Infusing Sustainability into New Product Development Practices: The Role of External Triggers and Internal Actors in Pursuing Change

ABSTRACT

While there has been growing recognition that considering environmental and social aspects of sustainability is important for a firm's reputation and long-term survival, research so far focused on strategic goals and how sustainability becomes relevant and less so on how sustainability practices become embedded and mainstreamed. Our paper addresses the change process of initiating sustainability practices in the context of new product development and how they unfold over time using results from a longitudinal case study in four multinational companies. Based on structuration theory and practice theory, we propose a theoretical framework for change processes around sustainability that incorporates the effects of external triggers and individual actors in initiating and mainstreaming sustainability-focused NPD practices.

Infusing Sustainability into New Product Development Practices: The Role of External Triggers and Internal Actors in Pursuing Change

Business and academia alike recognize the pivotal role of embedding environmental and social sustainability[1] into business activities. The growing interest in sustainability among business firms is evident from the high number of organizations that now participate in evaluative firm rankings that benchmark their sustainability performance (Chabowski, Mean, & Gonzalez-Padron, 2011). A recent BCG study among executives of globally operating firms found that 70% of the participating firms have placed sustainability permanently on their management agenda (BCG, 2012). There are a number of external triggers for sustainability infusion: Two-thirds of the executives reported that sustainability had become a necessity for economic survival. Since environmentally legitimate firms have been found to incur less unsystematic stock market risks (Bansal & Clelland, 2004), investors have also realized the added value of sustainability. Consumers are also becoming increasingly aware of the effects of their own choices (Peloza, White, & Shang, 2013) and stricter legislation on environmental impact and labor rights are also external triggers for increasing sustainability efforts. In other words, pressure from various stakeholder groups to increase sustainability is rising.

There are also internal actors that pursue a change towards more sustainability, yet the evidence so far is that it is often difficult for them to initiate a cultural shift. Many organizational members still perceive sustainability as a threat. One reason for this resistance might be that the impact of not being sustainable is seldom immediate, but 'something for the future' to deal with. Hence, sustainability initiatives often lack a certain sense of urgency (Slawinski & Bansal, 2012).

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[1] Sustainable development is often defined as development that meets the needs of the present without compromising the ability of future generations to meet theirs WECD. 1987. *The Brundtland Commission: Our Common Future*. New York: Oxford University Press..

Change processes towards sustainability frequently start as local initiatives that need to be 'sold' internally and create a momentum for change (Howard-Grenville, 2007). Also, the translation of sustainability as a strategic goal at the corporate level into the operational implementation of sustainable practices is a complex maneuver that creates many tensions. Strategic directives to not only generate economic, but also ecological and social value are often visionary and abstract and do not necessarily translate into operational innovation decisions (Haugh & Talwar, 2010). Hence, many companies struggle with the question of how to achieve cultural changes to allow the infusion of sustainability practices into their existing organizational processes.

While existing, multi-disciplinary research has shown the relevance of addressing sustainability as part of normal business activities, little is known about *how sustainability is or can be successfully infused into business practices*. The goal of this paper is to propose a framework for understanding how sustainability practices are created and mainstreamed into companies' innovation activities by characterizing it as a process of emergent organizational change. We think that most firms moving towards more sustainable practices will do so in an evolutionary fashion, rather than through a radical change program (see Howard-Grenville, Golden-Biddle, Irwin, & Mao, 2011). We draw on structuration theory as theoretical framework, because it provides an *evolutionary* explanation for organizational change, in what Orlikowski (2000) calls emergence. A structuration approach also helps to explain how strategic goals (here sustainability goals) get translated into operational activities and practices through social action.

We decided to study the issue of sustainability infusion in the context of innovation. During NPD many decisions are made that determine the environmental and societal impact of future products and production processes and it thus creates more leverage for change than later processes, while providing an ideal occasion for research into sustainability infusion and its

effects. While many recent studies focus on so-called environmental innovation (e.g., Berrone, Fosfuri, Gelabert, & Gomez-Mejia, 2013; Dangelico, Pontrandolfo, & Pujari, 2013; Dangelico & Pujari, 2010), there is also a call to consider sustainability in a broader sense, i.e., regarding its impact on the triple bottom line of profit, planet and people (e.g., Elkington, Emerson, & Beloe, 2006). Translated to NPD practices[2], this implies that organizations should explicitly address economic, environmental and social aspects when developing new products so as to create the least harmful innovation outcome (Pujari, 2006). Our analysis focuses on the different activities of the *initial* development and the *enactment* of sustainability practices. We investigated the issues in a qualitative study, interviewing more than 100 company representatives from different industries, namely chemical, food, and energy distribution.

Our article aims to contribute to the literature on organizational change by analyzing how sustainability practices emerge and develop, and by providing a model of how sustainability practices can be mainstreamed throughout an organization. We investigate 1) initial sustainability practices in innovation, 2) the routine enactment of these sustainability practices as they unfold within the organization and 3) the tensions that these sustainability practices may create. This allows us to identify and discuss the drivers and barriers for infusing sustainability practices in NPD.

THEORETICAL BACKGROUND

Initiatives for change do not only take the form of planned, top-down interventions; change can also be of a more emergent nature arising from modifications of daily practices. Such emergent change can take the form of "accommodations to and experiments with the everyday

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[2] We define sustainability-oriented NPD practices as the behavioral activities that simultaneously address or balance economic, ecological, and social considerations during NPD and guide human action as organizational agents employ these practices.

contingencies, breakdowns, exceptions, opportunities, and unintended consequences" (Orlikowski, 1996, p. 65). This micro-perspective on change acknowledges organizing as an ongoing process of mindful construction in the moment in response to the sociomateriality that people encounter and enact (Weick & Quinn, 1999). This perspective also pays attention to change agents outside of top management, who try to promote certain issues that they regard as strategically relevant for the future of the organization (Burgelman, 1983; Dutton, Ashford, O'Neill, & Lawrence, 2001).

We argue in this paper that most firms moving towards more sustainable practices will do so in an evolutionary fashion, rather than through a radical change program (see Howard-Grenville et al., 2011). Creating a momentum for sustainability often involves multi-actor change processes in which concerned individuals, often in middle management, make attempts to place sustainability on the corporate agenda and create pockets of new practices, which may eventually become mainstreamed into companies' innovation activities. If their individual concerns are aligned with corporate values, this raises the likelihood for action (Bansal, 2003). Rather than a one-off event, pursuing change for sustainability requires perseverance and repeated action to sell the issue and gain legitimacy and resources, as Howard-Grenville (2007) showed in her analysis of the interactions between engineers and a small environmental technology group within a manufacturer of microprocessors.

