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Weaving a New Path: Rethinking Incumbents' Role in Sustainability Transitions Through a Multilevel Perspective

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ABSTRACT

This study investigates how incumbent firms can actively foster sustainability transitions by strategically engaging across regime and niche levels when developing sustainable innovations. Drawing on an embedded case study of a leading Italian textile company involved in eight sustainable innovation projects, we identify four strategies—namely, Joining, Scouting, Engaging and Bridging—that enable incumbents to develop transition capacity. Unlike conventional innovation efforts, sustainable innovation demands longer timelines, broader stakeholder engagement and the ability to manage systemic complexity. Our findings challenge the traditional multilevel perspective (MLP) view of incumbents as passive regime defenders, instead portraying them as dynamic actors capable of supporting niche experimentation and building bridges across levels. We show that incumbents leverage internal innovation labs, trusted intermediaries and direct partnerships with niche actors to explore, absorb and maintain radical sustainable innovations. Additionally, we highlight the crucial role of intermediaries who must engage with the niche to prevent reinforcing existing lock-ins. Even ‘failed’ collaborations generate valuable learning spillovers that contribute to organisational resilience and innovation capability over time. This study enriches the MLP framework by offering a more dynamic view of regime–niche interactions and provides actionable insights for firms seeking to navigate the grand challenge of sustainability through proactive innovation strategies.

1 | Introduction

In the last 20 years, there has been a significant shift in innovation studies due to the need for coordinated innovation efforts to tackle challenges such as climate change (Falcke et al. 2024). Tackling sustainability as a grand societal challenge demands both technological innovation and systemic transformations that involve diverse actors at multiple levels (Ahmad et al. 2024; Ferraro et al. 2015; George et al. 2016). These challenges are propelling sustainability-oriented innovations that transcend incremental improvements and necessitate deeper collaborations

across traditional boundaries (Geels 2019; Perotti et al. 2025). However, despite the importance of systemic change, much of the literature in transition studies, particularly if grounded in the multilevel perspective (MLP) framework (Geels 2002), has depicted incumbent firms primarily as regime actors resistant to radical change. Recent research has challenged this view, suggesting that incumbents may adapt and even initiate and support niche innovations (Berggren et al. 2015; van Mossel et al. 2018). Nevertheless, the mechanisms through which incumbents operate across levels, especially how they overcome the institutional, organisational and technological barriers to

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foster sustainable niche innovation, remain underexplored (Abadzhiev et al. 2024). Moreover, while the MLP framework provides a structured lens to examine sustainability transitions, its application often lacks conceptual depth regarding the characteristics and challenges of sustainability-driven innovations (Köhler et al. 2019). In fact, sustainable innovations tend to differ from conventional technological innovations in their dependency on systemic support, extended time horizons, value-laden goals and broader stakeholder engagement (Beger et al. 2023; Boons and Lüdeke-Freund 2013). Unlike traditional innovations, which focus predominantly on economic returns or technical performance, sustainable innovations are embedded within wider societal and ecological contexts. They often face barriers such as fragmented regulatory environments, uncertain consumer demand and the need for cross-sectoral integration (Markard et al. 2012). As such, managing sustainable innovation requires new forms of coordination, governance and value creation. Accordingly, Franzè et al. (2024) discuss that sustainability-oriented innovations often evolve cumulatively, from processes to supply chains and then to products, highlighting the importance of leadership and organisational learning in sustaining innovation trajectories. Building on these premises, this paper investigates how incumbent firms strategically engage in sustainability transitions through collaboration with niche actors. Particularly, we aim to respond to the following research question:

RQ: How can an incumbent foster sustainable innovation across the regime and niche levels?

We answer this question in the empirical context of an established Italian textile company that carries out projects to develop sustainable niche innovations in collaboration with different actors. The textile industry is a relevant context for our research. It has come under increasing scrutiny due to its environmental footprint, characterised by high resource intensity, chemical use and waste generation (Ellen MacArthur Foundation 2017). We mapped eight projects embedded in the case company, collecting archival documents and direct observations and conducting 10 focused interviews over 1.5 years with the focal company and its counterparts in the projects. Data were analysed considering the focal incumbent firm as the unit of analysis, and they indicated that the role of incumbent firms in a sustainable transition unfolds at the crossroads of the regime and niche levels, with evidence of a potential synergic relationship between regime and niche actors. Our findings question the traditional view of the MLP on incumbent actors being confined to the regime level. Through this embedded case study, we identify four distinct strategies, i.e., *Joining*, *Scouting*, *Engaging* and *Bridging*, that enable incumbents to engage across levels and facilitate sustainable innovation.

2 | Theoretical Background

2.1 | Sustainable Innovation: Challenges and Specificities

Sustainable innovation differs from conventional innovation not only in its environmental and social aims but also in the complexity of its development and implementation (Adams et al. 2016).

Rather than focusing solely on technical performance or market competitiveness, sustainable innovation is concerned with systemic transformation to address grand challenges such as climate change, biodiversity loss and social inequality. It therefore presents distinctive complexities that require longer development cycles, broader stakeholder engagement and alignment with evolving policy and regulatory frameworks (Bocken et al. 2014; Boons and Lüdeke-Freund 2013).

First, sustainable innovation typically involves extended development horizons (Longoni and Cagliano 2018). For instance, vertical farming ventures like Infarm, a German company that builds modular, high-tech indoor farms, and Plenty, a North American firm using tech to grow pesticide-free products indoors, faced long development cycles due to the need for integrated technological solutions and restructured supply chains (McKinsey and Company 2021). Similarly, Xiang et al. (2022) argue that green innovation is typically linked with high costs, high risks and lengthy development, additionally constrained by financial bottlenecks. These examples highlight how sustainable innovation requires deep, system-level adaptation.

Second, sustainable innovation is shaped by broad stakeholder involvement, often through multiactor platforms and innovation ecosystems (Van Geenhuizen and Ye 2014). Likewise, to develop its bio-based innovation strategies, DSM, a Dutch multinational corporation operating globally in the fields of health, nutrition and materials, relied on collaborations with universities, NGOs and local governments to co-create solutions aligned with regional development goals (DSM 2020). This case shows how successful sustainable innovation depends on participatory processes that span sectoral, geographical and institutional boundaries. Additionally, Huang et al. (2019) report that firms' internal resources and external linkages jointly shape their capacity to pursue green innovation. Absorptive capacity, defined as the ability to recognise, assimilate and apply external knowledge, is a critical moderator in the relationship between environmental regulation and green innovation. Moreover, collaborations with universities, research institutes and supply chain partners are essential conduits for the knowledge and legitimacy needed to navigate the uncertainty and multidimensional goals typical of green innovation. Therefore, firms cannot rely solely on internal R&D or top-down regulatory pressure; rather, they must build strategic capabilities and network-based learning mechanisms to cope with environmental complexity and institutional expectations.

Third, sustainable innovation is frequently tied to policy frameworks due to its embeddedness within shifting regulatory and institutional environments (Meelen and Farla 2013). The offshore wind sector in Denmark and the UK, for instance, would not have scaled without stable government support through feed-in tariffs, risk-sharing mechanisms and long-term infrastructure planning (IRENA 2018). In construction, the emergence of green buildings and net-zero standards has been influenced by urban policy, tax incentives and international frameworks such as LEED and BREEAM certifications (World Green Building Council 2021). At the strategic level, broader policy shifts such as the European Green Deal or the Sustainable Development Goals require firms to align innovation strategies with societal expectations

(European Commission 2020). Similarly, Yuan et al. (2025) describe green innovation as characterised by double externalities, i.e., knowledge spillovers and environmental benefits that can generate public value but reduce firms' returns. This results in chronic disinvestment in green innovation by market actors unless external support mechanisms are in place.

