Environmental Sustainability Dynamics and Environmental Innovation: How can firms adapt their organization to implement environmental sustainability?

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Résumé :

Climate change imposes firms to adapt their production processes and resource consumption while developing sustainable products and services. Although research has shown a strong link between innovation and environmental sustainability, it has not defined a procedure for implementing this change while maintaining economic performance. This work explores how do companies implement environmental sustainability dynamic within their organization through innovation.

A qualitative case study of a family business specializing in electrical products, services, and solutions was conducted. Data were gathered from 14 semi-structured interviews, participatory observations, and internal documents. This triangulation enabled an in-depth analysis of the firm's environmental sustainability strategy.

Environmental innovation is crucial for implementing an Environmental Sustainability Dynamic (ESD). Firms need to integrate it into their strategy and establish prioritized, achievable objectives. Improved ambidexterity capacities are key to meeting environmental goals.

This study advances research on the link between innovation and environmental sustainability in firms. It offers insights into fostering an ESD through innovation, emphasizing the role of organizational ambidexterity in achieving sustainability objectives.

Mots-clés : Environmental sustainability, Innovation, Environemental Innovation, Organizational ambidexterity

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INTRODUCTION

In 1987, the Brundtland Report made for the first time this observation: our production and consumption patterns are at the root of climate change (UN-Secretary, 1987). Today, this has been confirmed and the consequences of climate change are affecting society as a whole (Lafortune et al., 2024; UN-Secretary, 2023). On March 2023, the Sixth Assessment Report of the IPCC drew up an alarming assessment of global warming trends (IPCC, 2023). In the same report, the experts made several recommendations, focusing on public policy. In particular, the IPCC recommended that measures should be put in place to move towards "climate-resilient development". In their view, it is possible to achieve sustainable development, if this transition is accompanied by standards and regulations to adapt to climate change, to protect biodiversity and to quickly reduce greenhouse gas emissions.

The quest for an environmentally sustainable society seems a necessary process to respond to the threats of climate change in our finite world. Therefore, environmental sustainability aims at preserving the environment by placing it at the center of our concerns, since it plays a vital role in human well-being as much as economic and social functioning.

Companies have a massive impact in triggering this collective reassessment. They are subject to environmental regulations; they must adapt to new consumer needs; and they must remain competitive in this area of environmental sustainability (Engert et al., 2015; Hermundsdottir & Aspelund, 2020; Pinget et al., 2015; Porter & Reinhardt, 2007). This requires them to rethink the way they produce, but also to redesign their offering to reduce their overall environmental impact. Therefore, innovation seems to be the solution that will enable companies to respond to the current pressures they are under, while preparing at the same time the future of their business and identifying unknown new business potentials (Cancela et al., 2022; Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020). Also IPCC experts identify innovation as one of the keys to combating climate change: "Enhancing technology innovation systems can

provide opportunities to lower emissions growth, create social and environmental co-benefits, and achieve other SDGs" (IPCC, 2023, p. 33).

Indeed, innovation, defined as the introduction of novel solutions that address market needs, appears well-suited to responding to the emerging demands posed by climate change (Cancela et al., 2022; Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020). What's more, innovation is an advantage both because of its ability to enable businesses to adapt quickly and its propensity to have a long-term impact on organizations and society (Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020).

While some authors recognize innovation as a driver for establishing environmental sustainability dynamic (ESD) in companies (Cancela et al., 2022; Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020), there is limited research on the specific characteristics needed for its effective implementation. Therefore, it is necessary to consider not only the need for companies to integrate environmental sustainability into their operations, but also the obstacles and tools needed to implement such a dynamic. The research question posed by this article is as follows: How do companies implement ESD within their organization through innovation?

To achieve this, we review studies on environmental sustainability in companies, focusing on innovation's role in implementing such a dynamic. Next, we present our research methods, based on a qualitative study of a company integrating ESD into its processes. Our results highlight three contributions: identifying environmental sustainability as a strategic factor, emphasizing innovation's role in ESD integration, and underlining the need for ambidexterity to implement ESD within broader company dynamics.

1. LITERATURE REVIEW

1.1. THE STRATEGIC ROLE OF ENVIRONEMENTAL SUSTAINABILITY

Over the last decades, growing concern about climate change have raised awareness at individual, organizational and institutional levels (IPCC, 2023; Lafortune et al., 2024; UN-Secretary, 2023). At company level, there has been an increase in initiatives and measures aimed at demonstrating the organization's commitment to protecting the environment (Engert et al., 2015; Hermundsdottir & Aspelund, 2020; Porter & Reinhardt, 2007). For many companies, this dynamic is not just greenwashing or commitment to regulation but a real desire to make the organization and its production more sustainable.

In this article, it is crucial to distinguish the oft-quoted term of 'sustainable development' from 'environmental sustainability'. Sustainable development seeks to balance economic, environmental, and societal factors (IPCC, 2023; Lafortune et al., 2024; UN-Secretary, 1987, 2023), while environmental sustainability focuses specifically on preserving the environment due to its essential role in human well-being and the functioning of society (Goodland, 1995; Mensah, 2019). Indeed, the notion of environmental sustainability puts the environment back at the center of our concerns, since we live in a finite world that requires us to manage natural resources and the environment's capacity to regenerate itself. Whether the aim is to meet the needs of economic and social growth (Mensah, 2019) or to improve human well-being (Goodland, 1995), environmental sustainability seeks above all to establish a balance so that the needs of human beings do not hinder the environment's ability to manage itself.