We frame this change of social practices in terms of structuration theory, which discusses social processes that govern the reciprocal relations between human actors and structural features of the organization (Orlikowski, 1992). These social processes are manifested in social structures, in particular in the rules and resources provided by organizations and the environment that serve as the basis for human activity (DeSanctis & Poole, 1994). These structures facilitate and

constrain human behavior simultaneously. They partly determine routines that serve as a behavioral guideline of how to approach, for example, innovation tasks, while at the same time the routines and practices restrict the opportunities and alternatives actors perceive and thereby increase the probability of certain types of behavior. However, through choice and action, individuals and organizations can consciously create, alter, and eliminate these structures (Barley & Tolbert, 1997). Hence, the types of structures that are provided by sustainability constraints and strategies shape the structures emerging in human action as people incorporate these constraints and strategies into their daily practices. Therefore, structuration theory deals with contextually situated action. It is important that new sustainability practices are aligned with and compatible to the existing practices and structures. However, agents may interpret a specific resource according to different schemas, for example, while one person may attribute climate change to human wrongdoing, another might think of it as a general climate development. An important element of structuration theory is the duality of structure (Giddens, 1979), meaning that while existing structures shape human behavior, the behavioral use of the structure reinforces and might modify the structure. Hence, the structure is a medium and an outcome at the same time.

Previous literature has classified firm reactions to sustainability issues along a continuum from reactive to proactive (e.g., Slawinski & Bansal, 2012). Reactive responses imply reacting to for instance changes in environmental legislation or pressures from stakeholder groups (Valente, 2012). Proactive actions anticipate future regulations and social trends and try to modify the existing products, processes, and operations in advance. For example, consumer groups and Greenpeace have been addressing the environmental and social issues connected to the non-sustainable production of palm oil. In response, firms in the food sector have founded the Roundtable on Sustainable Palm Oil (RSPO) with the objective of promoting the growth and use

of sustainable oil palm products through credible global standards and engagement of stakeholders (http://www.rspo.org/). Valente (2012) proposes a further extension of this scale from reactive to proactive by proposing the 'sustaincentric organization' that adopts a more paradigmatic shift in its sustainability orientation moving beyond a proactive approach. Sustainability practices can hence be classified in their intensity from a mere reactive 'prevent harm' to a sustaincentric inclusion of economic, ecological, and social issues as an organizational way of life. The strategic sustainability goals of an organization build and provide an important set of rules for the motivation and the way sustainability is integrated into NPD; hence, they set the initial structure in a firm's endeavor towards sustainable NPD. They also provide the corporate values with respect to sustainability and hence sustaincentric companies create a higher momentum for sustainability-oriented practices.

We define sustainability practices as behavioral activities that simultaneously address economic, ecological, and social considerations and guide human action as organizational agents employ these practices. We discriminate analytically between human actions that affect the sustainability practices and which are affected by the sustainability practices. Thus, sustainability practices can serve as a medium for human action, while they can also be the outcome of human action.

In line with e.g., Orlikowski (1992), we consider two different stages of sustainability practices: the *initial* development (i.e., their emergence) and the *enactment* of a sustainability practice (i.e., mainstreaming the practice). These two stages of a sustainability practice are closely linked. The initial development of a sustainability practice is often based on the suggestion of a single person or small team (e.g., Howard-Grenville et al., 2011). Also, during the initial development, practices are still malleable and have not yet reached stability. Hence,

modification of the practice is still easy. The practice also still needs to prove its legitimacy as a normative frame of desired behavior.

During initial development, practices often need a stronger alignment with existing practices and processes to get accepted by the organization. Once the practices have become routinely enacted, there is more room for deviation. As sustainability practices become institutionalized, they reach a certain level of stability. However, they are still shaped through usage and new information. The actors involved in a sustainability practice can still redesign the practice and thus create a new social structure. How strategic sustainability goals are implemented at an operational level may differ from how they were intended at the corporate level, thereby creating tensions. Hence, the implementation of economic, ecological, and social aspects of sustainability may differ within organizations, as NPD teams focus on different practices and balance the three dimensions divergently.

Developing and enacting sustainable practices in NPD is context specific and hence organizations will encounter different drivers and barriers for implementing specific sustainability practices. Each organization has its own particular set of constraints (e.g., products that need a scarce material) and capabilities (e.g., working with external partners), which will impact the emergence and mainstreaming of sustainability-oriented NPD practices. Taken together, the infusion of sustainability into NPD practices creates many tensions and it remains unclear why and how companies address this challenge. Hence, our research question is as follows:

Research Question: Why and how do sustainability-focused NPD practices emerge and how do they unfold when enacted?

METHOD

We employ a qualitative research design to acquire a more fundamental understanding of why and how organizations infuse sustainability into their NPD practices. This research area is relatively new and represents an under-researched phenomenon. Furthermore, it involves complex processes that we need to inquire in-depth to develop a profound conceptual framework in this area. As a result, qualitative research is best suited to tackle our research question. Specifically, we employ a case study approach, defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1994, p. 13). We use a multiple case design to trace why and how different organizations in different contexts develop initial sustainability practices and enact them within their organizations. In line with grounded theory (Glaser & Strauss, 1967), a case study research and a literature review were used as a platform for theory development. We embed our qualitative empirical findings in a synthesis with existing knowledge, in particular, using structuration and practice theory as our theoretical lens while extending it through scientific literature on managing sustainability. Furthermore, we pay particular attention to literature on innovation management and organization cultural change (e.g., Howard-Grenville et al., 2011). This design provides a strong foundation for our theory building, as the interplay of empirical, in-depth data and latest scientific findings offer a reasonable basis for generalizability.

Research context

Our case study involved four core companies from different industries. Company A is a leading multinational in the chemical industry. Company B is a multinational food company, operating in more than 200 countries with a well-known major brand as well as many local brands. Company

C is a network company responsible for energy distribution in large areas of a major European country, specializing in complex private energy grids and installations. Company D is a medium-sized, independent contract research company, mainly operating in food research. All four companies engage heavily in innovation efforts. However, they operate in different sustainability settings. While Companies A and C operate in industrial contexts in which sustainability is very important, Companies B and D are in a more ambivalent situation, where external forces are not as strict with respect to sustainability concerns. Some leaders in their industry even think that a concern for sustainability is irrelevant and counterproductive. Hence, their strategic ambitions in terms of sustainability vary from reactive towards sustaincentric. Accordingly, the companies differ in their sustainability efforts. While Companies A and C have a holistic, more strategic, approach towards sustainability and already mainstreamed several of their sustainability practices, Companies B and D have mainly concerned individuals who are initiating and trying to mainstream these practices. Therefore, their internal conditions for initiating and mainstreaming change towards sustainability differ.