Taken together, these characteristics illustrate the systemic and collaborative nature of sustainable innovation. Unlike conventional innovation, it demands capabilities for cross-sector coordination, long-term planning and adaptive governance. Analytical frameworks are needed that can account for the co-evolution of technologies, institutions and societal values in sustainability transitions (Köhler et al. 2019).

2.2 | Multilevel Perspective

The MLP is prominent in transition studies (Geels 2002; Rip and Kemp 1998; Smith et al. 2010). It combines concepts from evolutionary economics, sociology of innovation and institutional theory (Köhler et al. 2022). The MLP suggests that transitions occur by means of interactions among three levels, namely, socio-technical landscape, socio-technical regime and niche innovations (Geels 2002). These levels are not hierarchical but nested within each other and coexist through the interactions among the actors lying at different levels. Innovations arise in niches and depend on the specific features, challenges, rules and capabilities of the existing regimes and landscapes. Usually, novelties emerge to solve problems in the regime and represent the seed of change. The MLP is relevant because the success of an innovation is governed not only by processes in niches but also by further developments occurring at the regime and landscape levels. For instance, disruptions and changes at the landscape level could shake the regime and create openings for novelties to emerge (Kemp et al. 2001).

The landscape includes slow-changing external forces like demographics, ideologies, societal values and global economic patterns (Geels and Schot 2007). These are beyond the influence of regime actors in the short term but shape transition pathways. Key actors here include governments and international bodies that set broad policies and frameworks.

The regime represents the dominant structure of rules and practices that stabilise the current system (Geels 2004). These include routines, beliefs, competencies, regulations and institutional arrangements (Geels 2011). Due to these 'lock-ins,' change is typically slow and incremental. Main actors include incumbent firms, industry associations and user communities who reinforce existing norms and resist radical change.

Niches are protected spaces for experimentation with alternative technologies and practices (Kompella 2017). Radical innovations often emerge here, developed by start-ups, entrepreneurs or spin-offs (Smith et al. 2010). However, niche innovations face hurdles in breaking into the regime due to infrastructure, regulation and user practice mismatches (Geels 2011). Still, they are crucial for systemic transformation. The challenge for innovation extends beyond economic

potential to encompass societal shifts driven by innovative activities, with implications for environmental and social sustainability (Smith et al. 2005).

2.3 | Role of Incumbents in the MLP

Incumbent firms have traditionally been viewed as resistant to radical innovation due to their embeddedness in existing technological and institutional regimes (Geels 2002). This resistance is often attributed to their investment in established routines, risk-averse cultures and role in maintaining the status quo of the dominant regime (Klammer et al. 2023).

However, some scholars have offered a more nuanced view by recognising incumbents as heterogeneous actors that can also foster transformative innovation by leveraging their scale, networks and absorptive capacity (van Mossel et al. 2018). This perspective is relevant in sustainability transitions, where innovation requires not only technological development but also cross-sector collaboration and socio-institutional change.

The Knowledge Spillover Theory of Entrepreneurship (Audretsch and Keilbach 2007, 2008) provides a useful lens to understand the dual role of incumbents as sources and beneficiaries of knowledge spillovers. The theory was originally applied to explain how entrepreneurial ventures commercialise underutilised knowledge within incumbent organisations or public institutions, but recent extensions have described how incumbents themselves actively shape entrepreneurial ecosystems (Audretsch et al. 2021). They create structural conditions by, for example, establishing accelerators, innovation labs and strategic partnerships that facilitate the externalisation and recombination of knowledge (Hutter et al. 2021; Kim and Wu 2019). Therefore, incumbents are not merely passive recipients of entrepreneurial activity. They actively orchestrate spillover networks to access diverse innovation logics (Ermini et al. 2024). These logics include upstream collaborations with start-ups and research institutions, downstream interactions with users and markets and lateral engagements with intermediaries.

Strategic alliances between incumbents and start-ups can entail relational asymmetries, which introduce both opportunities and risks. Start-ups mitigate expropriation risks through relational pluralism, forming multiple ties to build legitimacy and safeguard knowledge (Knoben and Bakker 2019). Incumbents thus play a dual role: they act as anchors for stability in innovation ecosystems while enabling exploration through controlled permeability and governance mechanisms (Baloutsos et al. 2020). Qadeer et al. (2024), for example, demonstrate that state ownership exerts a nonlinear influence on green innovation, where minority participation stimulates innovation, while majority control hampers it, underlining the role of governance structures in shaping incumbents' innovation capacity.

Incumbent engagement in cooperative relationships (i.e., simultaneous cooperation and competition) with start-ups fosters both learning and unlearning dynamics (Klammer et al. 2023). These interactions can challenge organisational routines and facilitate cognitive renewal, especially when start-ups have sustainability-driven logics that differ from incumbents' traditional models.

However, these collaborations must be carefully designed to avoid superficial engagements that fail to translate into sustained transformation (Hutter et al. 2021).

Overall, these insights frame incumbents as institutional entrepreneurs both navigating and shaping transitions by mobilising knowledge, influencing expectations and connecting regime and niche levels. This multifaceted view advanced by the Knowledge Spillover Theory of Entrepreneurship could enrich the MLP by depicting incumbents as actors bridging system levels and actively engaging in the creation, selection and scaling of sustainable innovations. Nevertheless, the mechanisms through which incumbents can achieve this are still unknown.

3 | Methodology

3.1 | Research Design

The research design is qualitative and adopts an exploratory approach (Miles and Huberman 1994) by conducting an embedded case study (Yin 2009) on a large textile company and its partners engaged in collaborative sustainable innovation projects. This approach is well suited to investigating environments where boundaries are not clearly defined (Yin 2009) and the phenomena under study are complex and multifaceted (Scholz and Tietje 2002). Such conditions characterise collaborative innovation processes, especially within innovation niches, where organisational boundaries are fluid and evolving and future trajectories are shaped by dynamic external influences (Hofman et al. 2016).

3.2 | Empirical Setting

The study is developed within the textile industry, where interaction between incumbent firms and niche actors is becoming increasingly critical. Mounting sustainability pressures and rapid technological advancements are challenging the industry's linear production model, prompting a fundamental transformation. The urgency to transition from a 'take-make-dispose' paradigm to more circular and sustainable production models is now widely acknowledged (Ellen MacArthur Foundation 2017). Nonetheless, sustainable innovations in textiles, such as bio-based fibres, circular design frameworks and nontoxic dyeing technologies, continue to face significant barriers related to scalability, supply chain integration and consumer adoption (Bocken et al. 2016; Pal and Gander 2018).

Numerous companies in the industry exemplify the complex, systemic adaptation needed for sustainable innovation. Their projects often require significant time for experimentation, scaling and alignment across the value chain. For instance, Patagonia's development of Yulex, a natural rubber alternative to neoprene used in wetsuits, took nearly 8 years of R&D and iterative testing with suppliers and scientists to achieve technical and ecological performance standards (Patagonia 2015). Spinnova, a Finnish company, developed a patented process to produce textile fibres from wood pulp without harmful chemicals, an innovation that required years of research and infrastructure investment before reaching commercial scale (Spinnova 2024).

