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How to cite this publication

Please cite the final published version:

Weigt-Rohrbeck, J., & Linneberg, M. S. (2019). Democratizing innovation processes: personal initiative in bottom-up eco-innovation. *European Journal of Innovation Management*, 22(5), 821-844. <https://doi.org/10.1108/EJIM-12-2018-0278>

Publication metadata

Title: Democratizing innovation processes: personal initiative in bottom-up eco-innovation
Author(s): Weigt-Rohrbeck, J., & Linneberg, M. S.
Journal: *European Journal of Innovation Management*
DOI/Link: [10.1108/EJIM-12-2018-0278](https://doi.org/10.1108/EJIM-12-2018-0278)
Document version: Accepted manuscript (post-print)

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Democratizing innovation processes: personal initiative in bottom-up eco-innovation

Abstract

Aims. Previous work on employee-driven innovation (EDI) has demonstrated the benefits of employees' proactive behavior in achieving success with innovations. This study employs the concept of personal initiative to investigate the underestimated role of employees' agency in complex processes of innovation, showing the impact of personal initiative on employees' innovation success.

Design and methodology. Based on two embedded cases of environmental bottom-up innovation at a large manufacturing company, this study examines employees' behavior in generating, championing and realizing such initiatives.

Findings. This paper provides insights into how employees succeeded, through taking initiative in generating, championing and realizing environmental initiatives despite facing high complexity, and resource constraints. Without being prompted from the top down, employees started these initiatives themselves and showed phase-specific behavior in overcoming the various challenges. Thus, self-starting behavior was found dominant in generating ideas, whereas proactive and persistent forms of behavior were found to be prevalent in championing and rolling out the initiatives.

Originality and value. Current understandings of employee-driven innovation highlight the importance of developing employees' potential capabilities and organizational-level guidance. Using an active performance perspective, this study emphasizes the importance of employees' agency in ensuring EDI success, even when conditions are not conducive to their doing so.

Keywords. Employee-driven innovation, eco-innovation, bottom-up innovation, proactive behavior, personal initiative

Paper type. Research paper

1 Introduction

Shifting the focus from a more traditional innovation approach towards democratizing the innovation process and involving non-experts has broadened the range of those who can contribute to innovation processes (Chesbrough, 2003, Von Hippel, 2005), as well as increased attention to the conceptual development of employee-driven innovation (EDI) (Høyrup, 2010). The concept of EDI stresses the active and systematic involvement of non-managerial employees in innovation processes, as their strong involvement in daily routines provides them with in-depth and contextual knowledge that is both unique and different from that of their managers (Kesting and Parm Ulhøi, 2010). In this way, employees are capable of making a contribution to innovation processes that strengthen an organization's capacity to innovate (Kesting and Parm Ulhøi, 2010). Despite the admitted potential of employees in contributing to the innovation process, scholarly work on EDI remains limited (Bäckström and Bengtsson, 2019) and focused either on the conceptual development of employees' capabilities or, when empirical in nature, dedicated to individual characteristics such as intrinsic motivation and well-being (Buech et al., 2010), self-efficacy (Frese et al., 1999) and organizational characteristics such as managerial support (Ramus and Steger, 2000), leadership behaviour (De Jong and Den Hartog, 2007) and group climate (Axtell et al., 2000), as well as how these characteristics determine – that is, facilitate or impede – the success of EDI.

While researchers have acknowledged that individual characteristics such as self-efficacy, proactivity and ownership are important for EDI success, most studies of EDI still seem to endorse a traditional performance perspective, emphasizing the importance of organizational-level guidance and expecting employees to focus on submitting innovative suggestions within a given frame of action (Holman et al., 2012). In this perspective, individual agency in work processes that involve changing the frame of action remains reserved to managers and specialists (Virkkunen, 2006). In that sense, the current literature on employee-driven innovation has taken only initial steps in developing an ontology of the emancipation of employees.

Within today's fast-moving working environment, with its increasingly rapid technological developments, the need to emancipate employees and shift from the traditional view of their performance is being argued (Frese, 2008). Unlike the prevailing understanding of EDI, the concept of individual agency embraces the employee as an active agent who breaks away from the current structure and changes the frame of actions (Virkkunen, 2006). The increasing scholarly attention being given to the role of individual agency in innovation processes supports this change in perspective (Engeström, 2011, Haapasaari et al., 2016, Haapasaari et al., 2017).

While we are not attempting to neglect the value of management initiatives or the guidance of EDI as a condition for successful innovation, in this paper we aim to add to the EDI literature by embracing a bottom-up view of employees' agency in accordance with the findings of our empirical study. Specifically, we noticed how employees changed the frame of action, took initiative and proactively steered highly complex innovation processes independently. Thus, the objective of this paper is to conceptualize how the process of employees' transforming innovative ideas into feasible initiatives happens without being activated from the top down. In doing so, we employ the concept of personal initiative (Frese et al., 1997), involving a consideration of individual agency and the proactive and dynamic facets of employee behaviour, which are particularly relevant in the critical phase of the implementation of ideas.

Environmental innovation (eco-innovation) is among the key concerns of today's manufacturing companies, in some studies even being mentioned as an essential driver of consistently high performance over time (Kindström et al., 2013). Eco-innovation carries several unique challenges, including **the decision of** choosing the specific area in which to innovate, acknowledging the potential demand for organizational changes, and linking with and balancing between stakeholders (Horbach and Jacob, 2018). Thus, the specific context of eco-innovation provides a relevant and critical setting to showcase employees as active agents taking initiative for a more environmentally sustainable organization (Jackson and Seo, 2010).

Consequently, this study provides an in-depth analysis of employees' initiative-taking in complex innovation processes and answers the following research question: How does personal initiative advance bottom-up innovation success and aid employees in overcoming the inherent complexities? Answering this research question, the paper contributes to the literature on EDI in three ways. First, it takes seriously an active performance perspective (Frese, 2008), viewing the employee as an "active architect of the job" (Wrzesniewski and Dutton, 2001, p. 194). Strengthening the role of 'underexposed' employees in innovation processes as active agents provides a counterbalance to the dominant traditional performance view. Secondly, as the paper provides empirical insights into how personal initiative provides employees with the necessary coping behavior to overcome the perceived challenges in what is a complex innovation process, it clarifies Buhl et al.'s (2016) argument that, for bottom-up innovation success, the focus on developing individual capabilities is not sufficient but requires employees' proactive and risk-taking behavior. Thirdly, this paper responds to the call for more research into the processes of EDI (Bäckström and Bengtsson, 2019) to help elucidate how employees' personal initiative is dynamically reflected in emerging innovation

processes, which in essence is a methodological contribution. Similar to a recent study of bottom-up innovation processes (Haapasaari et al., 2017), this paper argues for a shift from a static input-output view towards a dynamic interactive view. The process approach is appropriate in this study because we follow eco-innovation as a dynamic process that encompasses different phases (Scott and Bruce, 1994). This allows the activities and experiences of individual employees to be illustrated and helps explain how employees' behavior unfolds and changes (Akgün et al., 2009).

