

Concept Paper

The More, the Merrier: Why and How Employee-Driven Eco-Innovation Enhances Environmental and Competitive Advantage

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Abstract: Innovative solutions are often conjured as a key factor for companies to come closer to the goal of ecological sustainability. Furthermore, proactive eco-innovation activities can encompass competitive advantages. Companies are therefore well advised to tap any available source of innovation. However, although employees' innovative capacity has often been described, to date, their manifold potentials for eco-innovation processes have hardly been examined in detail. The overarching research questions guiding this conceptual paper are *why* and *how* employee participation in eco-innovation processes can entail environmental and competitive advantages for companies. The authors introduce the concept of employee-driven eco-innovation (EDEI), defined here as ordinary employees' voluntary engagement in innovation activities within an organizational context that, intentionally or not, lead to environmental improvements. This paper complements previous literature on employee-driven innovation (EDI) by applying it to the specific case of eco-innovation. In this context, employees' comprehensive environmental competences resulting from "tacit knowledge", "private consumer experience" and "green identity" are taken into account. In addition, we delineate critical intra-organizational factors for EDEI activities and illustrate green employees' specific requirements in this regard.

Keywords: employee-driven innovation (EDI); eco-innovation; employee participation; employee environmental initiatives; green employees; environmental performance; competitive advantage; intra-organizational factors; green human resource management (GHRM)

1. Introduction

Consumers and employees expect it, legislators dictate it, NGOs monitor it—the pressure exerted by external and internal stakeholders increasingly forces companies to address environmental issues [1,2]. In this situation, innovative solutions are seen as a key driver for improving companies' environmental performance [1,3,4]. However, the wide range of stakeholders with often contradictory demands makes developing green innovations a highly complex, ambiguous and risky endeavor [5]. Nevertheless, a proactive engagement in eco-innovation projects may also entail an environmental lead that can constitute a competitive advantage [6–9].

Against this background, companies are well advised to access every available source of innovation. Hasu et al. [10] (p. 170) stress the importance of "the opening and the democratizing of innovation". The concept of "Open Innovation" emphasizes that organizations do not necessarily hold all the relevant knowledge in-house and describes organizations' intricate strategies for integrating external knowledge sources into corporate innovation processes [11,12]. However, the idea of a democratization of innovation processes departs from the assumption that innovations not only

emerge from expert groups but also emanate from “non-experts” in communities of practice [13,14]. This assertion is substantiated by Ramus [15] who argues that eco-innovations can arise at any organizational level and across departments. However, when it comes to their innovation activities, most companies still rely on top-down investments in their research and development (R&D) departments [16] and other innovation experts. Consequently, ordinary employees, so far, still represent a mostly unrecognized internal source of eco-innovation in practice as well as in theory.

Employee-driven innovation (EDI) constitutes a relatively new research field that focuses on the mobilization of ordinary employees for innovation processes who, according to their job description, are not explicitly assigned to carry out innovation work [17]. To date, the concept of EDI has not specifically been applied to eco-innovation development. The aim of this paper is thus to extend the existing theory on EDI by addressing ordinary employees’ roles and contributions in eco-innovation processes. This conceptual paper focuses on intra-organizational innovation processes where ordinary employees are not only involved in the generation of new environmental ideas but also in their promotion and implementation. Accordingly, the two questions guiding this research are: *why* and *how* can employee participation be particularly beneficial for eco-innovation processes?

To answer this question, we suggest that the integration of the two streams of literature on eco-innovation and EDI makes sense on several grounds. First, finding innovative solutions to environmental concerns is challenging and thus necessitates the involvement of a large range of contributors [18]. Second, employee creativity is a valuable source of innovation and readily available within companies. Due to their various roles (i.e., as employees, private consumers, environmentalists), employees can incorporate practice-based experiences and environmental expertise that stem from “tacit knowledge”, “private consumer experience” and “green identity” [17,19,20]. Third, in particular with regard to employees who hold a “green identity”, their involvement in eco-innovation processes can be advantageous for two main reasons. Organizations can benefit from these green employees’ proactivity concerning the promotion of eco-innovations. In addition, green employees can act out their environmental convictions and reach attitude-behavior-consistency [19].

The remainder of this paper is structured as follows. First, we set the context by defining eco-innovations and by describing the underlying concept of EDI. In a second step, we introduce the concept of employee-driven eco-innovation (EDEI). For this purpose, we take a closer look at the different potentials and environmental capabilities that qualify ordinary employees as contributors to eco-innovation processes. We distinguish EDEI from related concepts and outline inherent chances. In a third step, we identify crucial intra-organizational prerequisites for EDEI activities and discuss green employees’ specific requirements in this regard. Finally, we summarize contributions, derive implications and conclude by outlining limitations and future research opportunities.

2. Eco-Innovation: Definition, Chances and Challenges

There is no consensus in the literature on the terminology used to describe green innovation. Terms such as “green innovation” [6,8], “environmentally sustainable innovation” [21–23], “environmental innovation” [15,24] or “eco-innovation” [21,25] are used synonymously. Two main sub-categories are usually distinguished: green product/service innovation and green process innovation [6,26,27]. While green product innovations aim at reducing negative environmental impacts during at least one stage of the product’s life cycle, green process innovations concern modifications of the product’s manufacturing process [28]. In this paper, we summarize both categories under the term “eco-innovation” and, following Driessen et al. [29], define it as new products and processes whose greenness’ is significantly better or that impose smaller environmental costs than conventional or competitive equivalents. In addition, we do not distinguish between intended and unintended environmental improvements and thus include all innovations that entail positive externalities with regard to the natural environment [30].

2.1. Chances

According to Ramus [15] and Weng et al. [31], companies that engage in eco-innovation practices are most likely to experience positive effects on their environmental performance (e.g., reduction of waste and emissions). In addition, the results by Weng et al. indicate a positive influence of eco-innovations on companies' financial performance. This may result from the fact that a company's superior environmental performance is associated with a strengthening of its intangible assets (i.e., perceived quality, brand awareness and trust as well as corporate image and reputation). On the one hand, superior environmental performance can positively impact customer satisfaction and attract additional customers [6,27,32]. It might also enhance a company's attractiveness as an employer and increase its employees' productivity and organizational commitment [33]. On the other hand, due to spillover effects, customer demand for a firm's non-green products might also increase and with it its market share and sales revenues. It becomes clear that companies pioneering in eco-innovations can benefit from "first mover advantages" which allows them to command a price premium [6,34]. As initially stated, companies' proactive engagement in eco-innovation development can constitute the basis for competitive advantages [7,26]. However, before being able to benefit from such a win-win situation, a couple of market-related challenges need to be mastered.

2.2. Challenges

As indicated above, the first critical challenge is to identify and target customer segments that value green product attributes. This is particularly challenging as the indicated customer attitude towards buying and paying more for green products often deviates from their actual behavior [35]. Possible customer targets vary from green niches to the mass market [36]. To be on the safe side, many eco-innovators tend to target market niches that favor green benefits over other product characteristics. However, if targeted at already environmentally conscious customers, it is questionable to what extent eco-innovations can make a change [29]. Hence, in order to actually impact previous consumption habits, "market success of green products at a mass scale is vital" [35] (p. 481). On the other hand, many companies struggle with the difficulty of leveraging a product's green attributes for competitive advantage in the mass market. The reason for this is that the majority of mainstream consumers still do not sufficiently appreciate the added value of green products. Peattie [9] identifies consumer conservatism and fear of sacrifices (i.e., inconvenience, higher costs, and lower product performance) as the underlying reasons for mainstream customers' unwillingness to change their consumption habits. As a consequence, it may happen that product characteristics assumed to be important by a company's R&D team do not at all meet customer expectations in the mass market [37]. At this point, it becomes obvious that, in eco-innovation development, it is crucial to find the right combination of product characteristics. "Greenness" is considered a product characteristic that typically comprises environmental attributes such as "recyclability, recycled content, fuel efficiency, toxic content reduction, and emission-related performance" [38] (p. 252) or efficient packaging. Commonly, these environmental attributes are distinguished from more traditional ones such as product quality, safety and price. A challenging task throughout the whole eco-innovation development process is to reconcile environmentally superior product performance with traditional non-green characteristics, legal regulations and customer needs [39,40]. As a consequence, the increased degree of complexity in green product specifications often leads to conflicts between environmental and functional attributes [41].

