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Practices of Knoledge-Based Dynamic Capabilities in Sustainable Innovation Projects

Maria Beatriz da Costa de Ávila

University of Vale dos Sinos, Porto Alegre, Brazil.
E-mail: beatrizmaria2690@gmail.com

Bibiana Volkmer Martins*

University of Vale dos Sinos, Porto Alegre, Brazil.
E-mail: bibivolkmer@unisinos.br

Mikaela Daiane Prestes Floriano

University of Vale dos Sinos, Porto Alegre, Brazil.
E-mail: mikaelapfloriano@gmail.com
* Corresponding author

Abstract: In response to increasing socio-environmental challenges, organizations have turned to collaborative projects to integrate competencies, resources, and knowledge in the pursuit of innovative solutions. In this context, the ability to acquire, create, and combine knowledge becomes central. This study analyzes how knowledge-based dynamic capabilities (KBDCs) manifest through organizational practices in sustainable innovation projects. A qualitative approach was adopted, based on a single case study of a collaborative project between a Brazilian petrochemical multinational and a supplier. Data were collected through interviews, observation, and documents and analyzed using content analysis. The findings contribute by empirically demonstrating the operationalization of KBDCs, highlighting their impacts on the social dimension of sustainability, and offering managerial implications by identifying practices that support knowledge mobilization in collaborative projects.

Keywords: knowledge-based dynamic capabilities; sustainability; collaborative projects; practices; case study.

1 Introduction

The increasing intensity of extreme climate events necessitates coordinated actions for effective sustainability practices (Batibeniz et al., 2023; Ouyang et al., 2023). Organizations must transform structurally to address socio-environmental challenges (Khavul and Bruton, 2013). Collaborative projects among organizations with shared objectives are crucial, integrating competencies, resources, and knowledge for innovative solutions (Bank et al., 2017).

Knowledge is strategic for innovation complexity (Zheng et al., 2011; Denford, 2013; Altintas, 2023; Tamirat and Amentie, 2023). The knowledge-based view and dynamic capabilities theory form knowledge-based dynamic capabilities (KBDCs), the ability to acquire, create, and combine knowledge to sustain innovation (Zheng et al., 2011; Denford, 2013; Altintas, 2023). Understanding these capabilities supports decision-making and strategic knowledge mobilization (Zheng et al., 2011; Denford, 2013; Altintas, 2023; Tamirat and Amentie, 2023).

In sustainability-oriented innovation, these capabilities are critical. Sustainability connects innovation, partnerships, and knowledge integration (Khanra et al., 2022), balancing economic, social, and environmental dimensions, requiring innovation to incorporate social justice and environmental preservation. Its implementation depends on knowledge transfer and partnerships (Karaman Kabadurmus, 2020; Khanra et al., 2022). KBDCs are essential for integrating knowledge and creating shared value (Ortiz-Avram et al., 2024).

However, literature lacks explanations on KBDCs' operationalization in interorganizational contexts, particularly in sustainability-oriented projects (Zheng et al., 2011; Denford, 2013; Altintas, 2023; Tamirat and Amentie, 2023). A gap exists in identifying practices for knowledge acquisition, generation, and combination in these contexts (Zheng et al., 2011; Denford, 2013; Köhler et al., 2022; Vicente-Oliva et al., 2016; Faccin et al., 2019; Kutu et al., 2025). Examining their microfoundations, including routines, practices, and structures, is important for sustainable innovation (Mehrabi et al., 2025).

This study examines how KBDCs manifest in sustainability-oriented innovation projects through organizational practices. A qualitative approach involved a single case study (Yin, 2015) in a collaborative project between a Brazilian petrochemical multinational and a supplier. Data collection included semi-structured interviews, direct observation, and secondary data, analyzed via content analysis (Bardin, 2016) using categories of knowledge acquisition, generation, and combination.