On the technological front, the Hong Kong Research Institute of Textiles and Apparel has developed the 'Green Machine,' a hydrothermal system that separates cotton and polyester blends, enabling fibre-to-fibre recycling on a large scale. This innovation has been tested in partnership with global brands such as H&M. Thus, while the direction of transformation is increasingly clear, the path remains complex, requiring both technological breakthroughs and cross-sectoral collaboration. The case company studied here reflects many of these broader dynamics, operating at the intersection of incumbent-driven innovation and emerging niche experimentation.

Both the landscape and niche levels are exerting pressure on the current regime. The former is increasingly developing regulations and directives, such as EU strategies encouraging a sustainable transition. In 2022, the EU Strategy for Sustainable and Circular Textiles was released to make the industry more sustainable and circular by 2030 (European Commission 2022). Key measures include promoting eco-design, tightening restrictions on hazardous chemicals deployed in production, extending producer responsibility to ensure increased responsibility of manufacturers in waste management and fostering transparency practices in the supply chain. The pressures from regulations, stakeholders and market demands push the textile industry towards a fundamental transformation where sustainability is no longer a choice but a necessity for long-term survival.

In parallel, the niche level is in a ferment state where multiple protected spaces are emerging to develop radical sustainable innovations, for example, the Circular Hub sponsored by Gucci and Kering (Pieraccini 2023). Therefore, the sector is embarking on a challenging path by increasingly collaborating and engaging in innovation networks to share knowledge and resources.

3.3 | Cases Selection

The focal company examined in this study is a large Italian textile company, founded in 1876, employing 1291 people worldwide. Specialising in the production of cotton fabrics for high-end shirting, the company has demonstrated a commitment to both innovation and sustainability. In 2019, it reinforced this orientation by establishing an innovation lab explicitly aimed at fostering radical sustainable innovation within the sector. Since its inception, the lab has initiated a series of collaborative projects with diverse partners, focusing on the development of sustainable circular product and process innovations situated within protected niche spaces.

The focal company has a dominant and long-standing market position. It relies on significant resources, a well-established supply chain and client base, and a recognised brand reputation. As such, we have considered the firm an incumbent throughout our discussion. The selection was also driven by the fact that the company, besides developing sustainable niche innovations, also operates at the regime level by deploying, on a large scale, conventional production processes, thus acting across multiple levels.

The unit of analysis is the focal company, i.e., the textile incumbent firm, which is engaged in developing sustainable

TABLE 1 | Data source overview.

Data source	Details	Role in analysis
1. Observations	122 meetings, 5 events, 88 other exchanges; 21 pages of notes	Different perspectives on cross-level collaboration. Insights on the involved actors, interactions among them and leveraged approaches and strategies for collaboration
Organisation-level decision-making activities of the focal company (incumbent)	Board meetings (5) Weekly meetings for projects monitoring and planning (28)	
Internal activities within focal company (incumbent) innovation team	Staff meetings (67) Planning meetings (22) Interdisciplinary team consultations (17) Informal exchanges (71)	
Public events	Local community events (5), e.g., Innovation district events where focal company (incumbent) or partners were involved	
2. Interviews	10 interviews; 132 pages of transcripts	Deep insights into interviewees' experiences, opinions and expertise; rich qualitative data about niche innovations
Semistructured interviews (8)	Interviews with focal company's (incumbent) employees and partners Informal exchanges (weekly)	
Follow-up interviews (2)	Follow-up interviews with innovation lab team (January–May 2024)	
3. Archival documents	24 documents, 2 videos, 1 podcast	Specific descriptions of sustainable niche innovations and involved partners
Internal company documents	Internal innovation management procedures	
Public documents	Local, regional and national newspaper articles (7 articles from 2019 until August 2024) Video recordings and podcasts	

innovations, represented throughout our discussion as projects aimed at developing such innovations, the embedded cases.

3.4 | Data Collection and Analysis

Data collection started in February 2023 and ended in August 2024. Both primary and secondary data were gathered to ensure triangulation (Table 1). We participated in four board meetings with the top management of the focal company to know more about the different projects. We were involved in other decision-making activities, such as meetings with the company's innovation team. These took place on a weekly basis during the data collection and were used to obtain updates and plan and control activities of projects. Finally, we participated in five events where the focal company described and discussed its sustainable innovation projects.

Secondary data were obtained from internal (e.g., reports, emails, company databases) and external documents (e.g., industry reports, newspapers, websites, project documentation).

We interviewed managers within the focal company and six partners for a total of 10 interviews (duration: 45–105 min, mean 60) with 10 interviewees. All interviews were recorded and

transcribed verbatim. Anonymity was ensured, with the interviewees identified only through their organisational role in the company (Table 2). The interviews with the focal company allowed us to map eight projects the company had run or was still running in collaboration with partners belonging to the niche to develop sustainable innovations (Table 3). The selected projects were considered by the focal company as the most relevant in its innovation project portfolio in terms of resource investments and the potential impact of the sustainable innovation.

Our qualitative analysis followed an iterative and embedded case study approach, informed by established methodological guidelines (Eisenhardt 2021; Hashimov 2015). Rather than applying a linear coding procedure, we moved dynamically between empirical material and theoretical perspectives, allowing for the gradual emergence and refinement of analytical insights grounded in the data (Yin 2009).

We began by developing detailed chronological narratives for each embedded case, which served both as descriptive anchors and as a springboard for interpretive analysis. These narratives enabled us to gain key insights and identify early patterns within each embedded case. Building on these foundations, we conducted a cross-case analysis that highlighted recurring mechanisms as well as case-specific divergences.

TABLE 2 | Summary of interviews conducted.

Organisation	Organisation type	No. interviews (interviewees)	Interviewees' role	Total duration	No. pages	Project
Focal company	Incumbent	6 (4)	Innovation manager Project managers (2) Marketing manager	5 h	72	All
Partner 1	Start-up	1 (3)	CFO Implementation specialist Business development executive	45 min	12	Project 3
Partner 2	Start-up	1 (1)	Director & project manager	1 h	15	Project 2
Partner 3	Start-up	1 (1)	Production Manager	1 h	10	Project 4
Partner 4	Start-up	1 (1)	Founder	1 h 30 min	23	Project 6

Coding was informed by these emerging insights and carried out by two researchers working in parallel, which strengthened consistency and mitigated potential individual bias. Data from interviews, archival sources and field notes were triangulated to support the credibility of the interpretations. Findings were continually discussed within the research team, and interpretations were refined through collaborative dialogue. We also engaged with select participants to validate our emerging analysis and ensure alignment with their lived experiences (Guba 1981).

The cross-case comparison played a pivotal role in shaping our theorisation. By systematically comparing and contrasting similar embedded cases, looking for both potential convergence and variation, we developed a more nuanced understanding of the dynamics under study. This analytical process ultimately led us to the identification of four distinct strategies that the focal company adopted to engage with emerging innovation contexts. These strategies were not predefined but inductively derived through iterative refinement of emerging patterns across embedded cases, supported by comparative tables and repeated returns to the data and literature (Eisenhardt and Graebner 2007; Shepherd and Suddaby 2017).

4 | Findings

4.1 | Regime Level and Its Lock-Ins

The regime refers to the dominant socio-technical system, which includes all the established practices, rules, norms, institutions and technologies that are deeply embedded in a context. In our case, the regime is represented by the practices that are dominant in the textile industry, namely, the focus on efficiency and cost reduction. The case study was embedded in this culture, with the advantage of being positioned in the medium- to high-end of the market, thus having the privilege of extra margins to be invested into objectives that were lateral to the business, such as sustainability. The regime culture oriented to profit maximisation and operational efficiency was evident during the meetings

with the company's owners and the CEO, where the thrust towards sustainable innovation was justified by the opportunity to enhance reputation and returns on investments, but also during the informal meetings with the innovation team, where some frustrations arose regarding some projects with high sustainable innovation potential that were, however, hampered by top management due to the need for large investments or lack of vision.