3. Employee-Driven Innovation (EDI)

To develop EDEI, it is important first to get a clear understanding of the underlying concept of employee-driven innovation (EDI). According to Høyrup [42] (p. 8), employee-driven innovation refers to "the generation and implementation of ideas, products and processes [...] originating from interaction of employees, who are not assigned to this task". Employees who engage in EDI activities do so outside their regular work duties (extra-role behavior), unlike, for example, employees in R&D

departments who are expected to be innovative according to their job description (in-role innovators). EDI describes employee activities that may not be started with the intention of innovation in mind, but, nevertheless, have it as a central result [43]. Hence, employee-driven innovation occurs not only in separate entities (e.g., R&D department), but accidentally and informally emerge from job enactment and everyday practices in the workplace. Accordingly, the concept primarily highlights employees' tacit knowledge (i.e., company-specific knowledge, expertise and problem-solving skills), which is acquired through learning processes during work routines [42]. It is clear that it is not a new finding that ordinary employees across the company identify and act on opportunities or suggest ideas based on which innovations might emerge [16,44]. However, EDI describes the systematic integration of ordinary employees into the various phases of innovation processes. According to Scott and Bruce [45], innovative work behavior consists of three different phases: idea generation, idea promotion, and idea realization. In this context, idea generation describes the creation of novel and useful ideas that constitute only the first step towards innovation. This is in line with Amabile et al. [46] who distinguish between creativity and innovation. The stimulation for EDI activities can come from different directions. Høyrup [42] classifies EDI activities into three categories:

- First order EDI:* These are bottom-up processes, initiated by employees, where innovations originate from the “autonomous creation of novelties at the grassroots level” [10] (p. 173). In this case, innovations informally arise from employees' everyday work practices and are not purposefully initiated for the sake of innovation.
- Second order EDI:* This form refers to management endeavors which aim at systematizing and formalizing promising innovation processes that emanate from employees' initiatives. As a consequence, it is a mixture of bottom-up and top-down processes.
- Third order EDI:* Here, EDI activities are stimulated by managers who specifically invite employees to participate in innovation processes. These top-down innovation processes are usually established with a certain innovation target in mind.

In this paper, we primarily refer to first and second order EDI which both rely on employee initiative-taking. However, it is important to bear in mind that EDI activities are not pure bottom-up processes that occur isolated from upper management. In most cases, managers systematize innovation processes and decide on employee ideas in order to reduce the risk of uncoordinated idea development. Thus, collaboration between management and employees appears essential in EDI processes.

4. Conceptualizing Employee-Driven Eco-Innovation (EDEI)

Faced with the challenge of keeping up with fierce global competition, companies need to reassess their innovation and sustainability processes according to new criteria [47,48]. As Ciocirlan [19] (p. 13) states “sustainability at the macro level starts with individual action”. Beard and Hartmann [18] describe ordinary employees as an important source of innovation and creativity with regard to environmental issues. The concept of EDI assumes that all employees within certain organizational boundaries have the potential to constitute a valuable source of innovation. EDI especially acknowledges the diversity of experiences and capabilities which ordinary employees might contribute to the innovation process.

Similar to EDI, many scholars in the field of environmental management call for increased employee participation instead of limiting involvement to managers and experts [49,50]. They argue that effectively implementing strategic environmental measures across the organization requires the involvement and support of individual employees [51,52]. Beyond that, employees at any organizational level and in every department possess the creative potential to initiate and develop eco-initiatives at work [53]. This “green creativity” is defined by Chen and Chang [54] (p. 109) as “the development of new ideas about green products, green services, green processes, or green practices that are judged to be original, novel, and useful”. For most employees, green behaviors are not required but rather voluntary and thus constitute “personal initiative that exceeds organizational

expectations” [55] (p. 105). Companies’ cumulative environmental impact is thus partly determined by their individual employees [56]. Nevertheless, in their review of corporate social responsibility (CSR) literature, Aguinis and Glavas [57] noticed that 90% of the articles focus on either the organizational or institutional level, with only four percent focusing on the individual level. Accordingly, there exists very little literature that specifically examines the application of EDI to the field of eco-innovations. Therefore, on the one hand, we draw on research on employee innovative behavior (e.g., EDI [17,42], embedded lead users [58]), and, on the other hand, refer to concepts of employee environmental behavior (e.g., green identity [19], employee environmental innovation [15]). Based on these insights, we propose the concept of EDEI and define it as ordinary employees’ voluntary engagement in innovation activities within an organizational context that, intentionally or not, lead to environmental improvements. To shed some light on the concept of EDEI, this paper explores the two questions *why* and *how* ordinary employees can play a decisive role in eco-innovation processes.

Section 4.1 discusses inherent chances with regard to companies’ environmental and competitive performance (*why*). The *how*-question is considered on two levels. While Section 4.2 identifies and describes relevant potentials on the individual employee level, Section 5 presents conducive intra-organizational factors.

4.1. Recognizing Chances of EDEI for Organizations

Tackling environmental issues innovatively and introducing eco-innovations can constitute a strategic approach that builds on rule-breaking and setting new rules within the competitive field [31]. Chen et al. [4] categorize eco-innovations into two types: reactive and proactive eco-innovations. Reactive (or passive) eco-innovations are adaptations made by companies in response to environmental regulations, stakeholder requests or competitors’ challenges. These external constraints (e.g., environmental regulations or the environmentalism of investors and clients) only lead to reactive eco-innovation. In contrast, proactive eco-innovations are self-determined implementations of new environment-related practices or products. Proactive eco-innovations are usually pursued in order to cut costs or to seize new market opportunities. Chen et al. [4] (p. 394) describe internal impulses toward the environment (e.g., environmental leadership, environmental culture, and environmental capability) as being “valuable, unique, non-imitable, and non-substitutable”. They can not only lead to proactive eco-innovations, but are also key sources to generate sustainable competitive advantages. According to the resource-based view, these intangible assets become important sources for sustainable competitive advantages [59]. Chen and Chang [60] (p. 531) define “green intangible assets” or also “green intellectual capital” [61] as “the total stocks of all kinds of intellectual property, knowledge, capabilities, and information systems, etc. about green innovation, environmental technologies or environmental management on the individual level and the organizational level within a company”. Chen [61] advises companies that want to increase their capabilities for successful eco-innovations to invest into three categories of green intellectual capital. Besides green structural capital and green relational capital, Chen [61] (p. 275) describes green human capital as “employees’ stocks of knowledge, skills, capabilities, experience, attitude, wisdom, creativities, and commitments about environmental protection or green innovation”. Against this background, our first proposition is:

Proposition 1: Higher levels of EDEI are positively associated with higher levels of companies’ competitive performance.

Looking at companies’ proactive environmental commitment, Henriques and Sadorsky [62] as well as Berry and Rondinelly [63] identify employees as particularly powerful advocates for a pro-environmental organizational development. Weng et al. [31] corroborate these results with their findings according to which employees’ environmental awareness constitutes the factor with the most significant effect on companies’ eco-innovation practices. According to Beard and Hartman [18] (p. 238), “finding innovative solutions to environmental concerns is going to be increasingly difficult and it needs to involve more creative people”. Hence, since the number of employees is usually much larger than that of managers, they represent an important creative potential which often remains undervalued [17].