2 Theoretical background

This section presents the foundations of EDI and the nature of eco-innovation that position the paper in the literature and frame the research question.

2.1 The role of employees in the innovation process

Although the concept of EDI implies the active and systematic involvement of employees, the current literature is dominated by a focus on identifying the necessary employee capabilities for engaging in innovation processes, such as tacit knowledge (Høytrup, 2010), and on how management should guide employees in creating EDI successes. This view is in line with the traditional performance **view** (e.g. Hackman and Oldham, 1976), which is mainly concerned with how employees perceive and react to the fixed and objective characteristics of certain tasks. Furthermore, it assumes that employees who are satisfied with their allocated tasks will be more likely to take on additional tasks. The few existing empirical studies of employees' involvement in eco-innovation adopt this perspective (Buech et al., 2010, Remmen and Lorentzen, 2000, Rothenberg, 2003). For example, Axtell et al. (2000) discuss employees' behavior in relation to certain job characteristics that support or impede employees' actions in the innovation process, while Veenendaal and Bondarouk (2015) investigate how managerial practices impact on employees' perceptions and behavior in the innovation process.

Scholars are increasingly calling for a change to the traditional perspective in the direction of a more contemporary view of active performance (Frese, 2008). In line with this view, the concept of transformative agency (Virkkunen, 2006) regards the employee as an active agent who questions the status quo and takes the initiative to change it (Engeström, 2011). Similarly, the concept of job-crafting argues that jobs and job tasks can actively be altered (Wrzesniewski and Dutton, 2001). Employees are motivated to craft their job tasks in order to create a more satisfying job situation, to craft a meaningful work experience, to enhance their self-image (Wrzesniewski and Dutton, 2001), to take control of their actions (e.g. Ashford and Black, 1996) and/or to redefine organizational goals in order to overcome barriers (e.g. Frese and Zapf, 1994, Hacker, 1985). Drawing on individual

agency, a recent contribution explores how employees' agency can influence the process of turning initial initiatives into feasible innovation studies (Haapasaari et al., 2017). Their findings indicate that employees' innovation efforts require transformative agency to turn ideas into successful innovations. Also studies of leadership behaviour in innovation processes found that the delegation of greater autonomy and responsibility to employees are important in facilitating EDI (Amundsen et al., 2014, Su and Baird, 2017).

A central concept associated with the notion of active performance is personal initiative (Frese and Fay, 2001, Frese et al., 1997). This entails employees' active, anticipatory and forward-looking behavior, which must be aligned with their organization's goals: "(it) is work behavior characterized by its self-starting nature, its proactive approach, and by being persistent in overcoming difficulties that arise in the pursuit of a goal" (Frese and Fay, 2001, p. 134). According to Frese et al. (1997) the three co-existing characteristics of personal initiative include first, self-starting behavior, which means that employees are actively pursuing a goal that is not prescribed by their role description, nor explicitly demanded. The goal is unusual in the corresponding context and thus presupposes a high degree of mental effort to anticipate. Second, proactivity implies that employees can anticipate future demands and prepare in advance for how to cope with the expected opportunities and difficulties. Third, persistence is needed to achieve one's goal and to overcome the barriers to its realization.

Regarding how aspects of personal initiative affect the innovation process knowledge is still limited. Unsworth and Parker (2003) studied the relation between proactivity and innovation and suggested that, while a self-starting approach may be relevant for developing ideas, persistence and a change-oriented focus may be relevant for implementing them. In one of the few empirical studies of employees' innovations in the production unit of a manufacturing company, Veenendaal and Bondarouk (2015) found that production workers were generally able to contribute to the entire innovation process, but were particularly successful in contributing to the generation of ideas. In their study they draw on the conceptualization of innovation as a multi-stage process consisting of idea-generation, including opportunity exploration, idea-championing and idea realization (as in Scott and Bruce, 1994). Veenendaal and Bondarouk (2015) justify their finding that idea-championing and realization make social interaction and support from others more necessary than idea-generation. Similarly, another process-oriented study by Karlsson and Skalen (2015) found that innovation was most effective when employees were actively involved early in the process.

There is no empirical evidence of how facets of personal initiative relate to the different phases of the innovation process, but a few contributions suggest that proactive employee behavior

constitutes a driver for innovation (Bindl and Parker, 2010, Unsworth and Parker, 2003). Relatedly, a few studies of employees' involvement in innovation indicate the need for phase-specific behavior (Axtell et al., 2000, Veenendaal and Bondarouk, 2015), although this was not part of the core analysis of these papers. Personal initiative and individual innovation are related in the way they both aim to change a work situation (Parker and Collins, 2010). Individual innovation, however, emphasizes the novelty of ideas, whereas personal initiative, with its focus on a self-starting and problem-solving approach, emphasizes the implementation of ideas under less than favorable conditions (Frese and Fay, 2001).

2.2 *The complexity of bottom-up eco-innovation*

Eco-innovation can be defined as the “production, application or exploitation of a good, service, production process, and 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 the negative impacts of resource use compared to relevant alternatives” (Kemp and Pearson, 2007, p. 7). As such, eco-innovation refers to a range of innovations such as renewable energy technologies, pollution prevention schemes, waste-management equipment, eco-design products and the adoption of biological materials (Kemp, 2010).

