

Microfoundations of Dynamic Capabilities for Eco-innovation in SMEs: Evidence from Industrial Case Studies.

Abstract

This study examines the microfoundations, that is, skills, processes, structures, and decision rules that underlie the dynamic capabilities enabling SMEs to achieve sustained eco-innovation performance. Building on Teece's (2007) dynamic capabilities framework, we adapt it to the SME context to explain how firms sense opportunities and threats, seize them, and maintain competitiveness by reconfiguring tangible and intangible assets. Using an inductive and abductive design grounded in five in-depth case studies of industrial SMEs in water technology, urban manufacturing, and technical apparel in the Basque Country, we develop a framework capturing how eco-innovation emerges from organisational innovation. The analysis reveals how dynamic capabilities are anchored in the orchestration of microfoundations across multiple organisational dimensions, including leadership, strategic intent, people management, business practices, and external relations. By extending Teece's model to the SME context, we offer contextualised, transferable insights for companies operating under similar conditions, along with practical pathways to strengthen their eco-innovation capacity. The framework also informs policymakers designing targeted support measures for industrial SMEs operating in comparable regional ecosystems, encouraging more adaptive, collaborative, and scalable sustainability transitions.

1. Introduction

Eco-innovation lies at the intersection of business innovation and sustainable development, enabling firms to grow, gain competitive advantage, and reduce their environmental footprint while contributing to global sustainability goals (Salim et al., 2019).

Small and medium enterprises (SMEs), defined as companies employing fewer than 250 people (European Commission, 2003), play a critical role in achieving these goals given their widespread presence in the global economy. SMEs account for around 90% of businesses worldwide and provide more than half of global employment (World Bank, 2024). Although their individual environmental impact may be smaller than that of larger firms, collectively they contribute significantly to energy consumption, emissions, and resource use (Smith et al., 2022). At the same time, their potential to contribute to environmental sustainability is considerable (Oduro, 2024). Survey evidence indicates that 93% of SMEs already implement at least one resource-efficiency measure and 25% have a decarbonisation strategy (European Commission, 2024). Adopting eco-innovations allows firms to reduce energy and material use, minimise waste, and comply with environmental regulations and stakeholder expectations (Carrillo-Hermosilla et al., 2010; Chistov et al., 2021).

Despite this potential, eco-innovation is often more demanding than conventional innovation. Firms seeking to eco-innovate must integrate environmental objectives with operational, economic, and stakeholder considerations, increasing coordination and implementation complexity (Chistov et al., 2021; De Marchi, 2012; Horbach et al., 2012; Hu et al., 2024). This challenge is sharper for SMEs, which generally possess fewer financial, technological, and human resources and weaker formal innovation infrastructures than large firms (Aboelmaged & Hashem, 2019; Brammer et al., 2012; Oduro, 2024; Rodríguez-Rebés et al., 2024). However, SMEs may partially compensate through organisational strengths such as flexibility and agility (Aboelmaged & Hashem, 2019; Rodríguez-Rebés et al., 2024), quasi-entrepreneurial structures (Oduro, 2024), environmental management practices (Brammer et al., 2012), and close stakeholder relationships (Halme & Korpela, 2014), suggesting that organisational innovation is relevant to understanding how eco-innovation emerges in SMEs (Rodríguez-Rebés et al., 2021, 2024).

Drawing on the Oslo Manual (OECD & Eurostat, 2005), organisational innovation is understood as the implementation of new organisational methods in business practices, workplace organisation, and external relations. Because eco-innovation depends not only on technological and financial drivers but also on firms' ability to develop new capabilities, improve resource efficiency, and respond to external pressures and opportunities (Bataineh et al., 2024), organisational innovation emerges as a plausible enabling mechanism. Some scholarly work points to this interrelatedness, showing that green innovations are tied to fundamental shifts in how businesses operate (Bocken & Geradts, 2020; Coffay et al., 2024). While the importance of innovation for environmental improvement is well established (Arranz et al., 2020), the specific mechanisms through which firms translate organisational innovation into eco-innovation remain insufficiently understood (Rodríguez-Rebés et al., 2021).

Organisational design research suggests that firms seek to combine key elements, such as strategy, people, structure, and management processes, to achieve efficiency and effectiveness (Bocken & Geradts, 2020; Coffay et al., 2024). Over time, these arrangements stabilise and routinise into organisational capabilities that shape how firms align activities, absorb knowledge, coordinate resources, and manage operations to face sustainability challenges (Bezerra et al., 2020). Explaining how organisations build and adapt such capabilities for grand challenges such as sustainability requires a dedicated theoretical lens. The dynamic capabilities (DCs) framework provides one, defining DCs as organisational and strategic routines through which firms achieve new resource configurations in rapidly changing markets (Eisenhardt & Martin, 2000). Teece's (2007) framework similarly posits that DCs enable firms to sense opportunities and threats, seize them through strategic action, and reconfigure resources to sustain competitive advantage in turbulent contexts.

Recent research consistently links DCs to sustainability transitions (Arranz et al., 2020; Bocken & Geradts, 2020; Khan et al., 2020b; Ortiz-Avram et al., 2024) and identifies microfoundations that support sustainability-oriented change (Chevrollier et al., 2024; Franco & Giannoccaro, 2025; Khan et al., 2020a; Mehrabi et al., 2025). However, few studies examine the specific organisational activities, processes, and skills through which SMEs develop the capabilities required for eco-innovation (Eikelenboom & De Jong, 2019). Scholars likewise call for research on how DCs evolve at the micro level (Cristofaro & Lovallo, 2022) and for frameworks capturing how fragmented microfoundations contribute to sustainable outcomes, especially in SMEs (Mousavi et al., 2019).

Addressing this gap, this study examines how SMEs leverage organisational innovation to develop the capabilities required for eco-innovation. Drawing on the DCs framework (Teece, 2007) and five in-depth case studies of industrial firms in the Basque Country, we analyse the microfoundations that support eco-innovation in SMEs. We propose an empirically grounded framework identifying the microfoundations associated with each of Teece's three capability clusters. In sensing, SMEs pursue eco-innovation through strategic exploration, with leadership identifying sustainable advantages via industry clusters. In seizing, adaptation is enabled by flexible, project-based structures, inclusive decision-making, and specialised training. In reconfiguring, agility is grounded in open innovation and client co-design, fuelled by purpose-aligned staff, decentralised decision-making, and the selective use of formal systems such as B-Corp certification. These findings call for a more nuanced understanding of eco-innovation capabilities in SMEs and offer a practical framework to guide their development.

Accordingly, the paper is structured as follows. The next section examines the existing research on organisational innovation, dynamic capabilities, and eco-innovation, with an emphasis on microfoundations, SMEs, and the sustainability transition. Section 3 details the

methodological approach, data collection, and analysis. Section 4 presents the results of the co-occurrence analysis and develops the proposed framework in relation to the literature. The final section provides the conclusions.

2. Theoretical framework

2.1 Linking organisational innovation and eco-innovation

Eco-innovation has often been approached as a technological phenomenon, emerging in response to external pressures such as regulation and market demand. However, the literature increasingly suggests its emergence is also conditioned by organisational capabilities (Aboelmaged & Hashem, 2019; Bataineh et al., 2024; Coffay et al., 2024; Rodríguez-Rebés et al., 2021, 2024). For eco-innovations to be financially and operationally worthwhile, firms must possess the internal capabilities to reconfigure their resources, making organisational change a prerequisite for successful environmental improvement (Bataineh et al., 2024). Rodríguez-Rebés et al. (2021) argue that organisational innovation and eco-innovation have too often been examined separately, conceiving organisational innovation as a vehicle for corporate environmental self-regulation: changes in workplace organisation and decision-making, business practices and procedures, and external relations can all support sustainability-oriented innovation.