Data collection

The data collection lasted more than 1.5 years and included interviews, company documentation, company website information and regular feedback sessions with company representatives. This study is part of a bigger research project on sustainability in innovation carried out by the authors in collaboration with a consortium of commercial partners. Interviews were usually organized through our main contact person in each partner company. In total, we conducted 101 interviews, mainly with employees of the 4 core companies, but also with their external innovation partners and clients. Interviewees came from all areas of a company who are involved in NPD, such as R&D, marketing, procurement, production, alliance management and internal sustainability

consultants. As usual in qualitative research, we used purposeful, conceptual sampling instead of random sampling, so our sampling strategy is driven by theory rather than representativeness (Miles & Huberman, 1994). The interviews usually lasted about 1 to 2 hours and were based on an interview guide with open-ended, exploratory questions. The interview guide addressed the general theme of integrating sustainability into their innovation efforts and in particular (1) the organization's strategic reasons, (2) the activities innovation-concerned employees perform, (3) the manner in which the company handles sustainability issues, and (4) the benefits and problems of such an approach. We recorded all but four interviews and transcribed them afterwards. For those four interviews, we took notes during the interview.

Data analysis

We performed a thematic content analysis of the collected data through an inductive process (Holsti, 1969). We follow the process suggested by Spiggle (1994), moving from categorization to abstraction, comparison, dimensionalization, integration, iteration, and refutation. Reflective reasoning (Miles & Huberman, 1994) was employed during the research process so as to build theory. In accordance with grounded theory, we analyzed our data using a well-defined process moving from basic descriptions to conceptual ordering and then to theory development. We first openly coded all case study data (e.g., interview transcripts, observation notes, internal documentation, feedback session notes) with simple and short summarizing statements, such as for example measuring CO_2 emissions of new products or particular activities of the internal sustainability group. Thereafter, we organized the statements into content themes related to different aspects of sustainability integration in NPD, such as for example ecological considerations during NPD, social considerations during NPD, strategic goals for infusing sustainability into NPD practices or emergence of a new practice. We then further abstracted the

resultant categories into higher-order conceptual constructs, such as external triggers and internal actors. We also assessed differences and similarities across incidents within content themes, comparing them to relevant literature from innovation management and cultural change, marketing, corporate social responsibility, structuration theory and practice theory. After we dimensionalized the data by identifying the characteristics of different elements, we moved to integration, which required lengthy discussions about the different emerging themes. Furthermore, we regularly discussed first insights with the contact persons of each company, which supported us to steer and change our data collection procedures if necessary. Also, that helped to assess the plausibility of our interpretations and to search for new cues. We also presented our results regularly at feedback sessions with the entire consortium (which also includes other companies beyond the ones from our sample) to talk about counterexamples and to challenge our interpretations. These feedback sessions provided insights for our iteration and refutation steps. To sum up, we validated our insights through a continual engagement with the organizations, via comprehensive and descriptively rich data from various sources and through the verification of our results with committed consortium members.

RESULTS

We first present our findings in terms of content of sustainability initiatives before turning to how and why sustainability-oriented NPD practices emerged and unfolded when enacted. The findings are structured along the two types of mechanisms for the emergence and mainstreaming of practices that we identified: external triggers and internal actors.

Ecological and social sustainability considerations in NPD

As all companies in our research had institutionalized the financial assessment of their innovation projects for a long period of time, we focus here on the emergence of ecological and social

sustainability practices. Content-wise, the ecological sustainability practices varied considerably among the different companies, as different ecological concerns played a major role in their industries: Company A was concerned about the toxicity potential of their chemical components, while Company B aimed to reduce food waste. Company C worked on smarter energy consumption, while Company D focused on transforming waste from the production processes into useful products. Taken together, we saw the following ecological categories emerge: energy consumption, materials consumption, toxicity potential, biodiversity, emissions to air, water and soil, and general risk potential. These categories are in line with those used in the eco-efficiency assessment tool developed by BASF (Saling et al., 2002).

The topics considered in the social sustainability practices varied even more. All companies agreed that for example child labor was an absolute no-go. However, beyond rather straightforward dimensions like human rights and general rules for their workforce, the opinions of what should be included differed. Across all four cases, we observed the following social dimensions of sustainability: the social impact on (1) employees, (2) customers, (3) local and national community, (4) international community and (5) future generations. Clearly, social sustainability is even fuzzier and larger in scope as a concept, and was less, sometimes hardly, considered. For example, in Company D sustainability was only linked to ecological concerns. This finding is consistent with the results from our literature review on sustainability, as the majority of studies also focus on the ecological dimension. Also, Littig and Griessler (2005) found that the social dimension was the most complex and least consistently defined dimension. While there is a considerable body of literature on corporate social responsibility (CSR), there is a scarcity of research that links CSR with innovation. In fact, Gallego-Alvarez, Prado-Lorenzo,

and García-Sánchez (2011) find a negative relationship between CSR and innovation if they are conceptualized as strategic decisions.

In comparison, Company A had the most explicit integration of social activities in their innovation efforts. For example, a sustainability manager told us:

> *If we have a production site in a town, our employees are part of the community of the town, and as part of the town we would expect to get involved in the community with our people. So we have a community program, which is financed properly and which encourages people to get involved in their local communities, and to work with the local communities to decide what that involvement should be.*

R&D employees participate as well in these community programs. The sustainability manager clearly observed benefits from these engagements, calling them 'capability development opportunities':

> *Actually, if employees are involved in projects, in managing those sorts of projects, they're gaining skills as well. So that is a real benefit to the employees, and therefore for the company as well as the community.*

Furthermore, Company A also promoted employing local people as senior managers:

> *So one of our objectives is very much to have senior executives who are coming from what we call high-growth markets, so we want to be operating our business in these places with local people, not just again shipping people out, but hopefully from their lands.*

However, all these initiatives were still fragmented and Company A was struggling at the time to find a more systematic way of incorporating social sustainability practices in their NPD efforts.

They also tried to initiate sustainability practices for office workers, as one sustainability manager from Company A explained:

> *For example, in our site in [city], we have I think 10 floors. And next to the elevators you have the staircase, and it says on the staircase, which is also very steep... much steeper than most other staircases in [Company A] sites that I've seen; next to the staircase it says: Burn calories, not electricity. It's a small sign; of course we do, to walk up. But of course, it is also very, very narrow; so only one person can hold the handrail anyway.*

The quote also shows that it is often hard to achieve all three dimensions at the same time, even on such a small issue as walking up the stairs. Here, it shows the trade-off between saving electricity and employee safety. Hence, considering the simultaneous enforcement of economic, ecological and social sustainability practices, it became clear that it is often very difficult to achieve a triple win situation. Littig and Griessler (2005) concur that achieving equality of the three dimensions is hardly realistic.

