalone innovation projects, a few examples of which are described here. In 2001, the company used the principles of biomimicry (Benyus, 1997) to develop a non-directional carpet design with beneficial material-saving properties as well as strong aesthetics (Nelson, 2009). This innovation appears to have catalysed a shift towards non-directional tiles in the wider carpet tile industry (Larson, 2007). In 2007, Interface made noteworthy progress towards goal 4 of Mission Zero when it introduced the first product lines which contained post-consumer recycled nylon. Interface utilized a novel process developed in partnership with supplier Universal Fibres (Nelson, 2009). In 2013, Interface unveiled Net-Works, a socially-oriented recycling programme, and one of the few innovation activities which directly contributed to goal 7 (and, to a lesser extent, goals 1, 4 and 6).

5.1.3. Management and organizational culture

Despite its size, Interface appeared to operate much like a small to medium-sized enterprise (SME) from an organizational and structural perspective. The company adopted a bottom-up management style. As a result, role definition lacked clarity in many areas of the business, such as senior management, research, marketing, design and engineering. This created “organizational slack”: extra availability of resources within the company to perform nonstandard tasks such as innovation (Herold et al., 2006). The core business activities (production and customer services) were more closely controlled in a top-down style, and had less slack. Systematic organizational development and employee management was not in place at the company. There was no formalized role training, career structure or personal development path present at the time of study.

The co-innovation team explained that relationships were the key to “getting things done” for nearly all SOI projects, particularly when encouraging employees to undertake discretionary activities above and beyond typical working practice, such as coming up with new ideas, identifying resource needs, or reviewing established processes and products. The co-innovation team’s utilization of organizational slack for innovative activity demonstrated one of the benefits of a high-slack environment for innovation. However, the lack of clear role definitions or clear development paths also had negative con-
sequences. Many interviewees commented that they felt disengaged and underappreciated in their roles. This corroborated previous evidence of overall engagement scores for the company (as measured in 2006–2009 using the Gallup Q12 framework), which indicated that overall employee engagement levels at Interface were below mean values (in comparison with similar companies measured within the Gallup Q12 framework).

5.1.4. Co-innovation team

The co-innovation team was responsible for finding, assessing, prioritising and funding innovation projects in Interface. It was formed in 2011 by the company’s senior leadership. The team sought to accelerate the company’s progress towards its Mission Zero goals by promoting radical innovation. The co-innovation team’s chosen approach was to formalise the innovation process in order to support and accelerate “collaborative breakthroughs” and “game-changing” ideas. Initially, the focus was on projects with strong economic and environmental aspects, although the chief co-innovation officer (who led the team) commented that a further priority was placed on projects which could improve social sustainability, such as FairWorks and Net-Works, described below.

5.1.5. Internal entrepreneurship

The majority of innovation projects at Interface were driven by entrepreneurial activity rather than by managed approaches. In other words, SOIs were proposed and delivered by project leaders who identified an opportunity which could contribute to the Mission Zero goals. These project leaders acted as internal entrepreneurs, undertaking the necessary background work to define each project, making use of organizational slack, and seeking financial approval in an ad-hoc manner. The company’s relationship-based culture and high levels of autonomy enabled this kind of activity. Some employee’s roles appeared to be entirely based around entrepreneurship. One such entrepreneur was the company’s European Sustainability Director, who was adept at working across internal and external boundaries, identifying market opportunities and making use of organizational slack. This individual was instrumental during the initial phases of the Net-Works project (described below). They have also actively lobbied for an EU ban on carpet waste in landfill. Overall, employees were encouraged to seek out and develop their own innovation projects independently and then present them for assessment and up-scaling. While this approach has had some successes, it is questionable as to whether it has been the most appropriate form of management to address the Mission Zero objectives within the promised timeframe, particularly given its reliance on organizational slack and employee engagement, both of which were found to be variable within the company.