Findings reveal KBDCs manifest through practices like partner interaction, data monitoring, specialist mobilization, team formation, and structured information sharing, supporting collaborative learning and innovation, particularly in enhancing working conditions, safety, and professional development (Melander and Pazirandeh, 2019).

The study highlights the importance of continuous knowledge sharing and documentation routines to sustain innovation. It advances understanding of KBDCs' microfoundations, identifies practices in interorganizational contexts, and integrates dynamic capabilities, knowledge management, and sustainability-oriented innovation literature. Managerial implications include guiding strategic knowledge mobilization.

2 Theoretical background

The literature on sustainability-oriented innovation integrates economic, environmental, and social dimensions within the Triple Bottom Line perspective (Rajeev et al., 2017). Innovation incorporates long-term value creation, environmental impact reduction, and social equity (Kayikci et al., 2022; Melander and Pazirandeh, 2019; D'Eusanio et al., 2019). This approach evolved from reactive to integrated strategies, though the social dimension is less explored (Adams et al., 2016; Rajeev et al., 2017; Śliwińska et al., 2025).

Sustainable innovation guides decisions on products, services, processes, and business models by incorporating economic, environmental, and social objectives (Cillo et al., 2019; Pintuma et al., 2024). It is systemic and collaborative, supported by knowledge transfer, RandD investments, and strategic networks (Khanra et al., 2022; Pintuma et al., 2024). This perspective integrates technical and social dimensions, implying strategic and cultural changes, and competitiveness with socio-environmental benefits like impact reduction and circularity (Adams et al., 2016; Śliwińska et al., 2025; Khanra et al., 2022; Karaman Kabadurmus, 2020).

Theoretical developments highlight the role of knowledge and interorganizational relationships. Sustainable innovation relies on accessing, sharing, and integrating knowledge through partnerships, fostering information flows and solutions (Phelps et al., 2012; Wang et al., 2014; Zhang et al., 2023). Trust-based relationships reduce barriers, reinforcing innovation's relational nature (Kanter, 1994; Karaman Kabadurmus, 2020), while knowledge sharing is central in complex contexts (Olson, 2018; Sabahi and Parast, 2023). Organizational learning, including knowledge acquisition and unlearning, is key (Adams et al., 2016). Literature emphasizes organizational capabilities related to adaptation and resource integration, influenced by culture and alignment between internal values and external demands (Ortiz-Avram et al., 2024; Śliwińska et al., 2025).

Reviews identify gaps in the social dimension and understanding of knowledge mobilization (Rajeev et al., 2017; Kalantary and Farzipoor Saen, 2022). Dynamic capabilities and knowledge management are relevant but underdeveloped in sustainability (Ortiz-Avram et al., 2024). Collaborative projects are key for operationalizing sustainable innovation.

Collaborative projects involve multiple actors combining resources and knowledge for shared goals, often related to innovation (Jones and Lichtenstein, 2008). In research and development, integration crosses organizational boundaries, forming networks for joint value (Faccin et al., 2019). Knowledge creation requires coordination, synthesis, and shared learning, with absorptive capacity and open innovation being key.

The field treats collaborative projects as complex, dynamic phenomena (Nihoul, Miralles, and Neamtu, 2023). Dynamic capabilities emphasize integrating, reconfiguring, and applying resources in dynamic environments (Kaur, 2023; Hernández-Linares et al., 2023). Knowledge-based dynamic capabilities (KBDCs) suggest interorganizational knowledge creation relies on capabilities developed throughout the project lifecycle, involving sensing, seizing, and transformation (Faccin et al., 2019). Recent studies focus on microfoundations, highlighting social interactions (Ortiz-Avram et al., 2025).

Sustainable innovation requires a systemic approach, with collaborative projects transforming business models and value chains (Ortiz-Avram et al., 2025). Integrating stakeholders, mobilizing resources, and adapting processes are critical, emphasizing resource integration and network capability (Gohr and Rodrigues, 2025). Structured interactions align interests and sustain innovation, with interdependent microfoundations (Mehrabi et al., 2025). Gaps remain in understanding these mechanisms.