It is also important to not only reflect on the three dimensions within the own organization, but also throughout the entire value chain, as a sustainability manager of Company A explained:

> *It used to be cradle to* gate *but meanwhile people became aware that: oh, wait a second! We might be making the wrong decisions, especially if you think about cradle to grave... Let's imagine you develop a product that has a higher footprint than another product, but you have significant impacts on saving downstream [CO_2 emissions].*

Another sustainability manager also encouraged internal developers to specifically look at downstream advantages:

So I specifically encourage people not to think about green products. I encourage people to think what are the things that are going to make a customer more sustainable. Because if we can help move a market in that direction, we are going to have much more impact than just a change in our own operations.

The literature on sustainability and in particular life cycle analysis (LCA) has also recognized that developing sustainable products needs to consider the impact of the product in the entire value chain (e.g., Dangelico & Pujari, 2010; De Benedetto & Klemes, 2009; Pujari, Wright, & Peattie, 2003). However, the implementation of life cycle thinking adds tremendously to the complexity of NPD. First, companies need to acquire all the information, sometimes from the suppliers of their suppliers and that is a time-consuming and costly endeavor. As an R&D manager from Company B pointed out:

Of course, you have the three holy pillars of NPD: time, quality and cost. If you consider that then for [LCA thinking], you need too much time and the time-to-market is way too long.

Second, organizations need to develop the capabilities to assess environmental and social impact of all their suppliers, supply chain partners and customers. Consequently, R&D has to work closely with Procurement and Marketing to get the right information and to manage the upstream and downstream consequences. Therefore, sustainability practices that consider life cycle thinking will most likely contribute to better cross-functional communication and advance integrated work practices. However, organizations do not only need to acquire information, but they also need to share it with their suppliers and customers. For example, an agronomist from Company B often educated farmers about environmental consequences:

But if you tell them: don't apply too much nitrate because the nitrate goes to the water table, or don't apply pesticides, or don't apply herbicides through the drip irrigation because it is

going to the water table... and some of the pesticides can create problems for the communities. I think if we explain and keep explaining they will improve.

Similarly, the case companies did not only share the sustainability information with their suppliers, they also used it for marketing communications to inform customers about more sustainable product options, as a sustainability manager from Company A told us:

Also for example, marketing could have an impact here. So for example, if we have two comparable products, and one is more carbon intense in its making, you could say: ok, let's put marketing focus on this one and try to fade this one out, the other; and make them switch.

Therefore, life cycle thinking was found to be an important structural element of sustainability-oriented NPD practices, as it shapes interpretive processes and guides the sharing of meaning. If employees understand the idea of the life cycle and apply it to their reflections during NPD, they can rely on an important shared mental model. In structuration theory, this process is called signification, as the structure provides meaning (e.g., DeSanctis & Poole, 1994; Giddens, 1984).

Next, we show our results on the emergence and mainstreaming of sustainability-focused NPD practices. Table 1 shows a summary of the external triggers and internal actors driving the emergence and mainstreaming.

Insert table 1 about here

Emergence of sustainability-focused NPD practices

Our empirical results revealed a wide variety of sustainability issues in NPD practices in various stages of emergence. Some companies in our sample had already reached a certain degree of

formalization in bundling their sustainability practices and communicating about them in a holistic manner. Others ran all kinds of initiatives that were not integrated into a coherent set of sustainability practices showing the emergent nature of these practices. For example, one R&D manager from Company B explained:

> *[…] because they are all scattered initiatives. And we are doing a lot, but we're not like [major competitor] having a really smooth story, we need to have, I think it helps bringing all the scattered things together for your own view, if you really want to take the next step.*

Hence, this company was experiencing a slow evolution of infusing sustainability practices in NPD, but the sustainability practices were still fragmented and also malleable, as they are still in a development stage. This observation is in line with Orlikowski's (2000) idea that initial practices emerge from individual action. Initially, often dispersed, human action starts and shapes the emergence of a particular practice. Then, through social interaction, this practice becomes shared and disseminated into other areas of the organization.

In line with previous literature, and based on our data, we can confirm that organizations started infusing sustainability in their NPD for various reasons that might co-exist, ranging from a strategic approach of 'do no harm' towards more sustaincentric paradigm shifts (Dangelico & Pujari, 2010; Valente, 2012). Our results revealed two important sources for emerging sustainability-oriented NPD practices: 1) external triggers and 2) internal actors.

External triggers for sustainability in NPD practices

First, we observed that some organizations had started to tackle sustainability in their NPD process to react to regulatory demands, or pressures from consumers or other stakeholders. For example, an R&D manager from Company B told us:

The food safety authority always wants more salt reduction. […] Even though that is just a guideline and hence not obligatory, we started this new project. The point is if you do not comply with the guideline, your product is blacklisted and customers won't buy from you anymore. […] That is of course not good and you do not want to be part of that group.

Similarly, someone from the Technology Development department of Company A explained about an external (industrial) customer request:

Then you have [customer name] and [customer name], these are typical clients. They want to get a green label themselves and hence come and talk to us.

This is in line with Aragon-Correa and Sharma (2003) who label such an orientation as 'reactive', especially if these are the only goals to become more sustainable. Similarly, Berrone et al. (2013) clearly find that regulatory (from government) and normative (from stakeholders) pressures make it more attractive and increase the propensity for organizations to engage in environmental innovation. Also, some organizations use sustainability mainly as a marketing tool. Another R&D manager from Company B explained:

I see at the moment a lot of trends when it comes to sustainability and I see also sustainability being used more as a marketing tool than as a real, let's say, the real intention to do something for the environment.

Even though the mere promotional purpose of creating a better corporate brand image might not be a sufficient trigger for a fundamental shift towards sustainability, it might spark a first initiative that later triggers further changes. A client of Company D told us the following:

Sustainability has been a big part of our reporting. Since 2004, we have had a sustainability report. So it started with tracking different environmental indicators. Having the sustainability report prioritized safety, health and environmental responsibility. So then, a new strategy was made a few years ago, in which sustainability became one of the four pillars. So that was a point in time where we said, sustainability is really a central element of the company and we want to drive it much more with initiatives, with stronger reporting, with production targets. […] Over the last two years, we really developed a strong sustainability strategy with different initiatives over the value chain and integrated a sustainability report in our annual report.