It is becoming essential for companies to ensure their long-term viability to implement ESD in their operations (Engert et al., 2015; Hermundsdottir & Aspelund, 2020; Porter & Reinhardt, 2007). At first sight, environmental sustainability is synonymous with constraints, compromises and trade-offs. This concept runs counter to the dominant way in which companies operate, which is to prosper over time, expand and increase profits (Nidumolu et al., 2009). However, there seems to be a consensus in the scientific literature on the strategic role played by environmental sustainability for companies (Bansal & Roth, 2000; Dangelico & Pujari, 2010; Elkington, 1998; Engert et al., 2015; Hermundsdottir & Aspelund, 2020; Nidumolu et al., 2009; Porter & Linde, 1995; Porter & Reinhardt, 2007). While it is acknowledged that implementing such a dynamic requires companies to reorganize their supply design and production processes, the literature agrees that sustainable development, when integrated into corporate strategy, constitutes a competitive advantage (Engert et al., 2015; Hermundsdottir & Aspelund, 2020; Porter & Reinhardt, 2007). This motivates companies to adapt and to consider environmental sustainability as one of the central concerns of their activity.

Although researchers agree on the strategic role of environmental sustainability for companies, their opinions differ, particularly on the source that motivates companies to implement such dynamics. Some researchers consider that the implementation of ESD is mainly motivated by the need to comply with standards and regulations (Bansal & Roth, 2000; Carroll, 2004; Engert et al., 2015). Others think that companies are motivated by the opportunity to develop a

competitive advantage through the implementation of ESD (Elkington, 1998; Nidumolu et al., 2009; Porter & Linde, 1995; Porter & Reinhardt, 2007). Some authors identify corporate environmental responsibility as a source of motivation in order to preserve and maintain the organisation's ethics and image (Bansal & Roth, 2000; Carroll, 2004; Engert et al., 2015). Engert et al. (2015) identify cost reduction, economic performance, quality management and risk management as other sources of motivation. However, these sources of motivation can also be attributed to the quest for compliance with regulation, competitiveness, or environmental responsibility. We retain these three sources as the main ones, as there seems to be a scientific consensus in literature.

Also, Dangelico and Pujari (2010) specify that ESD, more specifically the development of green products, *"can be driven by different motivations that sometimes can co-exist within the company"* (Dangelico & Pujari, 2010, p. 476). These multi-dimensioned motivations add complexity in the way to implement ESD within organizations.

1.2. INNOVATION TO SERVE ESD

Following the increasing interest of companies in environmental sustainability, literature observes a growing interest of companies in environmental innovations as this has been identified as a tool that encourages the implementation of an ESD in companies (Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020).

In their article, Diaz-Garcia et al. (2015) note that since 2009, there has been a steady increase in the number of publications dealing with the concepts of eco-innovation, green innovation, sustainable innovation, and environmental innovation. This shows the growing interest in these concepts on the part of research, businesses and, more generally, society. However, when studying the existing literature, we are confronted with the difficulty of distinguishing these concepts from one another and therefore to define them precisely. According to Diaz-Garcia et al. (2015), *"there are four different notions/terms used in the literature to describe innovations that have a reduced negative impact on the environment: 'green', 'eco', 'environmental' and 'sustainable'"* (Díaz-García et al., 2015, p. 7). According to these authors, the definitions of green innovation, ecological innovation, sustainable innovation, and environmental innovation are very similar and even interchangeable (Díaz-García et al., 2015; Schiederig et al., 2011).

Although, Diaz-Garcia et al. (2015) found that *'environmental innovation'* was the predominant term used.

To define the term environmental innovation, some authors understand this concept as a system that enables the company's activities to remain profitable while preserving the environment (Adams et al., 2016; Oksanen & Hautamäki, 2015). Others define this concept as the creation or modification of an existing product, process or organization with the aim of reducing the impact of the company's activities on the environment (Dangelico & Pujari, 2010; Kemp & Pearson, 2008; Pinget et al., 2015; Schiederig et al., 2011). Consequently, the remainder of this paper will refer to the notion of environmental innovation as defined by Kemp and Pearson as the most complete definition : *"Eco-innovation is the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives"* (Kemp & Pearson, 2008, p. 7).

Environmental innovation is widely recognized in the literature as an essential lever for the development of corporate sustainability (Bansal & Roth, 2000; Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020; Nidumolu et al., 2009; Oksanen & Hautamäki, 2015; Porter & Linde, 1995). Not only does it enable companies to reduce their ecological impact, it also enables them to respond to the challenges of climate change with appropriate solutions (Dangelico & Pujari, 2010; Kemp & Pearson, 2008; Porter & Linde, 1995). It also helps companies to comply with new standards and regulations, while meeting the growing expectations of consumers (Dangelico & Pujari, 2010; Hermundsdottir & Aspelund, 2020; Maletic et al., 2015; Nidumolu et al., 2009; Pinget et al., 2015; Porter & Reinhardt, 2007). Finally, environmental innovation offers a competitive advantage by enabling companies to differentiate themselves in the marketplace while optimizing their long-term performance (Hermundsdottir & Aspelund, 2020; Maletic et al., 2015; Nidumolu et al., 2009; Porter & Reinhardt, 2007). The adoption of environmental innovation thus becomes a proactive strategy that contributes to the economic success and survival of businesses in a world in transition towards environmental sustainability.

Finally, environmental innovation is emerging as a key strategic tool for companies seeking to navigate against a backdrop of increasing regulation and environmental pressure. As a lever for adapting to climate and societal challenges, it not only offers a response to legal obligations, but also represents a source of opportunities to differentiate and strengthen competitiveness. However, implementing such a corporate strategy requires costly and complex transformation work. In this quest for transformation, the company must meet current environmental requirements by reorganizing its product design and production methods, but it must also anticipate future demands by the prisms of environmental sustainability.

To sum this up, the literature highlights the strategic importance of environmental sustainability, now seen as essential for competitiveness and long-term viability. Environmental innovation enables companies to reduce their ecological impact while meeting consumer and regulatory demands. However, it has not yet clarified how organizations can adapt to develop impactful innovations for an ESD. This article attempts to fill this gap by answering the following question: How do companies implement ESD within their organization through environmental innovation?