At this point, it becomes clear that employees can contribute to eco-innovation processes in several ways. As internal stakeholders, they can exert pressure on their companies and push them to reduce their environmental impacts [63]. Beyond that, they can actively contribute to successful eco-innovation processes by incorporating their various environmental capabilities. Remmen and Lorentzen [49] thus demand increased employee participation in eco-innovation processes instead of limiting involvement to managers and specialists. This takes us to our second research proposition:

Proposition 2: Higher levels of EDEI are positively associated with higher levels of companies' environmental performance.

4.2. Identifying Employee Potentials for EDEI

Previous literature on EDI primarily discusses employees' tacit knowledge, including aspects of practice-based experience, company-specific knowledge and useful networks, as crucial starting points for employee participation in innovation processes [17,42,64,65]. Regarding the development of the concept of EDEI, we include additional employee potentials. We suppose that ordinary employees possess consumer experiences that they acquire in the course of private consumption processes. In addition, we expect that certain employees possess environmental knowledge and expertise, which qualify them as active contributors for eco-innovation processes. While it is possible that employees' relevant resources for innovation are limited to their "tacit knowledge", we believe that, in most cases, they can bring in combinations of various potentials. As outlined in Section 2, eco-innovation can be distinguished into two sub-categories, namely green product and green process innovation [13]. We assume that the relevance of the following employee potentials might vary according to the sub-category.

4.2.1. Tacit Knowledge

Employees possess implicit knowledge and practice-based skills that managers lack [66] but that might be crucial for eco-innovation processes. This kind of knowledge relies on learning processes that occur in the context of daily activities on the operational level. In addition, employees gain specific information from day-to-day contact with external partners (e.g., customers, suppliers) and thus receive valuable information, for instance regarding customer satisfaction [17]. Hasu et al. [10] (p. 170) highlight the fact that innovation has been "co-evolving with practical activities, which means that it is closely linked with different forms of learning—not only with the conscious search for novelties but also with learning-by-doing". Hence, employees can contribute important in-depth information in innovation processes if their tacit knowledge is taken into account. Employees' tacit knowledge predestines them for the detection of work-related environmental issues (e.g., pollution sources) which also might stimulate the development of adequate and innovative ideas to prevent or solve them [67,68]. Similarly, based on their exclusive insights into organizational processes, employees are capable of identifying opportunities for reducing their companies' environmental impacts or anticipating consequences for work routines that managers would never recognize [17]. In general, as innovation processes always imply high levels of uncertainty, managers have to deal with an incomplete information basis. This is where employee participation in eco-innovation processes can substantially contribute to reducing deficiencies in management decisions. On this basis, we propose the following:

Proposition 3: Employees' work-related tacit knowledge is positively associated with green process innovation performance.

4.2.2. Private Consumer Experience

One might argue that employees' tacit knowledge is restricted to internal organizational processes. Employees commonly have a rather superficial or partial understanding of their company's overall strategy and might not possess an adequate market orientation. However, market orientation

is necessary in order to face certain market-related challenges associated with eco-innovation development (see Section 2.2). As outlined in the section on challenges inherent in eco-innovation development, it is crucial and extremely challenging at the same time to create green products that meet customer needs [69]. However, Ottman [40] points to the risk of “green marketing myopia”. This concept describes R&D experts’ and designers’ narrow focus on environmental product attributes, which often causes products to misalign with actual consumer needs. Ottman argues that “a fixation on products’ environmental merits has resulted frequently in inferior green products [. . .] and unsatisfying consumer experiences” [40] (p. 27). In order to avoid catering environmental benefits that do not meet customer preferences, Berchicci and Bodewes [39] argue that these trade-off situations can only be reconciled if a clear focus lies on actual market requirements. However, the development of radically innovative green products usually comes along with high levels of uncertainty. Market information and customer input are indeterminate [37,70], which is why the development of radical eco-innovation is based on preliminary assumptions and projections. These assumptions must be tested as early as possible in the eco-innovation development process in order to approximate actual consumer requirements [39]. As confidentiality during eco-innovation processes is also highly significant, we suggest that ordinary employees can function as representatives of actual customers. We argue that ordinary employees are able to compensate their potential deficiencies concerning strategic market orientation by introducing their private consumer experiences into their company’s eco-innovation processes. Significant environmental impacts result from product consumption, usage and disposal rather than from manufacturing processes [30]. Employees’ experiences and irritations that arise when using existing product offerings constitute a great source for developing innovative product solutions for environmental improvements [71]. Schweisfurth and Herstatt [72] introduced the embedded lead user concept, which recognizes the potential of employees’ private consumer experiences with regard to a certain product (category) for their companies’ innovation processes. Furthermore, during evaluation processes for green products, employees can be consulted with the aim of validating the right customer target and proposed value proposition (i.e., product features and functionality). We expect that employees can authentically assess from their perspective as private consumers whether they, for example, would buy the proposed product innovation. We suggest that the integration of employees might even replace the integration of external users into innovation processes [73]. If implicated by their feedback, the innovating company can adapt the envisioned eco-innovation concepts and prototypes already at a very early stage in the product development process. Thus, one benefit of EDEI for eco-innovation is the prevention of a new green product development that misses customer preferences and consequently does not generate additional value for the company. From an environmental perspective, missing customer preferences would mean making products that customers do not value and thus do not purchase. In this case, energy and material as well as financial resources are wasted during production and marketing processes. The resulting remnants must be stored or destroyed, which again means extra usage of resources. In this scenario, the initially desired environmental advantage of the envisioned green product gets neutralized or even deteriorates in comparison with conventional products. This takes us to our fourth research proposition:

Proposition 4: Employees’ private consumer experiences are positively associated with green product innovation performance.

4.2.3. Green Identity

Green employees, which represent a subgroup of all employees, hold strong pro-environmental beliefs and values and are characterized by a distinct green identity. A green identity entails “an intrinsic motivation to protect the environment through work, and aims for consistency between home and work environmental behaviors” [19] (p. 2). With regard to employee environmental behavior, Ciocirlan [19] highlights green employees’ intrinsic motivation to integrate environmental standards into workplace processes. In the context of employee innovative behavior, intrinsic motivation (i.e., motivation that arises from motives such as interest, enjoyment, satisfaction, or challenge of

the work itself) constitutes a key prerequisite for employee creativity [46,74,75]. Accordingly, green employees are particularly inclined to proactively start eco-innovation projects as they do not depend on managerial or regulatory triggers to become actively involved in pro-environmental projects. Green employees deploy their environmental impact no matter at which organizational level they are situated. This assumption is supported by several conceptual as well as empirical studies that identify green identity as a crucial determinant of high-intensity pro-environmental behavior at work [19,76–78].

Green employees shape their environmental beliefs and behaviors both in their private life [79] and in their work context [80]. Muster and Schrader [81] describe the reciprocal interactions between private and work domains as a cycle of “green work-life balance”. In the course of their environmental engagement at home and at work, green employees acquire comprehensive environmental knowledge and skills. Hence, they may possess a lead in relevant knowledge and expertise compared to their colleagues and/or their company as a whole which is why they might come up with more creative ideas to advance environmental protection [19]. Their environmental capabilities in combination with their intrinsic motivation make green employees a particularly valuable key resource for companies regarding the proactive development of competitive eco-innovations. Accordingly, we derive the following propositions:

Proposition 5: Employees’ green identity is positively associated with green product innovation performance.

Proposition 5a: Employees’ green identity is positively associated with green process innovation performance.