Hence, the mere fact of having to report about sustainability helped to initiate the development of sustainability practices and these in turn shaped strategic goal setting. Various global sustainability initiatives, such as the Global Reporting Initiative (GRI) or the Dow Jones Sustainability Index, have triggered companies to pay more attention to their sustainability issues (e.g., Haugh & Talwar, 2010). It shows that structure impacts human behavior and in turn the changed human behavior impacts the existing structures and changes them. This is in line with Barley and Tolbert's (1997) view on structuration in that organizations can consciously create, alter and eliminate particular structures.

We also identified risk management as an external trigger for infusing sustainability in NPD practices. For example, Company A developed an explicit decision process for investments above €5 million. This process entails several steps, including a qualitative pre-screening of the

environmental and social impact of the investment (for example a new production site), as well as a full-fledged LCA in a later stage of the process. The purpose of this process is to highlight and assess the impact of different choices and work with scenarios. Thereby, the company could identify potential sustainable directions and accompanying actions. Clearly, risk management was an important impetus for that procedure. Similarly, Company B piloted a sustainability tool for NPD, which includes a checklist of questions on economic, ecological and social aspects. Pilot participants agreed that such a procedure would help to detect risks (e.g., in the sourcing of a material; important public discussions) early on and would thus help the organization to make better-informed innovation decisions, anticipate potential risks and prevent potential crises. This thinking is in line with Godfrey (2005) who argues that the mechanism for a positive relationship between philanthropic activity and the creation of shareholder wealth is related to risk reduction. Companies can build up positive moral capital that then acts as insurance-like protection. Risk anticipation also is part of the more proactive orientation towards sustainability (Aragon-Correa & Sharma, 2003; Valente, 2012).

A final external trigger of sustainability infusion in NPD we identified was opportunity identification. For example, an alliance manager of Company C explained:

There is a lot of entrepreneurship involved; to see chances, especially for social innovation, societal innovation with a focus on public interest. Not innovation to just earn a few Euros. That can and has to be there, too, but...[…] for example, they are developing a new European regulation for privacy. That is very important. How do you tackle that in your innovations? […] We choose to closely follow it to be socially conscious and engage in relevant business propositions.

Hence, the company used their sustainability management to identify important opportunities for their innovation efforts. Similarly, Company A actively chose to participate in sustainability-related organizations and associations to keep their finger on the pulse and then install employees from relevant business units as representatives. A strategic sustainability manager clarified:

We're maintaining a number of cross-business activities, involving both world business councils of sustainable development and also a UK organization. And, we, at our group, we're identifying these opportunities because we're linked in those sorts of networking activities, but we would not see ourselves as the [company A] representatives on those things; but we actually then talk to the business that might be relevant to, and someone from that team becomes the representative.

In the literature there is agreement that companies that follow the strategic goal of opportunity identification already move in the sustaincentric direction (Valente, 2012) and can reap several benefits from infusing sustainability in NPD. First, they can spot opportunities for product differentiation (e.g., Orsato, 2006). Second, they can create and penetrate new markets or develop new, superior technology (Dangelico et al., 2013). Finally, they can build up networks of important potential partners. Research has shown that due to the increased complexity of sustainable development, organizations often need their stakeholders in their innovation efforts and cannot create these innovations in isolation (e.g., Dougherty & Dunne, 2011).

Internal actors driving sustainability in NPD practices

In Company A, a small group of LCA experts pre-existed, who were then 'discovered' and sent out to the business units to initiate sustainability practices in NPD projects there. A sustainability manager remembers:

There was the corporate director for sustainability; he was looking for a kind of approach to sustainability. And then, somehow, he came to eco-efficiency at the same time.... then the [sustainability] group was still mainly doing LCA. At the same time, they were an expertise center selling services; and then a number of different people had done pilot studies with eco-efficiency, so the internal group went to different business units to see if that would work. And from there, basically this has been adopted as a way to evaluate [R&D] investments or in order to compare products.

For the employees at the business unit (BU), the support of the sustainability group employee was an occurrence that Howard-Grenville et al. (2011) term 'liminal'. The BU employees got insight into a new cultural resource that is different yet connected to their everyday action. Hence, it initiated a new way of thinking generating gradual cultural change. This slow emergence of new practices is often easier to adapt than a radical change program (Orlikowski, 1996). Such a slow process introduced a social context, as also the sustainability experts learned from the experiences of the BU employees and could sharpen their ideas. Similarly, an alliance manager from Company C confirmed that the new practices were still malleable and hence influenced by social interactions:

Do you know what the essence of these ideas is? They are really not sharp. But no one has an idea [of how to do it], so you fix it in a short paragraph. And then if you speak with many people about it, you get sharpness. Everyone adds a little and this is how it starts.

Thus, the initial sustainability practices needed social context and interaction to emerge and can thus be seen as structures that result from human action (Poole & DeSanctis, 2004).

Several interviewees reported that they did not engage in sustainability-oriented behavior because they did not have the resources (e.g., time) and were not evaluated on it. They also often missed

the freedom, decision authority or slack resources to initiate a new practice. For example, an R&D manager from Company B explained:

> *There is a substantial lack of communication between the different departments. And within my department I was hardly trained, so [when] I started, sustainability was not there...[…] because we are simply presented with projects [that we have to execute]. The project brief really states what the objective is, so there is not a lot of freedom to develop something else.*

In contrast, Company C provides quite some freedom and slack resources to engage in new initiatives. The alliance manager calls it the art of entrepreneurship within projects:

> *I always call it the [managerial, rational] manner of how to do a project. I had an idea about [...]. Then a manager from [Company C] comes and asks me for a project plan, what are the steps, which people should be involved and how much revenue we make. And then I think you don't understand it - [what you are asking for] is not entrepreneurship, it is management and if the environment stays stable that's fine, but not for new business.*

The quote illustrates that a more entrepreneurial cultural frame also helped to initiate new practices, in line with what (Howard-Grenville & Hoffman, 2003) found. However, where the cultural frame did not allow for that, passionate individuals who would have liked to initiate sustainability practices in NPD encountered many more problems. This finding is in line with (Bansal, 2003) who shows that resource slack is an important condition for passionate individuals to have their organizations respond more profoundly to environmental issue selling. In terms of structuration theory, this finding shows that existing structures within the organization could endorse as well as constrain human behavior.

Mainstreaming of sustainability-focused NPD practices

Our empirical results showed a variety of ways to mainstream the sustainability-focused NPD practices. We again differentiate between external triggers and internal actors who enact emerging practices.