5.1.6. Extra-organizational context

Interface accounts for a significant proportion of the global carpet tile market, with a share of approximately 30%. The company exerts a powerful gravitational influence on its surrounding industry, customers and supply chain. Interface is recognized as the pioneer of sustainable business practices in the carpet and flooring industry. CEO Anderson was credited by Shaw Floors (a lead competitor) for catalysing change in the industry (Larson, 2007). Interface’s public commitment to sustainability in the 1990s created a kind of arms race in the flooring industry, which has caused many other major companies in the space, such as Mohawk, Milliken, Desso and Shaw to adopt similar stances on sustainability. Interface’s primary customers are the design and architecture community; a base which Interface has found to be especially sensitive to sustainability issues (Hensler, 2014). At the national policy level, Interface has played an active role in shaping the regulatory environment, ranging from Anderson chairing the President’s Council for Sustainable Development in 1999, to ongoing lobbying efforts in Europe to enforce greater penalties for landfill carpet waste.

5.2. Innovation activity

5.2.1. Key innovation projects

Despite widespread media coverage for its level 1 SOI accomplishments under Mission Zero, the company’s attempts at more radical SOI have been largely unsuccessful. Three examples of these are highlighted. Each of these projects can be characterized as “late-stage” failures, with Interface having already invested significant resources on development and promotion before they failed in the marketplace.

The Evergreen Services Agreement (ESA) was a product-service model which was launched in 1995, following soon after the creation of the company’s environmental programme. It offered customers the opportunity to lease a “long-term floor covering service”, rather than carpet products (Olivia and Quinn, 2003). The idea was to fulfill customer’s needs for the function of carpet without requiring the ownership of the products. This approach could be compared to long-term car leasing. At the end of the contract (and throughout it, as the individual tiles wore out), the used carpet was returned to Interface for recycling and reprocessing. In many ways, ESA has been the project for which Interface is best known. It encapsulates the “design for environment” principles of the industrial ecology paradigm, as championed by Allenby and Graedel (1993), through servicing of products enabling the resource loop to be closed. However, the ESA put off customers because of its unconventional financial model, which attempted to shift a capital expenditure into a license-based model (Olivia and Quinn, 2003). Although the ESA is still available, uptake has been incredibly low, with only a handful of contracts ever sold.

InterfaceRAISE was an attempt to create a sustainability consultancy arm of the company in 2011. With InterfaceRAISE, the company sought to leverage its recognition as a global sustainability leader in order to deliver on its promise of becoming a “restorative enterprise”. In line with goal 7 of Mission Zero (Table 1), InterfaceRAISE set out to encourage changes in external
organizations in order to create a shift towards a more sustainable economy. This was abandoned a year later, primarily because of the lack of a proper definition for the scope and nature of the work, reliance on part-time employee availability, and inexperience in operating this kind of service-based business model (Toffel et al., 2011).

FairWorks was a “social product” development process which was initiated by the co-innovation team in 2008. It attempted to utilize local artisans in India to weave handmade products from grasses (Interface, 2008). Here, Interface set out to create products with a tangible social benefit by providing skilled artisans with a route to a global marketplace through an inclusive business model. Despite its virtuous intentions, FairWorks failed in the marketplace due to a lack of scale, variable quality, high costs, and poor integration into the company’s core product range (Arratia, 2010). Each of these factors are recognized pitfalls in sustainability-oriented innovation literature (Esty and Winston, 2009). After four years of development, it was phased out without making a market impact.

5.2.2. Innovation success: Net-Works

In 2013, Interface launched Net-Works, a disruptive, cross-sector, ongoing partnership between Interface, fibre manufacturer Aquafil and the Zoological Society of London (ZSL). Net-Works involves the recovery of discarded fishing nets in the Philippines and the recycling of them into high quality nylon to be used in manufactured goods such as the yarn for Interface’s carpet tiles. Net recovery is undertaken by partnering village communities through a mutually agreed social enterprise model. Net-Works has had a significant impact. One member of the co-innovation team commented that this project has greatly exceeded expectations, and it has gained an unexpected global recognition for its sustainability aspects. This includes prize wins during 2013–2014 from the European Commission, the Clinton Global Institute, Ethical Corporation, Accenture and the Sustainable Entrepreneurship Award. Net-Works has now spun out into its own organization, supported by the original project partners with a separate website and its own dedicated team. The Net-Works programme is currently being expanded to other sites, with an ultimate goal of creating a social enterprise model which could be applied to other contexts and inspire similar activities by other companies.

