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Eco-Renewal Urgency: Enabling Eco-Innovation and Driving Sustainable Transformation Within Organizations

Maria Cristina Zaccone | Matteo Pedrini

Università Cattolica del Sacro Cuore, Milano, Italy

Correspondence: Maria Cristina Zaccone (mariacristina.zaccone@unicatt.it)

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ABSTRACT

Building on dynamic capabilities theory, this paper develops a conceptual model explaining how organizations pursue eco-innovation. Drawing on in-depth interviews with sustainability and innovation managers across diverse industries, the study provides rich empirical insights into the drivers of eco-innovation. Using the Gioia methodology, we inductively develop a data-driven model that captures how firms activate and sustain eco-innovation processes. Our key theoretical contribution lies in extending dynamic capabilities theory by conceptualizing eco-renewal urgency as a foundational organizational condition that both precedes and propels the sensing, seizing, and transforming phases. Eco-renewal urgency motivates firms to actively scan their environments and prioritize ecological opportunities, while simultaneously sustaining momentum in organizational transformation, ensuring that such opportunities are effectively acted upon and embedded over time. By highlighting the leading role of eco-renewal urgency, this study contributes to a deeper understanding of how organizations can accelerate eco-innovation and advance more durable forms of sustainable transformation. The findings also offer practical insights for managers seeking to cultivate and sustain urgency as a key enabler of eco-innovation.

1 | Introduction

The growing awareness of global climate crisis and its profound impact on ecosystems, economies, and communities has prompted organizations across industries to reassess their commitment to environmental sustainability. In response, firms are increasingly adopting strategies aimed at reducing their environmental footprint, including efforts to lower carbon emissions, optimize resource consumption, and minimize waste generation (D'Angelo et al. 2023; Hakovirta et al. 2023). Among these strategies, *eco-innovation* has emerged as a key approach. It entails rethinking organizational processes, products and services to reduce negative environmental impacts while simultaneously generating positive environmental and economic outcomes (Carrillo-Hermosilla et al. 2009; Sihvonen and Partanen 2016). Beyond addressing environmental concerns, eco-innovation reshapes how organizations create, deliver, and capture value, thereby supporting long-term competitiveness through more sustainable business models (Bocken et al. 2014). For instance, firms may shift from one-time product sales to service-based offerings that extend product lifecycles through maintenance, reuse, and recycling, benefiting both environmental performance and business outcomes.

Extant research on eco-innovation has largely emphasized external enablers, such as regulatory frameworks, technological developments, and public incentives (Arranz et al. 2019; Horbach 2008; Triguero et al. 2013). While these factors are undeniably important, they are insufficient to explain how eco-innovation is initiated and sustained within organizations. Eco-innovation typically unfolds within complex and

dynamic organizational contexts in which internal factors play a decisive role. Prior studies highlight the relevance of organizational experience, resource availability, and environmental responsibility as key internal drivers of eco-innovation (de Jesus Pacheco et al. 2017; Arranz et al. 2020). In addition, individual-level factors—such as employees values, motivations, and expertise—have been shown to shape how organizations approach eco-innovation (Horbach and Jacob 2018; Fernández-Muñiz et al. 2024).

Despite these insights, existing research tend to examine internal drivers of eco-innovation in isolation, offering a fragmented view of how eco-innovation emerges and is implemented in practice. This fragmented approach overlooks the interdependence and dynamic interaction among organizational conditions, managerial interpretations, and capability development. As a result, our understanding of how organizations activate and sustain eco-innovation processes remains incomplete.

To address this gap, this study develops a theoretical model grounded in dynamic capabilities theory (Teece 2007) to explain how eco-innovation unfolds within organizations. Drawing on in-depth interviews with 32 sustainability and innovation managers, we show that eco-renewal urgency plays a pivotal role in driving eco-innovation by acting as the catalyst that activates an organization's dynamic capabilities. Specifically, eco-renewal urgency shapes the sensing of eco-innovation opportunities by compelling firms not only to recognize emerging sustainability trends, market demands, and technological advancements, but also to prioritize them as immediate and consequential.

More broadly, we theorize that eco-renewal urgency propels organizations through the entire eco-innovation process—sensing opportunities, seizing them, and transforming organizational structures and practices accordingly. We define eco-renewal urgency as a shared organizational perception of immediacy and responsibility in addressing environmental challenges. This heightened sense of urgency motivates firms to actively scan their environments and sustains momentum for organizational change. The urgency to act swiftly in response to environmental degradation, regulatory pressures, or changing market demands compels firms to not only identify but also seize these opportunities. As a result, firms that experience prominent levels of eco-renewal urgency are better positioned to sense and act on eco-innovation opportunities, which supports the processes of seizing and transforming, as outlined in dynamic capability theory. Through this model, we provide deeper insights into how organizations can effectively harness their dynamic capabilities to foster eco-innovation and drive sustainable change.

The manuscript proceeds as follows. Initially, the theoretical foundations are revisited, highlighting the research gap and the research question that we aim to address. Subsequently, the research methodology employed is explained. In the third section, the results are presented. Finally, the results are discussed, elucidating how they contribute to both theory and managerial practice.

2 | Theoretical Foundations and Research Question

2.1 | Dynamic Capabilities Theory: A Framework for Innovation

The Dynamic Capabilities Theory (DCT) posits that firms' long-term success depends on their ability to integrate, build, and reconfigure resources in response to changing environments (Teece et al. 1997). Unlike traditional resource-based perspectives that emphasize static sources as competitive advantage, DCT highlights the importance of continuous renewal and adaptation. In volatile and uncertain contexts, organizations that fail to respond to technological shifts, regulatory changes, or evolving customer expectations risk strategic misalignment and obsolescence (Sharkie 2003).

At the core of DCT are three interrelated processes: *sensing*, *seizing*, and *transforming* (Matysiak et al. 2018). *Sensing* refers to an organization's ability to detect external changes—such as technological advancements, regulatory shifts, or evolving consumer preferences—that may influence its strategy (Teece 2007; Helfat and Peteraf 2015; Zhou et al. 2019). Firms that excel in this capability invest in market intelligence, trend analysis, and stakeholder engagement to anticipate disruptions and emerging opportunities before competitors.

Once opportunities are identified, *seizing* involves taking decisive actions to develop innovative solutions, allocate resources, and adapt business processes to exploit these opportunities (Bocken and Geradts 2020; Bojesson and Fundin 2021). This phase requires strategic decision-making at multiple levels, from leadership setting priorities to operational teams executing initiatives. Firms must assess the feasibility of potential innovations, secure the necessary funding, and coordinate cross-functional teams to ensure smooth implementation. The effectiveness of seizing depends on the firm's ability to overcome barriers (Brändström et al. 2024) such as organizational inertia, high switching costs, and uncertainty in technological feasibility.

Finally, *transforming* entails restructuring an organization's processes and culture to embed these innovations into its long-term strategic framework, ensuring sustained competitive advantage (Demirel and Kesidou 2019; Klettner et al. 2014). Transformation is not a one-time adjustment but an ongoing capability that enables firms to realign structures, update routines, and institutionalize new knowledge. Firms that excel in transformation not only implement innovations successfully but also create a culture that embraces change, allowing them to iterate and refine their strategies in response to continuous market evolution.

While DCT has traditionally been applied to general innovation strategies, it also provides a valuable lens for understanding how firms develop and implement eco-innovations.

2.2 | Applying Dynamic Capabilities to Eco-Innovation

Dynamic capabilities are specifically manifested and enacted within the domain of eco-innovation. Eco-innovation,

defined as innovation that reduces environmental harm while generating economic and social value, has emerged as a critical strategic response to growing sustainability challenges (Carrillo-Hermosilla et al. 2009; Dentchev et al. 2016). Unlike conventional innovation, which primarily seeks efficiency and profitability, eco-innovation incorporates an environmental dimension, requiring firms to rethink their value creation, delivery, and capture mechanisms. This process often leverages purposeful knowledge exchanges across organizational boundaries to effectively tackle social challenges and enhance innovation, as shown by recent studies on social innovation (Battistella and Pessot 2024).

From a DCT perspective, eco-innovation requires firms to engage in sensing, seizing, and transforming capabilities to effectively integrate sustainability into their competitive strategies. *Sensing* in the context of eco-innovation involves identifying external forces such as regulatory requirements for emissions reduction, advancements in renewable energy, and shifting consumer demand for eco-friendly products (Demirel and Kesidou 2019). Companies that are proactive in sensing sustainability trends can gain an early-mover advantage, positioning themselves as leaders in green innovation. However, failing to recognize these shifts in time may result in compliance risks, reputational damage, and missed market opportunities.