Multiple *lock-in* mechanisms, for example, technological, institutional, economic and cultural factors, were preventing the company from bridging the regime and the niche.

Evidence of these *lock-ins* is visible in many mapped projects, where technological barriers, skills and knowledge gaps often hindered innovation from scaling up. Adapting the established system to support new, more sustainable technologies often requires significant investments that disrupt established practices, creating resistance to change. For example, in Project 2 developing a more sustainable finishing process, the collaboration was hindered by the need to modify machinery parameters in the company's production plants to accommodate the new fluorine-free finishing formula, changes that met resistance from production employees due to the disruption of existing processes.

Cultural lock-ins are also evident in cases where departments like procurement and design lead to objectives misalignment due to their conflicting priorities because criteria such as cost-efficiency and style take precedence over sustainability, thus reinforcing the existing regime's stagnation. For example, the Founder of Partner 4 stated:

‘When you speak with the majority of the industry's actors, the profiles that they have in sustainability are people that used to be a designer, a buyer, a sourcing manager and now they're converted into sustainability managers. [...] If you're a designer, why are you involved in sustainability processes which are very complex and involve many factors?’ (Founder, Partner 4)

TABLE 3 | Overview of sustainable niche innovations developed by the focal company. (Source: interviews, company website).

Project #	Project name	Description	Innovation type
Project 1	<i>Algae-based fibre</i>	<i>Developed in collaboration with a start-up based in North America that produces seaweed-based fibres that have lower environmental impacts compared with conventional fibres. The project was the joint development of a new fibre made by a specific type of algae.</i>	<i>Product</i>
Project 2	<i>Sustainable finishing</i>	<i>Conducted with a start-up (a spinoff of an Italian university) which develops chemical products for coating applications. The project involved the development of a formula to make a fluorine-free finishing, a more sustainable water-repellent.</i>	<i>Process</i>
Project 3	<i>Genetically modified organism-based colouration</i>	<i>Implemented in collaboration with an English start-up focused on biotechnology using DNA sequencing and natural colours to create sustainable dyes for the fashion industry. The project aims at the transition from synthetic dyes to colours from engineered microorganisms, so the development of OGM-based colorations for fabrics dyeing.</i>	<i>Process</i>
Project 4	<i>Chemically recycled yarn</i>	<i>Conducted in collaboration with a start-up based in Sweden whose main business is to chemically recycle cellulosic-based textile waste (both industrial and postconsumer). The product obtained can be used as feedstock into production of artificial cellulosic fibres.</i>	<i>Product</i>
Project 5	<i>Sustainable colouration</i>	<i>Developed with a Chinese start-up that provides natural dyes from organic (food) waste for the production of bright and vibrant natural colours.</i>	<i>Process</i>
Project 6	<i>Hydroponic cotton</i>	<i>Developed with a Spanish start-up that started hydroponic technology in cotton farming. This soilless farming technology allows the production of cotton using much less water than soil-based farming and the production of many cotton varieties that are usually grown in remote regions thanks to indoor farming.</i>	<i>Product</i>
Project 7	<i>Indigo-based dyeing</i>	<i>Developed with an American start-up, manufacturer of a certified 100% plant-based indigo. The collaboration was established to study the application of natural indigo, cultivated through regenerative farming practices, to package dyeing.</i>	<i>Process</i>
Project 8	<i>Graphene-based dyeing</i>	<i>Developed in collaboration with an Italian start-up with the aim of using graphene waste for fabrics dyeing.</i>	<i>Product</i>

This quote reflects the misalignment between creative/design departments and the technical demands of sustainability, showing how the legacy of professional identities and departmental boundaries act as cultural lock-ins. These barriers can prevent effective evaluation or implementation of sustainable solutions when cost or style takes precedence.

4.2 | Niche Level

It is possible to observe strategies taking place between the focal company and the different niche actors with whom it collaborates (Table 4).

In comparative analysis of the projects, we identified four strategic patterns that describe how incumbents engage with niche

actors, namely, *Joining*, *Scouting*, *Engaging* and *Bridging*. Each strategy addresses specific challenges of sustainable innovation, such as technological uncertainty, partner misalignment or distance (both geographical and cultural). We included both successful and unsuccessful projects to capture the full spectrum of strategic responses and learning dynamics, as even unsuccessful initiatives can provide valuable insights into barriers, adaptive strategies and organisational learning processes crucial for sustainability transitions.

4.3 | Joining: Internal Creation of an Innovation Lab

The *Joining* strategy refers to the creation of dedicated internal structures within incumbent organisations, such as innovation

TABLE 4 | Overview of projects' main features.

Project #	Project 1 (algae fibre)	Project 2 (sustainable finishing)	Project 3 (OGM-based coloration)	Project 4 (chemically recycled fibre)	Project 5 (sustainable coloration)	Project 6 (hydroponic cotton)	Project 7 (indigo-based coloration)	Project 8 (graphene-based coloration)
Duration	4 years	3 years	4 years	1 year	2 years	1 year	1 year	<1 year
Subject area	New materials	Green chemistry	Alternative colorations	New materials	Alternative colorations	New materials	Alternative colorations	Alternative colorations
Incumbent activities	Collaboration with geographical distant, small actor Provision of know-how Investment in a completely new material	Collaboration with university Provision of production facilities for testing	Exploration and experimentation of sustainable innovations proposed by other parties Provision of production facilities Investment in resource training and development	Exploration and experimentation of sustainable innovations proposed by other parties Provision of know-how, production facilities and laboratories Management of new supply chain configuration	Collaboration with geographically distant small actor Investment in a completely new coloration process	Exploration and experimentation of sustainable innovations proposed by other parties Provision of know-how, production facilities and laboratories for testing	Collaboration with geographically distant small actor Investment in a completely new coloration process	Collaboration Provision of material, know-how and laboratories
Niche actor activities	Idea generation Material supply	Idea generation Providing know-how	Idea generation Providing know-how	Operational Providing technology, competences and know-how	Idea generation Material supply Providing know-how	Operational (providing material) Providing know-how	Idea generation Providing technology and know-how	Idea generation Providing material and know-how
Barrier	Scalability	Lack of technology and competences	Lack of technology	Product performance	Communication barriers Product performance	Objectives misalignment	Product performance	Objectives misalignment
Intermediary	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Type of intermediary	Incumbent	Incumbent	Incumbent	Incumbent	Incumbent	Incumbent	Incumbent	Incumbent

(Continues)

TABLE 4 | (Continued)

Project #	Project 1 (algae fibre)	Project 2 (sustainable finishing)	Project 3 (OGM-based coloration)	Project 4 (chemically recycled fibre)	Project 5 (sustainable coloration)	Project 6 (hydroponic cotton)	Project 7 (indigo-based coloration)	Project 8 (graphene-based coloration)
Intermediary entrance in project	At the beginning	At the beginning	At the beginning	At the beginning	Partner identification (V1)	For the lab testing (D1)	For the industrial testing (D2)	
Role of intermediary in project	Put the two partners in contact	Financing	Put the two partners in contact Financing	Put the two partners in contact	Put the two partners in contact	Financing and support	Operational	
Previous collaborations with intermediary	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Successful project	No	No	Yes	Yes	No	Yes	No	No
Spillover generation	Yes	Yes	No	Yes	No	Yes	No	No
Spillover details	New products	Alternative product application		New business model development (Client Venture)		Collaboration with other partners		

labs, that serve as boundary infrastructures between regime practices and niche experimentation. These spaces enable incumbents to ‘join’ the niche from within, aligning with radical innovation logics while leveraging their own resources and strategic intent.