5. Intra-Organizational Factors Influencing EDEI

EDEI activities occur within a specific organizational context. Compared to the underlying concept of EDI, further differences arise with regard to organizational factors that stimulate or impede employee engagement in eco-innovation activities. Numerous studies have identified and described relevant intra-organizational factors that stimulate and foster employee innovative behavior [45,82–84]. Smith et al. [64] map intra-organizational factors that cause or support the development of EDI activities based on a comprehensive literature study. They identify four key factors that affect the probability as well as the success of EDI, namely leader support, autonomy, cooperation and innovation climate. With respect to employee environmental behavior, Ramus [15] provides empirical evidence that the supporting factors necessary to encourage employee innovation in general are the same which encourage employee participation in eco-innovation processes. Hence, organizational and supervisory encouragement directed toward the environment positively influence employee creativity and eco-innovation [85].

Organizational support includes formal rewards and informal recognition [53] as well as competence building (e.g., trainings) to enable employees to make high quality contributions with regard to environmental problem-solving [86,87]. Furthermore, high levels of autonomy are mentioned in the innovation literature as a crucial factor to enable innovative employee behavior. According to Smith [64] (p. 228), “autonomy is the extent to which employees are given the freedom to make decisions and to carry out tasks without excessive supervision”. In addition, the allocation of “slack” resources (e.g., working time and financial budget) is a key factor supporting employees who engage in the creation and further development of new ideas [17,88,89]. With regard to collaboration, support from colleagues constitutes another important organizational determinant of employee creativity [90]. Employees who raise environmental issues in an organizational setting may experience skepticism among colleagues, which can be frustrating and can even lead to discouragement [91]. However, employees are more likely to innovate in a cooperative environment where they feel safe and sufficiently supported. Employees are supposed to be more likely to innovate.

Supervisory support (e.g., quick feedback for employee suggestions, endorsement of mistakes as learning opportunities) for innovative and pro-environmental behaviors constitutes a key factor for stimulating employee participation in eco-innovation. When perceiving their supervisor’s encouragement, employees on all hierarchical levels and across functional domains are more willing to rise beyond their actual field of duty and to engage in proactive eco-innovation activities [53,92,93].

In addition, Ramus [94] stress the importance of publishing a company's *environmental policy* as a clear signal of organizational commitment to the environment. Thus, a company demonstrates that although environmental activities may not be explicitly included in employees' job descriptions, every employee still is expected to contribute to the improvement of the company's environmental performance. Results of a study by Ramus and Steger [53] (p. 623) show that "having a convincing environmental policy tripled the probability of employee eco-initiatives".

However, whether employees perceive given intra-organizational factors as supporting (or impeding) for EDEI activities and how they respond to the given conditions might, for example, depend on the type of employee. Literature on organizational citizenship behavior for the environment (OCBE) so far does not distinguish between green employees, less green, or non-green employees. This suggests that all shades of green employees behave in a similar manner and have similar needs regarding levels of organizational support [19]. Accordingly, it is still unclear whether green employees need more, fewer or different forms of organizational and supervisory support than non-green employees in order to proactively engage in EDEI activities. In general, previous studies on employees' environmental behavior at work assume a positive correlation between perceived organizational support toward the environment (POS-E) and OCBE for employees who value environmental sustainability [56]. Accordingly, Paillé and Mejia-Morelos [95] expect that green employees, who perceive that their organization does not sufficiently share and support their environmental values, reduce their pro-environmental efforts.

In contrast, our considerations emanate from the above described fact that green employees are characterized by an intrinsic motivation to protect the environment. Sonenshein et al. [91] demonstrate that committed green employees actively shape their own environment and do not just respond to given organizational structures. Hence, even if available, green employees might disregard or circumvent green organizational support structures if this enables them to more effectively pursue their interests and initiatives according to their own ideas [91]. These assumptions also appear to hold true for employees with comprehensive consumer experiences with regard to a specific product (category). According to Schweisfurth [58], such organizationally embedded lead users pursue informal innovation activities rather than participating in standardized innovation processes. Hence, we expect that green employees (as well as embedded lead users) require particularly high levels of autonomy not only to promote their own initiatives but also to define their own ways of how to pursue them. However, as we expect green employees to already possess comprehensive environmental knowledge and skills, standardized offerings for sustainability trainings seem less appropriate or even presumptuous. Similarly, in the case of EDEI, standard reward systems might be perceived as unsuitable as green employees see pro-environmental behavior anyway as the right thing to do [96]. Consequently, green employees might perceive certain intra-organizational factors as patronizing instead of empowering. Accordingly, we specify our sixth proposition:

Proposition 6: The respective type of employee potential moderates the influence of the intra-organizational factors on EDEI.

6. Distinguishing EDEI from Related Concepts

EDEI combines literature streams on employee innovative behavior and employee environmental behavior. In order to position the concept of EDEI in this context, we will first distinguish it from related concepts. Similarly to EDI, EDEI comprises the active and direct participation of ordinary employees throughout all phases of the eco-innovation process (i.e., idea generation, further development, promotion and implementation). However, there are two essential differences between EDI and EDEI. First, EDEI particularly focuses on the specific case of innovations that, intentionally or not, lead to an improvement of environmental performance. The second difference lies in a more comprehensive understanding of employees' roles and potential contributions to eco-innovation processes. Here, compared to EDI, we argue that ordinary employees can contribute to their companies' eco-innovation processes by incorporating their various sources of knowledge and expertise.

In contrast, corporate suggestion systems and “idea-boxes” typically separate idea generation from idea development and prototyping. The method of internal crowdsourcing constitutes a rather top-down approach as it uses the wisdom of crowds for gathering ideas and finding solutions to predefined tasks and challenges. Firms that apply this innovation method deliberately invoke their employees to submit purposive ideas. Subsequently, employees can be invited to comment on and evaluate their colleagues’ proposals [97]. The function of these innovation methods is usually limited to tapping ideas generated by employees [96].

Furthermore, the statement by Smith et al. [64] (p. 226) that EDI “includes all activities that are required to change a firm’s business model” discloses certain parallels and partially similar features between EDI and intrapreneurship activities [98]. Intrapreneurship describes processes where employees show entrepreneurial behavior within already existing organizations. Intrapreneurship can thus be used synonymously with terms such as employee-driven entrepreneurship or corporate entrepreneurship. EDI, as well as intrapreneurship, have individual employees’ proactivity as a defining characteristic and occur at the organizational margins of existing firms. Both concepts entail the development of new product development, product improvements and new production methods and procedures [99]. Innovation is seen as a defining feature of entrepreneurial and/or intrapreneurial behavior which distinguishes it from managerial behavior [68]. Their common focus on newness (and employee involvement) makes intrapreneurship and innovation almost inseparable and the distinction between the two concepts remains subtle. However, EDI describes innovations which constitute renewal within given organizational boundaries. Accordingly, EDI initiatives are usually aligned with the company’s prevalent business strategy. In contrast, intrapreneurship comprises additional aspects [100]. First of all, the most important difference is that intrapreneurship also includes the creation of new, more formally autonomous units or firms within or adjacent to the existing firm. Second, intrapreneurship may also encompass the promotion of changes in strategy. In this context, strategic renewal means, for example, transforming an existing organization by changing the fundamental ideas on which it was initially built [101]. Hence, intrapreneurship is more than employee-driven innovation. Accordingly, EDI can be considered a subset of intrapreneurship, yet it is not a prerequisite for intrapreneurship because strategic renewal, reorganization and the creation of new business can also occur without innovation [99].

Similar to EDEI, the concept of environmental workplace behaviors (EWBs) describes employees’ pro-environmental behavior and assumes that it can be executed by ordinary employees situated at any hierarchical level. According to Ciocirlan’s definition [19] (p. 6), EWBs are “work behaviors directed toward the protection or improvement of the natural environment, which may or may not generate value for the organization”. EWBs include organizational citizenship behaviors toward the environment (OCBE), in-role behaviors (IRBs) and counterproductive workplace behaviors (CWBs). While IRBs are stipulated by an employee’s job description and hence expected by the organization, the concept of EDEI explicitly describes employees’ voluntary extra-role engagement. The focus of ECWBs lies on green behaviors that might seem counterproductive from an economic perspective but responsible from an environmental perspective. In contrast, EDEI means that employees generate new ideas which generate environmental as well as economic value for the organization when being implemented [42].