External triggers for sustainability in NPD practices

Company A used external consultants to gather and validate LCA database information. As the underlying database for LCA requires extensive data collection efforts, they used other specialists to help update database information. Furthermore, they worked with industry associations to generate a standard for specific LCA databases and procedures. One sustainability manager of Company A explained:

> *I work for the [name] Association in [location], where the whole industry has come together and developed a life-cycle inventory database; […] and this helps because then you have one standard database for all [products].*

The power of the association in turn helped to gain momentum in mainstreaming the usage of LCA in NPD throughout the organization. Hence, external parties can also support practice enactment, when they help legitimize the practice.

Internal actors driving sustainability in NPD practices

Company B wanted to implement a checklist to systematically consider sustainability during their NPD process and also include ecological and social factors in their portfolio decision-making. The checklist would be an important structure that should shape behavioral activities. They hoped

that initially this checklist would create awareness of the different issues in each category and hence provide R&D employees with an overview. An R&D manager told us about the benefits:

Sometimes it's just common sense, just things or these kinds of questions, it's good to have an overview of everything that you should consider. But of course, humans make mistakes so if you have like that kind of checklist that you can check, oh here this is considered and this is not, oh this is something that I didn't think of okay, but it's good to have a look at that, and it's useful.

Such a checklist provided employees with the opportunity to engage in reflective behavior. In structuration theory such a situation refers to reflexive monitoring (e.g., Sarason, Dean, & Dillard, 2006). Reflexivity captures the capacity of humans to routinely scrutinize their behavior and the reasons for a particular behavior. Hence, they can monitor their own social contexts and activities within those contexts, and accordingly adapt their behavior (Giddens, 1984).

The checklist has been piloted and is due to be integrated into Company B's official stage gate process and documentation. This is in line with the structurational process of legitimation providing a normative frame, i.e. specified evaluation criteria, that justify an employee's behavior (DeSanctis & Poole, 1994). When the general idea of the checklist was presented to other employees, first reactions were mixed. For example a marketing manager was rather enthusiastic:

Oh, I would like it! I would love it! Because then it becomes part of my role to be sustainably oriented. I personally have an interest in [sustainability] things I would not even dare to ask [in our company]...

A packaging designer, who is personally sustainability passionate, on the other hand feared that the economic dimension would rule during decision-making:

In a way, it bothers me […] even doing all the evaluations projects were pushed through because they were more profitable. And then we did all the work and we showed why you should not do it, and why you should do it differently and then still you come to the same conclusion. So it doesn't mean that even that you've made all these efforts, it doesn't mean that you will be rewarded for doing it this way. But it is an informed choice, so that's okay.

The managers supporting the integration of the checklist to all R&D projects within Company B hoped that it would help to familiarize all NPD related employees with the desired sustainability thinking. R&D employees working with the checklist could then experience the new practice in their own activities. Howard-Grenville et al. (2011) show that directly experiencing a new activity that is relevant for one's own work can help to transfer a vague idea to the doable and practical. Such a checklist also contributes to routine enactment because it facilitates bridging old and new practices by incorporating well-established and familiar economic criteria with the new ecological and social criteria. Hence, employees can experience the old and the new at the same time (see Howard-Grenville et al., 2011).

Another way to enact routines is by using narratives. As a business development manager of Company D explained:

For me personally it is giving examples. Examples of what we are doing. For me that is really helpful. My learning style is stories. So If I can tell a story […] they can more easily grasp the concept.

Narratives are an integral part of social life and represent forms of cultural transmission as they activate affective, cognitive and belief changes in story receivers (Van Laer, De Ruyter, Visconti, & Wetzels, 2014). They also function as a transmission mode for values and norms and in turn impact behavior, as they carry symbolic meaning. They supply a normative frame with

regard to behavior that is appropriate in the context of sustainability. Hence, narratives are an important means to disseminate sustainability practices and lead to a stabilization of the routine.

Practice initiators also often engaged like-minded people to achieve routine enactment. For example, an alliance manager of Company C told us:

Some people on the other side of the table are not able to do something with the purity of the motivation for a project. So, when you appeal to their personal morale, some will react and some won't. Then, you try to bring together those people that do react without the people that do not react. […] So, then a core team of people emerges and with them you move further.

Gebhardt, Carpenter, and Sherry Jr (2006) also incorporate the step of engaging like-minded people in their change process of cultural transformation, where dissenters are removed and believers are further included in an organization's activities. Similarly, Howard-Grenville et al. (2011) show the importance of including other believers for support. Even though these enactments may be dispersed at the beginning, they seed organizational change and also build up internal networks for further incorporation of sustainability practices in NPD.

Another important mechanism for mainstreaming practices is the presence of sustainability-passionate individuals, who trigger new sustainability activities and enforce existing ones during NPD. As a sustainability manager from Company B explained:

I see a lot of things and all of a sudden there's initiatives and instead of waiting until the system industry is coming up, if it's good sustainable initiatives, I take it and say, hey and then I show it to people. Like for instance, the [ingredient], everybody was quite skeptical, yeah that will cost money and nobody will do that. But, and we worked together with somebody from purchasing who is very enthusiastic and finally we realized it. Now it's a

big success and it has two big advantages: advantage number one was, the guy from purchasing […] now [talks] about sustainability issues that are going to be on the table. Second advantage, a lot of people from the marketing side were very enthusiastic, 'yeah, that's why I want to work for it'. All of a sudden, quite some enthusiasm came into that group.

The passion of these individuals facilitated the development and enactment of sustainability practices in NPD, as they continuously pushed for an organizational change towards sustainability. Literature on issue selling points out that these passionate individuals act as issue-sellers towards top management, bringing sustainability on the organization's agenda (Bansal, 2003; Howard-Grenville, 2007). They do not necessarily need to hold hierarchical power, as Howard-Grenville et al. (2011) show. However, if this passion comes from someone with hierarchical power, it is often easier recognized and implemented. For example in Company A, a sustainability manager explained:

We just got a strategy update from our CEO yesterday; and he made it very, very clear that sustainability is an integral part of our business strategy overall, over our chain, everything... So that is pretty much something. And we see this clearly as a long-term success factor, driver for all sorts of initiatives: R&D initiatives... these kinds of things.

Accordingly, the company also implemented incentives and targets on a personal level with respect to sustainability. In contrast, Company B had no such incentives on a personal level; their sustainability goals stayed on a rather abstract and global level.