In our case, the focal company established its innovation lab in 2019 to explore sustainable product and process innovations. This move enabled the firm to bypass some of the constraints of the mainstream textile regime, such as time-to-market pressures, cost-efficiency logics and operational inertia and to engage in more exploratory collaborations with start-ups and other niche actors. At one of our informal meetings, the innovation manager of the focal company observed:

‘Our main challenge is that we deal with sustainable innovation. Innovation takes time and some projects could take years, so we have completely different timing with respect to the industry seasonality.’ (Innovation Manager, Focal Company)

By creating its own protected space, the company also developed internal capacity to test and incubate sustainable innovations without compromising core production operations. The innovation lab served not only as a space for technical experimentation but also as a site for cultural translation across regime and niche languages and strategic learning. Therefore, the creation of this internal infrastructure enabled the company to operate across levels of the MLP, facilitating protected experimentation while maintaining regime-level activities.

The presence of the innovation lab also legitimised the company’s niche activities in the eyes of external stakeholders, that is, partners, investors and certification bodies, by signalling a sustained commitment to long-term innovation rather than opportunistic experimentation. For example, as one of the researchers observed, different partners and companies from the same innovation lab began taking an interest in the focal company’s innovation model, requesting meetings and seminars to learn from it and explore how to replicate it within their own contexts. Simultaneously, this structure fostered collaboration with diverse industrial associations to test the implementation of an innovation management system and made the focal company a virtuous example of trailblazing sustainable innovation.

Additionally, by strengthening internal commitment, the company enhanced its ability to autonomously engage with niche actors and support innovation processes, as evidenced by the words of the innovation manager:

‘I think our role is crucial because we’re the ones that have the time to first research the technology and actually bring that technology to the industry. Most investigation and start-ups are just studying and doing their work in a small scale, but there’s no one that brings this small thing into the big picture, so our innovation lab dedicates the time to do this trial-and-error process in order to bring what is not yet grown up. We are mainly project managers [...] and I think

we’re the central point between the communication of a small group and big industry.’ (Innovation Manager, focal company).

The creation of an innovation lab can provide a space to ‘become one of them’ in the niche, acting as a cultural and operational interface between regimes and radical innovators.

4.4 | Scouting: Leveraging Internal and Intermediary Networks

The *Scouting* strategy refers to the process through which emerging sustainable innovations are identified, assessed and brought to the attention of the incumbent firm. In our case, the company actively pursues scouting activities to identify potential partners and collaborations. However, what we observed is that this effort is complemented and often amplified by the role of an intermediary actor, itself an incumbent firm with an innovation lab. While the focal company engages in targeted exploration based on its strategic interests, the intermediary actively monitors the broader innovation landscape and acts as a curator of niche ideas, proposing selected opportunities to the focal company’s innovation lab.

Rather than relying solely on internal resources for broad external scanning, the focal company benefits from a dual-channel approach: direct, focused scouting and intermediary-led filtering. The innovation lab then evaluates the opportunities emerging from both channels and, if considered viable, initiates collaborations with the proposed niche actors.

This configuration illustrates a multilayered scouting dynamic where the intermediary acts as both scout and broker, and the focal company acts as a gatekeeper and partner. The intermediary thus shapes the innovation pipeline and narrows the field of engagement, reducing cognitive and relational overload for the incumbent. A clear example of this dynamic was highlighted during an informal meeting the researchers had with the innovation team. The team reported that the innovation lab of their incumbent intermediary had a key role in some projects (e.g., Project 3, OGM-based coloration) by identifying the start-up and introducing its CEO and project manager directly to them. In this case, the intermediary curated the innovation opportunity and facilitated the initial connection, allowing the focal company to focus on evaluating the proposal and determining its strategic fit. This set-up highlights how the intermediary shaped the innovation pipeline while reducing the cognitive and relational load on the incumbent firm.

However, once the innovation reaches the incumbent’s internal lab, the process becomes more complex. As evidenced in several projects, internal misalignments, especially among departments driven by different logics (e.g., sustainability, procurement and design), emerged as recurring barriers to project development, even when the proposed idea had high potential. One project manager of the focal company stated:

‘It’s always a matter of style and purchasing departments [...] The sustainability department would

buy anything you produce; the purchasing department only looks at the price, and the style department only cares about the design. So, if you don't have a sustainable product which is both beautiful and cheap, it never goes into production.' (Project Manager, Focal Company)

Thus, while the intermediary enhances the efficiency and quality of the scouting process, the incumbent's internal absorptive capacity, that is, its ability to interpret, integrate and act on proposed innovations, remains a crucial determinant of project success.

Overall, *Scouting* in this context is not a unilateral activity done by the incumbent, but a process distributed across organisations, highlighting the importance of trusted intermediaries in enabling incumbents to access and evaluate niche innovations efficiently and strategically.

4.5 | Engaging: Direct Engagement Without Intermediaries

The *Engaging* strategy captures direct collaborations between incumbents and niche actors without the mediation of intermediaries. These collaborations often entail high risk, as they involve early-stage technologies, high uncertainty and limited formal safeguards. However, they also offer opportunities for deep engagement, rapid learning and capability-building.

Project 8 exemplifies this strategy. The focal company partnered directly with a start-up offering a graphene-based dyeing technology. The firm provided material inputs, access to laboratory facilities and production feedback. This knowledge and facilities sharing was observed by the researchers during the weekly operational meetings, where the innovation team coordinated testing and scaling activities of the technology provided by the niche actor. Despite intense collaboration and mutual learning, the project was eventually abandoned because of its similarity with an already ongoing initiative within the company, thus indicating the challenges of novelty assessment in early-stage innovation, as the project manager explained:

'The colour that came out was a dark grey that wasn't interesting for us because we already had another sustainable black coloration project and by diluting that black we could already obtain the same result. So, we decided not to go forward.' (Project Manager, focal company)

The classification of this project as 'unsuccessful' by the innovation team reflects internal evaluation criteria focused on originality, strategic fit and added value. This reflects a deeper issue: in early-stage innovation, the novelty of a solution is not always clear upfront, especially when multiple teams are working on it. As innovation unfolds and outcomes become tangible, what seemed unique or disruptive may initially turn out to be functionally or strategically duplicative.

This situation also points to the importance of internal coordination and strategic alignment in innovation portfolios. Mechanisms must be implemented that can systematically assess overlap and synergies, as resources may be invested in projects that eventually cannibalise or replicate each other. Nevertheless, even this 'failed' initiative generated important learning regarding technology readiness, absorptive capacity and internal alignment. The experience reinforced the need for clearer scouting processes and knowledge-sharing mechanisms across projects.

4.6 | Bridging: Operational and Financial Support Within the Collaboration

While the *Scouting* strategy captures the intermediary's role in identifying and proposing niche innovations to the focal company, the *Bridging* strategy describes the intermediary's active involvement during the collaboration itself, supporting implementation through financial resources, operational infrastructure or relational facilitation.