According to Rennings (2000) there are three important characteristics that differentiate eco-innovation from conventional innovation and make eco-innovation highly complex and even ambiguous. First, the “double externality problem” concerns knowledge *and* environmental externalities. While innovation activities are generally incentivized by knowledge spill-overs, eco-innovations also entail the high costs of products and/or processes to reduce the negative environmental impacts and thus provide a disincentive to invest in them. Second and related to these externalities, Rennings (2000) argues that eco-innovations are not self-enforcing and hence need a regulatory support through for example environmental policy. Third, there is a need to pay attention to the ecological, social and economic impacts of eco-innovations such as the effect on employment. Moreover, it is maintained that the realization of eco-innovations requires extensive collaborative efforts with the organization's networks and external partners (Foxon and Andersen, 2009) and often the need to balance contradictory demands (Hall and Vredenburg, 2003). For example, eco-innovations often entail the replacement of components with eco-friendly alternatives, which might not be readily available or need adaption. Also, the development and implementation of eco-

innovation is a complex process, as it requires specific knowledge and skills that can be different from the “traditional” knowledge already available (De Marchi, 2012). Representing a technological frontier, De Marchi (2012) argues that standards such as measures to evaluate the performance of eco-innovations do not yet exist. Accordingly, it remains difficult to assess the environmental benefit or value that may justify additional costs.

In such complex innovation settings, it is argued that the development of specific capabilities such as context-specific knowledge and user understanding are not sufficient (Buhl et al., 2016). Employees who engage in such processes are required to take the initiative and to cope with uncertainty, inconveniences and the risk of failure (Buhl et al., 2016, Chen et al., 2012). Compared to conventional innovation processes, eco-innovation creates explicit paradoxical tensions that need to be taken into account, as corporate sustainability studies suggest (Hahn et al., 2015). These tensions occur because successful eco-innovation requires financial and environmental value creation to be balanced in order to align it with various stakeholder groups with contradictory demands (Hall and Vredenburg, 2003). This carries risks, such as a one-sided, overly narrow focus on the environmental benefits (Ottman et al., 2006), which may eventually prevent the product from being mainstreamed and from creating market success at mass scale (Dangelico and Pujari, 2010). In the further course of action, when employees aim to champion and realize their innovative solutions (Veenendaal and Bondarouk, 2015), complexity grows, increasing the likelihood that employees need to overcome barriers, and with it the risk of their being discouraged from participating in eco-innovations (Buhl et al., 2016).

The current debate on EDI follows the arguments of the rational choice approach (see for example expectancy theory in Vroom, 1964), which explains that a large number of barriers or low expectations can lead employees to abandon a desired goal. Thus, EDI can only reach its full potential if its contextual conditions are approving (Amundsen et al., 2014). However, advocates of the action performance perspective argue that barriers do not necessarily lead employees to feel discouraged or to abandon their goal of innovating (e.g. Frese, 2008). Their argument is largely based on the Rubicon theory (Gollwitzer, 1993, Heckhausen and Kuhl, 1985), which states that, once an individual has formed an action plan, the intention to implement that plan and the effort to overcome barriers and reach one’s goal are high. Concerning personal initiative, it has been argued that such behavior may be triggered especially when employees feel dissatisfied with the status quo and are motivated to set themselves a goal in order to overcome the anticipated barriers (Frese and Fay, 2001). Hence, as these authors maintain, employees would take the initiative to innovate without the experience of positive

emotions such as satisfaction. Accordingly, the concept of intrinsic motivation does not enhance the understanding of personal initiative at work (Frese and Fay, 2001).

Using the notion of democratized innovation, the literature has taken steps to highlight the importance of a broader range of stakeholder involvement in the innovation process, including employees and their purposive involvement in innovation processes in both practice and theory. However, both generally and in relation to cases of complex innovation in particular, it remains unclear how employees actually initiate and drive such processes successfully.

2.3 Summary

To conclude the literature review, we summarize the main concepts for the analysis. Point of departure is taken in the literature on EDI (e.g. Høyrup, 2010). Specifically, we address EDI in eco-innovation, a setting that represents a complex innovation process and demands employees' proactive behavior (Buhl et al., 2016). To understand the role of employees in complex innovation processes such as eco-innovation, this paper takes an active performance perspective (Frese, 2008) and views employees as active agents that can change the frame of action despite anticipated challenges (Virkkunen, 2006, Wrzesniewski and Dutton, 2001).

With its acceptance of employees' agency, the paper adds to the EDI literature because it broadens the scope of employees' contributions to complex innovation processes and does not restrict their contributions to idea generation or make them dependent on managerial guidance. To understand the role of employees in such processes, the concept of personal initiative (self-starting, proactive and persistent behaviors) is assumed central to the analysis of how employees engage in the phases of bottom-up eco-innovation processes.

3 Methods

Our qualitative case-study approach enables a holistic investigation to be conducted of individual-level processes and interactions. We follow eco-innovation processes that encompass the dynamic phases of idea-generation, idea-promotion and idea-realization (Scott and Bruce, 1994), as well as events that employees act upon. Looking at the process helps us to describe the dynamic nature of eco-innovation, thus allowing us to explore how the process is initiated, sustained and aided by personal initiative. As such, being a micro-level analysis, this study provides room for accounts of human dynamics that are important in innovation processes. The collection of contextual data from

multiple sources fosters a greater understanding (Strauss and Corbin, 1998, Strauss, 1987). For instance, we were able to examine particular initiatives closely and to elucidate employees' actions, showing how these are linked to the eco-innovation process.

3.1 Case selection

Two environmental initiatives were selected as embedded cases in a focal company within the manufacturing sector. An embedded single case study offers the prospect of a broader analysis while having the advantage of providing rich insights into a single example (Yin, 2003). At the same time, using two embedded cases allows both inter- and intra-case comparisons. The company has almost 20,000 employees and is headquartered in Denmark. It has production and sales subsidiaries worldwide, and a few domestic production sites. The company has a good reputation for maintaining a high level of environmental performance and is a forerunner in organizational efforts to produce environmentally sustainable and energy-efficient products. Placed in a market with high environmental standards, there is great pressure to innovate. Thus, we anticipated that employees' awareness and participation in environmental efforts would be traceable. The two embedded cases, which we call the Motor and Pump Replacement Project (MPRP) and the Lubricants Project (LP), were selected on the basis of the following: (1) they were generated from bottom-up; (2) they had been implemented; and (3) they demonstrated that they could create environmental improvements.