DISCUSSION

This study provides in-depth insights and a framework that explains how sustainability-focused NPD practices emerge and how they are enacted as they unfold. To determine how organizations can initiate and fulfill an evolutionary change towards sustainability, we used a longitudinal case study research interviewing more than 100 employees from four multinational companies. Our findings show that the organizations varied substantially in their strategic ambition and their change efforts towards sustainability. While some organizations were moving towards a sustaincentric approach, others mainly used sustainability for promotional and reporting reasons. Our key findings pertain to the importance of external triggers (i.e., drivers that are situated outside the focal firm) and internal actors (i.e., drivers that are situated inside the focal firm) in shaping the emergence and the mainstreaming of practices. These factors play a crucial role in an organization's change program for infusing sustainability into NPD practices.

Our study makes several contributions. First, we show which environmental and social sustainability issues organizations consider during their NPD efforts. Companies can use the identified dimensions (ecological: energy consumption, materials consumption, toxicity potential, biodiversity, emissions to air, water and soil, and general risk potential; social: the social impact on (1) employees, (2) customers, (3) local and national community, (4) international community and (5) future generations) to systematically integrate these considerations into their NPD process. Many organizations use a systematic stage-gate process for their innovation efforts and can hence enrich their documentation with the environmental and social topics that are relevant for them. Sustainability-oriented NPD practices might also trigger a change in departmental structure by altering institutionalized roles. For example, research has shown that organizations often employ larger external networks to achieve sustainability in NPD (e.g., Dangelico et al., 2013). Hence, the alliance management department might get to play a more active role in NPD

projects than before. It is, however, noteworthy that it appears often very difficult if not impossible to simultaneously achieve sustainability advantages on the triple bottom line. Organizations have to prepare themselves for challenging trade-off decisions, which shows the complexity of infusing sustainability into NPD practices.

Second, we explain how and why sustainability-oriented NPD practices emerge. We find that organizations culturally transform towards sustainability through a slow, evolutionary process arising from modifications in daily practices. Concerned individuals, often from middle management, initiate new practices responding to external triggers and engaging as internal actors to create momentum for a new practice. These individuals utilize the external triggers to pursue their sustainability-concerned goals internally. The external triggers thus provide the change agents with a selling rationale to other organizational members. In the emergence phase, the new practices are often still unstable and malleable and hence easily influenced by other organizational members. Therefore, the slow process of practice emergence and practice mainstreaming happens in a multi-actor setting where social interactions shape the evolution of the practice. Furthermore, because this kind of change is not a top-down directive, but rather a patchwork of various cultural change engagements, companies can be in many stages at the same time. Thus, the change is not uniform but multi-evolutionary. Also, Bansal (2003) shows that organizations whose strategic values are closely aligned to the individual concern of change initiating employees have a higher probability to change quicker towards sustainability.

Third, our findings explain the mainstreaming phase of sustainability-oriented NPD practices. The stages of emergence and mainstreaming are often intertwined and in practice it might be difficult to distinguish the two stages. For example, while we provide the example of the LCA expert group of Company A initiating practices at different BUs, the same process could

be seen as a way of mainstreaming the practice throughout the organization. Hence, depending on which actor and organizational level is taken into consideration, practices can be in the emergent or in the mainstreaming phase. Furthermore, the timing for mainstreaming a new practice can vary considerably depending on the current state of the organization and the support for the practice. The mainstreaming of practices needs a certain momentum that is not always present.

Our study also shows which external triggers and internal actors drive the emergence and mainstreaming of sustainability-oriented NPD practices. While the different external and internal triggers are not necessarily mutually exclusive, some of them cannot be easily combined. For example, striving for cost reduction can act as an internal trigger to become more sustainable, trying to realize better outcomes with fewer resources. At the same time, and in line with Bansal (2003), we find that slack resources may provide internal actors with opportunities to initiate sustainability-focused NPD practices. Sonenshein (2013) focuses on this paradox by showing how both fewer resources and more (slack) resources foster and constrain creativity. We think that a similar logic could apply to our results in that both situations can facilitate and inhibit the emergence of new practices. Future research should delve into this paradox to determine the boundary parameters of when these drivers foster and/or constrain change.

In our structuration theory approach the emergence and mainstreaming of sustainability-oriented NPD practices illustrates the duality of structure (Giddens, 1979). The emergence and mainstreaming process is contingent upon the existing structures within organizations, while the process at the same time reinforces and changes the existing structures, thereby creating evolutionary change. Hence, using structuration theory and practice theory to explain the infusion of sustainability in NPD practices illuminates how and why organizations develop and employ specific social structures to implement more abstract concepts into daily innovation activities. Thereby, organizations can evolve to become more sustainable across different organizational

levels. By capturing both the emergence and mainstreaming processes, we can reveal the complexity of infusing sustainability practices into firms' innovation management. We can attain a better understanding of how to implement sustainability practices, and subsequently may also be able to improve innovation management decisions and performance. Using our results, firms may recognize tensions between their existing structures and the necessary pre-requirements for fostering sustainability-oriented practices. In particular, they can utilize the external triggers to support internal actors in their efforts towards sustainability-oriented change.

References

Aragon-Correa, J. A., & Sharma, S. 2003. A Contingent Resource-Based View of Proactive Corporate Environmental Strategy. *Academy of Management Review*, 28(1): 71-88.

Bansal, P. 2003. From Issues to Actions: The Importance of Individual Concners and Organizational Values in Responding to Natural Environmental Issues. *Organization Science*, 14(5): 510-527.

Bansal, P., & Clelland, I. 2004. Talking Trash: Legitimacy, Impression Management, and Unsystematic Risk in the Context of the Natural Environment. *Academy of Management Journal*, 47(1): 93-103.

Barley, S. R., & Tolbert, P. S. 1997. Institutionalization and Structuration: Studying the Links between Action and Institution. *Organization Studies*, 18(1): 93-117.

BCG. 2012. Boston Consultancy Group: Sustainability Nears a Tipping Point, *MIT Sloan Management Review Research Report*.

Berrone, P., Fosfuri, A., Gelabert, L., & Gomez-Mejia, L. R. 2013. Necessity as the Mother of 'Green' Inventions: Institutional Pressures and Environmental Innovations. *Strategic Management Journal*, 34(8): 891–909.

Burgelman, R., A. 1983. A Process Model of Internal Corporate Venturing in the Diversified Major Firm. *Administrative Science Quarterly*, 28(2): 223-244.

Chabowski, B., Mean, J., & Gonzalez-Padron, T. 2011. The Structure of Sustainability Research in Marketing, 1958-2008: A Basis for Future Research Opportunities. *Journal of the Academy of Marketing Science*, 39(1): 55-70.

Dangelico, R. M., Pontrandolfo, P., & Pujari, D. 2013. Developing Sustainable New Products in the Textile and Upholstered Furniture Industries: Role of External Integrative Capabilities. *Journal of Product Innovation Management*, 30(4): 642–658.