5.2.3. Sustainability characteristics of Net-Works

Net-Works’ most prominent feature is that it addresses social, environmental and economic sustainability in a tangible and integrated way. Furthermore, Net-Works is a rare example of level 3 “system-building” innovation as described by Adams et al. (2012). It has demonstrated a novel approach to partnering for sustainability and gained significant recognition, with the potential to catalyse system-level changes.

Socially, Net-Works was designed to be self-supporting, and to integrate with the existing livelihoods of the partnering village communities. By collecting and selling the nets, the community-based partners earn a supplemental income which is aligned with their traditional way of life. In order to facilitate payment, a community savings & credit association (CoMSCA) was set up by the Net-Works programme, and is run by members of the community. This aspect in particular has empowered members of these communities to save money, organize loans and credit, and establish simple insurance models, all of which are helping to ensure long-term financial security, civic engagement, self-determination and education opportunities (Khoo, 2015). The project has also built awareness about waste and recycling among the partnering communities, and engagement with the sustainability agenda has increased as members have witnessed the local social, environmental and economic benefits that a sustainability-focused project like Net-Works can bring. This is most clearly evidenced by the strong uptake for a dedicated environmental conservation fund among the communities in which the concept has been piloted. The environmental fund enables members of the CoMSCA to invest some of their money in local conservation projects in order to protect the environment upon which they are reliant (Khoo, 2016).

Environmentally, the project has made short term, local impacts as well as longer term, global impacts. Locally, Net-Works has directly reduced pollution and improved local marine stocks and biodiversity at the partnering sites. At a wider scope, the environmental impact of the yarn products made from the recovered nylon is significantly lower than equivalent non-recycled yarn products; with approximately 55% lower CO2 emissions per kilogram (Aquafil, 2014). This in turn reduces the impact of Interface’s final carpet products by approximately 25% (Hensler, 2014).

Economically, it has been a major success. Net-works has earned several high profile awards and is a continued source of positive publicity for Interface and the project partners. The Net-Effect product (made from 100% ECONYL yarn and designed with an oceanic theme) has been successful for Interface, and a member of the sales team commented that the story of Net-Works has been a powerful, differentiating sales tool which has resonated with customers. At the local scale, the poverty-affected partnering communities have also benefited from a steady source of supplementary income. The mutually beneficial “social enterprise” approach helps to safeguard the long-term viability of the project.

5.2.4. How Net-works formed

As the FairWorks project failed and was being drawn to a close in 2011–12, members of Interface’s co-innovation team sought an alternative project to focus on. The goal remained the same: to address the social dimension of sustainability through the company’s products. Rather than attempting to create a new product line with a social aspect (like FairWorks), the team entered into an exploratory phase, seeking opportunities to embed a social dimension into their existing core range. The level of trust demonstrated here by the company’s senior management in enabling such “exploratory” activity following the lack of success of FairWorks is notable.
At this time, Aquafil, one of Interface’s yarn suppliers, had recently rolled out their ECONYL recycling technology to convert postconsumer nylon waste into high quality recycled yarn. The main source of material for ECONYL at that point was the fishing industry (large fishing fleets and fish farms). Interface was already a purchaser of Aquafil’s post-consumer recycled products, but had not considered its potential role in the new project, as it lacked a tangible social dimension. The link to fishing communities in the Philippines came about through a researcher from Imperial College London, Hill, who had recently completed a PhD with ZSL studying livelihood approaches to marine conservation (Hill, 2011). Hill had met some members of the co-innovation team at a conference in 2011, and following this, the connection to Hill’s work and the Aquafil technology was made by Interface’s European Sustainability Director.