3.2 Data collection and data analysis

The study was carried out in 2016 over a period of five months. In order to validate the findings continuously, several sources of data were used, namely interviews, observation, e-mail correspondence and video calls with key informants, reviews of internal presentation materials, annual and sustainability reports, press releases, internal blogs, and photos covering the environmental initiatives studied (see Appendix 1). The informants were employees who were directly involved in the process of generating, championing or realizing the initiatives, and managers who directly or indirectly supported their employees' initiatives (see Appendix 2). This multi-level approach allowed rich insights to be obtained into the underlying processes of employee perspectives (Wright and Nishii, 2007). We conducted and transcribed seventeen in-depth interviews from 30 to 60 minutes long (101 hours of material). Approximately forty hours of field observations provided insights into the production facilities, thus allowing a better understanding of the technical challenges

and complexity of the initiatives. Observing the employees in their daily routines and their relations with both their colleagues and managers provided us with an impression of the enactment of environmental responsibility in an organizational reality.

The data analysis drew on the framework of Corley and Gioia (2004), illustrated stylistically in Figure 1. Regarding the employees, initial codes were assigned to the transcripts using codes such as “employee directly involved in eco-innovation”; “risk-taking”; and “strives to create long-term impact”, and showing employees’ actions in the environmental initiatives. The second round of coding comprised the interpretive codes, which were created by repeatedly revisiting the academic literature and the data. In this way, eight interpretative codes were created for employee behavior. Finally, on an aggregate level the two codes “personal initiative” and “EDI in eco-initiatives” were deployed in a close relationship with the relevant literature. Regarding the organizational level, we identified perceived organizational challenges in the process of generating, championing and realizing the idea and developed appropriate codes accordingly.

The coding procedure allowed us to move to the analysis, where we explored how the particular aspects of personal initiative relate to EDI in the innovation process in the two eco-initiatives. In addition, from the data it clearly appears that personal initiative was relevant in tackling the perceived organizational challenges throughout the eco-innovation process.

Insert Figure 1 about here

Figure 1. Coding scheme: descriptive codes, interpretative codes and aggregate codes

3.3 *External validity*

By means of this case study, we conceptualize the core dimensions of personal initiative in eco-innovation processes. Concepts are by their nature inherently concerned with general perspectives (Nørreklit et al., 2016). As such, the notion of analytical generalization addresses the phenomenon of conceptual expansion. Whereas single case studies will not be generalizable to a population, they can be generalizable to either theoretical propositions (Yin, 2017) or theoretical understanding (Popay et al., 1998). We make use of the “enfolded literature” to determine the fit with existing concepts (Eisenhardt, 1989), thus improving our ability to generalize from this single setting to theoretical understandings. A rich, in-depth analysis of two embedded cases, including the context of the chosen

case, is also necessary (Kennedy, 1979, Stake, 1995), as it provides the reader with knowledge of the sites to which the method is being applied. In this way, a prior understanding is provided of whether it is reasonable for the reader to conclude that “generalization can, and cannot, be extended” to another setting (Payne and Williams, 2005, p. 310).

This is also explained as naturalistic generalization (Stake, 1995) which allows readers to apply depictions presented in single case studies to personal contexts so that, when rich descriptions are presented, “single case studies may prove to be more valuable to management practitioners than nomothetically oriented group studies because ... group comparisons may not generalize to individual cases. It is these individual, single cases that practitioners must deal with on a day to day basis.” (Luthans and Davis, 1982, p. 387). Thus, even if generalization depends on the replicability of findings, the judgement of generalizability for single case studies can be shifted to the reader or user of the case data rather than the producer of the case data (Kennedy, 1979). Thus, our concept of personal initiative in EDI processes provides us with an image that can be replicated in different contexts. We further discuss the usability and restrictions of the findings in the section on implications.

4 Findings

This section first presents case narratives of each eco-initiative to provide a rich insight into the innovation processes within each example. Then, we continue with a comparative analysis of the different cases to answer the research question.

4.1 The Motor and Pump Replacement Project (MPRP)

During 2011, this company’s top management set a new environmental target not to emit more CO₂ than in 2008, while at the same time having ambitious growth targets. Two experienced mechanics, Martin and Tom, who work for the Danish production company decided to take on the task themselves: production should increase while at the same time energy consumption should decline. They redefined the goal as reducing energy by redesigning the production equipment and optimizing inefficient pump motors so that they consume as little as possible. While thinking about the challenges of redesigning the machinery, they also wondered how to make this initiative attractive in the longer term. Besides having the goal of saving energy and reducing CO₂ emissions in their own production, they also wanted the company to use their own products as a showcase for its customers and to create new business potential by selling not only pumps but also energy-efficient motors for pumps.

After about two years working to convince their managers of their idea, they persuaded the top management that their initiative was both environmentally and financially feasible. In fact, the initiative could contribute to an energy reduction of twenty percent in the Danish production company. Finally, the project was granted a sufficient budget to take implementation further. It also won attention from the global sustainability department, whose role is to push environmental initiatives to meet global strategic sustainability objectives.

Realizing the project's benefits locally, the sustainability department saw the potential to make the new energy-efficient motors successful globally and started to roll out the project in other European, Asian and North American subsidiaries. Although successful, the project ended in 2015 due to the company's financial difficulties. That same year the company was undergoing many organizational changes, including downsizing and the appointment of a new top management team. In 2016 the project team relaunched the initiative with the support of the global sustainability department, drawing up a new proposal and a detailed plan for a new global roll-out in the autumn of 2017. In Figure 2, the horizontal axis outlines the innovation process, while the vertical axis presents employee behavior associated with the innovation process.

Insert Figure 2 about here

Figure 2. Process overview: The Motor and Pump Replacement Project

4.2 *The Lubricants Project (LP)*

Back in 2013, Diana, a newly employed engineer, was asked to look at the cooling lubricants that were used in the production of pump parts to see if there was any potential for saving waste water. Saving water in the production process was a main strategic goal of the company's top management, yet the results of taking measurements of how much water was wasted through the use of cooling lubricants were meagre.

In the event, waste water did not appear to be the actual problem. Instead, the engineer found that the waste resulting from the use of cooling lubricants mainly consisted of chemical substances. To verify this, she looked for support from interested colleagues with experience of chemical processes. In Paul, she found a colleague willing and able to support her in the project's development, and so her management approved his involvement. They started by redefining the project goal, since

money would be saved not as a result of less water consumption but because of a reduction in the chemical waste. They formulated the project goal in terms of a reduction of eighty percent in the amount of cooling lubricants that ended up in the waste containers.