Organisational change in the workplace and decision-making involves redefining job responsibilities and decentralising decision-making through teamwork, employee participation, and staff rotation (Bataineh et al., 2024; Rodríguez-Rebés et al., 2021). Greater employee autonomy may increase staff commitment to environmental objectives, and decentralisation is identified as a management factor enabling rapid identification and implementation of green ideas (Bataineh et al., 2024). Similarly, Bataineh et al. (2024) argue that boosting employee involvement and skills base creates an internal environment better

equipped to integrate complex external innovation. For SMEs, flatter structures and flexible teams may allow higher decentralisation and autonomy than in larger organisations, bypassing bureaucratic hurdles. At the same time, top management is equally decisive. The CEO-owner's vision, combined with fewer management layers, translates more rapidly into employee mobilisation and commitment (Eikelenboom & De Jong, 2019; Rodríguez-Rebés et al., 2024). Empirically, Rodríguez-Rebés et al.'s (2021) analysis shows that applying new methods of organising work responsibilities and decision-making increases the probability of environmental benefits by a factor of six in European SMEs.

Changes in business practices and procedures involve deploying innovative strategies for organising routines and work procedures to increase learning and knowledge exchange. For many companies, the adoption of green business practices is driven by a pragmatic need for cost-efficient strategies rather than a clearly established sustainability orientation, market demand, or regulatory pressure (Rodríguez-Rebés et al., 2021). SMEs may implement cost-efficient alternatives to maintain their competitive position or in reaction to external economic shocks. This constant search for efficiency can contribute to green innovation by reducing energy, water, and material consumption in administrative and operating procedures (C.-Y. Lin & Ho, 2011), and by redesigning manufacturing and other operational processes to minimise hazardous substances and waste. Similarly, adopting Environmental Management Systems (EMS) such as ISO 14001 has been found to facilitate green innovation through increased awareness and monitoring of environmental standards across internal operations, i.e., input sourcing, manufacturing, and output disposal (Cai & Li, 2018; Daily & Huang, 2001). Such systems tend to institutionalise environmental management within firms' routines, integrating environmental checks and balances into operating standards. However, only a minority of SMEs employ these formal tools (Rodríguez-Rebés et al., 2024); instead, they often rely on self-developed systems and informal procedures to achieve resource efficiency.

Finally, external relations entail organising new relationships with other firms, public institutions, or research organisations. This is crucial for acquiring the external knowledge needed to solve complex environmental problems that a single firm can rarely tackle alone: networking provides access to industry best practices, advanced technology, and benchmarking (Chevrollier et al., 2024; Mousavi et al., 2019; Ortiz-Avram et al., 2024). Rodríguez-Rebés et al. (2024) show that SMEs rely on consultants' know-how to integrate innovation knowledge they often lack and to support their environmental transformation. Spreading the costs and uncertainties of innovation among multiple partners also enhances willingness to engage in innovative activities, especially for smaller firms (Bataineh et al., 2024). In some sectors, government relationships are a critical driver for leveraging opportunities created by emerging sustainability-oriented regulation (Coffay et al., 2024). Cooperation with suppliers and customers is likewise well documented as a driver of eco-innovation (Alcalde-Heras & Carrillo Carrillo, 2023; Chistov et al., 2021; Passaro et al., 2023). SMEs may seek suppliers that help them adopt sustainability practices, such as certified products or chemical disposal protocols, while sustainability-oriented customers can push suppliers to green their supply chains, forcing firms to comply or risk losing business (Aboelmaged & Hashem, 2019).

Organisational innovations in workplace organisation and decision-making, business practices, and external relations operate as interdependent conditions that collectively shape a firm's capacity for eco-innovation. For SMEs, this may represent a more feasible and strategically relevant pathway, requiring significantly less financial effort than product-based innovation (Aboelmaged & Hashem, 2019; Rodríguez-Rebés et al., 2024), and thus offering a more accessible route to environmental improvement.

2.2. Dynamic capabilities and the microfoundations of eco-innovation

DCs constitute the transformative bridge between a firm's organisational resources and its capacity to achieve eco-innovative outcomes (Franco & Giannoccaro, 2025; Khan et al., 2020b; Singh et al., 2022). Unlike ordinary capabilities, which enable firms to perform routine operations, DCs allow organisations to adapt, reconfigure, and renew their competences under conditions of uncertainty and change. They act as a meta-competence through which firms intentionally create, modify, and extend their resource base to address new and existing markets, here, in response to shifting sustainability demands (Teece, 2007, 2014). They are particularly relevant in contexts characterised by regulatory shifts, technological change, and evolving stakeholder expectations, where firms must continuously realign their strategies and structures.

Teece's (2007) framework operationalises DCs through three interrelated clusters, sensing, seizing, and transforming, which together explain how firms adapt and renew their resource base over time. Sensing capabilities enable firms to identify environmental challenges, market trends, and regulatory shifts, positioning them to respond proactively to sustainability pressures through active market intelligence, stakeholder collaboration, and monitoring of emerging technologies (Khan et al., 2020a; Mousavi et al., 2019; Ortiz-Avram et al., 2024; Y. Zhu et al., 2023). Seizing capabilities turn identified opportunities into concrete sustainability actions, investing in green technologies, redesigning processes, and fostering cross-functional collaboration (Bocken & Konietzko, 2022; Ortiz-Avram et al., 2024; Y. Zhu et al., 2023). Firms that seize eco-innovation opportunities successfully tend to rely on flexible structures, decentralised decision-making, and external partnerships to strengthen implementation (Inigo et al., 2017; Khan et al., 2020b; Mousavi et al., 2019). Finally, transforming capabilities embed eco-innovation as a continuous organisational process rather than an episodic response (Bocken & Konietzko, 2022; Inigo & Albareda, 2019). This entails aligning sustainability with core

strategy, fostering continuous learning, and redesigning routines and supply chains to sustain environmental commitments over time (Arranz et al., 2020; Cristofaro & Lovallo, 2022; Inigo et al., 2017; Singh et al., 2022). Without this ongoing reconfiguration, early eco-innovation efforts risk losing momentum and failing to produce lasting environmental impact (Hällerstrand et al., 2023; Y.-H. Lin & Chen, 2017).

Although Teece's (2007) framework was originally conceived for rapidly changing competitive environments, its analytical logic translates well to sustainability transitions, where firms must purposefully reconfigure internal and external competences in response to ecological, regulatory, and technological pressures unfolding simultaneously (Inigo & Albareda, 2019; Ortiz-Avram et al., 2024). Recent scholarship consistently links DCs to sustainability, showing that strategies such as circular economy implementation (Coppola et al., 2023; Khan et al., 2020a; Santa-Maria et al., 2022), eco-efficiency (Ortiz-Avram et al., 2024), eco-innovation (Arranz et al., 2020; Mousavi et al., 2019; Singh et al., 2022; Y. Zhu et al., 2023), carbon reduction (Chevrollier et al., 2024), and sustainable business models (Bocken & Geradts, 2020; Inigo et al., 2017; Mehrabi et al., 2025; Sandberg & Hultberg, 2021) all depend on DCs. This literature increasingly calls for a more granular understanding of the mechanisms through which these capabilities develop at the organisational level (Mehrabi et al., 2025; Strauss et al., 2017).