2. METHODOLOGY

This research aims to understand how companies implement ESD within their organization through environmental innovation. To answer this question, the exploratory approach based on the study of existing theories has made it possible to clarify the key concepts and identify the gaps in the literature to date (Miles & Huberman, 2003).

By adopting an interpretivist epistemic paradigm (Clegg et al., 2022; Thiétart, 2014, Chapitre 1), we conducted a case study to highlight the crucial role of developing companies' capacity to exploit current practices while exploring innovative approaches, in order to adapt their strategies sustainably to meet environmental challenges. As underlined by Yin (2009), the case study is the recommended method for understanding decisions: how they are made, how they are implemented and what the results are.

The data collection focused on how to manage the implementation of the ESD within company X[1] by the prism of its environmental innovation capacity. The case study took place directly

[1] Company X is an acronym to preserve its anonymity

within the company, the researcher being employed in the user testing department of company X's marketing department. The researcher's integration within the organization enabled the case study to be based on multiple sources of data and to acquire a precise vision of the research context (Eisenhardt, 1989).

Company X, a family-owned supplier of electrical devices based in Germany, originally focused on producing meter panels and distribution boards. Over time, the company has expanded to include various brands, allowing it to offer a range of products, solutions, and services for electrical installations. Its offerings are grouped into three main areas: energy infrastructure, energy management solutions, and business and living space management.
In 2022, these activities generated a global turnover of 2.8 billion euros. While most of its revenue comes from the German and French markets, company X's solutions are available in over 100 countries. The organization employs 12,900 people, 2,500 of whom are attached to the Grand-Est site under review, making it the company's largest in France and the second largest in the Group. This site has a strategic importance, as it brings together most of the production, marketing and design activities.
The company's sales focus on electrical solutions for both residential (individual houses, flats, and multi-residential buildings) and commercial buildings (shops, offices, hotels, and more). This market orientation makes company X's distribution channel a compelling case study, as its primary customers include electrical wholesalers, installers, consultants, and architects. The company's distribution operates through both B2B and B2B2C models.
In comparison to its direct competitors, company X ranks as one of the leading suppliers of electrical device solutions. Company X's market positioning varies depending on the product type. It aims to maintain its leadership in energy infrastructure and seeks to establish itself as a key player in the energy management sector, a newer strategic focus for the company.
This research mainly examines the "Sustainability Project", an environmental initiative launched by company X in 2020. In 2023, the key goal was to explore how the company could develop a business model around environmental sustainability by defining its environmental value proposition.

According to the methodology described by Yin (2009), the case study is initially based on participative observation. This is based on the collection of various documents and information such as: internal company documents, minutes of meetings, performance reports, graphs and any other data already collected by the company (Yin, 2009).

A phase of semi-structured interviews enriched the case study (Thiétart, 2014; Yin, 2009). **Table 1** provides an overview of the 14 interviews conducted between May and June 2023.

Tableau 1. Summary table of interviews conducted

INTERVIEWEE	POSITION	SENIORITY	DURATION	LANGUAGE
N°1	Environmental Business Partner	2,5 years	40min	English
N°2	Environmental Reporting Specialist	1 year	42min	English
N°3	Sustainability Manager	5 years	35min	English
N°4	System and Solution Manager	15 years	41min	English
N°5	Environmental Business Partner	15 years	54min	French*
N°6	Strategy Vice President	1 year	42min	French*
N°7	Communications Specialist	1 year	45min	English
N°8	Technical Innovation Director	25 years	35min	French*
N°9	Engineering Discipline Leader Materials	16 years	35min	French*
N°10	Group Strategic Solution Marketing Senior Director	28 years	52min	English
N°11	User Testing Department Manager	20 years	58min	French*
N°12	Environmental Sustainability Director	5 years	30min	French*
N°13	Residential & Distribution Business Director	19 years	32min	English
N°14	User Testing Specialist	2 years	52min	French*
Total duration of interviews			**10h**	

** Quotations extract for the interviews conducted in French have been translated in English*

These interviews aim to gather a detailed description of the process of integrating environmental sustainability into the organization's activities and operations. To do so, an interview template was developed based on the literature review (**Table n°2**). All interviews were recorded, transcribed, and coded. Most of the interviews were conducted remotely via Teams; only one interview was conducted face-to-face in on of company X's site. Seven interviews were conducted and transcribed in English, the other seven were conducted and transcribed in French. The quotes from these interviews are translated into English in the body of the paper.

Tableau 2. Interview Guide

PRELIMINARY QUESTIONS	
SUSTAINABILITY PROJECT	- What is the "Sustainability project"? (main goals, when did it emerge, who initiated it, what are the major milestones, …
SUSTAINABLE DEVELOPMENT VALUE PROPOSITION – HISTORICAL AND OBJECTIVES	- Define what is called "value proposition"? - Does company X have a current value proposition in terms of sustainable development? - How did company X's interest in sustainable development evolve over time? Why?
SPECIFIC QUESTIONS DEPENDING ON PARTICIPANT'S DEPARTMENT	<u>Sustainability department</u> - What are the legal constraints imposed on companies in terms of respect for the environment? <u>Engineering</u> - How do you see the "sustainability project" as an engineer? - Are you doing innovation? Are you searching for existing solutions or new ideas, non-already existing materials? <u>Market</u> - What do you think of "sustainability project" regarding the environmental engagement of the competitors? - What is the added value of customer centricity? <u>Communication</u> - What is the communication strategy of company X about the "sustainability project"? Is it an intern or extern communication strategy? Why? <u>Innovation</u> - Is the "sustainability project" intended to generate new avenues of innovation? - How important should be the place of customer centricity to conduct innovation?