Now the team was confronted with different and sometimes outdated production equipment, for which they struggled to find sufficient data. After months of information collecting, observations and calculations, they came up with three different solutions to save lubricants in producing pump parts and thereby reducing chemical waste. Because of differences in the company's production equipment, several procedures suited to type of equipment were required: (1) equipment where it is possible to mount a timer to control the conveyer; (2) equipment where it is not possible to mount a timer but to which a tray can be attached to collect excessive lubricants for reuse; or (3) lowering the level of cooling lubricants. All suggestions were low-cost and could operate with the means currently available.

The team succeeded in implementing their idea on the local production site. However, despite the fact that they convinced the top management that the initiative was both financially feasible and a value-adding eco-initiative, and despite other European subsidiaries expressing an interest in the idea, the initiative was not extended globally. It appeared that the top management welcomed the team's effort to reduce chemical waste, but only on a small scale and at a low cost. The eco-initiative was not sufficiently prioritized because the top management's emphasis was clearly on water and not on the reduction of chemicals. The horizontal axis in Figure 3 outlines the innovation process, while the vertical axis presents employee behavior associated with the process.

Insert Figure 3 about here

Figure 3. Process overview: The Lubricants Project

4.3 How employees use personal initiative in environmental initiatives

4.3.1 Personal initiative in idea-generation

When the top management announced its strategic core ambition to keep carbon emissions constant, it remained unclear how this target could be met, and to the employees it appeared contradictory, as the level of production was set to increase. The two mechanics in the MPRP project who initiated the novel solution to decrease energy consumption were experienced in pumping equipment. They

actively discussed and interpreted the communicated target and the company's situation in order to gain a better understanding. They searched for cues that would provide them with knowledge of how they could approach the task and noticed that the company was encouraging customers to save energy and to use more environmentally friendly pumps. They wondered whether this could be applied internally by replacing the old pumps in the production facilities.

"[Our company] tells our customers that forty per cent of the consumption used in pumps can be saved by changing to a newer, more environmentally friendly model. If you look around our own factories, why don't we do that ourselves?" (Martin, MPRP).

Hence, the external task, which was broadly communicated by top management, quickly became a personal goal and internal task for the two employees, and they took ownership of it by actively redefining the problem and creating an action plan. In contrast, in the LP project an employee, Diana, was directly assigned the task of identifying ways of reducing waste water. She showed self-starting behavior by exploring the drilling process in order to gather information, and she actively questioned her managers' assumption that the reduction of waste water could result in major savings, figuring out instead that the wasting of chemical additives would be a more significant factor to examine. By collecting further data on the cooling lubricants, she departed from her prescribed task and redefined the task in order to develop her own plan, which resulted in reducing chemical waste.

"They had tried before to look into the savings concerning water because it's quite obvious that we are losing cooling lubricants into the small containers out there... I think the turning point in this project was...to focus on the chemical part because we had already looked into the water part". (Diana, LP)

By not following her managers' expectations and main priorities, Diana took a risk but also ensured that her goal was in line with the firm's environmental strategy. In both cases, employees drove eco-innovation in the idea-generation phase, initiating and creating novel ideas directed towards environmental improvements beyond their prescribed job roles. They also ensured that their ideas were in line with the company's overall strategy and took the initial risk to create an idea that might be turned down. In both cases the employees actively redefined the organizational task and deviated from the prescribed task. The self-starting approach was found important in the idea-generation phase: to get the project started from the bottom up, to develop the project goal, to gather information and data to support goal development, and to find collaboration partners who were complementary in skills and knowledge.

4.3.2 *Proactive and persistent behavior in idea-championing and realization*

In championing these eco-initiatives, the employees proceeded systematically by creating attention and visibility for the project idea and persuading their managers to support it. In these cases, both project teams invested time and effort in communicating the initiatives' success stories in the internal employees' magazine. In addition, having a market perspective and anticipating customers' needs was perceived as an important element in championing the idea; the project initiators, Tom and Martin, explained that they repeatedly took potential customers on a factory tour to demonstrate the positive effects of their initiative. Yet, championing the idea was also perceived as challenging and enduring, only being realized due to the employees' proactive behavior and their ability to recognize potential problems early on. Diana anticipated that, although the factories were generally positive regarding improvements, disturbances in their work flow would have to be tolerated while the necessary changes to the production equipment were implemented. Thus, Diana and her team were in constant dialogue with the factory workers, informing them about the changes so as to increase their understanding, as well as to gather knowledge about potential problems. The factories were involved in the planning so they could take the work flow into consideration and minimize conflicts with the employees' shifts.

"I think that [we] used quite a lot of time in the factory, and when we looked at the equipment we talked to the people down there. So they knew what was happening."

(Diana, LP)

While gathering data and drawings of the production equipment, Diana and her team were challenged when it came to obtaining accurate data from the factories. They persistently asked for the missing data, and when they made changes to old drawings, they asked the factory managers for feedback early on so as to be able to adjust the drawings. During the roll-out Diana's team were confronted with specific challenges regarding access to the production equipment and in achieving alignment with the factories' work flow, as well as more general challenges that related to the conflicting goals of meeting both economic and environmental needs. While acknowledging the priority of the business side, they held on to their plan.

"The main goal is to deliver pumps. We have a business going. But sometimes we also need to put some pressure on..." (Paul, LP)

Hence, showing persistence and holding on to the project goal despite its challenges and conflicts with other goals appeared essential if the environmental initiatives were to be implemented, as the

senior environmental project manager pointed out in relation to Paul, the team member in the LP project:

“If you say ‘no’ to Paul, he won't accept that. He will find another way to achieve what is a good idea. And I think you need that in the environmental projects because it's easy to say, ‘No, we don't have the time. We are focused on other things...’ So the people who are in the organization make a difference when it comes to making a success, especially in the environment”.

Similarly, in the MPRP project, the project initiators maintained an ongoing dialogue with the line managers and employees in the affected factories during the championing phase in order to increase the understanding and support for their initiative. In contrast to the LP project initiator, their long affiliation with the company helped them connect with influential sponsors and bypass the line managers, who are likely to hamper the initiative, as Martin noted:

“You need to have people who are capable of bypassing so you can actually address the managers who are asking for a reduction in the consumption. You need to have the scales to make it clear that if you don't do something different, it will never happen... if we didn't have the direct contact to [our head of the sustainability group], we would have to go through a lot of managers...and we would never succeed.”