This granular level of analysis is captured by the concept of microfoundations: the individual activities, processes, and structures that underlie and constitute higher-order capabilities (Felin et al., 2012; Teece, 2014). Understanding microfoundations is particularly important in sustainability contexts, where capability development unfolds under long time horizons, systemic complexity, and competing objectives. The emerging literature on microfoundations of sustainability-oriented DCs identifies several recurrent themes across the

sensing, seizing, and transforming dimensions: network building and stakeholder engagement (Franco & Giannoccaro, 2025; Khan et al., 2020a; Mehrabi et al., 2025; Santa-Maria et al., 2022), knowledge creation and experiential learning (Khan et al., 2020a; Mehrabi et al., 2025; Strauss et al., 2017), external knowledge integration (Eikelenboom & De Jong, 2019; Khan et al., 2020a), regulatory monitoring and strategic adaptation (Franco & Giannoccaro, 2025), and organisational restructuring through formal and informal coordination (Franco & Giannoccaro, 2025; Santa-Maria et al., 2022). In the SME context, research suggests that these microfoundations are heavily shaped by the owner-manager's cognitive orientation and transformational leadership (Eikelenboom & De Jong, 2019), a reliance on external rather than internal processes to compensate for limited R&D capacity (Eikelenboom & De Jong, 2019; Mehrabi et al., 2025), and a preference for informal over formalised coordination (Franco & Giannoccaro, 2025). Furthermore, stakeholder pressure has been shown to act as a key driver of green dynamic capabilities in SMEs, capabilities that in turn enable green innovation outcomes (Singh et al., 2022). Yet while these studies identify individual microfoundations in specific domains, such as the circular economy or business model scaling, a comprehensive account of how they collectively enable eco-innovation in SMEs through organisational innovation is lacking. This study addresses that gap by examining the specific microfoundations through which industrial SMEs develop the DCs required for eco-innovation.

3. Methodology

To address the objectives outlined above, and given the exploratory nature of this research, a qualitative case study method was selected as the most appropriate approach. While the choice of geographical setting and sample was based on convenience, both represent highly relevant contexts for the research objectives.

3.1. Sample definition

Geographical context

The Basque Country, located in northern Spain and bordering France, stands out for its strong industrial base. In 2022, the region's industrial contribution to GDP was 7.2% higher than the national average (23% vs. 15.9%), accounting for 8.26% of national industrial GDP with only 4.37% of the working-age population (COGITI & CGE, 2024; INE, 2024). It is also notable for its robust innovation ecosystem, built over nearly three decades of policies promoting industrial clusters and R&D, and supported by a network of technology centres providing broad access to innovation services (Alcalde-Heras et al., 2021). Eco-innovation has gained particular traction in the region, supported by ambitious environmental goals, many of which have already been met. For example, landfill waste has fallen by 54% since 2018, and greenhouse gas emissions by 33% since 2005 (Ihobe, 2024). This progress reflects a multilevel governance model coordinated between the Basque Government and regional councils, with the Provincial Council of Gipuzkoa (PCG) playing a key role through initiatives led by Naturklima and Ihobe, the publicly owned environmental management agency, whose shared mission is to support environmental policy development and promote a culture of sustainability across the region.

Case Selection and Sampling Rationale

Following a purposeful sampling technique (Merriam, 1997), the selection process followed a three-stage rationale to ensure methodological robustness. First, for identification and institutional alignment, we leveraged previous Basque institutional efforts (e.g., Ihobe and PCG) to identify firms recognised as 'eco-innovation champions', producing an initial shortlist of 12 industrial SMEs based on institutional monitoring, publicly available information (e.g., websites and press releases), and the authors' prior expert knowledge of the firms. Second, for inclusion criteria and heterogeneity, beyond their commitment to sustainability, we sought a

heterogeneous sample to ensure the transferability of findings, with selection criteria including diversity in sub-sector, degree of internationalisation, age, and CEO profile. Third, regarding organisational complexity versus size, we specifically included micro-enterprises (fewer than 10 employees), as they constitute approximately 90% of the industrial fabric and are key drivers of agility (OECD, 2023). Crucially, the final selection was based on organisational complexity and industrial relevance rather than headcount alone, ensuring that even the smallest firms exhibited the structural readiness necessary to observe the microfoundations described by Teece (2007), such as formal R&D processes and complex stakeholder networks.

As shown in Table 1, the five participating organisations not only meet the individual criteria for being considered 'eco-innovation champions' but also collectively reflect the diversity needed for the analysis (e.g., size, sector, age). Firms were categorised as Micro, Small, or Medium-sized according to European Commission standards (European Commission, 2023), with data retrieved from the SABI (Sistema de Análisis de Balances Ibéricos) database and subsequently verified by each firm's management team for accuracy. Special consideration was given to Firm 4, which functions as a network of social economy entities; despite its scale, its decentralised management and high percentage of insertion-profile employees (55%) align its organisational behaviour with the SME model that is the focus of this research.

[Insert Table 1 here]

3.2. Data collection

The case insights were collected through in-depth semi-structured interviews with key decision-makers. Given the SME nature of the organisations studied, and to ensure balanced representation across the five cases, we interviewed a single key informant per company, selected at the highest possible organisational level to ensure comprehensive visibility across the issues examined. The informants included three CEOs (two also co-founders), a Senior Project Manager, and a Sales Manager, as detailed in Table 1.

The interview protocol was developed based on the study's theoretical background. It began with an introductory section on the strategic antecedents of each company's eco-innovations, including drivers and motivations, internal barriers, key characteristics, and whether the innovation was incremental or disruptive. The protocol was then structured around an ad hoc taxonomy of organisational spheres potentially related to eco-innovation development. Building on the Oslo Manual (OECD & Eurostat, 2005, 2018), this taxonomy includes five categories: leadership and decision-making, organisational structure, people management, implementation of new business practices, and management of external relations (see Table 2).

[Insert Table 2 here]

The interviews were conducted online between January and March 2024, each lasting 90 to 120 minutes. All interviews were recorded and transcribed using Tactiq, a Google Chrome extension that generates real-time transcripts. The authors reviewed the transcripts and then shared them with the interviewees for accuracy checks. The interviews were conducted and coded in Spanish, with selected excerpts subsequently translated into English for use as illustrative quotes.

3.3. Data analysis

Drawing on the methodological foundations of Gioia et al. (2013) and Saldaña (2012), we applied content analysis (Seuring & Gold, 2012; Torraco, 2005), combining qualitative and quantitative analyses, namely frequency and co-occurrence, where appropriate. We adopted an abductive approach (Mantere & Ketokivi, 2013), integrating data-driven theme generation with pre-existing theoretical frameworks to identify recurring themes, patterns, and meaningful relationships within the qualitative data, while accounting for the diversity of the companies interviewed in terms of sector and size.