	- What is innovation in company X?

An iterative analysis of this qualitative data was carried out in three stages: condensation of the data through coding, presentation of the data and drawing of conclusions (Miles & Huberman, 2003). The data was coded by classifying and assigning first-order, second-order and other categories (Miles & Huberman, 2003).

By triangulating all these data, it has been possible to obtain a precise analysis of company X, its process of integrating environmental sustainability into its operations and innovation strategy (Denzin, 2012; Santos et al., 2020).

3. ANALYSIS AND RESULTS

To achieve these research objectives, the data were organized and analyzed under three themes: (4.1) the history of environmental sustainability in company X; (4.2) the challenges faced by company X in its quest for ESD and (4.3) the relationship between ESD and innovation within the company.

3.1. ENVIRONMENTAL SUSTAINABILITY IN COMPANY X

We first try to identify, define and understand the ESD implemented within the company X. We established a history of the company's concern for the environment and the implementation of a dynamic in this area. We also studied the "Sustainability Project" in depth.

First, we checked at how long the company has been concerned with its environmental impact. According to the quotes gathered from employees who have been with the company for more or less than 10 years, it seems that the company's concerns for the environment are not a new subject, as shown in **Table n°3**.

Tableau 3. Quotes about company X's historical of sustainability

P1	*"I mean environment in company X is not new"*
P4	*"I think it was already before because it's been several years that in our vision, we have it. We know that we have a family business, tomorrow will be electrics, so everybody has remembered that. But in our vision, it's also to make our planet safer, so it was already in, but it was not implemented, or the cascading was not done, or people heard it."*
P7	*"So, the first one is so the "Sustainability Project" is not, let's say, the start of our sustainability efforts. We already had a sustainability strategy, and this is then where you have the E3 that was already developed and in place before that."*

P7	*"I would say is that partly it has always been part of our approach, however, let's say, it's really became more important, and we put a lot more efforts and resources into it since I think 2020."*
P9	*"There had in fact been initiatives underway for years, or that had been, that had been initiated.*

Therefore, environmental sustainability did not begin with the "Sustainability Project". Nevertheless, although the environment is not seen as a new subject in the company, the implementation of a clear and formal environmental sustainability strategy within the company X seems to be a new element for the whole company. Indeed, as P1 says: *"The department as I know it right know is quite new let's say. And, the "Sustainability Project", it has maybe two years now. So, the strategy that we implemented is quite new somehow"*. Also, P4 describes that previously *"everybody did something [around the environmental topic] but it was not structured"*. In 2020, the executive board decided to appoint P12 as head of a new department: *'Sustainability Department'*. That same year, the department set up the "Sustainability Project", an integral part of its CSR *(Corporate Social Responsibility)* strategy, called E3 (Ethics, Employees, Environment).

These two successive decisions are the result of growing pressure on the construction sector, as stated by P2: *"Building accounts for over 30% of Europe's energy consumption and over 30% of its greenhouse gas emissions. So, the building sector consumes a lot of energy and produces a lot of pollution, so there's a lot of regulatory pressure on buildings, on the substances in products, on CO2 emissions and things like that"*. This need for regulatory compliance has led to a certain amount of change within the company. Indeed, several participants highlighted this internal change in the following **Table °4**.

Tableau 4. Quotes showing the changes that have led to the implementation of an ESD at Company X

P1	*"The mindsets have evolved and also the Executive board's mindset has evolved. Because if we would have come ten years ago with the Sustainability Project it would have say 'okay very nice but it's too much budgets, it's not the priority'"*
P2	*"Because we realized that this is relevant not only for the planet but more importantly for the business, if we want to survive in this business, we have to be smart, we have to act as exemplary when it comes to our practices but also as an enabler and to be able to produce solutions that contribute to the energy transition for example."*
P5	*"So, we'll say x [Chief Officer Technical], plus x [Group Quality & Environment Vice President], plus a person who is 100% dedicated, we'll say, to the environment, which has really boosted everything."*

P12	*"We finally managed to create a form of awareness within the company"*

Yet, it is important to emphasize that this change has come up against, and continues to come up against, internal reluctance. As P13 points out *"x [Environmental Sustainability Director/P12] had to fight a lot to convince people. In the beginning, it's all seems spending money and what do you get in return at least a better planet, that's what we want to do. But there is always a commercial aspect in a company as well, which is feel it, because it's the existing of a company that you must make a profit to growing and to have more people getting a job"*. However, it seems that the company sees this change of mindset as an opportunity, as expressed by P3 *"might be costly in the short run, it might be cost it to get the certifications but in the long run, I think that if you don't do these steps you are going to be obsolete. You're not going to be able to compete on the market as well"*.

These developments and the company's motivation to implement an ESD within its organization have facilitated and supported the work of the Sustainability Department. As a result, in 2023, the first phase of the "Sustainability Project" was launched. The implementation of this project meets a need expressed by P1: *"We needed something more global that impacts the whole group […] I think the environment sustainability is very transversal, so it impacts all functions somehow it impacts the offer, the impact the suppliers, it's really a transformation"*. Most of the interviewees see this project as the environmental strategy or action plan of the company in terms of environmental sustainability. "Sustainability Project" can be defined as company X's environmental sustainability strategy. This strategy sets global objectives (compliance with regulation, fighting climate change and adapting the company, sustainable offering, and transparency) for the company to reduce its environmental impact while remaining economically viable and compliant with regulations.

3.2. CHALLENGES OF IMPLEMENTING ENVIONMENTAL SUSTAINABILITY IN COMPANY X

Although environmental sustainability is not a new subject in company X and a dynamic is now being implemented, there are certain issues and obstacles that complicate this process. The case study has highlighted three main challenges: competitors' advantage; internal complexities; and some difficulties in the innovation process. They are summed up by the quotation in **Table n°5, 6 and 7**.