KBDCs, combining knowledge-based view and dynamic capabilities, are vital for adaptation and competitive advantage (Tamirat and Amentie, 2023; Bindra et al., 2023; Teece, 2007; Wang and Ahmed, 2007). They involve acquiring, generating, and combining knowledge to respond to change (Zheng and Zhang, 2011; Denford, 2013; Altintas, 2023), aligned with sensing, seizing, and reconfiguring (Teece, 2007). Knowledge acquisition accesses internal and external knowledge; generation explores knowledge; combination integrates sources for innovation and adaptation (Zheng et al., 2011; Denford, 2013; Hernández-Linares et al., 2023; Bhardwaj et al., 2023).

Practices like knowledge sharing, training, technologies, and partnerships enhance monitoring and integrating knowledge (Kaur, 2023; Hernández-Linares et al., 2023). Despite advances, literature is mostly theoretical, with limited empirical evidence on these capabilities in practice, especially in sustainability-oriented interorganizational contexts (Zheng et al., 2011; Denford, 2013; Altintas, 2023; Tamirat and Amentie, 2023). Understanding mechanisms for knowledge acquisition, generation, and combination in collaborative projects remains a key research agenda.

3 Methodology

This study adopted a qualitative approach, based on a single case study with a deductive orientation (Yin, 2015), aiming to understand how knowledge-based dynamic capabilities (KBDCs) manifest in organizational practices within sustainable innovation projects. This strategy proved appropriate given the revelatory nature of the phenomenon and the focus on "how" and "why" questions (Eisenhardt, 1989), allowing for an in-depth analysis of the empirical context.

The study was conducted in a collaborative project between a Brazilian petrochemical company and a supplier. The organization is recognized for its sustainability initiatives, including the reduction of environmental impacts, recycling, reverse logistics, and improvements in working conditions. The selected case refers to a machine automation project, chosen among five initiatives based on criteria of collaboration, location, and stage of implementation. The project presents outcomes aligned with sustainability dimensions, particularly improvements in working conditions and reductions in operational risks.

The sample included participants directly involved in the project, comprising 12 interviews, six in each organization. Participants held different roles and hierarchical levels, including technicians, engineers, and managers, all engaged in knowledge mobilization. Sampling followed the criterion of theoretical saturation, beginning with the supplier and expanding through snowball sampling.

Data collection took place between May and July 2025 and combined semi-structured interviews, field observation, and secondary data. The interviews were grounded in the literature and addressed knowledge acquisition (Zheng et al., 2011; Teece, 2007), generation (Denford, 2013), and combination, as well as sustainability outcomes. They were conducted both in person and via Microsoft Teams, with audio recording and transcription. Observation involved immersion in activities, including monitoring routines, meetings, and simulations, with records maintained in field notes and video analysis. Secondary data included documents, indicators, and corporate materials.

Data analysis was conducted using content analysis with a semantic focus (Bardin, 2016), including coding, categorization, and interpretation stages. Data were organized with the support of Evernote and Atlas.ti. Categories were defined a priori and refined throughout the analysis. Triangulation across different data sources ensured robustness and reliability in identifying practices associated with KBDCs.

4. Results Analysis

4.1 Emergence of the Need for the Sustainable Innovation Project

The Machine Automation Project emerged from the need to develop sustainability-oriented innovations based on monitoring operational demands, including the identification of technical and safety issues, equipment failures, and opportunities for process improvement. Although these demands are more directly related to the social dimension, they also involve the reduction of economic losses and compliance with environmental requirements, thus encompassing all three dimensions of sustainability.

The primary objective of the project was to reduce individuals' exposure to risks (E10). Safety, particularly the prevention of serious accidents, was treated as a priority, as highlighted by one interviewee: "*This need initially had the objective of removing people's exposure to that risk... we saw this as a basic necessity*" (E9). In addition, the need for innovation emerges from continuous operational monitoring, data analysis, and environmental interpretation, often identified as process gaps (E12).