Seizing represents the ability of firms to capitalize on these identified opportunities by taking decisive action to develop eco-innovative solutions. This phase is particularly complex, as it requires firms to make strategic investment decisions while navigating uncertainties related to green technologies, regulatory compliance, and shifting competitive landscapes (Bocken and Geradts 2020). Companies must also reconfigure supply chains, establish partnerships, and develop new capabilities to ensure the successful implementation of eco-innovation. As shown by Centobelli et al. (2023), in complex engineering-to-order environments like shipbuilding, the integration of digital technologies and cross-organization collaboration enhances firms' ability to seize sustainability-oriented opportunities while increasing resilience. Given that sustainability initiatives often involve high upfront costs, firms must carefully balance short-term financial constraints with long-term environmental and economic benefits (Bojesson and Fundin 2021).

Transforming refers to the process through which organizations embed eco-innovation into their long-term strategic vision. This includes integrating sustainability metrics into performance evaluations, fostering a corporate culture that prioritizes environmental responsibility, and reconfiguring business models to align profitability with sustainability (Demirel and Kesidou 2019; Klettner et al. 2014; Santa-Maria et al. 2022). Successful transformation ensures that sustainability is not treated as a temporary response to external pressures but as a core pillar of the company's long-term growth strategy.

2.3 | Bridging the Gap in Eco-Innovation Research

Eco-innovation has attracted growing scholarly attention as a means of reconciling environmental sustainability with competitive advantage (Dentchev et al. 2016). Defined as the development of innovations that reduce negative environmental impacts while promoting positive environmental outcomes (Carrillo-Hermosilla et al. 2009), eco-innovation plays a crucial role in how organizations create, deliver, and capture value. The adoption of new, sustainable products, services, or processes that improve a company's environmental footprint is seen to address pressing environmental concerns while securing long-term business profitability. By embracing these innovations, firms can contribute to resource conservation, reduce emissions, and build sustainable growth strategies (Dias Angelo et al. 2012).

Research has highlighted several external drivers that influence eco-innovation, including governmental support, regulatory frameworks, technological advancements, and market and consumer trends (Aksu and Akman 2023). Government policies and regulations often encourage eco-innovation by providing financial incentives and creating a framework that mandates certain sustainability practices. These regulatory frameworks can compel firms to adopt more sustainable practices in response to changing laws or customer demands (Horbach 2008; Triguero et al. 2013). Technological advancements also play a significant role, providing new tools and methods that enable firms to reduce their environmental impact (Horbach et al. 2012). Additionally, market and consumer trends that emphasize sustainability can push organizations to innovate and adopt greener solutions, as consumers increasingly demand environmentally friendly products and services (Jansson et al. 2010).

While external drivers are important, internal determinants also play a critical role in enabling eco-innovation. These factors encompass both organizational and individual characteristics that shape a firm's capacity for innovation. Organizational factors such as previous experience with eco-innovation, resource availability, and the presence of an innovation-oriented culture are essential in determining a firm's ability to successfully pursue and implement eco-innovations (Arranz et al. 2020). The availability of resources such as financial capital, skilled personnel, and R&D facilities is particularly crucial for sustaining long-term eco-innovation efforts (de Jesus Pacheco et al. 2017). An organization's environmental awareness, embedded within its corporate culture, influences how sustainability is integrated into its operations and decision-making processes (Chang and Chen 2013; Chen et al. 2012).

Additionally, individual factors, such as employees' personality traits, can impact eco-innovation efforts. Traits such as agreeableness, openness, and conscientiousness are crucial in fostering collaboration and creative problem-solving within eco-innovation teams. Employees who are open to latest ideas are more likely to embrace and contribute to innovative sustainability solutions, while those high in agreeableness are more likely to cooperate and work effectively within teams focused on sustainability initiatives (Fernández-Muñiz et al. 2024).

While significant progress has been made in understanding the drivers of eco-innovation, there remains a need for a comprehensive theoretical framework that can fully capture the

diverse and interconnected factors influencing eco-innovation. Considering these considerations, our study aims to address the following research question: *How do organizations sense, seize, and transform eco-innovation opportunities in their operations, products, and services?*

By answering this question, we aim to shed light on the internal mechanisms that enable eco-innovation and to advance a more integrated and dynamic understanding of sustainability-oriented innovation.

3 | Research Method

To answer the research question, we decided to adopt a grounded theory-based approach (Glaser and Strauss 1998; Pidgeon and Henwood 2004). This methodological approach lends itself when the research is aimed at understanding the how of things, concerning a new or unknown phenomenon (Charmaz 2006).

3.1 | Empirical Setting

We selected our research setting based on Corporate Knights' ranking of the 100 most sustainable companies of 2023, as this ranking identifies firms that have demonstrated a strong commitment to sustainability through their environmental, social, and governance (ESG) performance. These companies are leaders in their respective industries and operate across diverse sectors and geographical contexts, making them ideal candidates for exploring how companies effectively design and develop eco-innovations. By analyzing firms that have already incorporated sustainability into their strategies, we were able to examine real-world examples of eco-innovation in both products and processes. This diverse sample allowed us to investigate how different companies, operating in various contexts, approach the challenge of enhancing sustainability.

After identifying the top 100 companies from the Corporate Knights Global 100, we contacted each organization to request participation in our study. Specifically, we sought to interview two key figures within each company: (1) the Chief Sustainability Officer (CSO) or Sustainability Manager and (2) the Head of Innovation or an equivalent role, involved in driving technological and business model innovations within the company. By including both sustainability and innovation representatives, we aimed to capture a comprehensive perspective on how eco-innovation emerges within organizations. This approach allowed us to understand not only the sustainability-related pressures and initiatives but also how firms integrate these considerations into their broader innovation processes and strategic decision-making. To ensure an objective and unbiased approach to gathering information, we chose to conduct separate interviews with the Chief Sustainability Officer and the Head of Innovation. This decision was made to prevent the responses of one from influencing the perceptions of the other, thus preserving the authenticity and neutrality of the collected information.

3.2 | Research Methodology

The research methodology employed in this study is the Gioia methodology (Gioia et al. 2013; Gioia 2021). Appendix A contains the complete list of questions that guided our semi-structured interviews. The interview protocol was designed to align with the core components of DCT framework. Each group of questions was formulated to investigate specific phases of this model. Questions 3, 4, and 14 were aimed at exploring the foundational trigger for eco-innovation, seeking to identify the drivers that compelled the organization to act on sustainability. Questions 4 and 7 were designed to investigate the sensing phase, focusing on how organizations scan their environment to identify and interpret sustainability opportunities. Questions 2 and 5 directly addressed the seizing phase, focusing on how a perceived opportunity is captured and transformed into a concrete plan or pilot project. Finally, questions 5, 6, 8, 9, 11, 12, 15, and 16 focused on the transforming phase, which involves the extensive process of implementing and diffusing the innovation, including the organizational changes, facilitating factors, and critical issues involved in embedding sustainable innovation.

All interviews were recorded, transcribed, and subsequently anonymized. Following this, we proceeded to develop first-order codes, breaking down the information into primary categories (Gioia et al. 2013; Gioia 2021). This process laid the foundation for a comprehensive analysis of the data, facilitating the identification of key themes and patterns within the narratives provided by the sustainability and innovation managers. Following the generation of first-order codes from the transcribed interviews, a meticulous comparative analysis ensued. These initial codes were not only examined in relation to existing literature on eco-innovation but were also cross-referenced among themselves. Subsequently, this iterative process led to the emergence of second-order themes. These higher-order categories represent synthesized concepts that encapsulate the essence of related first-order codes (Gioia et al. 2013; Gioia 2021). By juxtaposing the findings with both established theories and the internal coherence of the data, we could distill overarching themes that contribute to a more profound understanding of the enablers shaping eco-innovation. Building upon the identification of second-order themes, the next phase of the analysis involved a process of aggregation into higher-level constructs known as aggregate dimensions. Each second-order theme, representing a nuanced aspect of the enablers for eco-innovation, was scrutinized to discern overarching patterns and relationships (Gioia et al. 2013; Gioia 2021). The aggregation into aggregate dimensions provided a holistic perspective, allowing for the grouping of related second-order themes into broader organizational constructs.