3.2.1. Challenge n°1: dealing with competitors' advantage

Through the triangulation of the data, we found out that the company encountered difficulties because of the lead taken by its competitors in terms of environmental sustainability as it is summed up in **Table n°5**.

Tableau 5. Company X's challenge of dealing with competitors' advantage when implementing environmental sustainability

PARTICIPANT	QUOTATION	1ST CODING LEVEL
P7	*"I can definitely exclude that we want to be the most sustainable company that is out there because being realistic we are not"*	Competitors advance is admitted
P9	*"I'll give the example. [A competitor] announced that by 2024 they would be incorporating 15% recycled plastic materials and 40% recycled metal materials, and for plastics in 2022, they were already at 10% recycled materials. We're at 1% and we don't have any targets"*	Competition maturity gap
P3	*"If we try to compare us to our competitors, we have company Y which has received rewards of being the most sustainable company in the world, not just in this market or this type of field, but the most sustainable company in the world"*	Company Y advance on environmental sustainability
P4	*"On the market, we have company Y which is number one on this topic because he begins on this topic 20 years ago. So, what we already know it we will never be number one, that's sure"*	Company Y advance on environmental sustainability
P10	*"But in that comparison, you need to know that what you see currently, road up at company Y is the implementation of the strategy that has been built 15 years ago. So, this is just the advantage in time they are having, and yes, they have a super clear strategy, how they want to shape the full company."*	Company Y advance on environmental sustainability
P13	*"Company Y started this topic 20 years ago, as the first. That was part of their values really to take care of it and they did fantastic work on the product, on reducing."*	Company Y advance on environmental sustainability
P12	*"after all, company X can't do that because company X has a turnover of 3 billion, while company Y has, I don't know, 30. So if company X says that, it doesn't have the same credibility as company Y. So, at the same time they have the critical mass to position themselves as a*	Company Y advance on environmental sustainability

	leader but at the same time, we must be honest, they have strategic intelligence"	
P4	*"perhaps we can also have ideas, because company Y is not doing everything well, where we could be better on one point, regarding company Y we will never be better completely"*	Still an improvement capacity for Company X

As shown by the quotation in **Table n°5**, it is internally acknowledged that company X will never be the leader in environmental sustainability. Competitors on the market has a much more advanced maturity and resources on this subject. Despite this, company X can continue to innovate in this field. This is a major challenge, both in terms of catching up and establishing itself in this field.

3.2.2. Challenge n°2: dealing with internal complexities

In addition, we identified internal obstacles within the company X as it is presented in **Table n°6**.

Tableau 6. Company X's challenge of dealing with internal complexities when implementing environmental sustainability

PARTICIPANT	QUOTATION	1ST CODING LEVEL
P5	*"Today, the main obstacles are that we're not used to integrating environmental issues. We're an old company and one of our managers hasn't yet understood that sustainable development is the key to the company's future. So, there's still this business mindset behind it"*	Top management impediments
P1	*"Overall, I'd say we got off to a very late start. We started the subject very late and then we're much too slow, in fact we're not making any progress because we have political brakes, because maybe we're not capable today of moving quickly and well, but whether it's on this or on a whole bunch of other things where it's a bit structural I think"*	Internal slowness in decision making
P14	*"I think it's really something like the company's always doing that. Before implementing a big change, they're doing a pilot phase pilot project on a very small scope just to see does it work, yes, no what are the issues and then they start thinking about scaling it up"*	Internal slowness in decision making

P5	*"Having someone who is also very sensitive to this would actually help to raise the profile of sustainable development to the Executive board level"*	Top management impediments
P5	*"if we take sustainable development up to Executive board level, it means that it's a very important parameter for making decisions".*	Top management impediments
P11	*"then we realized that there were indeed silos, everyone was working in silos, engineering was working for engineering, PM [Project Management] was working for PM and MI [Market Intelligence] was working for MI. And that everyone was doing tests, each in their own field, in their own silo, but that nobody trusted anybody, so that meant 3 times tests, that meant 3 times energy, that meant 3 times time and that meant 3 times budgets"*	Employees works in silos
P14	*what I've seen over the last 2 years is that we're finding it hard to work across departments. It doesn't work very, very well. We're also struggling between the company and the subsidiaries, the country subsidiaries. You see, the group is a relatively recent organization at company X, and I find that there are still a lot of organizational problems and power struggles, so that also slows everything down"*	Employees works in silos

Thus, as shown by the quotation of **Table n°6**, the mechanisms embedded in the way companies operate, the lack of resources allocated to environmental sustainability and the difficulty departments generally have in collaborating with each other are real obstacles to the implementation of an ESD.

3.2.3. Challenge n°3: difficulties in the innovation process

Following on from the difficulties noted above, we observe that the company has difficulties in identifying and fostering innovation as presented in **Table n°7**.

Tableau 7. Company X's challenge of dealing with difficulties in the innovation process when implementing environmental sustainability

PARTICIPANT	QUOTATION	1ST CODING LEVEL
P2	*"I had discussions with directors about what is existing, they told me about different initiatives while*	Poor data on Innovation

	that we have about bi-directional charging for example, some research projects that are existing. But there is no allocated budget for innovation in the sustainability field"	
P6	*"our strength really lies in operation. Company X is seen as an ingenious brand, having found incremental improvements in its core products, products that make the installer's life easier, that's really its strength".*	Company X traditionally specializes in incremental innovation
P6	*"The exploration field is really underdeveloped, in other words, it's precisely an initiative that we have at the moment to revive, to push back this exploration innovation. It's precisely to have more agile ways of exploring, of doing pilots, of testing without starting up the big machine, of perhaps slowing down a little this process that we can have in the field of exploitation. So, it was a bit of a weakness, that there wasn't enough exploration yet, and that's something we're trying to put in place"*	Need to work on Company X's exploration capacities
P8	*"we're more followers than innovators, even if we are talking about innovation. We can't really be pioneers, that's not our DNA. Our DNA is more that of a follower"*	Company X traditionally specializes in incremental innovation
P12	*"I think there's a real challenge for Company X in terms of innovation, i.e. we have people who have great ideas, who detect things, but in fact nothing happens. And we absolutely must ensure that the innovation process is better aligned with the company's normal business and that we can quickly transform innovative ideas into a business case and into action for both customers and sustainable development"*	Need to work on Company X's exploration capacities

The results presented in **Table n°7** offer a clearer understanding of the challenges company X faces: a culture focused on incremental innovation hinders the development of the company's environmental innovation capabilities.