Furthermore, EDEI primarily has similarities with the concept of OCBE which is defined as “voluntary behaviors that are not specified in official job descriptions that, through the combined efforts of individual employees, help to make the organization and/or society more sustainable” [102] (p. 165). OCBE mostly describes employees’ low-intensity behaviors in the context of their work environment (e.g., recycling, printing double-sided, encouraging colleagues for environmental protection) [56,103,104]. In contrast, EDEI primarily describes employees’ innovative activities regarding sustainability in their companies’ production as well as product development processes [17]. Accordingly, EDEI activities fall under the category of high-intensity behaviors, which are characterized

by high levels of uncertainty regarding outcomes, high potential costs for the organization or the individual (e.g., loss of reputation or dismissal) and high visibility [19].

To sum up, in contrast to EDEI, none of the three sub-categories of EWBs explicitly address employees' creative and innovative potential. Furthermore, the concept of EDEI does not only comprise employee activities which are necessarily directed toward the protection of the environment. In line with our definition of eco-innovations in Section 2, it also includes those activities that unintentionally entail environmental improvements as a side effect. While EWBs mostly focus on company-internal effects of employee pro-environmental behaviors, EDEI also integrates a market perspective by identifying employees as valuable contributors in green product development processes. To this end, EDEI takes the various roles and potentials into account that ordinary employees possess in addition to their company-specific knowledge.

7. Discussion

7.1. Implications for Green Employees and Green Human Resource Management (GHRM)

Bartram and Casimir [105] as well as Berraies et al. [47] highlight employee empowerment and employee participation as important means of increasing not only their levels of innovativeness but also of employee satisfaction and organizational commitment. This effect seems particularly relevant with regard to green employees [106]. It is expected that green employees are particularly striving for introducing their private environmental attitudes and habitual practices to their work environment. In this context, positive spillovers for the employee and for her organization can occur [81,107]. We expect that, in case a green employee is denied this transfer, she will probably perceive an inconsistency between her environmental convictions and actual behavior options. Cognitive dissonance and inner conflicts resulting from a mismatch between employee and organizational values might lead to a decrease in employee satisfaction. As a consequence, the probability increases that these employees might consider leaving the company for another employer, which promises a better consistency with their environmental convictions [19].

However, we also recognize the fact that the opposite might occur. The concept of EDEI entails an increase in demands and responsibilities for ordinary employees. Not only are employees expected to behave in an eco-conscious way, they are also supposed to come up with innovative ideas for the environment. At the same time, challenges inherent in eco-innovation development increase associated levels of uncertainty and risk of failure [4]. From the employee's perspective, suggesting new ideas always comes along with certain inconveniences and exposure which might discourage employees from engaging in such kind of high-intensity behavior [17,19,64]. The theoretical model by Huhtala and Parzefall [108] suggests that employee well-being and innovativeness may constitute self-enhancing cycles. While high well-being is perceived to boost innovativeness and vice versa, low well-being may lead to a decrease in innovativeness. Employees' perception of innovation tasks as an excessive demand and overload reduces their level of innovativeness. In this case, increased employee involvement might as well result in employees leaving the company [109].

However, as (green) human capital is primarily embedded in employees and only through them also in organizations, this would not only mean a loss of environmental knowledge but also cause direct and indirect costs (e.g., hiring and training costs, damage to company's reputation) [19,61]. Thus, especially for companies with a weak environmental orientation, it is beneficial to identify, retain, involve and acquire green employees in order to profit from their expertise and proactive behavior. This can even induce an upward spiral with regard to environmental performance and employer attractiveness. Organizations with high levels of environmental performance can attract high potential employees with a green identity. This, in turn, positively influences the organizations' environmental competence and performance [110]. Hence, it can be stated that organizations' environmental performance can lead to an increase in green human capital and vice versa. In order to actually turn their employees' comprehensive environmental knowledge into a competitive

advantage, organizations are well advised to restrict the predominance of formal knowledge in managing environmental issues. Instead, a clear communication of the company's environmental policy and strategic green objectives needs to be implemented that encourages employees to share their experiences and engage in eco-innovation activities [17,111].

7.2. Limitations and Directions for Future Research

First, to assess the validity of the propositions developed in this paper, empirical studies need to be conducted. Future research should investigate whether EDEI in practice actually leads to an increase in companies' environmental and competitive performance. In addition, further studies may examine to what extent the three identified employee potentials are in fact beneficial during eco-innovation processes. Moreover, research should investigate whether a personal sustainability orientation of employees also leads to a more resourceful innovation behavior. With regard to the above delineated intra-organizational factors for EDEI, future investigations may analyze how the different types of employee potential influences their respective conduciveness.

Second, the question remains whether EDEI is advantageous throughout the various phases of eco-innovation processes. As each innovation phase comes with its particular challenges, the potentials and limitations of EDEI may vary substantially along the different phases [66]. Axtell [17] argues that employee participation is particularly suitable during the generation and promotion of ideas, whereas idea implementation might require experts for their functional as well as strategic knowledge and skills.

Third, attention must be drawn to the fact that merely increasing the quantity of EDEI projects is not necessarily beneficial. Many ideas that seem promising from an employee's perspective might not fit to the firm's strategic context. In this case, "it must be expected that a large part of employee-generated ideas are unworthy subjects of (resource-consuming) management decisions" [17] (p. 73). In order to prevent this scenario, future studies may investigate which types of qualification measures and tools are suitable to enable employees to come up with relevant and valuable ideas.

Fourth, we expect market-related characteristics to influence the applicability of EDEI. On the one hand, environmental regulation and public awareness for environmental concerns differ among various industrial and cultural contexts [29]. On the other hand, cultural characteristics may affect the occurrence of employee participation in innovation processes. When putting on a Hofstedeian lens (e.g., considering different levels of power distance), the probability of EDEI practices is expected to vary considerably between different countries [112]. In Scandinavia, favorable conditions for EDEI already exist due to low hierarchical barriers between managers and employees. Against this background, it does not come as a surprise that the majority of previous publications on EDI originated from Scandinavian countries. In contrast, effects of authority and power distance strongly shape collaboration in Indian companies and are likely to impede employee participation in innovation processes [17]. Limitations might therefore exist with regard to the applicability of EDEI to other industrial or cultural settings outside Northern Europe. Future research might therefore examine the proposed concept of EDEI from an institutional perspective, including cross-culture and cross-industry comparisons.

8. Conclusions

This conceptual paper responds to recent calls for opening and democratizing innovation processes. In the beginning, we drew attention to the lack of research regarding the application of employee-driven innovation to the development of eco-innovations. Against this background, the contribution of this paper is threefold. First, deriving from challenges associated with eco-innovations and based on previous literature on EDI, we develop the concept of employee-driven eco-innovation (EDEI) and delimit it from related concepts. Second, we argue *why* employee participation in eco-innovation processes can be particularly fruitful for enhancing companies' environmental and competitive advantage. To answer the question *how* employees can successfully

contribute to eco-innovation processes, we draw on recent research on employee innovative as well as environmental behavior which has disclosed “tacit knowledge” [17], “private consumer experiences” [71] and “green identity” [19] as crucial influencing factors. We acknowledge and describe these three employee potentials which qualify ordinary employees as active contributors in eco-innovation processes. So far, literature on EDI has mainly focused on employees’ task-related capabilities and company-specific ‘tacit knowledge’. The concept of EDEI additionally considers their private consumer experiences as well as potential green identities as further sources of innovative behavior for the environment. As a third contribution, based on a thorough literature research we delineate *how* intra-organizational factors can support or hinder EDEI activities and discuss green employees’ specific requirements in this regard.