We used a structured coding process beginning with a close reading of the interview transcripts, followed by a codebook based on the interview protocol categories, progressively enriched throughout the coding rounds. Two authors coded the data independently using the same codebook, yielding 110 codes from 410 quotes. Once all interviews were coded, the qualitative analysis concluded with a validation of the resulting framework by all authors. We adopted a reflexive and iterative approach involving continuous engagement with the literature to minimise expectancy bias (Durach et al., 2017; Mantere & Ketokivi, 2013), refining the final set of codes, categories, and concepts through several rounds of discussion and consensus-building; discrepancies were resolved collaboratively, and inductive codes were reviewed after each round to consolidate overlapping or unnecessary categories. This process achieved a high level of intercoder agreement (Krippendorff's $\alpha = 0.895$). Alongside the quantitative analysis, we examined the frequency of code occurrences in each category and analysed the corresponding content across interviews to compare participants' perspectives, and conducted a co-occurrence analysis (i.e., codes frequently cited together in specific passages) to identify relationships between thematic categories (see Table 3).

This methodology also facilitated data triangulation, strengthening the reliability and validity of our findings and enabling a richer, more contextualised interpretation of participants' experiences and perceptions. We enhanced triangulation through a final workshop with three of the five participants, who completed a questionnaire showing a high level of agreement (69.7%) with the results presented to them. The workshop was transcribed and used to further interpret and refine the coded data. Atlas.ti software supported the analysis throughout, and the results are presented and discussed in the following section.

4. Results and Discussion

The co-occurrence analysis, shown in Table 3, identifies high-frequency relationships between codes, revealing not only the most cited topics but also how they interact across SMEs'

eco-innovation practices. This reinforces the qualitative findings by mapping how participants experience and describe organisational innovations. The key patterns identified, explored further below, include:

[Insert Table 3 here]

- *Interaction, Knowledge Sharing, and Knowledge Transfer* showed the highest co-occurrence, indicating that eco-innovation in SMEs depends strongly on social learning and inter-organisational collaboration. This underscores organisational learning, cross-functional teamwork, and external partnerships as critical enablers.
- A frequent co-occurrence between *Financial Performance and Environmental Performance* suggests that firms do not view these as mutually exclusive. Many participants explained how sustainability initiatives contributed to economic value through differentiation, access to new markets, or cost savings.
- The co-occurrence of *Shift in Organisational Goals, Practices, and Strategies* with both *Personal Conviction and Sustainability Orientation* suggests that values-driven leadership often acts as a catalyst for structural change. These shifts are not purely top-down but emerge from a shared organisational culture aligned around sustainability.
- The link between *Internal Communication and Cost-effective Access to Information* shows that many SMEs rely on digital tools and informal networks to support innovation. In resource-constrained environments, efficient communication platforms help compensate for the lack of formal R&D or dedicated sustainability departments.

Table 4 provides a summary of the identified microfoundations, organised by dynamic capability and organisational innovation dimension. The full empirical evidence base, including supporting interview quotes for each microfoundation, is presented in Table 4.

[Insert Table 4 here]

The results outlined above allow us to propose a theoretical framework identifying how these SMEs orchestrate key DCs to develop eco-innovation successfully. Based on the interview findings, several organisational dimensions, namely strategic antecedents, leadership and decision-making, organisational structure, people management, implementation of new business practices, and management of external relationships, play a central role in the emergence of dynamic capabilities within the firm.

In the following subsections, we discuss these results in relation to the existing literature and highlight their specific implications for SMEs.

4.1 Sensing: Identifying and Interpreting Environmental and Market Signals

At this stage, three organisational dimensions prove particularly relevant: strategic antecedents, people management, and management of external relations.

Within the dimension of strategic antecedents, three key microfoundations emerge: exploratory search for sustainable competitive advantages, product refinement through sustainability, and assessment of eco-innovation barriers (external market and financial scalability challenges).

Our findings align with prior research showing that SMEs can gain competitive advantages through eco-innovation (Oduro, 2024; Rodríguez-Rebés et al., 2024). FIRM 5, for example, distinguishes itself through innovations that minimise environmental impact, align with societal values, and reflect the strategic foresight highlighted in the literature. FIRM 1 and FIRM 2 similarly embed sustainability in product refinement, relying on aesthetic and quality enhancements based on recycled materials to increase commercial appeal, a finding that nuances previous studies by showing how eco-innovative design can provide a competitive advantage in industries where aesthetics are key. As FIRM 1 illustrates, this involves

proactively embedding sustainability criteria into product development through collaborative exploration:

[...] we have not innovated in organic cotton, what we have decided is that all our cotton should have these characteristics. And we have participated in a very active way in the exploration through projects that have allowed us to identify the use of resources to develop, in this case, fabrics.

However, several challenges obstruct the sensing process. The evaluation of eco-innovation barriers has emerged as a key microfoundation for addressing two main challenges: external market barriers and financial scalability. External market barriers vary by sector and extend beyond resource scarcity to include constraints linked to firm size, such as limited market visibility or restricted access to distribution channels; assessing these barriers enables SMEs to respond more effectively to external drivers such as public policy or stakeholder pressure (Franco & Giannoccaro, 2025; Rodríguez-Rebés et al., 2024). SMEs in our study also repeatedly encountered barriers related to financial scalability, consistent with research showing that eco-innovation, like other forms of sustainable innovation, demands substantial financial, technological, and human capital over extended periods, placing smaller firms at a structural disadvantage (Halme & Korpela, 2014; Rodríguez-Rebés et al., 2024; Oduro, 2024). For example, FIRM 1 reports difficulties sourcing sustainable raw materials with tested quality standards and an inability to transfer associated costs to price-sensitive markets. Similarly, FIRM 2 highlights the challenge of scaling while upholding environmental values, citing ‘smallness’ as a barrier to securing funding and achieving economies of scale. FIRM 5, with limited access to tenders that reward eco-innovation, struggles to convert sustainable design into a competitive advantage.

We have not yet obtained any tender that is prescribing and that is giving virtue or benefits to these eco-innovative projects in their requirements. We are competing as equals and we all know the

effort it takes to be innovative and to implement pioneering projects. [...] if we had greater profitability, then surely we would bet on marketing and visibility and communication.

Regarding the management of external relations, we corroborate one important microfoundation: external collaboration for insight gathering. Interacting with diverse knowledge sources enables SMEs to identify pressing environmental challenges (Eikelenboom & De Jong, 2019; Franco & Giannoccaro, 2025) and stay aware of systemic changes in industrial, economic, and political systems (Mehrabi et al., 2025). FIRM 2 and FIRM 5, for example, leverage industry associations and clusters to gain insights into market trends and regulatory changes, a practice the literature identifies as critical for effective sensing capabilities.

From there [mentioning different clusters] we receive all the changes in all the information regarding active regulations, laws, training courses [...] and then having a good relationship with [public organisation], which is the one that makes these clusters dynamic, we are kept up to date with everything related to environmental improvement and new developments (FIRM 5).

Finally, in the organisational dimension of people management, internal human capital emerges as a significant constraint in this study. SMEs recognise the need to address the lack of in-house environmental specialists as a critical step toward enhancing their eco-innovation capabilities (Del Río et al., 2015; Oxborrow & Brindley, 2013). FIRM 4 identifies the recruitment of innovation-oriented talent as a key bottleneck, particularly for roles combining sustainability, design, and technical expertise. Without employees who possess these skills, the company struggles to establish monitoring systems and stay up to date with the state of the art.