Net-Works was initiated by Interface, with Aquafil and ZSL joining at an early stage. In 2011, a meeting was held between Interface, Aquafil, Hill and several invited sustainability consultants. The outcome of that meeting was the core concept for Net-Works – to partner with local villages in the Philippines through an “inclusive business” social enterprise model (similar to that of FairWorks); to utilize Aquafil’s technology to process the waste, and to integrate the products into part of Interface’s tried and tested core ranges of products. Hill suggested a partnership with ZSL, who would advocate for the marine conservation aspects of the project. ZSL has an ongoing commitment to field-based conservation work, and recognized the opportunity to address “ghost fishing” in the region by incentivizing the removal of abandoned nets that would otherwise continue to trap marine wildlife and damage reefs (ZSL, 2013). Throughout 2011–13, the team addressed numerous challenges and barriers to meeting their shared vision of a project with tangible environmental, social and economic sustainability aspects. Particular highlights included the invention of a mechanical baling system suitable for use in the electricity-free village environment, as well as negotiation for transport of the net material from the villages in Danajon Bank, Philippines to the Aquafil plant in Ljubljana, Slovenia.

6. Discussion of net-works

6.1. Consideration of contextual factors

Net-Works stands out as a rare example of a successful level 3 SOI project with its noteworthy sustainability aspects across all three dimensions of the Triple Bottom Line (Elkington, 1997). Finding a breakthrough to higher level SOI projects proved to be challenging for Interface, with several attempts ending in costly failure. The various contexts surrounding the successful project are examined here.

At the firm-level, several factors were relevant. The Mission Zero goals created a vision which drove a large amount of innovative activity at Interface, ranging from iterative to radical. The history and approach of Mission Zero clearly show that it is rooted in the industrial ecology paradigm. Interface’s engagement with these goals over such an extended period (approximately 20 years), coupled with the public commitment to deliver “zero” by the year 2020, created a “culture of sustainability”. Multiple interviewees commented that sustainability was something which was “in the DNA” or “bred in” to employees and the organization. This vision and culture empowered senior management to take long-term decisions towards achieving sustainability goals, such as permitting the co-innovation team to explore Net-Works despite the recent costly failure of an apparently similar project, FairWorks. Indeed, the company’s European Sustainability Director referred to this permissive attitude as a “safe failure space” for the co-innovation team. It is also possible that this high degree of free reign was caused by a lack of management oversight of the co-innovation team, although this is deemed less likely since Interface has a long history of innovation activities with varying degrees of success, and FairWorks was not the first failed innovation project. At the team level, perhaps most influential of all was the decision of the team leader to continue in a similar vein to FairWorks by deliberately seeking a project with a social benefit. This drove the team to explore unconventional solutions, and ultimately led to the unusual partnership with the fishing communities through Hill. A further contributing context at the firm-level was Interface’s culture of entrepreneurship, which was instrumental during the early stages of Net-Works for identifying potential opportunities and partners.

Beyond the firm-level, Hill’s involvement during ideation brought marine conservation expertise and local knowledge of the village communities, but also led to the collaboration with ZSL, a non-governmental organization (NGO), NGO involvement helped to ensure that the project could maintain its credibility and transparency in the eyes of customers and awards panels. ZSL benefited from involvement in the project by contributing to its stated goals of conservation of animals and their habitats, and by gaining an example of a multi-dimensional conservation partnership (with environmental, economic and social aspects) to promote to its members and on its website. On the supply side, Aquafil’s development of the ECONYL technology can be partially attributed to Interface’s influential force on its own supply chain, as described by Nelson (2009). ECONYL is one of several sustainability-oriented projects which Interface’s suppliers have delivered over the past decade (Hensler, 2014). The receptive customer base also played a role in Net-Works. As the final end product was not actually new (rather, Net-Works is a modification of the product material sourcing), it was clear through existing knowledge that the product would perform well with customers given the upgraded product background which the Net-Works narrative provided. In a similar vein, the industrial landscape provided a competitive backdrop which appeared to drive mutual “greening” among firms (Larson, 2007).