3.3. Relationship Between Innovation And Environmental Sustainability in Company X

3.3.1. Link between innovation and environmental sustainability

The link between innovation and environmental sustainability is clearly identified by the company. In fact, different departments have identified this link. P6 stresses that the company operates in a constantly changing environment: *"we can see how the world is speeding up, the markets are really speeding up. There are more and more digital products, more and more software. We're in a world where energy, mobility and building are really converging and overlapping, so there's more and more of this ecosystem dynamic coming together"*. These rapid changes require the company to be *"more involved in exploring future trends, potential technologies, or business models etc... to be ready for these changes. It's this acceleration that means we really need to speed up and strengthen this area of innovation and exploration"* (P6). And one of the components of these *'future trends, potential technologies or business models'* is environmental sustainability, as highlighted by P7: *"there's a very tight connection between environmental sustainability and innovation. The one cannot go without the other"*. P5 emphasized this link because *"even if we innovate, we mustn't forget the environment"*.

It is evident that there is a connection between innovation and environmental sustainability for company employees.

3.3.2. A company focused on customer centricity

Although the company has identified the link between innovation and environmental sustainability, there is one obstacle to exploring environmental innovation within the organization: the company's core values "customer centricity". Indeed, company X is a family business with a reputation for being close to its customers and meeting their needs. While the company had become techno-centric, measures were taken to return to a more customer-centric organization.

Customer centricity implies transparency with customers. In this context, customer centricity is an advantage because it enables company X to be close to its customers. It is also an advantage when it comes to incremental innovation. As P6 explains, *"for operational innovation, to help installers install better, to make the incremental innovations that are Company X's strength, we of course have to be very customer centric, to observe them, to install with them, to observe them as they install, etc., to see what will make their lives easier"*.

However, this dynamic of refocusing on the customer led to efforts and a constraint when it comes to ESD, as P8 explains: *"like sustainable development, it's often seen as a constraint. There are companies that have said, well, I'm going to make special products that are more expensive, but only because there are customers. So there must be customers who are prepared*

to pay more, and now I think they exist. And then, well, I offer something that others sometimes don't. So, instead of experiencing it as something of a constraint, we're in a bit of a constraint mode ourselves. I don't think we've managed to move into a mode where we use it as a competitive weapon". By refocusing on its customers, the company has also reduced its field of vision, so that today its ability to explore new ideas is limited. This restriction in identifying customers' needs and expectations has prevented the development of new business models and new products, as P6 explains *"for exploratory innovation, to go two or three steps further, to anticipate the trends that will be there in 4-, 5- or 6-years' time, you can't ask the customer because the customer won't be there"*.

What's more, customer centricity is not always an advantage when it comes to standing out from the competition. As P6 explains, it is necessary to look beyond customer centricity because *"customers say the same thing to all competitors. So, if you want to stand out from the crowd, you have to be able to anticipate, to be brave, to try things that will eventually stand out from the competition"*.

Customer centricity is one of company X's core values. It means being close to the customer, providing a solution tailored to their needs and maintaining a relationship based on listening and dialogue. However, it should be noted that this strong value hinders the company's ability to explore, innovate and see beyond the customer's current needs.

3.3.3. Company X's ESD mobilized through environmental innovation

Although customer centricity may represent an obstacle to the implementation of environmental innovations that have a significant impact, company X is nevertheless implementing an ESD through innovations.

Firstly, company X puts a lot of effort into the eco-design of its products and solutions. According to P5, *"eco-design can be a good tool for innovation"*. But he warns that *"let's say that doing eco-design on existing products is a bit musty because it's super complicated to do. So yes, you can replace virgin materials with recycled materials or a mix of virgin and recycled materials, but it hasn't been thought through as a whole"*. P10 emphasized the real problem of eco-design at Company X: *"if you are in product development, when we have just done the first implementation of what we are calling eco-design. Eco-design by Company X as also you might know that from x [Design Studio Director], there is a good, let's say, guideline what it could be. The challenge is: how to translate that in the daily life to the engineers, which is not so*

obvious. So, there's still some work needed on how to translate eco-design properly in marketing requirements, specifications".

The second element of environmental innovation is circularity. This concept requires to think about the entire life cycle of a product, considering the end of its life and pushing it back by creating new value-creation loops using existing products. P1, P5, P6 and P10 all talked about the example of the electric car charging station recycling project. Participant n°5 summed it up by saying that *"So on the charging station, for example, we're thinking about a system that would allow us to recover faulty charging station, we'll say, we repair them and then we do some furbishing to resell, to put back on the market products that are guaranteed to be almost new, we'll say"*. P6 sees this as an opportunity for innovation, *"we have a topic on the circular economy where we can explore this aspect, looking at products but also business models, etc. Is there anything we can do to be perhaps not a pioneer, but a little more innovative or at least prepare for certain changes?"*.

All these opportunities for innovation are being studied by the company, but it is necessary to prioritize these areas of environmental innovation. This is what P13 said: *"you have of course to make choices that you need to come to priorities where you will work on. It's not faceable to work on all the topics in one time"*. But also, what P7 told me: *"in the end you need to prioritize as a company"*.