The first round of interviews was crucial in identifying first-order codes, second-order themes, and aggregate dimensions. However, due to the complexity of the phenomenon, we found it necessary to further our investigation with additional interviews. These subsequent interviews were aimed at gaining a deeper understanding of the existing linkages among the various concepts identified. This layered approach allowed us to

obtain a more comprehensive and nuanced view of the context, highlighting connections and dynamics that underscore the complexity of relationships among the key concepts identified. To ensure data robustness, we complemented our interviews with secondary data sources, including sustainability reports, corporate websites, and public disclosures from the sampled companies. This triangulation approach helped validate interview responses and provided additional context for analyzing eco-innovation.

At the culmination of our analysis, the aggregated dimensions were integrated to construct a grounded model. This model serves as a conceptual framework that encapsulates the multifaceted enablers influencing the development of eco-innovation within large companies.

3.3 | Data Collection

Table 1 shows the detailed list of sources that have been used during the research. In total, 32 interviews were conducted. Table 2 shows the information regarding each interview, the title of the job position held by the person interviewed, as well as the duration of the interview. Each interview was recorded and transmitted verbatim. After the initial interviews, we reviewed and updated the interview protocol following the guidelines provided by Glaser and Strauss (1967). Data collection and comparison with what previously emerged in the literature continued until theoretical saturation was reached (Glaser and Strauss 1967).

3.4 | Data Analysis

To analyze the data collected, we implemented a repetitive process, moving back and forth between the data that emerged during the interviews, those present in company documents, and what is present in studies in literature. Following the guidelines of Gioia et al. (2013), we followed three main steps.

3.4.1 | Step 1: Creating Categories and First-Order Codes

We have labeled the industry organizational enablers that, according to the interviewed managers, have enabled the development of eco-innovations within their respective companies. The codes were inductively derived from the data, varying from a few words to full sentences. After multiple readings of the interviews, we consolidated the original labels into an initial set

TABLE 1 | Data sources.

Data source	Type of data	Use in the analysis
A. Interviews	Semistructured interviews	Reconstruction of the set of concepts produced in the data tables
B. Company documents	Sustainability report	Supporting, integrating, and triangulating evidence from interviews
C. Corporate website	Public statements on corporate websites	Familiarization with corporate effort toward eco-innovation

TABLE 2 | Interview data.

#	Job title	Supporting documents	Interview duration	Industry
1	Sustainability Manager	Sustainability report	51 min	Industrials
2	Innovation Strategist	Sustainability report	48 min	Industrials
3	Chief Sustainability Officer	Sustainability report	60 min	Financials
4	Head of Innovation	Sustainability report	36 min	Information technology
5	Chief Sustainability Officer	Sustainability report	60 min	Utilities
6	Sustainability Manager	Sustainability report	40 min	Materials
7	Innovation Manager	Sustainability report	53 min	Information technology
8	Chief Sustainability Officer	Sustainability report	60 min	Materials
9	Sustainability Manager	Sustainability report	32 min	Utilities
10	Sustainability Manager	Sustainability report	45 min	Industrials
11	Head of Innovation	Sustainability report	55 min	Industrials
12	Sustainability Manager	Sustainability report	60 min	Health care

(Continues)

TABLE 2 | (Continued)

#	Job title	Supporting documents	Interview duration	Industry
13	Head of Innovation	Sustainability report	61 min	Industrials
14	Sustainability Manager	Sustainability report	40 min	Communication services
15	Chief Sustainability Officer	Sustainability report	60 min	Consumer staples
16	Chief Sustainability Officer	Sustainability report	64 min	Consumer staples
17	Sustainability Manager	Sustainability report	45 min	Energy
18	Chief Innovation Officer	Sustainability report	50 min	Consumer discretionary
19	Chief Sustainability Officer	Sustainability report	60 min	Financials
20	Sustainability Manager	Sustainability report	45 min	Financials
21	Chief Sustainability Officer	Sustainability report	35 min	Industrials
22	Innovation Manager	Sustainability report	45 min	Utilities
23	Sustainability Manager	Sustainability report	60 min	Industrials
24	Chief Innovation Officer	Sustainability report	70 min	Information technology
25	Sustainability Manager	Sustainability report	48 min	Consumer discretionary
26	Innovation Manager	Sustainability report	50 min	Information technology
27	Chief Sustainability Officer	Sustainability report	26 min	Health care
28	Chief Sustainability Officer	Sustainability report	63 min	Financials
29	Sustainability Manager	Sustainability report	32 min	Consumer staples
30	Innovation Strategist	Sustainability report	44 min	Information technology
31	Chief Sustainability Officer	Sustainability report	54 min	Consumer discretionary
32	Head of Innovation	Sustainability report	32 min	Consumer discretionary

of first-order codes. The reliability of the data analysis was ensured by double coding procedures. Two assistant researchers independently coded the data before combining their analyses and seeking substantial agreements.

3.4.2 | Step 2: Integrating First-Order Codes and Creating Second-Order Themes

In the second phase, we grouped first-order concepts into categories previously established in literature. Through axial coding, we merged first-order codes into second-order themes, systematically comparing emerging constructs with existing literature concepts. Finally, we organized the second-order themes into broad aggregate dimensions. Figure 1 in our data structure illustrates our first-order codes, second-order themes, and aggregate dimensions.

3.4.3 | Step 3: Building a Grounded Model

After identifying our second-order themes and organizing them into five aggregate dimensions, we thoroughly explored the relationships and interconnections between these constructs. We visually represented these relationships in a figure, which illustrates the grounded model that will be detailed in the following section.

4 | Results

4.1 | Sensing Eco-Innovation Opportunities

The first aggregate dimension identified in the analysis is *Sensing Eco-innovation opportunities*, which refers to the ability of organizations to identify and respond to environmental opportunities emerging from external changes. Based on insights gathered through interviews with sustainability and innovation managers, it became evident that firms proficient in this dimension are better positioned to navigate the complexities of sustainability and capitalize on emerging opportunities. The following three key subthemes emerged from the interviews, each shedding light on the practices that enable firms to sense eco-innovation opportunities effectively: (a) monitoring regulatory and market trends; (b) engaging with external stakeholders; and (c) exploring emerging technologies.

Monitoring regulatory and market trends was repeatedly highlighted by interviewees as a critical activity for identifying eco-innovation opportunities. According to one sustainability manager, "By staying ahead of regulatory changes, we can not only ensure compliance but also identify market shifts those present new opportunities for sustainability-driven innovation." Another innovation manager explained, "We regularly track evolving regulations to ensure that we are ready to pivot our strategy when new standards emerge, which often leads us to