Another of the difficulties that we could have for innovation is also talent, the recruitment of talent, not for management but for recruitment because for innovation, above all for the launch and for the definition of the idea of the plan, certain profiles are needed that are not abundant (FIRM 4).

4.2 Seizing: Mobilising Resources through Organisational Innovation

When analysing the seizing capability, the companies in this study demonstrated the interplay of several organisational dimensions, particularly organisational structure, innovation in business practices, leadership and decision-making, and people management.

A defining feature of the SMEs in this study is their organisational model, which displays a high degree of flexibility rooted in the adaptability of their human resources. This echoes Rodríguez-Rebés et al.'s (2024) point that SMEs leverage their lighter, more flexible structures to advance their technological development incrementally. A common characteristic among these firms is their informal yet structured approach to collaboration and communication: smaller teams enable fluid coordination between departments and foster cross-functional work, shown to benefit engagement in eco-innovation processes (Mousavi et al., 2019). SMEs often adopt ad hoc collaboration frameworks and lateral integration mechanisms to support agile, responsive decision-making. FIRM 4, for example, transitioned to multidisciplinary teams to improve responsiveness, while FIRM 1 and FIRM 5 implemented informal cross-functional collaborations to mobilise internal resources for sustainability initiatives effectively. In the words of FIRM 4:

... until [new model] arrives, we had a model of responsible managers and workers, and labour we go, then this model turned around a little bit all the positions, all the positions were dismissed and we established work teams and multidisciplinary work teams aligned by customer visions.

To mobilise resources during the seizing phase, innovative business practices play a pivotal role in leveraging the inherent agility of SMEs. Project-based coordination, as seen in FIRM 3, provides flexibility in managing innovation cycles, while cross-functional collaboration among internal specialists facilitates sustainable innovation development (Mousavi et al., 2019). Digital tools further enhance coordination and streamline decision-

making, helping avoid duplication of effort and enabling more comprehensive sustainability solutions.

In the domain of leadership and decision-making, aligning managerial practices with sustainability values strengthens both collective commitment and individual conviction to achieve the firm's sustainability goals (Santa-María et al., 2022). FIRM 5's operational practices illustrate this, with regular meetings involving multiple stakeholders across the supply chain.

... We have meetings, two short meetings a week, we see how the production is going and we also see those prototypes or those projects that we wanted to develop and we give participation to the whole value chain of our product [...] from the storekeeper to the designer or the assembler of the product.

These discussions ensure that production progress and innovation projects are collectively monitored, drawing on contributions from roles ranging from storekeepers to designers and fostering a holistic approach to sustainability.

Regarding the people management dimension, the findings reveal a wider range of approaches than typically described in the literature. Existing studies typically advocate structured training programmes for capability enhancement (Daily & Huang 2001; Oduro, 2024; Santa-María et al., 2022). For instance, FIRM 1 implemented structured, recurring training aligned with long-term sustainability goals, highlighting a diversity of effective approaches within SMEs.

In the field of sustainability linked to product, let's say that there is permanent internal training from the innovation and sustainability area, especially in its sustainability function towards the teams of the different design and product brands. Every 6 months [...] there is an internal milestone called product architecture, and part of this milestone is the re-statement of the strategic sustainability

objectives, the ambition to have 100% of the collections in terms of commitment: the carbon footprint revolution, progress in circular economy criteria... Every 6 months we remind them of these objectives that form part of the strategic plan.

By contrast, SMEs such as FIRM 3 relied heavily on self-directed employee training for technical profiles, which may help address the lack of dedicated in-house environmental specialists identified as a critical barrier for SMEs (Del Río et al., 2015; Oxborrow & Brindley, 2013).

There is nothing formalised, also the type of profiles [influences], they are very specialised people with a very high level of expertise in their field, so they are self-trained, right? It's not like they start from a more average level where you have to give homogeneous training, but it's something very specific and based on self-training and self-knowledge, highly specialised self-training and they start from expert levels (FIRM 3)

4.3 Reconfiguring the business enterprise's intangible and tangible assets

The transformative capacity of SMEs, as described in the qualitative analysis, strongly aligns with existing theoretical frameworks on DCs (Teece, 2007). However, in our sample, the microfoundations for reconfiguring DCs differ significantly from those reported in previous studies.

New insights explicitly highlight open innovation through extensive stakeholder collaborations, particularly with universities, research institutes, and cross-sector partnerships, aligning with previous literature emphasising the importance of external collaboration in helping SMEs address internal resource constraints (Eikelenboom & De Jong, 2019). Collaboration extends beyond traditional industry stakeholders: some companies engage in cross-sector partnerships that generate innovative material recovery and recycling initiatives, underscoring the centrality of external knowledge integration (Santa-María et al., 2022). FIRM

1 exemplifies this by working with local organisations to repurpose waste materials into high-value products. For many SMEs, co-designing solutions with clients plays a central role in shaping eco-innovative products, tailoring solutions to diverse market needs while ensuring the effectiveness of sustainability initiatives (Mehrabi et al., 2025; Mousavi et al., 2019). FIRM 3 illustrates this well, co-designing solutions with clients to adapt to context and share problem-solving:

... obviously we work together with the client. It is a process of co-designing the solution because even if it works well in one [...] as I showed you before, you go to another and it has another problem, so we always work together with the client to decide how we approach the dynamics.

The role of intrinsic employee motivation and commitment, strongly evidenced in our qualitative analysis, aligns closely with existing literature highlighting personal initiative and staff engagement as critical enablers of eco-innovation (Weigt-Rohrbeck & Linneberg, 2019). This dimension appears particularly salient in SMEs with a strong technical or sustainability-driven orientation, where the departure of skilled employees has a proportionally greater impact and organisational culture plays a more pronounced role in shaping day-to-day operations (Oxborrow & Brindley, 2013; Weigt-Rohrbeck & Linneberg, 2019). For example, FIRM 3 places significant emphasis on aligning recruitment and internal culture with environmental values and long-term sustainability objectives, where cultural fit is not just preferred but essential, serving as a unifying force that reinforces shared purpose and commitment, particularly in smaller teams where individual misalignment is more noticeable. FIRM 1 has institutionalised this by cultivating a collective identity rooted in corporate sustainability values, ensuring cohesion across a growing workforce. Similarly, FIRM 2 shows how founders' intrinsic motivation can be structurally embedded in a firm's governance model, ensuring that environmental and social objectives are codified in its foundational principles.

We can't build a business with a lame leg, and one of those weak legs is mainly the founders' motivation. [...] That's why one section of our bylaws includes specific paragraphs stating that the company's goal is to provide environmental, social, and economic benefits to society. So, when we created the company, we already set that as our goal. That is our objective, and we remain committed to it.

Across these cases, shared values and intrinsic purpose act as stabilising forces, enhancing employee engagement and creating the cultural conditions necessary for sustained eco-innovation (Santa-María et al., 2022).

A key finding in the domain of leadership and decision-making is that SMEs in this study combine organisational flexibility with structured coordination mechanisms to embed sustainability into core operations. This extends to the SME context the microfoundations Santa-María et al. (2022) identified for sustainability-oriented business model innovation, namely organisational flexibility and decentralised innovation teams. FIRM 2 exemplifies this through informal, collaborative practices enabling rapid, cross-departmental action despite some hierarchical elements.