Dangelico, R. M., & Pujari, D. 2010. Mainstreaming Green Product Innovation: Why and How Companies Integrate Environmental Sustainability. *Journal of Business Ethics*, 95(3): 471-486.

De Benedetto, L., & Klemes, J. 2009. The Environmental Performance Strategy Map: An Integrated Lca Approach to Support the Strategic Decision-Making Process. *Journal of Cleaner Production*, 17(10): 900-906.

DeSanctis, G., & Poole, M. S. 1994. Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science*, 5(2): 121-147.

Dougherty, D., & Dunne, D. D. 2011. Organizing Ecologies of Complex Innovation. *Organization Science*, 22(5): 1214-1133.

Dutton, J. E., Ashford, S. J., O'Neill, R. M., & Lawrence, K. A. 2001. Moves That Matter: Issue Selling and Organizational Change. *The Academy of Management Journal*, 44(4): 716-736.

Elkington, J., Emerson, J., & Beloe, S. 2006. The Value Palette: A Tool for Full Spectrum Strategy. *California Management Review*, 48(2): 6-30.

Gallego-Alvarez, I., Prado-Lorenzo, J. M., & García-Sánchez, I. M. 2011. Corporate Social Responsibility and Innovation: A Resource-Based Theory. *Management Decision*, 49(10): 1709-1727.

Gebhardt, G. F., Carpenter, G. S., & Sherry Jr, J. F. 2006. Creating a Market Orientation: A Longitudinal, Multifirm, Grounded Analysis of Cultural Transformation. *Journal of Marketing*, 70(4): 37-55.

Giddens, A. 1979. *Central Problems in Social Theory*. Berkeley CA: University of California Press.

Giddens, A. 1984. *The Constitution of Society*. Berkeley CA: University of California Press.

Glaser, B. G., & Strauss, A. L. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Hawthorne, NY: Aldine de Gruyter.

Godfrey, P. C. 2005. The Relationship between Corporate Philanthropy and Shareholder Wealth: A Risk Management Perspective. *Academy of Management Review*, 30(4): 777-798.

Haugh, H. M., & Talwar, A. 2010. How Do Corporations Embed Sustainability across the Organization. *Academy of Management Learning & Education*, 9(3): 384-396.

Holsti, O. R. 1969. *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-Wesley.

Howard-Grenville, J., Golden-Biddle, K., Irwin, J., & Mao, J. 2011. Liminality as Cultural Process for Cultural Change. *Organization Science*, 22(2): 522-539.

Howard-Grenville, J., & Hoffman, A. J. 2003. The Importance of Cultural Framing to the Success of Social Initiatives in Business. *Academy of Management Executive*, 17(2): 70-84.

Howard-Grenville, J. A. 2007. Developing Issue-Selling Effectiveness over Time: Issue Selling as Resourcing. *Organization Science*, 18(4): 560-577.

Littig, B., & Griessler, E. 2005. Social Sustainability: A Catchword between Political Pragmatism and Social Theory. *International Journal of Sustainable Development*, 8(1-2): 65-79.

Miles, M., & Huberman, M. 1994. *Qualitative Data Analysis*. London, UK: Sage.

Orlikowski, W. 1992. The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, 3(3): 398-427.

Orlikowski, W. 2000. Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science*, 11(4): 404-428.

Orlikowski, W. J. 1996. Improvising Organizational Transformation over Time: A Situated Change Perspective. *Information Systems Research*, 7(1): 63-92.

Orsato, R. J. 2006. Competitive Environmental Strategies: When Does It Pay to Be Green? *California Management Review*, 48(2): 127-143.

Peloza, J., White, K., & Shang, J. 2013. Good and Guilt-Free: The Role of Self-Accountability in Influencing Preferences for Products with Ethical Attributes. *Journal of Marketing*, 77(1): 104-119.

Poole, M. S., & DeSanctis, G. 2004. Structuration Theory in Is Research: Methods and Controversies. In M. E. Whitman, & A. B. Woszcynski (Eds.), *The Handbook of Information Systems Research*. London: Idea Group.

Pujari, D. 2006. Eco-Innovation and New Product Development: Understanding the Influences on Market Performance. *Technovation*, 26(1): 76-82.

Pujari, D., Wright, G., & Peattie, K. 2003. Green and Competitive. Influences on Environmental New Product Development Performance. *Journal of Business Research*, 56: 657-671.

Saling, P., Kicherer, A., Dittrich-Krämer, B., Wittlinger, R., Zombik, W., Schmidt, I., Schrott, W., & Schmidt, S. 2002. Eco-Efficiency Analysis by Basf: The Method. *The International Journal of Life Cycle Assessment*, 7(4): 203-218.

Sarason, Y., Dean, T., & Dillard, J. F. 2006. Entrepreneurship as the Nexus of Individual and Opportunity: A Structuration View. *Journal of Business Venturing*, 21(3): 286–305.

Slawinski, N., & Bansal, P. 2012. A Matter of Time: The Temporal Perspectives of Organizational Responses to Climate Change. *Organization Studies*, 33(11): 1537-1563.

Sonenshein, S. 2013. How Organizations Foster the Creative Use of Resources. *Academy of Management Journal*.

Spiggle, S. 1994. Analysis and Interpretation of Qualitative Data in Consumer Research. *Journal of Consumer Research*, 21(3): 491-503.

Valente, M. 2012. Theorizing Firm Adoption of Sustaincentrism. *Organization Studies*, 33(4): 563-591.

Van Laer, T., De Ruyter, K., Visconti, L. M., & Wetzels, M. 2014. The Extended Transportation-Imagery Model: A Meta-Analysis of the Antecedents and Consequences of Consumers' Narrative Transportation. *Journal of Consumer Research*, 40(5): 797-817.

WECD. 1987. *The Brundtland Commission: Our Common Future*. New York: Oxford University Press.

Weick, K. E., & Quinn, R. E. 1999. Organizational Change and Development. *Annual Review of Psychology*, 50: 361-386.

Yin, R. K. 1994. *Case Study Research: Design and Methods* (2nd ed.). Thousand Oaks, CA: Sage.

Table 1: Summary of Findings on External Triggers and Internal Actors

	Emergence of sustainability-oriented NPD practice	**Mainstreaming of sustainability-oriented NPD practice**
External triggers	Requests from stakeholders Promotional interest Reporting initiatives Risk management Opportunity identification	Using external input for validation and legitimacy
Internal actors	Internal sustainability groups Slack resources	Sustainability checklist in official NPD process Narratives Engage like-minded people Passionate individual (issue selling) Strategic management support