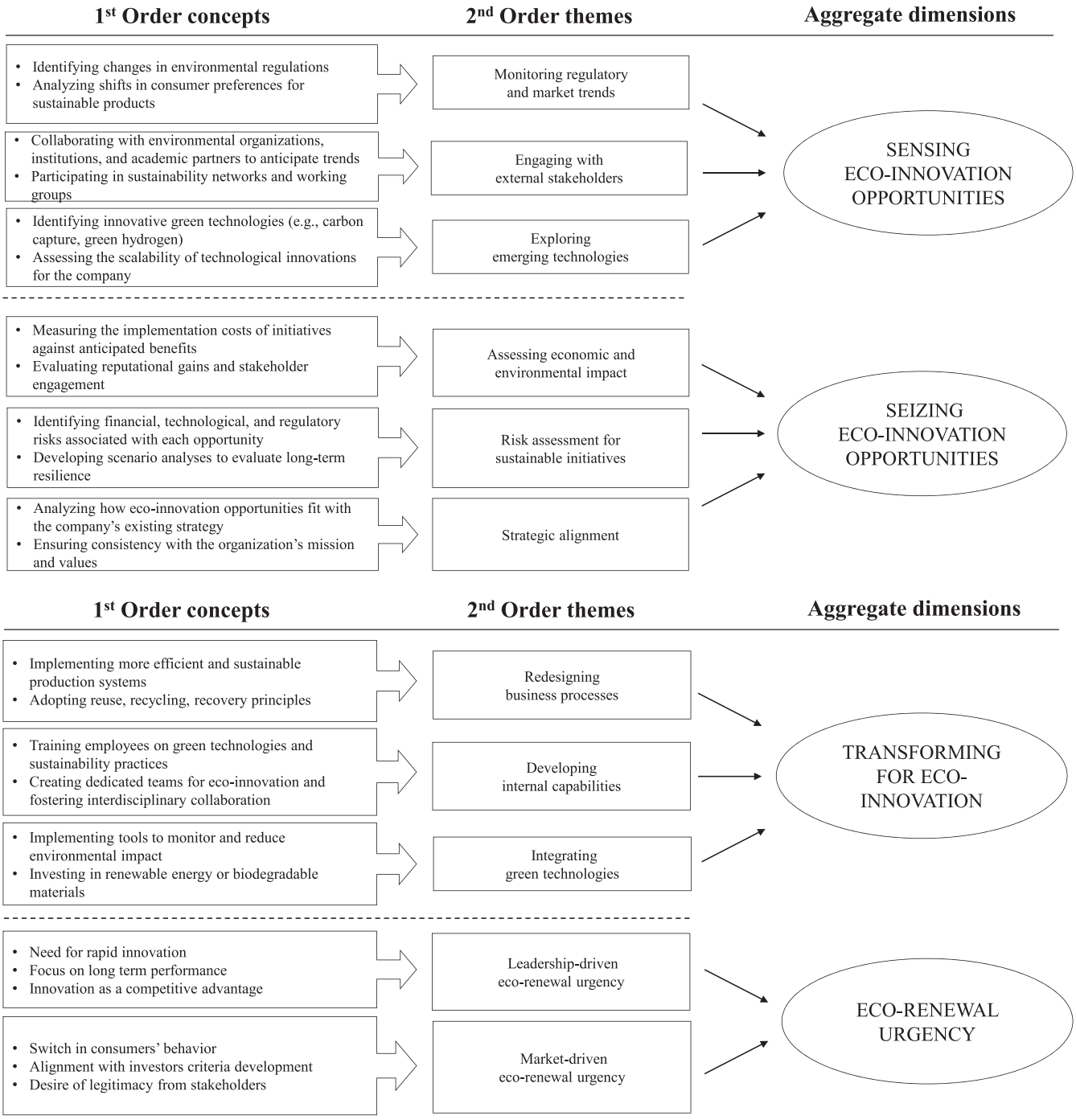

FIGURE 1 | Data structure.

new opportunities." This proactive approach enables firms to adjust their strategies in anticipation of regulatory changes and market dynamics, allowing them to remain competitive by leveraging their environmental actions. This proactive approach positions firms as adaptable entities that can quickly align their strategies with external demands, enabling them to capitalize on sustainability trends and maintain competitiveness. Such adaptability is not only a defensive mechanism against potential noncompliance but also an offensive strategy to differentiate the firm in a rapidly changing market landscape. The importance of this activity aligns with the findings of Demirel and Kesidou (2019), who argue that firms must develop sustainability-oriented capabilities to respond effectively to regulatory pressures.

Engaging with external stakeholders emerged as another important theme in the interviews. Sustainability and innovation managers emphasized that actively involving external groups—such as customers, suppliers, and NGOs—plays a key role in discovering eco-innovation opportunities. One manager noted, "Our company places a strong emphasis on engaging with external stakeholders, as their feedback often guides us toward innovative sustainability solutions that we might not have considered otherwise." Another respondent mentioned, "Working closely with our suppliers and customers allows us to align our sustainability efforts with the broader ecosystem, ensuring that we meet their evolving expectations and tap into new market trends." Such engagement helps firms uncover eco-innovation

opportunities by understanding external needs and leveraging the collective knowledge of their stakeholders. This approach aligns with Adomako and Tran (2023), who found that stakeholder ties, both intraindustry and extraindustry, positively influence eco-innovation and new product performance. Strong relationships with stakeholders provide firms with access to critical resources, information, and support, enabling them to co-create solutions that address environmental challenges effectively. In line with this, Centobelli et al. (2023) highlighted the importance of a systemic framework in managing sustainable supply chain practices, where collaboration among stakeholders and technological integration enable firms to better coordinate and orchestrate sustainability efforts across their supply networks.

Exploring emerging technologies was highlighted as a vital aspect of sensing eco-innovation opportunities. Sustainability and innovation managers consistently stressed the importance of keeping an eye on innovative technologies that could drive eco-innovations. As one innovation manager stated, "Emerging technologies are often the key to unlocking new eco-innovation opportunities. We actively explore how these technologies can improve our environmental performance and give us a competitive edge." Another interviewee shared, "*Our R&D teams are constantly exploring new technologies that could disrupt our industry, and many of the most exciting eco-innovation opportunities come from these technological breakthrough*s." By staying ahead of technological trends and partnering with external tech providers, firms can identify novel solutions that can enhance their sustainability efforts. These technologies often enable organizations to address environmental challenges in innovative ways, ranging from energy efficiency and waste reduction to product lifecycle optimization. These findings align with Montresor and Vezzani (2023), who highlighted that the adoption of digital technologies, particularly artificial intelligence (AI), has been shown to enable eco-innovation in production processes and business models. For instance, AI-driven analytics can optimize production systems, reduce waste and energy consumption while improve resource allocation.

4.2 | Seizing Eco-Innovation Opportunities

A second aggregate dimension identified in the analysis is *Seizing Eco-innovation opportunities*, which refers to the actions taken by firms to capitalize on the eco-innovation opportunities they have sensed. Interviews with sustainability and innovation managers revealed that organizations are adept at turning identified opportunities into concrete actions, ensuring both economic and environmental benefits. Three second-order themes emerged from the interviews, each illustrating practices that support firms in seizing eco-innovation opportunities: (a) assessing economic and environmental impact; (b) risk assessment for sustainable initiatives; and (c) strategic alignment.

Assessing the economic and environmental impact of potential opportunities was emphasized by interviewees as a crucial step in the process of seizing eco-innovation opportunities. As one Chief Sustainability Officer shared, "Before committing to any sustainability initiative, we carefully evaluate its economic and environmental impact. This ensures that the initiatives we pursue provide tangible benefits both financially and environmentally." Another innovation manager explained, "We use detailed cost-benefit analyses to determine whether a new sustainable technology or practice will lead to long-term value. It is about finding the right balance between the environment and our bottom line." This dual focus allows companies to prioritize initiatives that generate substantial value while ensuring their environmental goals are met.

Conducting risk assessments for sustainable initiatives was frequently mentioned by interviewees as an essential part of the decision-making process. According to one respondent, "We need to assess the risks involved in implementing sustainability initiatives. This includes both financial risks and the potential impact on our reputation, as well as risks related to market adoption." Another innovation manager noted, "Risk management is key when pursuing eco-innovation opportunities. We evaluate the potential hurdles—whether technological, market-driven, or regulatory—to ensure that we are prepared for any challenges." This careful consideration of risks allows firms to anticipate potential obstacles and take proactive measures to mitigate them, increasing the likelihood of success for eco-renewal initiatives.

Strategic alignment emerged as another critical practice in seizing eco-innovation opportunities. Sustainability and innovation managers consistently emphasized the importance of ensuring that eco-renewal initiatives align with the overall business strategy. As one manager put it, "Initiatives are only successful when they are fully integrated into our company's broader strategy. They need to align with our long-term vision and values to ensure they receive the necessary support and resources." Another respondent highlighted, "We regularly review our strategic goals to ensure that sustainability is embedded in everything we do. This alignment helps to secure top management's commitment and ensures that all teams are focused on the same objectives." By aligning eco-renewal initiatives with broader strategic goals, companies can ensure that these efforts contribute to both sustainability and long-term business success.

4.3 | Transforming for Eco-Innovation

A third aggregate dimension identified in the analysis is *Transforming for Eco-Innovation*, which refers to the internal changes organizations must undergo to foster and scale eco-innovations. Insights gathered from professionals in sustainability and innovation reveal that companies successfully transforming for eco-innovation are those that not only create innovative solutions but also adapt their internal processes, capabilities, and technologies to support long-term sustainable growth. The analysis highlighted the following three second-order themes that play a role in this transformation: (a) redesigning business processes; (b) developing internal capabilities; and (c) integrating green technologies.

A key element in driving eco-innovation is the *redesign of business processes*. As one respondent noted, "To implement eco-innovation, we had to rethink our business processes

completely—from procurement to production, every step was re-evaluated with sustainability at the core." Another participant shared, "By incorporating circular economy principles into our design and production processes, we've significantly improved efficiency while embedding sustainability across our value chain." This strategic redesign enables companies to minimize waste, optimize resource use, and ensure sustainability is deeply integrated into their operations.