We are a small company. Yes, decisions are not taken if there is a, that is, if there are partners and managers. But they are made by extracting the lessons we learn as a team. That is to say, if the design department has done different things or learnt different things, then they are put together in the team, I can say that it can be in one morning. In one morning, design comes up with an insight, we all talk together and suddenly a decision is made. And all of a sudden we are already in motion. I wouldn't say it's hierarchical, although it is hierarchical, but it's something very natural, a very open dynamic of a start-up or a small company in which we all participate a little and are involved in everything. That also brings problems: sometimes we get involved in other people's departments, but there are roles and then it's divided. (FIRM 2).

FIRM 4, for example, highlights the evolution of its self-management model, which enhances operational agility without undermining collective decision-making.

... this evaluation that we have done of the self-management model has led us to take this nuance in the model and now we are already there. [...] We make decisions in, this doesn't change the decision-making, okay? Establishing these controls is to make work operations more comfortable and more agile. But the decision making is still in the management team, we call it, which is a team that we have in which all the leaders of the teams that are affected by the decision meet.

Similarly, FIRM 2 and FIRM 1 exemplify how structured routines, such as weekly coordination meetings and biannual strategic milestones, embed sustainability objectives into core organisational planning, complementing the informal dialogue and cross-functional engagement that Franco and Giannoccaro (2025) identify as critical for diffusing sustainability principles across the organisation.

The first big decision is the decision to establish an innovation department which, as I mentioned, was made in 2015, right? [We always had innovated]. What was decided was that an area would be created, a team would be assigned to it, and it would be provided with resources. That decision is included in the 2015–2018 strategic plan and has been maintained. It is a strategic decision and, therefore, is made at the corporate level, at the company level. In the establishment of the innovation area, in addition to providing it with human resources, with people, and with a certain annual budget, it is also given a process (FIRM 1).

The qualitative analysis supports previous literature on the role of formalised management systems in structuring eco-innovation initiatives, particularly in response to external pressures such as supply chain certification requirements and growing consumer awareness (Arranz et al., 2020; Bataineh et al., 2024; Franco & Giannoccaro, 2025). Examples include FIRM 2's pursuit of B-Corp certification, which underscores SMEs' proactive approach

to external validation and legitimacy, and FIRM 5's adherence to ISO standards for procedural alignment. As noted by FIRM 2:

One of the important points is the B-Corp certification, which we have known for a few years and we knew the procedure to follow to become a B-Corp [...] So, when we created the company already, we set ourselves that. That is our objective, and let's continue to be.

These findings emphasise that formal systems are most effective when coupled with collaborative decision-making and a supportive organisational culture, nuances often overlooked in existing research: successful eco-innovation in SMEs depends not only on formal systems but also on an organisational culture that fosters collaboration and empowers employees. In other words, formalised management systems do not automatically translate into eco-innovation.

4.4. Towards a framework of microfoundations for eco-innovation in SMEs

Over the past few decades, eco-innovation has attracted considerable attention from both academic and professional circles (Horbach et al., 2012; Hu et al., 2024), yet numerous research gaps remain regarding the precise nature of the phenomenon (López Pérez et al., 2023). One important gap concerns the limited understanding of how different levels of dynamic capabilities for innovation connect and evolve during a company's transformation towards sustainability (Iñigo & Albareda, 2019; Ortiz-Avram et al., 2024). Moreover, despite SMEs' significant contribution to the global economy and their environmental impact, research on these firms remains largely overlooked compared to large companies, often leading to solutions poorly adapted to SMEs' specific characteristics and challenges (Alcalde-Heras & Carrillo-Carrillo, 2023; Smith et al., 2022).

In terms of sensing, SMEs ground their capabilities in external collaborations with industry associations and clusters to identify market trends and regulatory changes. The barriers

they face extend beyond resource scarcity to include external market challenges, such as low visibility, restricted distribution channels, and limited access to public procurement mechanisms that reward eco-innovation (Franco & Giannoccaro, 2025; Rodríguez-Rebés et al., 2024). A critical barrier is the lack of internal environmental expertise (Del Río et al., 2015b; Oxborrow & Brindley, 2013), calling for targeted sustainability-oriented sensing strategies that rely on exploratory search for competitive advantage and product refinement to enhance commercial appeal.

Regarding seizing capabilities, the main divergence from dominant narratives appears in the mobilisation of human capital. SMEs utilise a flexible organisational model rooted in the adaptability of their staff, which acts as a catalyst for innovation (Rodríguez-Rebés et al., 2024), fostering cross-functional engagement through multidisciplinary teams and informal yet structured collaboration frameworks rather than relying solely on financial incentives (Mousavi et al., 2019). While some firms implement structured training (Rodríguez-Rebés et al., 2024; Santa-María et al., 2022), others rely on self-directed learning to mitigate the lack of internal specialists and facilitate knowledge exchange (Del Río et al., 2015; Oxborrow & Brindley, 2013). Resource mobilisation is further supported by project-based coordination and digital tools that promote cost-effective solutions.

As for reconfiguring capabilities, SMEs demonstrate a strong transformative capacity through open innovation and extensive stakeholder collaborations with universities and research institutes. A central element of this phase is co-designing solutions with clients, allowing firms to tailor eco-innovative products to specific market needs (Mousavi et al., 2019; Mehrabi et al., 2025). Intrinsic employee motivation and cultural fit are essential drivers, as shared values and a collective identity act as stabilising forces for sustained eco-innovation (Weigt-Rohrbeck & Linneberg, 2019; Santa-María et al., 2022). Decision-making is characterised by decentralised, adaptive models, such as self-management or cross-functional

leadership teams, which enhance operational agility (Santa-María et al., 2022). While formal systems such as B-Corp or ISO certifications provide legitimacy (Bataineh et al., 2024), our findings suggest they are effective only when integrated into a supportive organisational culture that empowers employees. Finally, rather than relying purely on standardised measurements, SMEs embed sustainability into core planning through structured routines, such as weekly coordination meetings and strategic milestones, to monitor environmental targets. These findings highlight a nuanced path for eco-innovation where organisational culture and shared purpose are as critical as formal management structures.

We highlight the key microfoundations associated with Teece's (2007) DC framework, organised across the three capability clusters:

- Sensing revolves around exploratory search for sustainable competitive advantage and product refinement, achieved through aesthetic, quality, and material enhancements that increase commercial appeal. To overcome market access barriers and financial scalability challenges, firms utilise external collaborations through associations and clusters to gather intelligence and monitor regulations, while addressing the scarcity of specialised innovation talent.
- Seizing is characterised by informal collaboration and multidisciplinary teams that enable functional decentralisation and autonomous decision-making. These processes are supported by project-based coordination and inclusive participation across the value chain, combining highly specialised self-learning with structured internal training cycles.
- Reconfiguring focuses on cross-sector material innovation and client co-design to adapt solutions to specific needs. This transformation is anchored in purpose-based hiring and a shared corporate culture that integrates formal certifications such as B-Corp or ISO.

Together, these elements facilitate agile, self-managed decision-making, where team insights are rapidly converted into organisational action.

These capabilities reflect an SME-specific configuration of Teece's (2007) framework, in which informal mechanisms, trust-based cultures, and external collaborations often substitute for scale-based resources.