Not only was proactive planning needed, but also persistence and endurance throughout the project, especially when championing the project idea and getting it implemented, as Tom, one of the project initiators of the MPRP project, maintained:

“At the organizational level, we are at the lowest end. That means that if we want to make things different it is really uphill. We have been running uphill since 2008 with this project...We are still pushing, pushing, pushing, discussing, discussing, discussing.”
(Tom, MPRP)

The head of the sustainability group also acknowledged the need for this direct approach and persistent behavior, which convinced her to stand up for their initiative in front of top management.

“It all started when Martin and Tom thought this was such a great idea and they just kept bringing it up, and they found their way to my office as well. Because, if they had not been very stubborn and kept talking about this, it would probably never have happened.”

In both cases, proactivity and persistence were key elements in the idea-championing phase. In this phase in particular it was crucial to anticipate which challenges could potentially harm realization of the project and also to involve the employees and managers that were likely to be affected early on

in the detailed planning. This enabled implementation to take place as a coordinated effort, as reflected in the LP project.

Persistent behavior, protecting one's own goals against disturbances and coping with failure and setbacks were all increasingly important at the point when the goal and the plan were communicated to potential supporters, as well as to the factories affected by the changes. In both cases, the initiators were very much affected emotionally by the enduring process of championing their initiative.

4.3.3 Personal initiative to cope with organizational challenges

Lack of resources. In both projects, the respective groups of employees had to deal with a lack of resources. In the LP project, they specifically addressed the fact that the data on the production equipment they needed in order to plan the changes were insufficient and outdated. In the roll-out they experienced limited access to the production equipment where the changes should be implemented, which required much alignment with employees and managers. However, Diana and her project team anticipated these kinds of challenges and therefore invested time in being present in the factories and being in constant dialogue so they could react quickly when difficulties occurred and inform employees about the changes. Even after the project had officially been closed, they kept on monitoring the ongoing implementation to ensure its success.

"I think with this project, one of the success factors is that Paul [team member] is down there to check up on things." (Diana, LP)

Diana had to deal with the fact that her project was not rolled out in other subsidiaries, although this would have supported the overall environmental strategy, which did not satisfy the head of the sustainability group either.

Conversely, despite having experienced resource scarcity and severe budget cuts that even forced them to stop the project for a year, the MPRP project continues globally. Compared to the LP project, we found that being a pair of innovators eases the championing of the project. In addition, the fact that energy reduction is one of the main strategic goals supports the promotion of the MPRP project. Yet, the initiators' persistent behavior throughout the process was a central project lever.

"If we hadn't continued pushing, pulling, pushing, pulling...if we had just sat down and waited, it would never have happened because it takes so much energy to make all that happen." (Tom, MPRP)

Line Managers' lack of support. Specifically, in the MPRP project, the project initiators faced the challenge that the top management communicated the strategic environmental goals and set the targets such as the reduction of energy consumption, but did not provide the line managers with the necessary budget to fulfill the targets and did not clearly communicate to the line managers that energy reduction initiatives needed promoting. Furthermore, managers in the production facilities were not measured in relation to environmental targets and had no incentives to contribute to minimizing the firm's environmental footprint. Pushing environmental initiatives forward was also perceived as challenging by the department:

"It is challenging for us because it's a money thing...The production manager, he doesn't really care. He likes productivity, and that's what drives him..." (departmental head for quality and the environment)

The MPRP project team perceived the vast gap between themselves and the decision-makers as a barrier to the efficient implementation of their environmental initiative because they did not have the mandate to provide them with sufficient power to push implementation through, in spite of the fact that the line managers did not approve.

"If I have an argument with a leader...then he or she will consider who I am, and they will say: 'I don't know him. Who's his boss?' But that's not important. I am too far away from the top. If we were closer to the top management...then they [the line managers] would say: 'I don't want to argue with him. I'd better listen to what he is saying...'"
(Tom, MPRP)

In addition, the project initiators found that important messages addressed to the top level were not communicated through the middle layers, which constituted a dilemma, as the top managers were interested in pursuing the initiative but could not support the initiators accordingly in the implementation, not knowing what challenges the project team was confronted with.

"I sometimes think that the top management should try to go out and see what works and what does not work... We have a lot of filters, a lot of different manager levels. So when we say we have a problem here, before it reaches the top it does not exist...the organization is absolutely a challenge." (Martin, MPRP)

For this reason, the project initiators found an effective way of pushing the initiative through by using their tacit knowledge and existing network ties and addressing the project's sponsors directly.

"We communicate a lot directly [with the decision-makers]. We bypass all the filters, so they get the right information. But that's also mainly because Tom has been employed

here for almost thirty years, and I have been here for 27 years. So we are not afraid of some managers who have been employed for a year or two... I think if you replace us with somebody else ...[then] the project would be over and out in six months.” (Martin, MPRP)

Combined with their proactive and persistent behavior, we found this approach beneficial too for expanding the MPRP initiative, an advantage compared to the LP project initiator’s lesser networking capacity.

Communication challenges. Communicating the changes to the affected employees in the production facilities was especially challenging for the LP team. Although the project initiators proactively involved many of the affected employees in the planning and informed the production facilities frequently through the line managers, they were not able to communicate face to face with all the employees. Thus, when monitoring implementation, they found that some employees neither understood nor accepted why the changes were important and did not follow the advised procedures.

“One of the changes was that they [the production workers] couldn't just turn the conveyer on to automatic to make it run all the time. But some of the people looking after the equipment and working in the production consider it best if the conveyer is running all the time. It's just a feeling they have. So how do you change that? [...] I think we did quite a lot to inform them, but maybe it was not sufficient.” (Diana, LP)

Moreover, alignment with the production facilities and the responsible line managers was very necessary in planning and rolling out the changes to the production equipment. Specifically, the LP project team had problems in aligning the documents that were necessary for planning the changes to the machines and also the time schedule for the changes. In both cases, alignment was perceived as necessary for a successful roll-out, but it was also time-consuming and slowed down the idea-championing and realization.

Oriented towards the coding structure, table 1 provides an overview of employees’ behavior and the perceived challenges in the two cases studied.