Building internal capabilities is another essential aspect for companies aiming to transform for eco-innovation. Respondents highlighted the importance of nurturing the skills and knowledge necessary to drive sustainability initiatives. One individual mentioned, "Developing our internal capabilities has been a priority. We have invested in training our teams so they can identify and seize eco-innovation opportunities across the company." Another noted, "We created dedicated sustainability teams with expertise spanning R&D, operations, and marketing to ensure a holistic approach to integrating green innovation." These efforts in capacity-building not only support the implementation of eco-innovations but also establish a culture of sustainability within the organization.

Integrating green technologies was consistently identified as a core enabler of eco-innovation. As one innovation expert explained, "The integration of green technologies, like energy-efficient tools or sustainable materials, has been crucial for improving the eco-performance of our products. These technologies are the foundation of our sustainable innovation strategy." Another manager added, "Adopting renewable energy solutions across our operations has reduced our carbon footprint while fostering new product development opportunities." The adoption and integration of these technologies allow organizations to enhance both their environmental performance and their market competitiveness.

4.4 | Eco-Renewal Urgency

Another aggregate dimension identified is *Eco-Renewal Urgency*, which captures the shared perception of an immediate and compelling need to restore and regenerate ecological systems in response to escalating environmental degradation. This perceived urgency acts as the critical force that enables organizations to activate the dynamic capabilities of sensing, seizing, and transforming toward eco-innovation. Eco-Renewal Urgency reflects the collective understanding that postponing actions risks irreversible harm to the planet and its life-support systems, thereby driving organizations to engage proactively across all phases of eco-innovation.

The following two second-order themes emerged as central to the urgency surrounding eco-renewal: (a) leadership-driven eco-renewal urgency and (b) market-driven eco-renewal urgency.

For many organizations, the urgency to pursue eco-innovation initiatives is driven by strong leadership commitment. One manager shared, "Our leadership team has made sustainability a top priority, recognizing the need for rapid innovation to stay ahead in a competitive market. This drive pushes the entire organization to act quickly and effectively. The sense of urgency comes directly from the top. It's not just about following trends but about establishing innovation as a competitive advantage." Another respondent emphasized, "The leadership's vision for a sustainable future has also instilled a focus on long-term performance, which has been a key factor in enabling us to implement eco-innovation faster. Without that push, it would have been easy to delay actions." Strong leadership alignment with sustainability goals ensures that the entire organization works toward the same objective with a sense of immediacy. These findings are consistent with Paraschiv et al. (2012), who argue that leadership is essential for integrating sustainability into organizational culture and operations, fostering eco-innovation to implement sustainable practices. Leadership commitment not only establishes sustainability as a core organizational value but also empowers teams to innovate by creating an environment where eco-innovation is prioritized and rewarded. Leaders play a crucial role in communicating the importance of sustainability initiatives and ensuring that these efforts are seamlessly integrated into the company's broader strategy. However, unlike Paraschiv et al. (2012), who focus on the role of leadership in embedding environmental concerns into organizational culture and operations, our data reveal that leadership also serves as a critical mechanism for creating a sense of urgency. By emphasizing the immediacy of environmental challenges and articulating a compelling vision for eco-renewal, leaders can instill a sense of urgency throughout the organization.

In addition to internal leadership, market dynamics also creates a sense of urgency for companies to adopt eco-renewal strategies. According to one professional, "The market is evolving rapidly, and customers are demanding more sustainable products due to a switch in consumers' behavior. This pressure from consumers forces us to innovate and act quickly to stay competitive." Another participant noted, "We are also seeing an increasing alignment with investors' criteria development, as sustainability is becoming a key factor in investment decisions." In addition, another interviewee noted, "Our competitors are adopting green technologies and practices at an accelerated pace, driven by the desire for legitimacy from stakeholders. This creates pressure for us to keep up with these industry standards. It's a race, and if we don't move fast, we risk losing market share." These forms of external pressure create a fast-moving environment that compels organizations to prioritize eco-renewal and reinforces the perception that inaction or delay carries significant risks.

Respondents articulated eco-renewal urgency in ways that differentiate it from top management commitment (Wijethilake and Lama 2019), sustainability orientation (Danso et al. 2019), institutional pressure (Liao 2018), and generic notions of urgency associated with episodic change initiatives.

While leadership commitment clearly emerged as an important *source* of urgency, interviewees did not describe eco-renewal urgency as being confined to top management support or intent. Rather than portraying urgency as a function of leaders' values or decisions alone, respondents emphasized that it materialized as a *shared organizational perception* that permeated interpretations and actions across hierarchical levels and functional boundaries. Leadership commitment thus appeared to act as a

trigger or amplifier (Colwell and Joshi 2013), but not as a sufficient condition to explain eco-renewal urgency itself.

Moreover, eco-renewal urgency was empirically distinguishable from a general sustainability orientation (Danso et al. 2019). While several interviewees referred to long-standing environmental values or sustainability commitments within their organizations, they consistently framed urgency as *temporal and action-oriented*, rather than primarily value-driven. Sustainability was not described merely as a guiding principle or long-term aspiration, but as a *nondeferrable imperative* that required immediate decisions and concrete action.

In addition, respondents differentiated eco-renewal urgency from institutional pressure (Liao 2018). Regulatory requirements, investor expectations, and competitive dynamics were frequently cited as external stimuli; however, interviewees emphasized that these pressures only became consequential once they were *internalized and interpreted as urgent*. Rather than equating urgency with the mere presence of external constraints, managers described a process through which such pressures were translated into a shared perception that delay would threaten both ecological outcomes and organizational viability. Eco-renewal urgency therefore resided not in the external environment itself, but in the organization's collective interpretation of that environment.

Finally, interviewees differentiated eco-renewal urgency from generic notions of urgency commonly discussed in the change management literature (Fredberg and Pregmark 2022). Rather than describing urgency as a short-term mobilizing mechanism aimed at initiating discrete change initiatives, respondents portrayed eco-renewal urgency as both *domain-specific and enduring*. Urgency was explicitly anchored in ecological challenges and was described as sustaining organizational momentum across the sensing, seizing, and transforming phases, rather than dissipating once an initial change had been launched.

In Table 3, the representative quotations are illustrated, providing a detailed overview of the key statements and their significance.

The following boxes illustrate brief case studies that concretely show how eco-renewal urgency influences the processes of sensing and seizing opportunities.

Box 1 Urgency and eco-innovation in the automotive sector

Context of urgency.

A major car manufacturer, a leader in the production of internal combustion engine vehicles, found itself facing twofold pressure. On one hand, the European Union announced new and strict regulations on CO_2 emissions with imminent deadlines. On the other hand, market data showed a rapid growth in consumer demand for electric vehicles. The combination of these two forces created a perceived urgency at the strategic level: the risk of noncompliance and the potential loss of market share threatened the company's long-term sustainability.

Sensing phase.

This urgency pushed the company to radically intensify its sensing capability. Instead of merely monitoring direct competitors, it expanded its focus to a broader innovation ecosystem. The R&D team initiated collaborations with startups specializing in batteries and software for electric vehicles, participated in technology forums, and analyzed emerging patents. An innovation manager explained: "the regulatory deadline set off an alarm that forced us to look beyond our traditional boundaries. The urgency pushed us to actively seek solutions, not to wait for them to come to us." This pressure accelerated the recognition of new technological and market opportunities that would have otherwise been ignored or considered premature.

Seizing phase.

Once the opportunities were sensed, urgency acted as a catalyst for the seizing phase. To prevent initiatives from getting lost in corporate bureaucracy, management created an "accelerated innovation team" with the authority to make decisions and allocate budgets in a brief time. This team quickly launched a pilot project for a new electric vehicle model, bypassing typical multi-year development cycles. Significant investments were allocated to the conversion of production lines and staff training. Urgency enabled decisive leadership that overcame organizational inertia and accelerated the translation of sensing opportunities into concrete actions.

Box 2 Urgency and eco-innovation in the food & beverage sector

Context of urgency.

A beverage company, known for its global brands, faced an urgent reputational crisis. An investigation by an NGO, widely publicized by the media, criticized the company for its use of single-use plastic packaging, highlighting its impact on ocean pollution. Although the company was not in violation of any law, the damage to its image among consumers and investors created an internal urgency to act quickly. The threat to reputation and, consequently, to brand stability became the main driver for innovation.

Sensing phase.