We have developed a clear understanding of company X's approach to environmental sustainability and the critical role of innovation in advancing it. This case study highlights the company's strategic commitments and concrete actions, notably through its flagship "Sustainability Project." However, company X faces challenges such as sustaining a competitive edge, managing internal complexities, and integrating exploratory innovation. Despite these obstacles, the company leverages innovation to advance its sustainability efforts and aims to align further with emerging environmental trends.

4. DISCUSSION

The case study of company X highlighted the mechanisms and obstacles involved in implementing an ESD. We have identified three points for discussion: the role of environmental sustainability for companies, the characteristics of successful implementation of environmental sustainability and, finally, the identification of ambidexterity as a tool for implementing such a dynamic in companies.

4.1. ESD IN BUSINESS: A NECESSITY, AN ADVANTAGE, A STRATEGY

Through the case study, we observed that three main motivating factors drive company X to implement an environmental sustainability strategy: the need to comply with regulations, the pursuit of competitiveness, and the personal convictions of its employees. These findings are partially supported by the literature.

In fact, the results of Bansal and Roth (2000), Carroll (2004), Dangelico and Pujari (2010), Engert et al. (2015) all identify compliance with regulations as an external motivating factor in the implementation of a corporate environmental sustainability strategy. Furthermore, this case study aligns with findings from several research studies, which show that companies are also internally motivated by the pursuit of competitiveness through the adoption of environmental sustainability initiatives (Bansal & Roth, 2000; Elkington, 1998; Engert et al., 2015; Nidumolu et al., 2009; Pinget et al., 2015; Porter & Linde, 1995; Porter & Reinhardt, 2007).

We also identify an additional motivating factor: the personal convictions of employees. Indeed, environmental sustainability appears to have become a central concern for many stakeholders, both internal and external to the company. This finding diverges from research conducted by various authors in the related literature. Some authors identify corporate environmental responsibility as the third main source of motivation (Bansal & Roth, 2000; Carroll, 2004; Engert et al., 2015). However, we can assume that ESD is being driven, in part, by employee demands, as they seek to have this issue addressed within the companies where they work.

Finally, through this case study analysis, we have demonstrated that there is no single source of motivation for a company to pursue environmental sustainability. This decision appears to be influenced by multiple, interacting factors: regulations, competition, employees' values, ... This finding is supported by the hypothesis of Dangelico and Pujari (2010) who defended the idea that companies are influenced and forced to act by different factors that co-exist in the organization. Also, environmental sustainability has become a cornerstone of corporate strategy. It is not only a legal requirement, compelling companies to adhere to uniform standards and regulations, but also a strategic imperative. To remain competitive and differentiate themselves in the market, companies must increasingly integrate sustainability into their core operations, making it a key driver of long-term success.

4.2. IMPLEMENTING ESD IN COMPANIES

To implement an ESD, a company must first undertake a meticulous analysis of its environmental impact, as well as the impact of climate change on its activities. These findings are confirmed by those of Porter and Reinhardt (2007) since they defend the idea of an *'inside out'* and *'outside in'* analysis. First and foremost, companies need to take stock of their activities and their impact on the environment (carrying out a carbon audit of its production sites, setting up a PEP (Product Environmental Profile) for each of its products and solutions, …). At the same time, the company should consider the consequences of climate change for its business, both now and in the future (considering shortages of raw materials and specific components, price increases and new standards and regulations that may emerge). This global assessment is of considerable importance, as it will enable the company to identify its strengths and areas for improvement, as well as raising awareness among internal stakeholders of the company's impact on the environment and the challenges ahead.

Subsequently, the company will be able to set objectives that address the areas identified for improvement. Company X has set itself objectives in various areas, such as regulatory compliance, transparency towards its stakeholders, the fight against global warming and the provision of a sustainable offering. The purpose is to categorize and clarify the organization's areas for improvement, and to report on the progress and efforts already made. The postulates of Adams et al. (2016) and Nidumolu et al. (2009) coincide with those of the case study. Indeed, the company must set and prioritize objectives to implement an ESD and account for its involvement to its stakeholders.

Through this case study, we were able to observe that certain elements seem to slow down the implementation of company X's ESDs. Indeed, the findings showed a need to overcome structural problems to bring this environmental sustainability project to a successful conclusion. These included organizational slowness, which hinders decision making, top management's limited awareness of the environment as a strategic issue, and the inability of different departments to work together. While in general these obstacles are a hindrance to the smooth running of the company, they are more of a barrier to the implementation of an ESD. These results are supported by the arguments of Nidumolu et al. (2009) who defend the idea that the implementation of an ESD is accelerated by the involvement of top management in this objective. It is not enough for the company to set these objectives; top management must identify it as a central element of the company's strategy and coordinate its activities in this direction.

Yet, this research stands out because it highlights the need expressed by the company's employees to improve collaboration between the company's various departments and to limit organizational slowness.

To sum this up, effectively implementing an environmental sustainability strategy requires companies to address several key elements. They must first assess their environmental impact and the effects of climate change on their operations to set relevant objectives. Next, these objectives should be incorporated into a comprehensive action plan. To adapt promptly to the challenges posed by climate change, companies also need to identify and address internal obstacles that may impede their progress, resolving complexities that could hinder their sustainability efforts.

4.3. AMBIDEXTERITY AS A TOOL TO IMPLEMENT ESD

The analysis of the case study enabled us to understand the role played by incremental innovations in the implementation of an ESD. Continuous improvement of supply, substitution of raw materials, recycling, etc. are the first measures applied by companies. These measures are generally incremental innovations, i.e. making improvements to a product, a service, or a solution without radically modifying it. Environmental sustainability is approached in this sense at company X: how can we make our offer and our activities less impactful on the environment quickly and at a lower cost? These results are therefore supported by those of Dangelico and Pujari (2010) which draws a distinction between *'radical green product innovation'* and '*incremental green product innovation'*. The authors point out that incremental environmental innovation is often the most sought-after type of innovation, since it may involve improving a single element of the product, service, or solution.