Insert Table 1 about here

Table 1. Employee behavior and perceived challenges in the two eco-initiatives

5 Discussion and implications

5.1 *Personal initiative in the individual phases of eco-innovation*

The findings in this study demonstrate how employees show personal initiative throughout the innovation process and may become enablers of successful EDI activities. In fact, “employees do not just let life happen to them”, as Grant and Ashford (2008, p. 4) emphasize; they take the initiative in eco-innovation processes, showing self-starting behavior and approaching the perceived challenges proactively and persistently when encountering them. While facets of personal initiative could co-occur, their prevalence varied in accordance with the inherent challenges the employees had to master. Thus, our findings underpin the notion of phase-specific behavior (e.g. Veenendaal and Bondarouk, 2015). In both initiatives self-starting behavior was central in generating the employees’ ideas, whereas proactivity and persistence were found to be prevalent in the championing and realization of ideas.

In respect to idea generation, the findings showed how employees were quick to set themselves a goal that appeared attractive despite the perceived challenges and to form an action plan for how to reach their goal and how to deal with the anticipated challenges. It appears that employees had formed an implementation intention (Gollwitzer, 1993) in the early stages of the innovation process that helped them to cope with and to overcome the perceived challenges in reaching their goals. The finding also supports the suggestion of Frese and Fay (2001) that, once employees have formed an implementation intention, EDI does not necessarily need to be reinforced by management, as the associated literature commonly assumes.

Employees’ motives for self-starting an eco-innovation initiative may be triggered by two things. First, they perceive an opportunity to alter and enrich their job by taking on a task that provides meaning and the opportunity to take ownership of it, a finding that has been described as a basic motivation in the job-crafting approach (Wrzesniewski and Dutton, 2001). Second, employees’ motivation may be strengthened by a sustainability-driven desire to innovate. It has been argued that eco-innovation naturally creates the positive attributes of a purpose- and commitment-oriented organization (Rangarajan and Rahm, 2011), which in turn triggers employees’ wish to reciprocate (Jones, 2010). Drawing on the stewardship perspective, employees’ approaches to environmental initiatives can be seen to be triggered by the motivation to act in a prosocial manner, providing collective goods to internal and external stakeholders who can benefit from the innovation in the long term (Hernandez, 2012, Davis et al., 1997).

In the championing phase, our findings implied that employees' market orientation was decisive in bringing their initiative forward, a capability that has been considered critical in recent conceptual developments of EDI (Buhl et al., 2016). Specifically, we found that employees' proactive issue-packaging, as described by Anderson and Bateman (2000), was supportive in reducing potential disturbances and setbacks. Hence, employees framed their initiatives as a highly relevant opportunity to improve the company's environmental performance and extending its business potential. In addition, they presented complex technical solutions in simple and positive messages that illustrated how the initiative is linked to the company's strategic goals, how it creates relevant impact and how it can be achieved. Then, in order to "sell" their initiative to decision-makers, employees used different influence tactics (Yukl et al., 1993), primarily in finding coalition partners and influential supporters to gain more authority and bypass unsupportive line managers. While the employees were in the process of communicating their idea, finding sponsors and persuading managers to support the initiative, they anticipated the risks associated with a lack of interest and support. Indeed, risk-taking is considered a necessary aspect of innovative behavior (Baer, 2012), and in the context of eco-initiatives the level of risk is likely to increase, since employees do not provide short-term gains and create less attention than innovation in other areas (Ramus and Steger, 2000). The anticipatory, change-oriented behavior seemed to help employees to predict future disturbances when planning integration into the production units, thus enabling them to detect problems early on and to plan how to manage them. This was perceived to ease the transition into integrating their idea into production in order to reduce the potential setbacks.

At the same time, in the championing phase EDI was found to be supported by a persistent dialogue that helped to draw attention to the initiatives. Notably, employees perceived line managers in particular as demonstrating a lack of attention to and support for eco-initiatives, making bottom-up communication an enduring process. As our findings revealed, one aspect preventing line managers from promoting eco-initiatives was the high level of risk, such as a lack of short-term profit generation (Ramus and Steger, 2000) and the risk of misaligning green products with customer expectations (Ottman et al., 2006). Supporting such initiatives with unpredictable outcomes is perceived as less attractive, especially without the prospect of organizational acknowledgement (Ramus and Steger, 2000). Yet, our findings indicated that employees were able to handle the complexities that arose from future challenges, to show continuous persistence in attracting attention to their initiative, and to maintain an ongoing dialogue with those employees who would be affected by the changes caused by the respective eco-innovation.

In realizing and integrating the idea into the business, EDI was supported by proactive and persistent behavior. In particular, the striving for proactive feedback was perceived as important in increasing levels of consensus and alignment with the business and in advancing the initiative. Moreover, a continuous dialogue with the affected production units appeared to ensure that the initiative was realized, as employees handled disturbances and resistance through constant face-to-face communication as active listeners on several organizational levels, from the shop floor to the decision-makers. Active listening is important in effective communication and in establishing relationships and trust capable of leading to a proactive response (Brunner, 2008).

While the two embedded cases were similar concerning employees' behavior and the challenges employees faced when pursuing the initiatives, they differed in the following three aspects.

Firstly, in the MPRP project two employees formed a dynamic team which took joint ownership, whereas in the LP project a single employee started to develop the idea. Being a pair of innovators eased the idea-generation and championing process, an observation shared by Halme et al. (2012).

Secondly, employees differed in respect to the knowledge they brought into the project. In the MPRP project, initiators were educated mechanics who were "bricoleur" types with a broad, versatile and detailed knowledge (Duymedjian and Ruling, 2010, p. 141), and an ability to overcome "functional fixedness", i.e. using an artifact for a different purpose than prescribed (German and Barrett, 2005, p. 1). Also, they had a much longer involvement in the company compared to the LP initiator, which presumably resulted in a high level of contextual, tacit knowledge. Such knowledge is crucial for EDI (Buhl et al., 2016, Hoyrup, 2010), as it stimulates the development of innovative ideas, and employees may identify potential that managers would not recognize to the same degree (Kesting and Parm Ulhoi, 2010). Also, in the same context, the project initiators of the MPRP project seemed to be equipped with a strong network that enabled them to cooperate across functional boundaries, to find influential sponsors and to access critical resources. As related research in entrepreneurship shows, the use of networks is crucial for the mobilization of resources and stakeholders (Di Domenico et al., 2010). In contrast, perhaps due to her shorter affiliation to the company, the LP project initiator was not (yet) equipped with a strong network, hindering the allocation of support and resources.

Thirdly, the different scope of implementation of the two initiatives resulted, among other things, from their respective levels of attractiveness: whereas the LP project was aimed at chemical

waste reduction, an important but less popular organizational goal, the MPRP project's goal of energy reduction was in line with the top management's own priorities.