To respond to this crisis, the company had to activate its sensing capability in an accelerated manner. The sustainability team organized urgent meetings with environmental NGOs, material suppliers, and researchers to gain a deep understanding of the criticism and potential alternatives. The media pressure acted as a megaphone that amplified the need to listen actively. Through this rapid "immersion" the company identified a radical opportunity: the development of a fully recyclable and compostable paper bottle, in collaboration with a specialized startup. A manager commented: "Before this crisis, sustainable packaging was on the agenda, but it wasn't a priority. The urgency made the problem unavoidable and forced us to look for solutions we hadn't dared to explore before."

Seizing phase.

The transition to the seizing phase was equally rapid. Leadership gave full support to a packaging eco-innovation project, granting the team unprecedented autonomy. Extraordinary resources were allocated to research and development, and external engineers were recruited to accelerate the design. The urgency justified a significant investment and a high technological risk. Moreover, the project was promoted company wide as a reputational recovery initiative, mobilizing staff and creating a shared sense of mission. The company thus converted a reputational emergency into an opportunity to launch an innovative product that allowed it to regain consumer trust and position itself as a sustainability leader.

5 | Eco-Renewal Urgency as Catalysator

In Figure 2, the grounded model is presented. This model encapsulates the dynamic and interconnected processes that organizations undergo when eco-innovating.

At the heart of this model lies *eco-renewal urgency*, which emerges as the critical starting point and continuous driver of the entire eco-innovation process. Rather than being confined to an initial trigger, this urgency permeates each phase of the dynamic capabilities' framework: sensing, seizing, and transforming.

Eco-renewal urgency is conceptualized as arising from two primary sources: leadership-driven eco-renewal urgency and

TABLE 3 | Data table.

Aggregate dimension	Second-order theme	Quotation
Sensing eco-innovation opportunities	Monitoring regulatory and market trends	[By staying ahead of regulatory changes, we can not only ensure compliance but also identify market shifts that present new opportunities for sustainability-driven innovation]. [We regularly track evolving regulations to ensure that we are ready to pivot our strategy when new standards emerge, which often leads us to new opportunities].
	Engaging with external stakeholders	[Our company places a strong emphasis on engaging with external stakeholders, as their feedback often guides us toward innovative sustainability solutions that we might not have considered otherwise]. [Working closely with our suppliers and customers allows us to align our sustainability efforts with the broader ecosystem, ensuring that we meet their evolving expectations and tap into new market trends]. [I mean, engaging with groups outside the company, like NGOs or consumers, is crucial, right? It helps us understand what they expect and keeps us on top of the eco-innovation game]. [Honestly, it is all about staying in touch with stakeholders to really grasp what they are looking for and that's what keeps us leading in sustainability].
	Exploring emerging technologies	[New technologies are often the key to unlocking new eco-innovation opportunities. We actively explore how these technologies can improve our environmental performance and give us a competitive edge]. [Our R&D teams are constantly exploring new technologies that could disrupt our industry, and many of the most exciting eco-renewal opportunities come from these technological breakthroughs]. [Emerging technologies are crucial in our strategy, and we constantly evaluate new innovations to maintain our sustainability edge]. [We really cannot ignore the power of technology in our approach. By continuously assessing new innovations, we are able to secure our position at the forefront of sustainability. It is an ongoing process of adapting and improving].
Seizing eco-innovation opportunities	Assessing economic and environmental impact	[Before committing to any sustainability initiative, we carefully evaluate its economic and environmental impact. This ensures that the initiatives we pursue provide tangible benefits both financially and environmentally]. [We use detailed cost–benefit analyses to determine whether a new sustainable technology or practice will lead to long-term value. It is about finding the right balance between the environment and our bottom line]. [We do not rush into sustainability initiatives. We carefully weigh both the consequences first that way, we can be sure we are getting actual, lasting benefits]. [Before jumping into any new project, we always take the time to assess its impact].

(Continues)

TABLE 3 | (Continued)

Aggregate dimension	Second-order theme	Quotation
	Risk assessment for sustainable initiatives	[We need to assess the risks involved in implementing sustainability initiatives. This includes both financial risks and the potential impact on our reputation, as well as risks related to market adoption]. [Risk management is key when pursuing eco-innovation opportunities. We evaluate the potential hurdles—whether technological, market-driven, or regulatory—to ensure that we are prepared for any challenges]. [We assess the risks involved in implementing sustainability initiatives].
	Strategic alignment	[Initiatives are only successful when they are fully integrated into our company's broader strategy. They need to align with our long-term vision and values to ensure they receive the necessary support and resources]. [We regularly review our strategic goals to ensure that sustainability is embedded in everything we do. This alignment helps to secure top management's commitment and ensures that all teams are focused on the same objectives]. [Our projects aren't just standalone projects ... They must be coordinated with our company].
Transforming for eco-innovation	Redesigning business processes	[To implement eco-innovation, we had to rethink our business processes completely—from procurement to production, every step was re-evaluated with sustainability at the core]. [By incorporating the principles of circular economy into our design and production processes, we have significantly improved efficiency while embedding sustainability across our value chain].
	Developing internal capabilities	[Developing our internal capabilities has been a priority. We've invested in training our teams so they can identify and seize eco-innovation opportunities across the company]. [We created dedicated sustainability teams with expertise spanning R&D, operations, and marketing to ensure a comprehensive approach to integrating green innovation]. [By investing in training, we have equipped our teams to act].
	Integrating green technologies	[The integration of green technologies, like energy-efficient tools or sustainable materials, has been crucial for improving the eco-performance of our products. These technologies are the foundation of our sustainable innovation strategy]. [Adopting renewable energy solutions across our operations has reduced our carbon footprint while fostering new product development opportunities].
Eco-renewal urgency	Leadership-driven eco-renewal urgency	[Our leadership team has made sustainability a top priority, recognizing the need for rapid innovation to stay ahead in a competitive market. This drive pushes the entire organization to act quickly and effectively. The sense of urgency comes directly from the top. It's not just about following trends but about establishing innovation as a competitive advantage]. [The leadership's vision for a sustainable future has also instilled a focus on long-term performance, which has been a key factor in enabling us to implement eco-innovation faster. Without that push, it would have been easy to delay actions].
	Market-driven eco-renewal urgency	[The market is evolving rapidly, and customers are demanding more sustainable products due to a switch in consumers' behavior. This pressure from consumers forces us to innovate and act quickly to stay competitive]. [We are also seeing an increasing alignment with investors' criteria development, as sustainability is becoming a key factor in investment decisions]. [Our competitors are adopting green technologies and practices at an accelerated pace, driven by the desire for legitimacy from stakeholders. This creates pressure for us to keep up with these industry standards. It's a race, and if we do not move fast, we risk losing market share].

market-driven eco-renewal urgency. Leadership-driven urgency reflects proactive recognition by company leaders that environmental renewal cannot be delayed: "If we wait, we lose both time and ground; acting now is part of surviving tomorrow", as one manager noted. Market-driven urgency, on the other hand, stems from external pressures, such as regulation, competition, and consumer expectations; "The market pushes us; our clients want greener solutions, and if we don't adapt, others will"

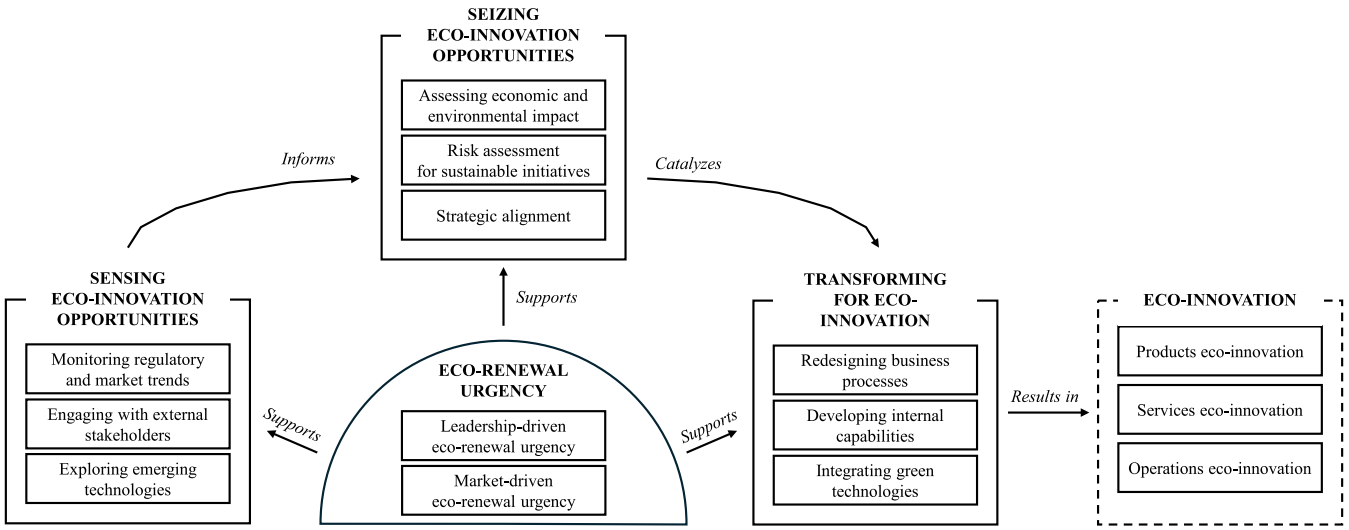

FIGURE 2 | Grounded model.

explained another respondent. These dual sources generate a shared perception of immediacy, instilling a collective sense that postponement carries irreversible risks for both the planet and organizational viability.