Conspicuous by its absence was any form of formal goal setting, reporting or measurement framework for the more intangible aspects of Mission Zero which were highly relevant for Net-Works, such as “sensitising stakeholders” (goal 6–see Table 1) or “redesign commerce” (goal 7, Table 1). While there exist popular and appropriate methodologies which could have
been used for assessing such metrics (e.g. Global Reporting Initiative 4.0), Interface has consciously elected not to use these. Also absent was any form of supportive regulation or government incentive. The chief co-innovation officer commented that regulation was simply permissive, but otherwise had minimal influence.

6.2. Summary of contextual factors

Summarising, there were a number of contextual factors which enabled Net-Works to succeed. At the team and firm-level, these were:

- Developed capabilities and experience – past knowledge from FairWorks and other innovation activity helped to avoid common pitfalls;
- Commitment to a social goal – caused the team to broaden their search and consequently make an unusual connection;
- Permissive management approach – allowing a “safe failure space” for the team to learn from failures and eventually find the breakthrough;
- Mission Zero – a high level sustainability vision and public commitment, rooted in the school of industrial ecology, and driving activity from the top down;
- Entrepreneurial culture – this was further enabled by a high level of organizational slack and loosely defined roles.

Beyond the firm-level, factors were:

- Involvement of academia (Hill) and NGO partnership (ZSL) – these partners provided advocacy and lent credibility to the project;
- Receptive customer base – the sensitivity of the design and architecture community to sustainability issues laid the pathway to market;
- Engagement of supply chain with sustainability – leading to future opportunities such as ECONYL with yarn supplier Aquafil.

Furthermore, conspicuous non-contributing factors were:

- No reporting, measurement or monitoring of social goals;
- No recognizable policy contributions or drivers.

Cross-comparing Net-Works with the innovation projects at Interface, several contextual factors in common can be identified, but there are a few exceptional factors which may have helped Net-Works to succeed where previous projects had not. In terms of scope, FairWorks, ESA and InterfaceRAISE each attempted to create a radical new product or service in support of sustainability, while Net-Works was integrated into the company’s existing product portfolio. This is a key factor, since it enabled the company to utilize existing pathways to the marketplace, and virtually guaranteed that the end result would have a positive uptake. The inclusion of an academic advisor at an early stage was also unique to Net-Works. Soon after Hill’s involvement, ZSL provided further advocacy for the sustainability aspects of the project while also lending credibility, which likely contributed to the level of awards and publicity that the project received.

7. Concluding remarks

The case of Interface and Net-Works was presented and discussed, and a number of relevant contextual factors for SOI were identified. One critical factor was the decision of the team to seek a social dimension. Comparing Net-Works with the other innovation examples presented here, the decision to avoid making a new product meant that Interface could ensure market uptake for the innovation. However, this comparison raises an interesting question about the degree to which Net-Works is radical. From the perspective of the end product, there is no change in functional performance – Net-Works was designed to integrate with the company’s existing product ranges. The reduction in overall carbon footprint of Interface’s Net-Works products compared to similar non-recycled products is a relatively modest 25%, which falls below the 30% threshold to be considered “radical” (Leifer, 2000). However, when taking into account other considerations such as the positive social impact on poverty-affected fishing communities, the conservation of local marine life and the creation of a novel social business infrastructure designed for replication, it seems clear that Net-Works as a whole has delivered radical change in some sense. Is this an example of what level 3 SOI – systems building, (Adams et al, 2012) – looks like in practice?

Interface is an organization which embodies a group of concepts such as cradle-to-cradle, design for environment and ecological modernization; encapsulated by the term “industrial ecology”. Industrial ecology has been criticized for appearing to advocate a “business as usual” approach to addressing sustainability while keeping a rather narrow focus on closing material cycles (O’Rourke et al., 1996; York and Rosa, 2003). Net-Works acts as a powerful exemplar in this debate. Thus, rather than being described as a product innovation, perhaps Net-Works is more accurately framed as a system-level inno-
vation (Bessant and Tidd, 2007), sincerely aimed at catalysing similar activity in other regions, and with a positive message demonstrating that level 3 SOI can be undertaken through an industrial ecology approach to sustainability.

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Net-Works.