5.2 *Personal initiative in complex and ambiguous innovation processes*

Our analysis of employees' behavior in the individual phases revealed that complexities and tensions increased from generating ideas and creating an action plan to when employees were about to implement their initiatives. In order to overcome the associated challenges, we found enduring proactivity and persistence to be indispensable behavioral aspects for implementation success. Earlier research acknowledged the positive impact of proactive behavior on reducing disturbances and enhancing employees' performances (e.g. Parker, 1998, Wall et al., 1992). Yet, it seems that in EDI research the ability of employees to apply these forms of behavior successfully beyond idea-generation are denied or at least treated skeptically (Veenendaal and Bondarouk, 2015). Clearly, our findings do not disregard employees' need for managerial and mutual support. However, unlike what the main EDI literature suggests, we propose that employees possess the ability to take ownership of small-scale innovations and to drive them to a great extent.

Personal initiative makes a particular contribution in more complex and ambiguous contexts. Contrary to the EDI literature, which implies that employees become discouraged when facing higher levels of complexity, we suggest that personal initiative can be triggered by complex settings, as it is driven by the desire of employees to change the frame of action, for example, if they are dissatisfied with a given status quo. This perspective relates to the concept of transformative agency (Virkkunen, 2006), which furthers the emphasis on employees' active agency. Thus, personal initiative entails anticipatory, problem-solving and change-oriented behavior, but also a readiness to take risks, which appears to be particularly relevant in ambiguous innovation settings, where conflicting goals do not provide a basis for solid sense-making processes or for the ability to control the situation.

Insert Table 2 about here

5.3 Managerial implications

Even though this paper does not offer a normative contribution in itself, it remains relevant in particular to the realities of medium-sized and large companies being pressured by external and internal stakeholders to address environmental concerns through innovative solutions to enhance environmental performance. In such companies, **the management's acknowledgement of the potential** in employees being active job-crafters and taking initiatives is crucial because dedicated employees can realize tangible value through bottom-up eco-innovations. Employees' personal initiative might be needed even more in manufacturing companies with a greater environmental footprint than that observed, such as the automotive or oil industries, where eco-innovation efforts need to address different life-cycle stages such as energy consumption in order to create valuable and visible outcomes (Dangelico and Pujari, 2010).

Launching innovation projects should be spotted, and support can be targeted in each phase of the process without constraining employees' initiatives. Balancing between being open and monitoring employees' behavior is a **challenging but critical management task** (De Jong and Den Hartog, 2007, Mc Grath, 2001), **which in a larger manufacturing company can be carried out at multiple management levels to make sure that personal initiative is not hampered**. For example, our findings indicate that self-starting behavior can decrease the complexity and ambiguity of an innovation process. Consequently, an important role for managers is to engage in creating and communicating a pro-initiative climate (Baer and Frese, 2001), in which trusting relationships and knowledge-sharing are valued (Hayton, 2005). At the same time, the encouragement and amplification of employees' self-starting behavior is a central managerial focus.

The study also shows that challenges in the process can trigger self-initiating, proactive and persistent behavior in dedicated employees to overcome these challenges. Thus, the findings provide a different perspective on employee-driven innovation that show that the employee contribution is not limited to certain phases of the innovation process, nor to "mainstream" innovation processes with lower degrees of complexity. Generally, we envisage the role of personal initiative and employee agency being relevant for any organization that aims to increase the level of employee innovation in sustainability initiatives, but where constraints such as short-term profit maximization, which reside in the organization, hamper employees' bottom-up initiatives. In particular we encourage research into situations in which employees find engaging in innovation meaningful and expect reciprocity.

5.4 Limitations and suggestions for future research



This study should be understood bearing its' limitations in mind. A limitation of the study may be its empirical anchoring in a Scandinavian country, where, it is argued, there are distinct traditions of employee involvement. Thus, the Scandinavian practice of employee participation represents a convenient case for EDI (Amundsen et al., 2014). However, in line with these authors, we argue that, although some features of EDI can be related to the Scandinavian model, they are rather general and should not diminish the possible value of the findings for other organizations in other regions. While the article provides a rich case study of how personal initiative is enacted in two environmental initiatives, this design has limitations that need to be considered in future research. Another limitation concerns the degree of scope determined by the restriction of the empirical material to one organization. A multiple case-study design including several companies is one option in assessing our findings, enabling the findings of the current paper to be validated, and strengthening our knowledge of how employees' phase-specific behavior may vary for different types of innovation.

Theoretically, our findings imply that the traditional managerial focus on how employees' innovative potential can be activated is limiting. Instead we posit that, in order to bring EDI research forward, integrating an active performance approach emphasizes employees as active change agents that can change a given frame of action. We argue that the active performance approach provides a suitable framework for studying EDI because today's organizations are confronted with growing pressure and pace in developing and implementing eco-innovations; they can therefore benefit from a more inclusive understanding of employee roles in these processes. With personal initiative, the focus is on how employees take ownership of the process by proactively and persistently addressing the perceived challenges. Specifically, the implementation of eco-innovations is endangered especially when management support is not fully provided, meaning that personal initiative compensates for the lack of encouragement and supports the implementation.

6 Conclusion

The aim of this study has been to elucidate how personal initiative advances bottom-up innovation success, specifically in complex and partly ambiguous eco-innovation processes. We have pursued this aim by investigating employees' behavior in two self-initiated eco-initiatives in a manufacturing company renowned for its eco-innovation success. We identified personal initiative to be a critical success factor for EDI in mastering environmental initiatives. Focusing on the individual aspects of personal initiative, our findings reinforce the need for phase-specific behavior. While personal

initiative was revealed throughout the eco-innovation process, its significance changed according to the various demands of the individual phases of innovation. Moreover, employees were found to be motivated to start initiatives themselves despite anticipating challenges and tensions, to set themselves goals quickly, and to create an implementation plan that helped them overcome the anticipated challenges. We suggest that the concept of personal initiative is particularly suited to complex and ambiguous contexts of innovation. With personal initiatives, the scope for EDI is broadened by making complex and ambiguous innovation processes feasible for employees. Thus, integrating personal initiative into the concept of EDI changes the perspective of employees' innovation efforts from an economic, rationale view of how to activate or optimize their contributions towards an active performance view of how employees themselves can craft innovation if organizations provide the room for them to do so.

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