This perceived urgency directly shapes the *sensing phase*. It sharpens organizational awareness and motivates active scanning of the environment: "We started looking at signals we had ignored before, because the urgency made them impossible to overlook." Urgency therefore enables firms not only to monitor trends but also to interpret them as pressing opportunities for eco-innovation.

Digital technologies play a complementary role in this phase by interacting with eco-renewal urgency rather than operating as purely instrumental enablers. Under conditions of heightened eco-renewal urgency, digital technologies make environmental inefficiencies in production processes, resource flows, and supply chains more visible, thereby revealing concrete opportunities for environmental performance improvement that might otherwise remain overlooked. In this sense, eco-renewal urgency directs organizational attention toward sustainability-relevant signals, while digital technologies render those signals more legible, measurable, and actionable, reinforcing the activation of the sensing capability.

In the *seizing* phase, urgency becomes the catalyst that pushes organizations to move from recognition to action. Without it, opportunities might remain unexploited: "The sense of urgency was what convinced us to invest; otherwise, we would still be debating the risks." Thus, eco-renewal urgency accelerates decision-making, aligns strategic choices with ecological imperatives, and legitimizes the allocation of resources toward eco-innovative initiatives. In this phase, digital technologies further support urgency-driven action by enabling faster evaluation, experimentation, and implementation of eco-innovative solutions.

Finally, in the *transforming* phase, urgency sustains the energy needed for deeper organizational change. Transformation requires altering processes, structures, and cultures, and this is often met with resistance. As one interviewee reflected: "Change is hard, but the urgency makes it nonnegotiable; it gives us the push to redesign how we operate." Eco-renewal urgency thus acts as the underlying force that ensures transformation is not partial or symbolic, but embedded across operations, products, and services. Digital technologies actively enable this transformation by supporting the reconfiguration of organizational processes and infrastructures in more sustainable directions.

The culmination of sensing, seizing, and transforming results in eco-innovation itself, but this outcome is consistently grounded in urgency. In this way, the grounded model demonstrates that eco-renewal urgency is not merely an initial spark but the pervasive driver that activates and sustains the dynamic capabilities necessary for eco-innovation.

6 | Discussion

Our manuscript enhances the understanding of how companies can effectively advance eco-innovation processes. The traditional dynamic capabilities framework—comprising sensing, seizing, and transforming—has long been regarded as essential for the successful implementation of innovation strategies within firms (Lee and Kelley 2008; Fallon-Byrne and Harney 2017). However, our findings reveal that this well-established model is insufficient to fully explain how organizations develop eco-innovation. While these three processes are undoubtedly crucial for success, our analysis highlights the pivotal role of an additional, underlying condition: *eco-renewal urgency*.

Eco-renewal urgency, understood as a shared organizational perception of responsibility and pressing need to act in response to environmental challenges, emerges as the force that enables, accelerates, and sustains all three phases of the dynamic capabilities' framework. In the *sensing phase*, urgency intensifies firms' environmental scanning activities and directs attention toward ecological signals, ensuring that

eco-innovation opportunities are detected and prioritized. In the *seizing phase*, urgency acts as a catalyst for decision-making and resource mobilization, pushing firms to move rapidly from opportunity recognition to concrete initiatives, thus reducing the risk of inertia or delay. In the *transforming phase*, urgency provides the rationale and momentum needed to embed eco-innovation within organizational processes, structures, and cultures, sustaining long-term change rather than peripheral adjustments.

To clarify its theoretical status within the dynamic capabilities' framework, eco-renewal urgency should be interpreted as an *enabling organizational condition*, rather than as a dynamic capability, a meta-capability, or a set of micro-foundations. Eco-renewal urgency does not represent a capability that organizations deliberately deploy, nor does it correspond to specific routines, skills, or individual-level actions typically associated with micro-foundations. Instead, it captures a *shared*, *organization-wide interpretive state* that could shape mechanisms that activate and sustain dynamic capabilities. By intensifying collective attention, accelerating decision-making, and legitimizing resource mobilization, eco-renewal urgency functions as a foundational condition that amplifies the effectiveness of sensing, seizing, and transforming processes without constituting a capability.

In this way, our study extends existing conceptualizations of dynamic capabilities (Teece 2007; Helfat and Peteraf 2015; Zhou et al. 2019) by showing that eco-renewal urgency is not only an antecedent to sensing but also a continuous driver of seizing and transforming. Firms experiencing important levels of eco-renewal urgency exhibit increased engagement in environmental scanning, paying particular attention to regulatory shifts, market dynamics, and emerging technologies. This allows them to identify opportunities for eco-innovation more effectively, especially those that align with both sustainability and strategic goals. This heightened sensitivity to environmental changes and opportunities can be seen as an extension of the sensing phase in the dynamic capabilities' framework, where urgency drives not just awareness but also the speed and depth of engagement with these opportunities.

The introduction of eco-renewal urgency as a precursor to the sensing capability also extends existing conceptualizations of dynamic capabilities. Previous work has emphasized that sensing involves the detection and interpretation of opportunities but has not specifically addressed the organizational conditions that foster the proactive search for eco-innovation opportunities. Scholars have suggested that dynamic capabilities are activated by internal factors such as strategic intent and external factors like market and technological shifts. Our research builds upon this by discussing that eco-renewal urgency plays a pivotal role in influencing both internal and external orientations of the firm, effectively driving more proactive and responsive behaviors to emerging eco-innovation opportunities. This urgency thus acts as a critical antecedent to sensing, making it a necessary addition to the dynamic capabilities' framework.

Furthermore, our findings highlight that the urgency to act in response to environmental challenges not only influences sensing but also shapes how firms engage with and assess these opportunities in the subsequent seizing and transforming phases. According to Teece (2007), seizing involves taking timely actions to capture value from identified opportunities, while transforming refers to reshaping organizational processes, resources, and capabilities to integrate innovation. Our study suggests that companies with a high sense of eco-renewal urgency are not only more likely to identify eco-innovation opportunities but are also better equipped to act on them swiftly. Urgency catalyzes the decision-making process, aligning internal capabilities and strategies to seize and transform opportunities in a way that enhances sustainability. For example, this might involve integrating green technologies into business processes or rapidly developing new products that meet environmental standards.

Our study contributes to the literature on eco-innovation by introducing eco-renewal urgency as a foundational precursor to the sensing capability. While prior research has underscored the importance of sensing, seizing, and transforming for eco-innovation, we demonstrate that organizations need to first cultivate an internal sense of urgency to strengthen their ability to identify and interpret eco-innovation opportunities. Eco-renewal urgency plays a particularly critical role in the sensing phase, where it heightens awareness and prioritization of ecological issues. At the same time, our findings indicate that this urgency does not fade after opportunities are identified; rather, it continues to act as a propulsive force that accelerates decision-making in the seizing phase and sustains the momentum for deeper organizational change in the transforming phase. By integrating eco-renewal urgency into the dynamic capabilities' framework, we provide a more comprehensive understanding of how companies can navigate across all stages of eco-innovation.