Mobilising each of these capability clusters requires the deliberate combination of multiple organisational dimensions. Within each dimension, microfoundations represent the underlying routines, skills, and social mechanisms that collectively shape how firms sense opportunities, mobilise resources, and adapt to change (Teece, 2007; Felin et al., 2012). In SMEs, these microfoundations are not simply scaled-down versions of those found in larger firms but are uniquely tailored to the characteristics of small organisational systems, enabling firms to overcome or leverage distinctive SME traits, such as lean hierarchies, informal communication channels, and a strong entrepreneurial ethos, that facilitate agility, rapid decision-making, and close-knit collaboration (Rodríguez-Rebés et al., 2024; Eikelenboom & De Jong, 2019). By systematically mobilising these microfoundations, SMEs can address structural constraints, such as limited resources or scale, while capitalising on inherent strengths, including flexibility, strong internal communication, and entrepreneurial orientation.

This framework offers a dynamic, multi-level perspective on capability building, illustrating how SMEs evolve towards eco-innovation through an ongoing, recursive interaction between organisational structure and strategic intent. It combines Teece's and behavioural approaches to the development of dynamic capabilities.

5. Conclusion, limitations and further research

This work leverages the distinctive patterns identified across the three dynamic capabilities of sensing, seizing, and reconfiguring in the context of SME eco-innovation to

contribute to both the literature and practice in three ways: first, by alerting scholars and practitioners to the risks of uncritically applying solutions derived from large firms to SMEs; second, by suggesting new avenues through which large firms may learn from the adaptive, context-specific practices observed in SMEs; and third, by supporting SMEs in developing successful eco-innovation.

We contribute to the literature by identifying the microfoundations underlying the development of eco-innovation in industrial SMEs. The analysis reveals how dynamic capabilities are anchored in the utilisation of microfoundations across multiple organisational dimensions, including leadership, strategic intent, people management, business practices, and external relations.

We provide a framework for practitioners in SMEs to help them nurture the microfoundations for eco-innovation best suited to their idiosyncrasies, rather than mimicking the structures and routines developed by larger enterprises. Moreover, larger firms can draw lessons on how exploration, flexibility, agility, and openness can be leveraged for eco-innovation in intrapreneurial projects. For policymakers, we highlight how tailored support measures, such as eco-innovative procurement, simplified certification processes, and cluster-based innovation funding, could strengthen SMEs' eco-innovation readiness.

This study would benefit from a larger sample of firms. Given that the analysis is based on five case studies within the specific regional and institutional context of the Basque Country, the findings should be framed as generating contextualised and transferable insights relevant to SMEs operating under similar industrial and sustainability conditions, rather than broad generalisations. It would also be valuable to replicate the research with a sample composed of manufacturing firms to better understand the emergence of potential alternative microfoundations. Further research could explore other geographical contexts or focus on the service sector, where different contextual paths are likely to complement these findings.

Finally, building on the framework outlined, a promising avenue for future research would be to apply QCA to identify effective configurations of dynamic capabilities that help SMEs embark more efficiently on the eco-innovation journey.

Declaration of generative AI and AI-assisted technologies in the writing process.

During the preparation of this work, the authors used ChatGPT to refine the language and improve the readability of the manuscript. After utilising this tool, the authors carefully reviewed and edited the content as necessary and take full responsibility for the final published version of the article.

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Tables and figures.

Table 1. Information about firms and informants.

Name of the company	Size	Activity	Age	Recognition	Informant
Firm 1	180 employees	Technical Outdoor Apparel	30 years	B-Corp certification 2024. Gold Industry Award 2017. 3 ISPO AWARDS 2022	CEO
Firm 2	4 employees	Lifestyle and Office Accessories and Urban Furniture	5 years	National Young Entrepreneur Award 2021 - Special Mention for Sustainability and Social Commitment. Premios Go!ODS 2020 Semi-finalist European Social Innovation Awards 2019 Premio 101 Empresas #PorElClima Accésit European Business Awards for the Environment	Co-founder & CEO
Firm 3	8 employees	Water Technology and Management	8 years	MIT Water Innovation Prize finalist 2017. Galileo Master regional winner 2019. Seal of excellence; H2020 Green Deal (European Commission). Sello PYME INNOVADORA (Spanish Government).	Co-founder & CEO
Firm 4	671 ¹ employees	Social and Circular Economy Services (Collecting and sorting)	32 years	First prize Vizcaína Aguirre Foundation for the improvement of the quality of life in Bizkaia. Premio Empresa 2022 (Basque Government)	Senior Project Manager
Firm 5	37 employees	Urban Equipment Manufacturing	35 years	IF Product Design 2012	Sales Manager

Source: Own elaboration.

¹ Although Firm 4 does not formally meet the definition of an SME, its decentralised structure, local orientation, strong social commitment, and its nature as a network of social and solidarity economy entities—together with the fact that around 55% of its workforce consists of individuals with so-called “insertion profiles”—make it resemble an SME in many respects.

Table 2. Categorisation and typology of organisational spheres.

Leadership and decision-making		
	Decision-making processes. Implement cross-functional, collaborative or decentralised decision-making methods.	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018).
Organizational structure		
	Redesign of the organisational structure. Shifting from traditional hierarchies to flat, matrix or network structures, decentralisation	(OECD and Eurostat, 2005).
	Organisation of work responsibilities	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018).
	Organisational integration Boosting coordination, planning and implementation of innovation strategies, cross-functional teams	(OECD and Eurostat, 2005).
People Management		
	Talent acquisition and retention. Implement innovative talent recruitment and retention strategies.	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018),
	Training and education	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018),
	Employee engagement programmes. Innovative approaches to increase employee engagement, motivation and satisfaction. Encouraging the contribution of ideas	(OECD and Eurostat, 2005),
Implementation of new business practices		
	Workplace organisation Creating collaborative, flexible or well-being-centred work environments. Remote and hybrid working models.	(OECD and Eurostat, 2018), (OECD and Eurostat, 2005).
	Organisational learning and knowledge sharing. Create systems for capturing, distributing and applying knowledge. Mobilise the tacit knowledge of individuals.	(OECD and Eurostat, 2005).

	<i>Internal communication tools and strategies.</i> Use of new platforms (e.g. digital) or methods to improve internal communication. Systems to capture and act on feedback from employees, customers or stakeholders.	(OECD and Eurostat, 2005),
	<i>Models of collaboration and teamwork.</i> Encourage cross-functional, cross-departmental or even cross-organisational collaboration through novel frameworks or tools.	(OECD and Eurostat, 2005),
Management of external relations Introducing new ways of organising relationships and collaborating with other entities. Partnerships and alliances: Forming strategic collaborations to drive value. Co-creation: Involving customers or stakeholders in the process of creating new products or services. Inclusion of a wider range of stakeholders in organisational decisions.		
	<i>The breadth of collaboration</i> Suppliers, customers, etc.	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018).
	<i>The depth of collaboration</i> Subcontracting, partnerships, etc.	(OECD and Eurostat, 2005), (OECD and Eurostat, 2018).

Source: Own elaboration.

Table 3. Selection of the most co-occurring codes and their co-occurrences².