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References

1. Nidumolu, R.; Prahalad, C.K.; Rangaswami, M.R. Why sustainability is now the key driver of innovation. *Harv. Bus. Rev.* **2009**, *87*, 2–10.
2. Bansal, P.; Roth, K. Why companies go green: A model of ecological responsiveness. *Acad. Manag. J.* **2000**, *43*, 717–736. [[CrossRef](#)]
3. Seebode, D.; Jeanrenaud, S.; Bessant, J. Managing innovation for sustainability. *R&D Manag.* **2012**, *42*, 195–206.
4. Chen, Y.; Chang, C.; Wu, F. Origins of green innovations: The differences between proactive and reactive green innovations. *Manag. Decis.* **2012**, *50*, 368–398. [[CrossRef](#)]
5. Hall, J.; Vredenburg, H. The challenges of innovating for sustainable development. *MIT Sloan Manag. Rev.* **2003**, *45*, 61–68.
6. Chen, Y.-S.; Lai, S.-B.; Wen, C.-T. The influence of green innovation performance on corporate advantage in Taiwan. *J. Bus. Ethics* **2006**, *67*, 331–339. [[CrossRef](#)]
7. Azzone, G.; Bertelè, U. Exploiting green strategies for competitive advantage. *Long Range Plan.* **1994**, *27*, 69–81. [[CrossRef](#)]
8. Chang, C.-H. The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation. *J. Bus. Ethics* **2011**, *104*, 361–370. [[CrossRef](#)]
9. Peattie, K. *Environmental Marketing Management. Meeting the Green Challenge*; Pitman: London, UK, 1995.
10. Hasu, M.; Toivonen, M.; Tuominen, T.; Saari, E. Employees and users as resource integrators in service innovation: A learning framework. In *The Handbook of Service Innovation*; Agarwal, R., Selen, W., Roos, G., Green, R., Eds.; Springer: London, UK, 2015; pp. 169–192.
11. Chesbrough, H.W. *Open Innovation. The New Imperative for Creating and Profiting from Technology*; Harvard Business School Press: Boston, MA, USA, 2003.
12. Chesbrough, H.W.; Vanhaverbeke, W.; West, J. *Open Innovation. Researching a New Paradigm*; Oxford University Press: Oxford, UK, 2006.
13. Lave, J.; Wenger, E. *Situated Learning. Legitimate Peripheral Participation*; Cambridge University Press: Cambridge, UK; New York, NY, USA, 1991.
14. Hippel, E.V. *Democratizing Innovation*; MIT Press: Cambridge, MA, USA, 2005.
15. Ramus, C.A. *Employee Environmental Innovation in Firms. Organizational and Managerial Factors*; Ashgate: Aldershot/Hampshire, UK; Burlington, VT, USA, 2003.
16. Birkinshaw, J.; Duke, L. Employee-led innovation. *Bus. Strateg. Rev.* **2013**, *24*, 46–51. [[CrossRef](#)]
17. Kesting, P.; Ulhø, J.P. Employee-driven innovation: Extending the license to foster innovation. *Manag. Decis.* **2010**, *48*, 65–84. [[CrossRef](#)]

18. Beard, C.; Hartmann, R. Naturally enterprising—Eco-design, creative thinking and the greening of business products. *Eur. Bus. Rev.* **1997**, *97*, 237–243. [[CrossRef](#)]
19. Ciocirlan, C.E. Environmental workplace behaviors: Definition matters. *Organ. Environ.* **2016**. [[CrossRef](#)]
20. Whitmarsh, L.; O'Neill, S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J. Environ. Psychol.* **2010**, *30*, 305–314. [[CrossRef](#)]
21. Hellström, T. Dimensions of environmentally sustainable innovation: The structure of eco-innovation concepts. *Sustain. Dev.* **2007**, *15*, 148–159. [[CrossRef](#)]
22. Bossink, B. *Managing Environmentally Sustainable Innovation. Insights from the Construction Industry*; Routledge: New York, NY, USA, 2011.
23. De Medeiros, J.F.; Ribeiro, J.L.D.; Cortimiglia, M.N. Success factors for environmentally sustainable product innovation: A systematic literature review. *J. Clean. Prod.* **2014**, *65*, 76–86. [[CrossRef](#)]
24. Forsman, H. Environmental innovations as a source of competitive advantage or vice versa? *Bus. Strateg. Environ.* **2013**, *22*, 306–320. [[CrossRef](#)]
25. Rennings, K. Redefining innovation—Eco-innovation research and the contribution from ecological economics. *Ecol. Econom.* **2000**, *32*, 319–332. [[CrossRef](#)]
26. Porter, M.E.; Van der Linde, C. Green and competitive: Ending the stalemate. *Harv. Bus. Rev.* **1995**, *73*, 120–134.
27. Chen, Y.-S. The driver of green innovation and green image—Green core competence. *J. Bus. Ethics* **2008**, *81*, 531–543. [[CrossRef](#)]
28. Klassen, R.D.; Whybark, D.C. The impact of environmental technologies on manufacturing performance. *Acad. Manag. J.* **1999**, *42*, 599–615. [[CrossRef](#)]
29. Driessen, P.H.; Hillebrand, B.; Kok, R.A.W.; Verhallen, T.M.M. Green new product development: The pivotal role of product greenness. *IEEE Trans. Eng. Manag.* **2013**, *60*, 315–326. [[CrossRef](#)]
30. Kammerer, D. The effects of customer benefit and regulation on environmental product innovation. *Ecol. Econ.* **2009**, *68*, 2285–2295. [[CrossRef](#)]
31. Weng, H.-H.; Chen, J.-S.; Chen, P.-C. Effects of green innovation on environmental and corporate performance: A stakeholder perspective. *Sustainability* **2015**, *7*, 4997–5026. [[CrossRef](#)]
32. Eiadat, Y.; Kelly, A.; Roche, F.; Eyadat, H. Green and competitive? An empirical test of the mediating role of environmental innovation strategy. *J. World Bus.* **2008**, *43*, 131–145. [[CrossRef](#)]
33. Renwick, D.W.; Redman, T.; Maguire, S. Green human resource management: A review and research agenda. *Int. J. Manag. Rev.* **2013**, *15*, 1–14. [[CrossRef](#)]
34. Orsato, R.J. Competitive environmental strategies: When does it pay to be green? *Calif. Manag. Rev.* **2006**, *48*, 127–143. [[CrossRef](#)]
35. Dangelico, R.M.; Pujari, D. Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *J. Bus. Ethics* **2010**, *95*, 471–486. [[CrossRef](#)]
36. Laroche, M.; Bergeron, J.; Barbaro-Forleo, G. Targeting consumers who are willing to pay more for environmentally friendly products. *J. Consum. Mark.* **2001**, *18*, 503–520. [[CrossRef](#)]
37. Veryzer, R.W. Discontinuous innovation and the new product development process. *J. Prod. Innov. Manag.* **1998**, *15*, 304–321. [[CrossRef](#)]
38. Chen, C. Design for the environment: A quality-based model for green product development. *Manag. Sci.* **2001**, *47*, 250–263. [[CrossRef](#)]
39. Berchicci, L.; Bodewes, W. Bridging environmental issues with new product development. *Bus. Strateg. Environ.* **2005**, *14*, 272–285. [[CrossRef](#)]
40. Ottman, J.A.; Stafford, E.R.; Hartman, C.L. Avoiding green marketing myopia: Ways to improve consumer appeal for environmentally preferable products. *Environ. Sci. Policy Sustain. Dev.* **2006**, *48*, 22–36. [[CrossRef](#)]
41. Keeney, R.L.; Raiffa, H. *Decisions with Multiple Objectives. Preferences and Value Tradeoffs*; Cambridge University Press: Cambridge, UK; New York, NY, USA, 1993.
42. Høyrup, S. Employee-driven innovation: A new phenomenon, concept and mode of innovation. In *Employee-Driven Innovation: A New Approach*; Høyrup, S., Bonnafous-Boucher, M., Hasse, C., Lotz, M., Møller, K., Eds.; Palgrave Macmillan: New York, NY, USA, 2012; pp. 3–33.