Our findings also provide a valuable bridge to other established theoretical frameworks. While our model is grounded in DCT, the sources of eco-renewal urgency we identify—both leadership-driven and market-driven—resonate with insights from institutional theory and stakeholder theory. Specifically, institutional theory helps explain how formal and informal pressures, such as new regulations, industry standards, or the growing influence of NGOs, create a context of legitimacy pressures that intensify the need for eco-innovation. This external push for legitimacy often manifests as the market-driven urgency observed in our data. Simultaneously, our findings intersect with stakeholder theory, which posits that a firm's success depends on managing its relationships with key stakeholders. The demands from powerful stakeholders—such as environmentally conscious consumers, activist investors, or employees concerned with sustainability—can be a direct source of eco-renewal urgency. This highlights that urgency is not just an internal state but is often a direct response to the expectations and power dynamics within a firm's stakeholder network. By acknowledging these connections, our work situates the concept of eco-renewal urgency within a broader academic conversation, demonstrating that the need for sustainable change is driven by a complex interplay of internal capabilities and external pressures.

6.1 | Implications for Practice

Our findings provide concrete guidance for managers, particularly CEOs and senior executives, who are responsible for shaping their organizations' strategic direction and governance

systems. Rather than treating eco-renewal urgency as a purely emergent condition, our study suggests that it can be *actively cultivated and sustained* through deliberate managerial practices. In contexts characterized by escalating environmental challenges and increasing stakeholder pressures, fostering eco-renewal urgency becomes a critical managerial task to enable and sustain eco-innovation.

First, leadership communication plays a leading role in cultivating eco-renewal urgency. Senior leaders can actively shape shared organizational interpretations by consistently framing ecological challenges as *immediate*, *consequential*, and *non-deferrable*, rather than as long-term or peripheral concerns. Repeated and coherent communication that links environmental risks to organizational viability helps embed urgency across hierarchical levels and functional boundaries.

Second, managers can reinforce eco-renewal urgency using *time-bound environmental targets and performance metrics*. Translating sustainability ambitions into concrete deadlines, milestones, and accountability mechanisms makes ecological goals more actionable and difficult to postpone. Such targets help transform abstract sustainability commitments into urgent organizational priorities that demand timely decision-making and action.

Third, integrating sustainability considerations into *governance structures and strategic decision-making processes* represents another important practice. Embedding eco-renewal concerns into boards, executive committees, investment appraisal routines, and strategic planning processes ensures that urgency is institutionalized rather than dependent on individual champions. This reduces the risk that sustainability is treated as an optional or secondary objective when competing priorities arise.

Fourth, the establishment of *cross-functional structures*, such as dedicated task forces, committees, or sustainability councils, can help maintain eco-renewal urgency over time. By facilitating coordination across functions and continuously revisiting priorities as environmental and market conditions evolve, these structures help keep eco-renewal concerns salient and prevent fragmentation or dilution of responsibility.

Importantly, our findings also suggest that eco-renewal urgency should be understood as a *dynamic organizational condition* that requires ongoing maintenance. The same practices used to cultivate urgency—leadership communication, time-bound targets, governance integration, and cross-functional coordination—also play a crucial role in sustaining it over time. Continuous reinforcement is necessary to prevent urgency from fading once initial initiatives are launched or early targets are achieved.

Finally, managers should be attentive to potential risks associated with actively cultivating eco-renewal urgency. Excessive or poorly managed urgency may lead to employee fatigue, resistance, or superficial and symbolic adoption of sustainability initiatives. To mitigate these risks, leaders should balance urgency with adequate resource support, learning opportunities, and mechanisms for reflection, ensuring that eco-renewal urgency remains a productive and enabling force rather than a source of overload or disengagement.

6.2 | Research Limits and Future Research Directions

This study presents several limitations that offer avenues for future research.

First, the empirical data were collected exclusively from sustainability and innovation managers. While these roles are directly involved in eco-innovation processes, they do not represent the full spectrum of actors who contribute to eco-innovation initiatives within firms. Employees from departments such as operations, procurement, R&D, or marketing may offer additional, valuable perspectives. Future studies should adopt a more inclusive approach by incorporating voices from across functional areas to capture the organizational complexity of eco-innovation.

Second, the sample includes only managers from large firms. While this choice allows for the examination of well-structured sustainability strategies, it limits the generalizability of the findings to smaller firms. Small and medium-sized enterprises may face different constraints—such as limited financial or human capital—and adopt distinct approaches to sustainability. Future research should compare how firm size influences the development of eco-innovative capabilities and the perception of eco-renewal urgency.

Third, the contextual variability of eco-renewal urgency across industries, countries, and cultures was not fully explored. Firms operating in highly regulated or environmentally exposed sectors may perceive greater pressure to act, while national institutional frameworks and cultural values may also shape how urgency is experienced and responded to. Future research could adopt cross-industry and cross-national comparative designs to investigate how institutional and cultural environments influence the emergence, intensity, and impact of eco-renewal urgency.

Fourth, the qualitative nature of the study limits the ability to test causal relationships or generalize findings. While the insights generated offer rich theoretical contributions, they should be empirically validated through quantitative methods. Future studies could develop and test hypotheses based on this framework, using larger samples and statistical techniques to assess whether the identified enablers of eco-innovation consistently led to sustainable outcomes.

Fifth, although eco-renewal urgency emerged as a foundational condition enabling firms to sense and act upon sustainability opportunities, the construction remains conceptually and empirically underdeveloped. Future research should focus on the operationalization of eco-renewal urgency by designing a robust measurement framework. This could include indicators such as the degree of leadership commitment to environmental goals, the speed and decisiveness of organizational responses to environmental pressures, the allocation of dedicated sustainability resources, internal awareness of ecological risks, and the intensity of stakeholder-driven expectations. Developing a validated scale would not only allow researchers to assess the presence and strength of urgency across contexts but would also enable empirical testing of its influence on organizational capabilities and innovation performance.

Additionally, future studies could explore specific organizational mechanisms and leadership behaviors that foster and sustain a heightened sense of eco-renewal urgency. Such mechanisms may include the implementation of formal sustainability performance metrics that translate environmental priorities into measurable objectives, thereby signaling their strategic importance to the entire organization. Strategic foresight practices, such as scenario planning and horizon scanning, can also play a pivotal role in anticipating ecological risks and opportunities, turning abstract environmental concerns into concrete managerial imperatives. Furthermore, cross-functional sustainability committees may institutionalize urgency by embedding responsibility for eco-renewal across different departments, ensuring that it is not siloed within a single function but becomes a shared organizational mandate. Structured stakeholder engagement processes, ranging from partnerships with NGOs to regular dialogues with customers and regulators, can further amplify the sense of immediacy by exposing firms to external expectations and pressures that reinforce the necessity of prompt action. Clarifying how this urgency is actively cultivated and embedded into daily operations would enhance its theoretical and practical relevance. For scholars, unpacking these mechanisms could deepen understanding of how urgency functions as a dynamic capability enabler, bridging the gap between abstract motivations and concrete organizational processes. For managers, insights into these practices could provide actionable guidance on how to move beyond rhetorical commitments to sustainability and create the conditions under which urgency becomes a lived, organizing principle that drives eco-innovation across operations, products, and services.

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Appendix A

Interview Protocol

1. What are the most significant innovations in business operations, products or services your company has developed in the past three years to minimize negative environmental effects while creating positive outcomes?

2. What aspects of these innovations are both novel and environmentally impactful? Please specify technologies, processes, or models involved.

3. How did the idea for these innovations emerge? Who were the key initiators (individuals, teams, departments)?

4. What organizational, cultural, or external conditions enabled the development of these innovations? Who championed it initially?

5. How was the idea developed into a first pilot or experimental project? What steps were taken, and what criteria were used to move forward?

6. Which departments or organizational units were involved in the pilot phase? What roles and responsibilities did they have?

7. Which external stakeholders (suppliers, customers, public institutions, NGOs, etc.) were involved in the design or testing phases? How did their input shape the project?

8. What factors (e.g., leadership, funding, partnerships, regulatory incentives) helped move the from idea to implementation?

9. What were the main barriers or difficulties in transitioning from idea to experimentation? How were they overcome?

10. Was the innovation adopted internally or commercialized externally? What steps were taken to scale or diffuse it?

11. What internal or external factors (culture, market demand, policy support, etc.) supported the spread of the innovation?

12. What challenges did the company face in promoting or scaling the innovation?

13. What measurable benefits—environmental, economic, or social—has the company observed as a result of the innovation?

14. Which tools, policies, or programs does your company use to systematically promote the innovation (e.g., R&D incentives, innovation labs, sustainability metrics)?

15. Was the company's decision-making and governance structure conducive to innovation? If not, how was it adjusted?

16. Following this innovation, were organizational structures or processes adapted to support future innovations more effectively?