Once a collaboration is initiated, often based on a proposal from the intermediary, the same intermediary may step in to help manage and sustain the collaboration. In particular, the intermediary can continue to support the relationship by acting as a translator, coordinator and facilitator throughout the project's life cycle. In our case, the intermediary, a fellow incumbent with its own innovation lab, frequently provided operational infrastructure, co-financing and project management support, thereby reducing the risks and barriers typically associated with asymmetric partnerships. The intermediary helped align expectations, manage uncertainty and provide technical or logistical assistance to overcome challenges that often arise due to differences in organisational culture, language, location or innovation maturity. A clear example of the *Bridging* strategy can be seen in Project 3 (OGM-based coloration), where the innovation lab of the intermediary played a pivotal role not just in initiating the collaboration but also in sustaining it operationally and financially. The intermediary initially introduced the start-up, which was offering a biotechnology-based dyeing process using engineered microorganisms, to the focal company innovation lab. Once the collaboration was underway, the intermediary continued to support the partnership by helping co-finance critical infrastructure, including contributing to the purchase of a fermenter, a key piece of equipment required to scale the new dyeing technology for industrial trials.

The intermediary also acted as a coordinator and relationship facilitator, helping manage communication and expectations between the two parties. This was important in navigating the asymmetries between the large incumbent textile firm and the smaller start-up. The intermediary thus helped mitigate risks, align timelines and technical goals and ensure that both partners remained committed and capable of advancing the project despite its experimental nature.

This role was especially critical in projects where the niche actor was geographically distant or lacked the resources to navigate a complex industrial supply chain, as in Projects 3 and 4. For the

latter (chemically recycled yarn), the intermediary both scouted the innovation and remained actively involved in supporting both the niche actor and the focal company during testing and implementation phases. The Production Manager of the partner in Project 4 noted:

'The supply and logistic chains are not developed for this kind of business. That's been challenging of course. It was challenging to find the right suppliers, who could develop this using this technology and make it into a big-scale operation, but also to get acceptance on the market, to introduce fibre producers to a new raw material that they're not used to.' (Production Manager, Partner 2)

This quote highlights the systemic challenges that bridging activities seek to address, particularly around infrastructure readiness, supply chain maturity and market acceptance. The intermediary, by offering targeted support, can reduce the burden on both the focal company and the niche actor, thus increasing the likelihood of success.

In this case, the intermediary innovation lab played a vital role in identifying the opportunity and initiating and legitimising the collaboration:

'We'd been in contact with the innovation lab for quite some time. So, in one of our earlier development projects, we were introduced to the focal company as a partner in this project, so that's how we came to know them.' (Production Manager, Partner 2)

The intermediary's ability to connect and endorse both partners was instrumental in building trust and establishing the foundations for a productive collaboration. The intermediary served therefore as a bridge across contexts, helping both partners navigate the operational ecosystem and reduce frictions.

In other cases, the intermediary offered communication and coordination support, helping mitigate the challenges stemming from cultural or organisational differences, especially when niche actors had limited experience working with large industrial incumbents. Similarly, in Project 6 (hydroponic cotton), the innovation lab of the intermediary and other brand partners helped resolve early misalignments by stepping in to facilitate dialogue between the focal company and the start-up, which initially resisted exclusive collaboration. These intermediaries acted as relational brokers, helping the niche actor adapt to the norms and expectations of a large industrial partner and thereby enabling the project to move forward under a venture client model.

However, the effectiveness of this bridging function depended on the intermediary's relational proximity and credibility with both parties. In cases where contextual distance was too high (e.g., different time zones, languages or regulatory frameworks), or where the focal firm lacked internal readiness, the bridging role alone was not sufficient to ensure project success. This was evident in Project 5 (sustainable coloration), where a

Chinese start-up provided a new coloration technology based on natural dyes from organic waste. The project encountered significant communication barriers due to the start-up's limited English proficiency and a geographical distance that made physical meetings difficult. These issues contributed to misunderstandings and delays which, coupled with technical underperformance, led to the project's abandonment. The intermediary's role in facilitating communication and attempting to align both parties was critical, albeit insufficient to save the collaboration.

The effectiveness of this bridging strategy is therefore context dependent. Intermediary support can mitigate but not fully overcome deep structural and relational challenges in collaborations between incumbents and niche actors. As such, bridging should be complemented by internal alignment within the incumbent as well as a certain level of readiness of the niche actor. The intermediary is therefore a critical enabler but not a substitute for collaborative capacity.

Overall, *Bridging* captures the dynamic role of the intermediary during the collaboration between regime and niche actors: it is not about initiating partnerships but rather about sustaining them by ensuring coordination, reducing uncertainty and facilitating knowledge flow. This role is particularly valuable in sustainability-oriented projects, where partners often come from different sectors, scales and contexts and where the complexity of experimentation requires trust, flexibility and operational support.

The four strategies, *Joining*, *Scouting*, *Engaging* and *Bridging*, are not mutually exclusive; they might overlap or evolve sequentially. *Joining* creates the internal foundation for *Scouting*, which may then lead to *Engaging* or *Bridging* depending on the maturity of the niche actor and the complexity of the technology.

Additionally, the findings highlight that even projects labelled 'failures' often produced valuable learning and innovation spillovers. For example, Project 1 (algae fibre) and Project 4 (chemically recycled fibre) helped inspire the client venture model later used in Project 6 (hydroponic cotton). Meanwhile, Project 2 (sustainable finishing) generated knowledge that was redirected towards alternative applications, such as sustainable packaging. Even Project 5 (sustainable coloration), despite communication breakdowns and technical challenges, contributed to understanding the limits of remote collaboration and the importance of partner alignment, which informed the structuring of subsequent partnerships. Evocative is the statement made by Partner 1's CFO:

'The secret is learning. Daily in our lives, in our experiences with customers [...] we learn so much with all of these interactions. It enables us to understand what comes next.' (CFO, Partner 1)

This perspective reinforces the idea that sustainable innovation follows iterative, nonlinear trajectories and that learning from experimentation, even when outcomes fall short of original goals, builds long-term transition capacity.

TABLE 5 | Summary of the identified strategies.

Strategy	Implemented by	Description	Role of incumbent	Role of intermediary (if any)	Challenges addressed	Projects	Example from case
Joining	Incumbent and intermediary	Establishment of a dedicated internal space, such as an innovation lab, to support sustainability and experimentation	Creates and hosts a dedicated unit to explore radical innovation and build absorptive capacity	Can establish its own niche-friendly space. May also engage with the incumbent's one, but not central at this stage	Lack of internal foundation for scouting; absence of time and resources for experimentation; difficulty connecting to niche actors	All projects	Incumbent creates a dedicated innovation lab in 2019
Scouting	Incumbent and intermediary	Identification of niche innovation opportunities through targeted searching, assessment and filtering. Opportunities are then evaluated for fit with organisational priorities and innovation goals	Actively scouts and evaluates opportunities; decides whether to pursue or reject them	Scouts broadly; filters and frames niche opportunities; acts as broker	Limited internal capacity for wide innovation scanning; difficulty in evaluating early-stage innovations; risk of poor fit with incumbent strategy	Scouted by incumbent: 2, 7, 8 Scouted by intermediary: 1, 3, 4, 5, 6	Project 3 (OGM-based coloration): Proposed by the intermediary; evaluated and selected by focal company innovation lab
Engaging	Incumbent	Direct collaboration with niche actors, often involving early-stage start-ups. These partnerships are high-risk and include sharing of resources, infrastructure and feedback loops to support joint development	Engages directly; provides materials, lab access, production feedback	Not involved	Accessing radical sustainable solutions; accelerated learning; co-creation of tailored practices	8	Project 8 (graphene-based coloration): Direct collaboration with start-up, no intermediary support

(Continues)

TABLE 5 | (Continued)

Strategy	Implemented by	Description	Role of incumbent	Role of intermediary (if any)	Challenges addressed	Projects	Example from case
Bridging	Intermediary	Financial, technical or relational support is provided throughout the implementation phase. This helps align organisational goals, manage testing and address collaboration frictions	Partners with niche actor; focuses on industrial testing and learning	Coordinates, funds and facilitates collaboration; resolves cultural/technical frictions	Geographic distance; organisational/cultural misalignment; capability gaps	1, 2, 3, 4, 5, 6, 7	Project 4 (chemically recycled yarn): the intermediary facilitated collaboration and helped manage testing and market entry

A summary of the four strategies emerging from the analysis is reported in Table 5.