43. Price, O.; Boud, D.; Scheeres, H. Creating work: Employee-driven innovation through work practice reconstruction. In *Employee-Driven Innovation: A New Approach*; Høyrup, S., Bonnafous-Boucher, M., Hasse, C., Lotz, M., Møller, K., Eds.; Palgrave Macmillan: New York, NY, USA, 2012; pp. 77–91.
44. De Jong, J.; den Hartog, D. Measuring innovative work behaviour. *Creat. Innov. Manag.* **2010**, *19*, 23–36. [[CrossRef](#)]
45. Scott, S.G.; Bruce, R.A. Determinants of innovative behavior: A path model of individual innovation in the workplace. *Acad. Manag. J.* **1994**, *37*, 580–607. [[CrossRef](#)]
46. Amabile, T.M.; Conti, R.; Coon, H.; Lazenby, J.; Herron, M. Assessing the work environment for creativity. *Acad. Manag. J.* **1996**, *39*, 1154–1184. [[CrossRef](#)]
47. Berraies, S.; Chaher, M.; Yahia, K.B. Employee empowerment and its importance for trust, innovation and organizational performance. *Bus. Manag. Strateg.* **2014**, *5*, 82–103. [[CrossRef](#)]
48. Peters, T. Get innovative or get dead. *Calif. Manag. Rev.* **1991**, *33*, 9–23. [[CrossRef](#)]
49. Remmen, A.; Lorentzen, B. Employee participation and cleaner technology: Learning processes in environmental teams. *J. Clean. Prod.* **2000**, *8*, 365–373. [[CrossRef](#)]
50. Hanna, M.D.; Rocky Newman, W.; Johnson, P. Linking operational and environmental improvement through employee involvement. *Int. J. Oper. Prod. Manag.* **2000**, *20*, 148–165. [[CrossRef](#)]
51. Haugh, H.M.; Talwar, A. How do corporations embed sustainability across the organization? *Acad. Manag. Learn. Educ.* **2010**, *9*, 384–396. [[CrossRef](#)]
52. Jenkin, T.A.; McShane, L.; Webster, J. Green information technologies and systems: Employees' perceptions of organizational practices. *Bus. Soc.* **2011**, *50*, 266–314. [[CrossRef](#)]
53. Ramus, C.A.; Steger, U. The roles of supervisory support behaviors and environmental policy in employee "ecoinitiatives" at leading-edge European Companies. *Acad. Manag. J.* **2000**, *43*, 605–626. [[CrossRef](#)]
54. Chen, Y.-S.; Chang, C.-H. The determinants of green product development performance: Green dynamic capabilities, green transformational leadership, and green creativity. *J. Bus. Ethics* **2013**, *116*, 107–119. [[CrossRef](#)]
55. Norton, T.A.; Parker, S.L.; Zacher, H.; Ashkanasy, N.M. Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organ. Environ.* **2015**, *28*, 103–125. [[CrossRef](#)]
56. Lamm, E.; Tosti-Kharas, J.; King, C.E. Empowering employee sustainability: Perceived organizational support toward the environment. *J. Bus. Ethics* **2015**, *128*, 207–220. [[CrossRef](#)]
57. Aguinis, H.; Glavas, A. What we know and don't know about corporate social responsibility: A review and research agenda. *J. Manag.* **2012**, *38*, 932–968. [[CrossRef](#)]
58. Schweisfurth, T. *Embedded Lead Users inside the Firm. How Innovative User Employees Contribute to the Corporate Product Innovation Process*; Springer: Wiesbaden, Germany, 2013.
59. Kaplan, R.S.; Norton, D.P. Measuring the strategic readiness of intangible assets. *Harv. Bus. Rev.* **2004**, *82*, 52–63. [[PubMed](#)]
60. Chen, Y.-S.; Chang, C.-H. Enhance environmental commitments and green intangible assets toward green competitive advantages: An analysis of structural equation modeling (SEM). *Qual. Quant.* **2013**, *47*, 529–543. [[CrossRef](#)]
61. Chen, Y.-S. The Positive effect of green intellectual capital on competitive advantages of firms. *J. Bus. Ethics* **2008**, *77*, 271–286. [[CrossRef](#)]
62. Henriques, I.; Sadosky, P. The relationship between environmental commitment and managerial perceptions of stakeholder importance. *Acad. Manag. J.* **1999**, *42*, 87–99. [[CrossRef](#)]
63. Berry, M.A.; Rondinelli, D.A. Proactive corporate environmental management: A new industrial revolution. *Acad. Manag. Perspect.* **1998**, *12*, 38–50. [[CrossRef](#)]
64. Smith, P.; Ulhoi, J.P.; Kesting, P. Mapping key antecedents of employee-driven innovations. *Int. J. Hum. Resour. Dev. Manag.* **2012**, *12*, 224–236. [[CrossRef](#)]
65. Galbreath, J. Twenty-first century management rules: The management of relationships as intangible assets. *Manag. Decis.* **2002**, *40*, 116–126. [[CrossRef](#)]
66. Rothenberg, S. Knowledge content and worker participation in environmental management at NUMMI. *J. Manag. Stud.* **2003**, *40*, 1783–1802. [[CrossRef](#)]
67. Boiral, O. Tacit knowledge and environmental management. *Long Range Plan.* **2002**, *35*, 291–317. [[CrossRef](#)]
68. Drucker, P.F. *Innovation and Entrepreneurship: Practice and Principles*; Heinemann: London, UK, 1985.