	Environment al Performance Gr=42	Financial Performanc e Gr=36	Interaction and Knowledge Sharing Gr=43	Shift in Organization al Goals, Practices, and Routines Gr=33	Transfer of Knowledge Gr=36
Communication and Information Sharing Gr=31	0	0	10	1	10
Cost-effective Access to Information Gr=13	0	0	10	0	4
Environmental mitigation Gr=16	10	2	0	1	0
Environmental Performance Gr=42	0	18	0	9	1
Financial Performance Gr=36	18	0	0	4	1
Interaction and Knowledge Sharing Gr=43	0	0	0	0	14
Internal Resource Constraints Gr=16	2	10	0	0	1
Personal conviction (intrinsic motives) Gr=29	11	7	1	0	0
Sustainability orientation Gr=30	12	5	0	3	0
Transfer of Knowledge Gr=36	1	1	14	1	0

Source: Own elaboration.

² Co-occurrences of 9 or less co-occurrences have not been included in the table for clarity of presentation, although they have been included in the analysis to identify the top 5 co-current codes.

Table 4. Summary of the main results with additional supporting interview quotes.

Dynamic Capability	Organisational Sphere Category	Microfoundation	Proof Quote
Sensing	Strategy	Strategic differentiation & market exploration	So the objective was to distinguish ourselves, to differentiate ourselves from the competition with an innovative project that had the least possible environmental impact and that was linked to the values that exist in society. (FIRM 5).
		Product refinement through sustainability	[...] we have not innovated in organic cotton, what we have decided is that all our cotton should have these characteristics. And we have participated in a very active way in the exploration through projects that have allowed us to identify the use of resources to develop, in this case, fabrics. (FIRM 1) The eco-innovation we are developing is a product that did exist in the market, because recycled furniture did exist in recycling, but not with that finish. (FIRM 2).
		Assessing external market barriers	... more than at the internal level the difficulties we encounter are external, the complacency that we have talked about and the resistance to change that gave us the fundamental problem. if the [...] water would cost [...] we would surely value it and manage it much better (FIRM 3).
		Financial scalability challenge	We come from being very, very, very environmentally positive, very socially positive, neglecting, so to speak, the more economic part. And now we are in that transition of how to make it sustainable, economically scalable, profitable, with adequate margins, with volumes that allow you to grow as well. (FIRM 2). The challenges we have faced, especially many years ago, is to achieve a sufficient level of product quality, using raw material in some cases recycled, not because it could not reach the quality but because in many cases it was untested, and to find the raw material in a sustainable way in fabric, trimmings, etc. that would provide an answer or an alternative to solutions that were already well established. [...]. It means knowing that you are not going to be able to pass on to the market the increase in cost that you are probably going to have, which reduces your competitiveness if you link it only to [the] economic factor. (FIRM 1).

	Management of External Relations	External collaboration for insights	On Wednesday, I'm going to a dinner in Madrid for an association in which we are a gift product: We are in this association simply to weave a network, to weave suppliers, to... I'm going to go to that dinner with a lot of people who sell promotional products and I go there to listen. To listen to the atmosphere a bit, to get a sense of how the market smells... (FIRM 2).
	Human Resources Management	Talent recruitment barriers	Another of the difficulties that we could have for innovation is also talent, the recruitment of talent, not for management but for recruitment because for innovation, above all for the launch and for the definition of the idea of the plan, certain profiles are needed that are not abundant. (FIRM 4).
	Organisational structure	Lateral integration mechanisms	... until [new model] arrives, we had a model of responsible managers and workers, and labour we go, then this model turned around a little bit all the positions, all the positions were dismissed and we established work teams and multidisciplinary work teams and aligned by customer visions. (FIRM 4).
	Business practices (Processes)	Project-based coordination	that collection, which forms part of the collection, is developed in accordance with sustainable requirements. Not only does it have to be functional, not only does it have to be technologically advanced and therefore offer the features that consumers demand, but it also has to be developed based on using the most sustainable fabrics and manufacturing processes possible at all times (FIRM 1).
	Leadership and decision-making	Inclusive decision-making	... We have meetings, two short meetings a week, we see how the production is going and we also see those prototypes or those projects that we wanted to develop and we give participation to the whole value chain of our product [...] from the storekeeper to the designer or the assembler of the product. (FIRM 5).
	Human Resources Management	Informal training & self-learning	There is nothing formalised, also the type of profiles [influences], they are very specialised people with a very high level of expertise in their field, so they are self-trained, right? It's not like they start from a more average level where you have to give homogeneous training, but it's something very specific and based on self-training and self-knowledge, highly specialised self-training and they start from expert levels. (FIRM 3).

		Structured internal training	In the field of sustainability linked to product, let's say that there is permanent internal training from the innovation and sustainability area, especially in its sustainability function towards the teams of the different design and product brands. Every 6 months [...] there is an internal milestone called product architecture, and part of this milestone is the re-statement of the strategic sustainability objectives, the ambition to have 100% of the collections in terms of commitment: the carbon footprint revolution, progress in circular economy criteria... Every 6 months we remind them of these objectives that form part of the strategic plan. (FIRM 1).
Reconfiguring	Management of external relations	Cross-sector material innovation	... in most or many of the projects, there is a process of innovation in collaboration with other agents such as the fishermen's guild, recovery of fishing nets and with these fishing nets recovered from the Cantabrian Sea, to have developed a recycled fabric and with it some garments, that is something unrepeatable. Or to have recovered walnut shells from the cider mills of Hernani, and with them to have generated the dye for certain garments in the collection. (FIRM 1).
		Co-design with clients	... obviously we work together with the client. It is a process of co-designing the solution because even if it works well in one [...] as I showed you before, you go to another and it has another problem, so we always work together with the client to decide how we approach the dynamics. (FIRM 3).
	Human Resources Management	Purpose-based hiring	If there was no alignment, if they did not believe in this, if they were not aligned, it would be difficult for them to enter the project because when there are few of us it is very clear whether or not you believe in this, [...] it is legitimate that we elect people here who really believe in this, who do not act out of opportunism. (FIRM 3)
		Shared corporate culture	If there is one thing we have worked on, and continue to work on, it is to generate a shared common culture that brings together all of the two hundred people who work at Ternua Group. [...] looking for what unites us or what we somehow identify as common. And as common, we would say that from a corporate perspective, those values are those corporate values. It is that purpose, isn't it? And all of this while maintaining certain criteria such as flexibility, right? [...] Nobody signs up here. (FIRM 1).
	Leadership and decision-making	Self-management models	... this evaluation that we have done of the self-management model has led us to take this nuance in the model and now we are already there. So where we make decisions as a team. We make decisions in, this doesn't change the decision-making, okay? Establishing these controls is to make work operations more comfortable and more agile. But the decision making is still in the management team, we call it, which is a team that we have in which all the leaders of the teams that are affected by the decision meet. (FIRM 4).

		Agile, organic decision-making	We are a small company. Yes, decisions are not taken if there is a, that is, if there are partners and managers. But they are made by extracting the lessons we learn as a team. That is to say, if the design department has done different things or learnt different things, then they are put together in the team, I can say that it can be in one morning. In one morning, design comes up with an insight, we all talk together and suddenly a decision is made. And all of a sudden we are already in motion. I wouldn't say it's hierarchical, although it is hierarchical, but it's something very natural, a very open dynamic of a start-up or a small company in which we all participate a little and are involved in everything. That also brings problems: sometimes we get involved in other people's departments, but there are roles and then it's divided. (FIRM 2).
		Certification-driven formal systems	One of the important points is the B-Corp certification, which we have known for a few years and we knew the procedure to follow to become a B-Corp [...] So, when we created the company already, we set ourselves that. That is our objective, and let's continue to be. (FIRM 2).