5 | Discussion

This study contributes to understanding how incumbent firms can actively shape sustainability transitions by engaging with niche actors through distinct collaborative strategies. Drawing from the MLP (Geels 2002) and grounded in empirical evidence from a textile incumbent's engagement in sustainable innovation projects, we identified four strategies: *Joining*, *Scouting*, *Engaging* and *Bridging*. These strategies challenge the traditional view of incumbents as passive or resistant regime actors (Geels 2011) and instead position them as dynamic agents capable of co-producing sustainability-oriented innovation. What makes these four strategies particularly distinctive and specific for sustainable innovation is their ability to address the unique challenges of sustainability transitions. Unlike conventional innovation, sustainable innovation typically involves longer development cycles, broader stakeholder engagement, higher uncertainty and more value-driven goals (Ali et al. 2023; Markard et al. 2012). Traditional innovation strategies focused solely on economic or technical performance often fall short in such contexts. Instead, sustainable innovation requires strategies that enable flexibility, collective experimentation and resilience across organisational and institutional boundaries (Goto et al. 2025; Köhler et al. 2019). Each of the strategies identified in this study reflects a response to these sustainability-specific challenges.

The strategy of *Joining*, through the establishment of an internal innovation lab, reflects a purposeful act of internal niche construction that allows for experimentation decoupled from regime-level constraints. This aligns with sustainable innovation literature emphasising the importance of protected spaces for radical innovation (Smith and Raven 2012). By setting up dedicated units, incumbents create organisational ambidexterity (O'Reilly and Tushman 2013) enabling simultaneous exploration and exploitation. The focal company's innovation lab serves not only as a technological incubator but also as a site for cultural translation, enhancing its absorptive capacity for sustainability-oriented knowledge (Herth et al. 2025).

The *Scouting* strategy reveals the role of intermediaries in filtering, framing and aligning external innovations with internal sustainability agendas. This resonates with literature on knowledge intermediaries in sustainability transitions (Kivimaa et al. 2019), who act as brokers of innovation. The incumbent's reliance on an external intermediary for innovation discovery reflects an intentional division of cognitive labour and risk reduction. However, it also introduces potential bottlenecks in novelty capture due to double-layered screening, which can reinforce path dependency.

In the *Engaging* strategy, the incumbent engages directly with niche actors, bypassing intermediaries. This results in higher uncertainty but also allows for more rapid and unfiltered learning. The strategy underscores the relevance of dynamic capabilities (Teece et al. 1997) and absorptive capacity (Cohen and Levinthal 1990) in managing emergent innovation. While the

direct approach is prone to redundancy and strategic misalignment, it also catalyses the development of new routines and know-how that can be leveraged in future projects.

Bridging highlights the importance of intermediaries as not only scouts but also active facilitators of innovation implementation. This strategy reflects the concept of collaborative innovation networks (Chesbrough 2003) and the role of support mechanisms in sustaining partnerships marked by asymmetries in scale, culture and resources. The intermediary's operational and financial involvement mitigates the liabilities of smallness faced by start-ups and helps navigate institutional and infrastructural barriers. Moreover, *Bridging* ensures continuity and coherence throughout the collaboration lifecycle, contributing to the scalability of niche innovations.

This form of collaboration creates space for *learning from failure*, a key but often underrated driver of sustainable innovation. By operating in uncharted territory and engaging closely with novel technologies or practices, incumbents are more likely to encounter setbacks. However, these failures become valuable learning opportunities that help firms refine their sustainability goals, challenge existing assumptions and build organisational resilience (Cannon and Edmondson 2005). Rather than being seen as sunk costs, failed experiments contribute to a repertoire of experience that informs more adaptive and forward-looking innovation practices (Madsen and Desai 2010; Shepherd 2003). This iterative learning process is especially important in sustainability transitions, where the complexity and novelty of solutions often defy linear planning and predictable outcomes (Kivimaa et al. 2019).

To summarise our findings, Figure 1 proposes an extended MLP framework that captures the key forces shaping sustainability transitions at each level. The two top rectangles represent two distinct incumbent organisations: One is a focal firm, and the

other is an intermediary that also operates at the regime level (e.g., another incumbent company). Both entities deploy innovation labs as internal infrastructures to scout for and engage with sustainability-oriented niche actors. The arrows indicate the four core mechanisms observed, that is, *Joining*, where incumbents temporarily shift to niche spaces; *Scouting*, the act of systematically identifying and assessing niche actors; *Engaging*, the direct interaction between incumbents and niche actors; and *Bridging*, where an intermediary facilitates the connection. The niche region is depicted as larger to reflect the empirically observed concentration of experimental and developmental activities in niche spaces, where much of the innovation groundwork takes place. The potential outcomes at the bottom, from failure to industrialised sustainable innovation, are linked to how incumbents position themselves and interact, both directly and indirectly, with niche actors. These outcomes are not deterministic but reflect pathways shaped by the combination and quality of the mechanisms deployed.

5.1 | Integrative Insights

Together, the four strategies illustrate a shift from linear, top-down models of regime–niche interaction towards more complex, co-evolutionary pathways. Incumbents are not merely adapting to sustainability pressures but are actively experimenting with hybrid organisational forms and distributed innovation processes.

Even failed projects yield valuable knowledge spillovers (Audretsch and Keilbach 2008), generating new competencies, alternative applications and strategic insights that inform subsequent initiatives. This finding supports calls to recognise the role of failed experiments in building transition capacity (Turnheim and Sovacool 2020). It also highlights how knowledge flows within and across organisational boundaries can seed further

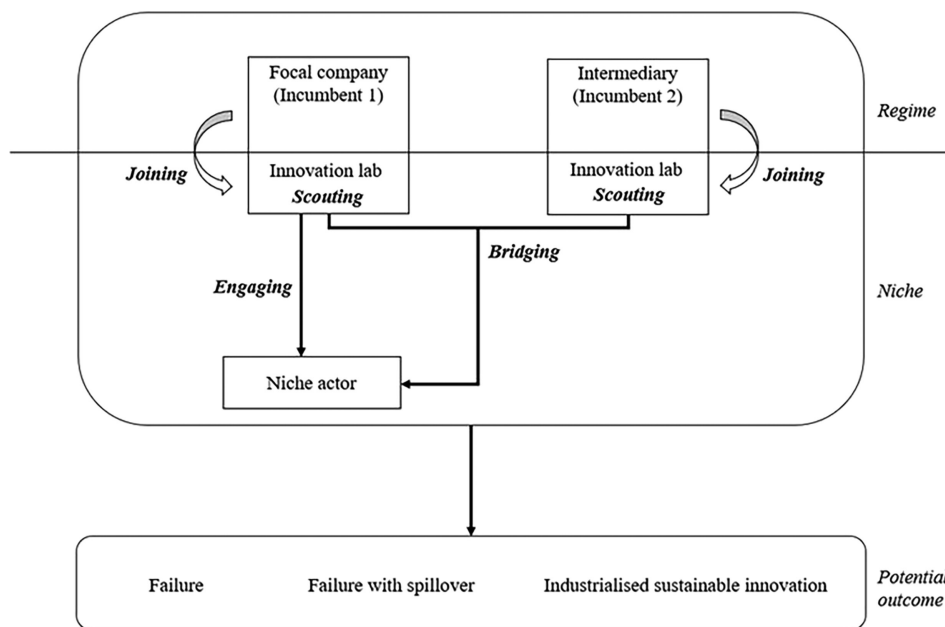


FIGURE 1 | Multilevel perspective-inspired framework illustrating incumbent–niche actor interaction strategies for sustainable innovation development and their potential outcomes.

innovation, consistent with the notion that the firm is both a recipient and a source of entrepreneurial opportunities (Audretsch and Keilbach 2007). Traditionally, this theory emphasises start-ups and new ventures as the primary beneficiaries and agents of spillover. Our findings extend this framework by showing how incumbents, through structured strategies, can internalise, reconfigure and redeploy external knowledge in ways that transcend opportunistic acquisition.