69. Visser, R.; Jongen, M.; Zwetsloot, G. Business-driven innovations towards more sustainable chemical products. *J. Clean. Prod.* **2008**, *16*, 85–94. [[CrossRef](#)]
70. Balachandra, R.; Friar, J.H. Factors for success in R&D projects and new product innovation: A contextual framework. *IEEE Trans. Eng. Manag.* **1997**, *44*, 276–287.
71. Schrader, U.; Belz, F.-M. Involving users in sustainability innovations. In *The Nature of Sustainable Consumption and How to Achieve It: Results from the Focal Topic “From Knowledge to Action—New Paths towards Sustainable Consumption”*; Defila, R., di Guilio, A., Kaufmann-Hayoz, R., Eds.; Oekom: Munich, Germany, 2012; pp. 335–350.
72. Schweisfurth, T.G.; Herstatt, C. How internal users contribute to corporate product innovation: The case of embedded users. *R&D Manag.* **2014**, *46*, 107–126. [[CrossRef](#)]
73. Enkel, E.; Perez-Freije, J.; Gassmann, O. Minimizing market risks through customer integration in new product development: Learning from bad practice. *Creat. Innov. Manag.* **2005**, *14*, 425–437. [[CrossRef](#)]
74. Amabile, T.M. Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Hum. Resour. Manag. Rev.* **1993**, *3*, 185–201. [[CrossRef](#)]
75. Deci, E.L.; Ryan, R.M. *Intrinsic Motivation and Self-Determination in Human Behavior*; Plenum: New York, NY, USA, 1985.
76. McDonald, F. Developing an integrated conceptual framework of pro-environmental behavior in the workplace through synthesis of the current literature. *Adm. Sci.* **2014**, *4*, 276–303. [[CrossRef](#)]
77. Matsuba, M.K.; Pratt, M.W.; Norris, J.E.; Mohle, E.; Alisat, S.; McAdams, D.P. Environmentalism as a context for expressing identity and generativity: Patterns among activists and uninvolved youth and midlife adults. *J. Personal.* **2012**, *80*, 1091–1115. [[CrossRef](#)] [[PubMed](#)]
78. Stets, J.E.; Biga, C.F. Bringing identity theory into environmental sociology. *Sociol. Theory* **2003**, *21*, 398–423. [[CrossRef](#)]
79. Temminck, E.; Mearns, K.; Fruhen, L. Motivating employees towards sustainable behaviour. *Bus. Strateg. Environ.* **2015**, *24*, 402–412. [[CrossRef](#)]
80. Andersson, M.; Eriksson, O.; von Borgstede, C. The effects of environmental management systems on source separation in the work and home settings. *Sustainability* **2012**, *4*, 1292–1308. [[CrossRef](#)]
81. Muster, V.; Schrader, U. Green work-life balance: A new perspective for green HRM. *Ger. J. Res. Hum. Resour. Manag.* **2011**, *25*, 140–156. [[CrossRef](#)]
82. Subramanian, A.; Nilakanta, S. Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. *Omega* **1996**, *24*, 631–647. [[CrossRef](#)]
83. Smith, M.; Busi, M.; Ball, P.; van der Meer, R. Factors influencing an organisation’s ability to manage innovation: A Structured literature review and conceptual model. *Int. J. Innov. Manag.* **2008**, *12*, 655–676. [[CrossRef](#)]
84. Axtell, C.M.; Holman, D.J.; Unsworth, K.L.; Wall, T.D.; Waterson, P.E.; Harrington, E. Shopfloor innovation: Facilitating the suggestion and implementation of ideas. *J. Occup. Organ. Psychol.* **2000**, *73*, 265–285. [[CrossRef](#)]
85. Boiral, O. Greening the corporation through organizational citizenship behaviors. *J. Bus. Ethics* **2009**, *87*, 221–236. [[CrossRef](#)]
86. Welford, R. *Corporate Environmental Management. Systems and Strategies*; Earthscan: London, UK, 1996.
87. Wehrmeyer, W. *Greening People. Human Resources and Environmental Management*; Greenleaf: Sheffield, UK, 1996.
88. De Jong, J.P.; den Hartog, D.N. How leaders influence employees’ innovative behaviour. *Eur. J. Innov. Manag.* **2007**, *10*, 41–64. [[CrossRef](#)]
89. Damanpour, F. Organizational innovation: A meta-analysis of effects of determinants and moderators. *Acad. Manag. J.* **1991**, *34*, 555–590. [[CrossRef](#)]
90. Perry-Smith, J.E.; Shalley, C.E. The social side of creativity: A static and dynamic social network perspective. *Acad. Manag. Rev.* **2003**, *28*, 89–106.
91. Sonenshein, S.; DeCelles, K.A.; Dutton, J.E. It’s not easy being green: The role of self-evaluations in explaining support of environmental issues. *Acad. Manag. J.* **2014**, *57*, 7–37. [[CrossRef](#)]
92. Amabile, T.M.; Schatzel, E.A.; Moneta, G.B.; Kramer, S.J. Leader behaviors and the work environment for creativity: Perceived leader support. *Leadersh. Q.* **2004**, *15*, 5–32. [[CrossRef](#)]

93. Tierney, P.; Farmer, S.M.; Graen, G.B. An examination of leadership and employee creativity: The relevance of traits and relationships. *Pers. Psychol.* **1999**, *52*, 591–620. [[CrossRef](#)]
94. Ramus, C.A. Encouraging innovative environmental actions: What companies and managers must do. *J. World Bus.* **2002**, *37*, 151–164. [[CrossRef](#)]
95. Paillé, P.; Mejía-Morelos, J.H. Antecedents of pro-environmental behaviours at work: The moderating influence of psychological contract breach. *J. Environ. Psychol.* **2014**, *38*, 124–131. [[CrossRef](#)]
96. Fairbank, J.F.; Williams, S.D. Motivating creativity and enhancing innovation through employee suggestion system technology. *Creat. Innov. Manag.* **2001**, *10*, 68–74. [[CrossRef](#)]
97. Simula, H.; Vuori, M. Benefits and barriers of crowdsourcing in B2B firms: Generating ideas with internal and external crowds. *Int. J. Innov. Manag.* **2012**, *16*, 1–19. [[CrossRef](#)]
98. Hasu, M.; Saari, E.; Mattelmäki, T. Bringing the employee back in: Integrating user-driven and employee-driven innovation in the public sector. In *User-Based Innovation in Services*; Sundbo, J., Toivonen, M., Eds.; Edward Elgar: Cheltenham/Northampton, UK, 2011.
99. Antoncic, B.; Hisrich, R.D. Clarifying the intrapreneurship concept. *J. Small Bus. Enterpr. Dev.* **2003**, *10*, 7–24. [[CrossRef](#)]
100. Ginsberg, A.; Guth, W. Corporate entrepreneurship (guest editors' introduction). *Strateg. Manag. J.* **1990**, *11*, 5–15.
101. Sharma, P.; Chrisman, S.J.J. Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. In *Entrepreneurship*; Cuervo, Á., Ribeiro, D., Roig, S., Eds.; Springer: Berlin, Germany; Heidelberg, Germany, 2007; pp. 83–103.
102. Lamm, E.; Tosti-Kharas, J.; Williams, E.G. Read this article, but don't print it: Organizational citizenship behavior toward the environment. *Group Organ. Manag.* **2013**, *38*, 163–197. [[CrossRef](#)]
103. Boiral, O.; Paillé, P. Organizational citizenship behaviour for the environment: Measurement and validation. *J. Bus. Ethics* **2012**, *109*, 431–445. [[CrossRef](#)]
104. Daily, B.F.; Bishop, J.W.; Govindarajulu, N. A conceptual model for organizational citizenship behavior directed toward the environment. *Bus. Soc.* **2009**, *48*, 243–256. [[CrossRef](#)]
105. Bartram, T.; Casimir, G. The relationship between leadership and follower in-role performance and satisfaction with the leader. *Leadersh. Organ. Dev. J.* **2007**, *28*, 4–19. [[CrossRef](#)]
106. Govindarajulu, N.; Daily, B.F. Motivating employees for environmental improvement. *Ind. Manag. Data Syst.* **2004**, *104*, 364–372. [[CrossRef](#)]
107. DuBois, C.L.Z.; Astakhova, M.N.; DuBois, D.A. Motivating behavior change to support organizational environmental sustainability goals. In *Green Organizations: Driving Change with I-O Psychology*; Huffman, A.H., Klein, S.R., Eds.; Routledge: New York, NY, USA, 2013; pp. 186–207.
108. Huhtala, H.; Parzefall, M.-R. A review of employee well-being and innovativeness: An opportunity for a mutual benefit. *Creat. Innov. Manag.* **2007**, *16*, 299–306. [[CrossRef](#)]
109. Honkaniemi, L.; Lehtonen, M.H.; Hasu, M. Well-being and innovativeness: Motivational trigger points for mutual enhancement. *Eur. J. Train. Dev.* **2015**, *39*, 393–408. [[CrossRef](#)]
110. Chang, C.; Chen, Y. The determinants of green intellectual capital. *Manag. Decis.* **2012**, *50*, 74–94. [[CrossRef](#)]
111. Chen, Y.-S.; Chang, C.-H.; Lin, Y.-H. The determinants of green radical and incremental innovation performance: Green shared vision, green absorptive capacity, and green organizational ambidexterity. *Sustainability* **2014**, *6*, 7787–7806. [[CrossRef](#)]
112. Hofstede, G. *Cultures and Organizations*, 2nd ed.; McGraw-Hill: New York, NY, USA, 2005.