This process is aligned with knowledge-based dynamic capabilities, which involve environmental sensing and the identification of opportunities for improvement. As reported:

> "If we have a need to understand what we can do differently to avoid ankle injuries. Or, for example, we have a unit, a piece of equipment that is experiencing production losses. What can I do to avoid production losses and improve the availability of this equipment? I think the need always arises from a gap. From that point, we seek knowledge, understand what already exists, examine its foundations, study the case, and then look for solutions in the market" (E12).

In this context, the petrochemical company and the supplier shared the objective of developing solutions that would increase safety, improve information management, enhance performance and productivity, and prevent accidents. Collaboration between partners enabled access to specialized knowledge, demonstrating that practices associated with KBDCs function as strategic resources that support the development of sustainable innovations.

4.2 Knowledge Acquisition Capability

The results on knowledge acquisition practices were organized into: (1) sources of knowledge acquisition; (2) the influence of trust and joint problem-solving; and (3) the interpretation of relevant environmental information. Knowledge acquisition involves external information search, knowledge transfer in interorganizational relationships, and internalization, including workforce qualification, report development, data sharing, simulations, training, meetings, informal conversations, personnel allocation, trend monitoring, and field follow-up.

Initially, knowledge acquisition sources were linked to the petrochemical company's need for a technically capable partner willing to co-develop solutions. As E10 highlighted, this process was complemented by market solutions and trend monitoring, even when demands arose internally.

> "I think there was already an interest in pursuing this automation, and the company saw an opportunity with the partner to develop it... But I think the trigger was this initiative, and the supplier bought into the idea... Then they started to look at what equipment existed elsewhere and what could be adapted and developed. Both benefited from this project" (E10).

E1 stresses external scanning's importance: "*If you do not monitor the market, we will never reach or maintain our position*". Concerns about qualified labor involved hiring or internal training, as E1 indicated: "*We considered market labor availability, whether to hire or train our workforce*". Structured data recording and analysis practices were essential, including documentation, reports, and operational indicators. E6 reported: "*We improved the daily report, facilitating data analysis... We mapped interferences, increased field presence, talked more with operators, and observed their ideas*".

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Monthly meetings analyzed these data, reviewing results and guiding project development. E7 stated these meetings generated documents and standardization processes: "*Which tools? These are the meetings and documents we create. From design and project documentation to procedures for assembly, installation, and service execution*". This process formalized and institutionalized knowledge, including internal procedure revisions, as E9 highlighted: "*The way we capture this... is related to procedure revisions, updating internal procedures, documentation, and recording new methods*". Trust and joint problem-solving's influence was central. Social capital facilitated information exchange and collaborative relationship development over time.

> "… the client needs to trust the contracted company. And this is not achieved overnight. It is built over time... trust and joint work between the client and the third-party company are essential. The client invests in the process, but they trust what we are able to deliver" (E1).

Relevant environmental information was interpreted through monitoring, observation, and data analysis, identifying opportunities and guiding decisions. Knowledge acquisition involves more than gathering information; it includes monitoring, collaboration, and institutionalizing practices. Integrating observation and documentation transforms experiential exchange into competitive advantage, supporting knowledge-based dynamic capabilities.

4.3 Knowledge Generation Capability

The results related to knowledge generation practices indicate a continuous process composed of: (1) exploration of existing knowledge; (2) knowledge mobilization; and (3) enhancement of knowledge capital. This dynamic reflects a learning cycle in which organizations use their knowledge base to identify opportunities, solve problems, and develop innovations. It includes practices such as the use of internal specialists, exchange of experiences, consultation of internal platforms, designation of focal personnel, training, and document formalization.

In practice, this process combines the use of data and methods with social capital, represented by internal specialists and consultants. E9 highlights the importance of inter-unit exchange as a trigger for innovation:

> "Internally, relationships between units are very common... Today, it involves experience sharing among focal points from each unit, where we bring our problems... We also have moments such as cross-functional groups, where all focal points from each region meet... It is in these moments that this exchange of experience takes place" (E9).