Additionally, our findings underscore the role intermediaries play not only in identifying and proposing innovations (*Scouting*) but also in sustaining and operationalising partnerships (*Bridging*). Intermediaries act as connectors and enablers in innovation ecosystems, helping align divergent actor goals, reduce collaboration risks and coordinate efforts across organisational/institutional boundaries (Howells 2006; Klerkx and Leeuwis 2009). This dual role of intermediaries as both scouts and enablers positions them as essential actors in sustainability transitions, particularly where system innovation requires the coordination of diverse and distributed knowledge bases (Kivimaa et al. 2019). Their effectiveness hinges on relational proximity and credibility with both sides and on the capacity to translate innovation goals into operational plans.

Overall, the diversity of actors involved suggests that sustainable innovation in the textile industry is a collaborative effort by different types of organisations, with start-ups contributing fresh ideas and incumbents offering resources, operational support and eventually, market reach. This discussion illustrates that incumbent companies can be proactive and supportive in niche innovation development. They can be trailblazers fostering and initiating niche innovations. By establishing innovation labs, funding projects and providing critical know-how, incumbents can contribute significantly to the development of radical innovations, working alongside start-ups and other niche actors in a more cooperative and symbiotic manner. This insight challenges the conventional view of MLP that sees incumbents as monolithic and resistant to change (van Mossel et al. 2018) and suggests a more nuanced interaction where incumbents are key enablers of sustainable transitions.

6 | Conclusions and Contributions

This study advances understanding of how incumbent firms can proactively contribute to sustainability transitions by engaging in strategies that operate across regime and niche levels. Drawing on the MLP (Geels 2002) and an in-depth case study in the textile sector, we identified four collaborative strategies through which incumbents can foster sustainable innovation in a complex, multiactor environment. Each strategy responds to specific challenges in sustainable innovation, such as extended development timelines, high uncertainty, systemic interdependencies and value-driven goals, which differentiate it from conventional innovation processes. Together, they illustrate the emergence, for incumbents, of an organisational ability to learn, align and innovate within long-term and complex systems.

Our study has implications for research at the intersection of innovation management and grand challenges, climate change in particular (Chandy et al. 2021; Eisenhardt et al. 2016;

Varadarajan 2017). Such challenges are among the most complex that societies face, and addressing them requires coordinated actions from many interdependent actors working collaboratively over extended periods (Ferraro et al. 2015; Gray et al. 2022; Mignacca et al. 2025). How incumbent firms can actively contribute by fostering sustainable innovation across different levels of socio-technical systems remains little understood (Doh et al. 2019; George et al. 2021). In sustainability transitions research, scholars (Geels and Schot 2007; Köhler et al. 2022; Smith 2007; Smith et al. 2010) have stressed the importance of understanding interactions between niche and regime levels to support transitions, as this could help identify how various paths unfold, essential for managing transition dynamics. This research makes a further effort by investigating how incumbents strategically operate across levels. This theoretical contribution can enrich the MLP framework, advocating for a more dynamic, multiactor understanding of sustainability transitions in industries facing grand challenges. Rather than treating the MLP's three levels (landscape, regime, niche) as static categories, our work advances a dynamic perspective focused on strategies that link particularly the regime and niche levels through concrete organisational practices. This adds depth to the MLP literature and provides actionable conceptual tools for future empirical research.

Additionally, the findings suggest actionable insights for practitioners by emphasising the pivotal role of intermediaries in scouting and sustaining collaborations with start-ups, especially when dealing with geographical, technological or cultural distance. Managers should consider building or partnering with trusted intermediaries to reduce coordination costs and improve absorptive capacity. However, our findings also caution that not all intermediaries are equally effective in enabling sustainable innovation. Intermediaries must themselves be willing to *join* the niche level and embrace the exploratory, experimental and value-driven nature of sustainability-oriented innovation. Intermediaries that remain too closely tied to traditional regime logics may reinforce lock-ins, filtering innovations through conventional criteria and thus constraining radical experimentation. Managers should therefore carefully assess not only the relational reliability of intermediaries but also their alignment with the goals, rhythms and values of niche innovation spaces.

In parallel, we provide suggestions for managers about the potential effect that establishing innovation labs or protected organisational units could bring, as such structures allow firms to engage with high-risk, long-horizon sustainable innovation without disrupting their core operations. This form of organisational ambidexterity (balancing exploitation and exploration) is especially crucial when navigating the slow, uncertain and systemic dynamics characterising sustainability transitions. As such, managers should consider that tackling sustainability transitions necessitates a redesign of firms' value logic. Sustainable Business Model Innovation (Geissdoerfer et al. 2018) can offer a concrete pathway for this transformation by enabling organisations to embed sustainability into their core strategies by means of experimentation, cross-sector engagement and new revenue and impact models.

Lastly, we note that not all projects succeed in their original form, but even 'unsuccessful' collaborations can yield spillovers

such as new product ideas, business models or partner networks. Embracing these learnings can enhance innovation resilience and build internal capabilities for future sustainable initiatives. Limited research in sustainability transition has been dedicated to learning capabilities development from failed niche innovations. As such, effectively understanding how to take advantage of failed niche innovations to build a new body of knowledge that can be devoted to tackling transitions could help develop new strategies and frameworks. Therefore, researchers should further investigate the strategic mechanisms through which incumbents collaborate with niche actors and examine the evolving roles of intermediaries and other emerging actors in order to enrich the MLP and deepen our understanding of how sustainability transitions unfold in practice.

Our research does not come without limitations. Our analysis is limited to eight sustainable niche innovation projects developed by the same incumbent company. While this sample size may limit the generalisability of the findings, it enabled a thorough, in-depth exploration of the variables most relevant to our research question. This focus allowed us to investigate the specific strategies through which incumbents engage across regime and niche levels and to identify with greater precision the strategic patterns underpinning sustainable innovation activities. Further efforts could be made to include additional initiatives or companies with different boundary conditions (e.g., brand reputation, resource availability) to ensure consistency. Moreover, the peculiarity of incumbent actors proactively participating in a niche is a novel topic that needs further investigation and elaboration, both in the textile industry and in other industrial sectors, to broadly understand whether this new role of incumbents is context-specific or is laying the foundations for new sustainability transition pathways. This points to the need for further research into these emerging dynamics, as they provide a broader perspective on incumbents' roles in accelerating sustainability transitions. A promising avenue might be to investigate more granularly what each of the four identified strategies entails for resource commitments, collaboration modes and governance structures. Such analysis could provide a richer understanding of the organisational implications and strategic choices associated with each strategy, offering more actionable guidance both for theory development and for managerial practice.

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