Although these results are not fully confirmed by those of Adams et al. (2016). They support the idea of incremental innovation as a means of setting in motion a process of environmental sustainability. Incremental innovation is a first step towards environmental sustainability, because it enables rapid changes to be made which are adapted to the needs of the market and the law, and often improves the performance of the business by reducing losses.

Incremental innovation is a major asset to initiate an ESD in companies. It enables rapid, inexpensive, and effective changes to be made to reduce the carbon footprint of products, services, solutions and company. By studying company X, we also found out that it has mainly implemented incremental innovations. Although this is an asset for the implementation of an ESD, it should also be noted that most of the employees interviewed regret this lack of risk-

taking through radical innovation. Although there is no radical innovation as such in the company, radical environmental innovation is identified internally as crucial to gain a competitive advantage in terms of environmental sustainability. Radical environmental innovation would be an asset for the company as it would enable it to position itself as a pioneer in this field, to gain a competitive advantage and to reduce its environmental impact and that of its customers. In addition, the company is anchored in its values of customer centricity, which are an asset in terms of incremental environmental innovation, but which can prove to be a brake on radical environmental innovation. Indeed, company X does not anticipate the future needs of its customers, which makes it a fast follower of the norms and standards in place. The company excels in exploiting its current in-house skills but has gaps in terms of exploration.

These results are confirmed by the study by Dangelico and Pujari (2010) which show that radical environmental innovations have a significant impact on the environmental impact of products. Although this type of innovation increases uncertainty, Adams et al. (2016) argue that companies need to move from incremental environmental innovation, focused on the company and its internal workings, to radical environmental innovation that takes account of the environment outside the company and proposes systemic change.

The importance of both incremental and radical environmental innovation is highlighted here. Although radical environmental innovation implies an increased uncertainty for the company, it seems essential that the company invests in research to gain a competitive advantage, to initiate significant changes and to survive the current competitive game.

The case study results highlight the need for the company to move towards a more ambidextrous organization. In this article, ambidexterity is understand in Cancela et al's sense, i.e. "ambidexterity comprises balancing exploration and exploitation to achieve superior performance and enhanced competitiveness" (Cancela et al., 2022, p. 3073). It seems that company X stands out for its ability to exploit the company's internal skills. Many ideas and solutions to improve products have been put forward since the "Sustainable Project" was implemented. However, this does not seem to be enough for the company to stand out and succeed in establishing itself among its customers and stakeholders as a company acting against climate change. As a result, the organization is looking to deepen its skills in terms of exploration and the search for innovative ideas, notably by having launched an external start-up. These results are confirmed by those of Maletic et al. (2015) who defend the thesis that there is a link between environmental sustainability and business performance as long as the company succeeds in exploring and exploiting this subject. This organizational ambidexterity

is a real asset, as it allows the company to respond to the immediate needs of customers which are often linked to minimal improvements and therefore easy to implement. It also gives the company the ability to anticipate its customers' future needs and see beyond what they can imagine. As a result, the company can potentially offer more radical and innovative solutions that will give it a real competitive edge over its competitors.

CONCLUSION

In recent decades, climate change has driven companies to embed sustainable development at the core of their organization. Increasing norms and standards imposed by policy makers are making the competitive landscape more complex by encouraging companies to seek to stand out from the competition. As a result, environmental sustainability is an interesting area for companies to investigate to gain a competitive advantage.

This research establishes that a company must integrate an ESD into the heart of its business strategy to implement it efficiently. It is necessary for all decision-making to be oriented towards and consider the company's environmental sustainability objectives. These objectives must be set by the company after a detailed analysis of its impact on the environment and the impact of climate change on its activities. Next, it is essential to know how to prioritize the environmental sustainability objectives that have been set. The company cannot act on all fronts at once, so the objectives must be realistic and prioritized.

In addition, this research highlights the need to consider certain internal characteristics of the company which may act as brakes on the implementation of an ESD.

Finally, this article establishes that environmental innovation is an essential tool to implement an ESD while preserving the economic performance of companies. This work establishes that incremental environmental innovation is crucial, as it enables a rapid response to customers' needs, which are evolving at the same pace as climate change. Radical environmental innovation, on the other hand, ensures the company's long-term viability, as it anticipates future questions linked to climate change and proposes responses to needs not yet envisaged or expressed by customers.

Therefore, this work aims at implementing an ESD in companies by mobilizing and developing a form of organizational ambidexterity. This would enable the company both to exploit its internal knowledge and skills to meet current needs and to explore new avenues of innovation.

This study is limited by our focus on a family-owned electrical sector company. In a future phase, it will be important to check our findings by drawing on more cases. In fact, it could be interesting to study the implementation of an ESD by mobilizing innovation in a company whose decision-making power is guided by the interests of its shareholders. Also, this analysis is limited in that we were able to analyze the company over a period of six months, which partially limited our ability to understand the company's situation, operations, and environment. Also, we had two years' hindsight about the "Sustainability Project" and company X's overall dynamics in terms of environmental sustainability. Although these two years have enabled us to identify and establish the results set out in the previous section, they remain insufficient to make a generalization. Here again, it would be interesting to take the case study further by analyzing the development of the company X's environmental strategy over five, ten or more years.

To go further, research should now focus on questioning how the reorganization and the strengthening of organizational ambidexterity within the company should help to meet the challenges of sustainable development. Another interesting point to explore would be the optimal form of organizational ambidexterity to enable the implementation of an ESD that considers today's needs but also anticipates tomorrow's needs.

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