This interaction enables the exploration of existing knowledge and its expansion through collaboration.

Knowledge mobilization occurs through the designation of focal personnel and the involvement of specialists with technical and practical expertise. This practice directs the project toward professionals capable of articulating solutions and monitoring their implementation. As reported by E6:

> "Yes, there was a recognized need to assign a specific person to address the automation aspect... We appointed a focal person, which allowed me more time to follow up... identifying small improvement points and addressing them directly with our partner's supervisor" (E6).

This structure facilitates coordination and contributes to achieving project objectives, particularly in relation to sustainability.

In addition, the mobilization of intellectual capital generates new knowledge through interaction among actors, especially in critical areas such as safety. The use of technical documents and formal training plays a central role in enhancing knowledge, promoting mutual learning between organizations. As stated by E4:

> "So we have our documentation... here we use the acronym JSA, Job Safety Analysis, where there is a procedure... a step-by-step for each piece of equipment... for each activity... so there is always this search for knowledge. And the training... our personnel are trained... when new equipment arrives, we provide training so they can go into the field and operate correctly, safely, and avoid accidents".

Thus, knowledge generation extends beyond information acquisition and involves the ability to articulate resources through social relationships and accumulated experience. By strengthening trust, socialization, and the formalization of practices, the organization transforms individual knowledge into collective intelligence. This process enables the mobilization of specialists and the development of training to support the creation of innovative solutions, particularly in sustainability contexts, preparing the organization for the continuous combination and reconfiguration of resources and knowledge.

4.4 Knowledge Combination Capability

Practices associated with knowledge combination capability involve: (1) the creation of focused teams; (2) the combination of different sources of knowledge; and (3) the reconfiguration of resources to meet environmental demands. This capability reflects the ability to articulate internal and external knowledge to promote innovation and continuous adaptation. It includes the formation of technical teams, periodic meetings, data integration, formalization of solutions, and the development of adaptations in equipment and processes.

In practice, this capability was enabled by the involvement of focal personnel and structured routines of interaction, including formal meetings and engagement within the operational environment. Knowledge combination occurred through continuous dialogue followed by formalization in documents and project designs. As highlighted by E7:

> "…after a conversation we had, there were many meetings. I think those discussions and their formalization are what most... generate documents... then we create drawings, design things together... until the final component is developed... these are the meetings and documents we

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> produce... from design and project plans to procedures for assembly, installation, and service execution" (E7).

This process is also supported by a logic of mutual benefits between partners, as emphasized by E8: "*The team structure we are working with today is a strong win–win model. We develop, we execute, and we exchange experiences*" (E8). Periodic meetings and interaction among specialists enabled the integration of different sources of knowledge, strengthening the joint development of solutions.

Knowledge combination proved particularly relevant in interactions among specialists, where data, practical experience, and external information were articulated to generate new solutions. As reported by E6: "*There was limited information in the material we received, but when we combined it with data and practice, we created new solutions*" (E6). This dynamic is reinforced by E7: "*A large part of this involves combining what the partner brings, creating something new together*" (E7). Thus, knowledge combination depends on interaction among different actors and the ability to integrate diverse forms of knowledge.

This capability is closely linked to the previous stages of knowledge acquisition and generation, enabling captured data and mobilized knowledge to be transformed into new organizational resources. As highlighted by E8: "*We develop, we execute, and we exchange experiences. This is important for us because we also need to know how to do it*" (E8). Through this integration, it becomes possible to reconfigure resources and develop innovative solutions aligned with sustainability.

Resource reconfiguration manifests in the adaptation of technologies and processes to specific contextual needs. E1 illustrates this process by describing the search for external technologies and their local adaptation:

> "…the company makes every effort to seek technology outside the country and adapt what it has developed... Today, with automation, we can allocate this automated system to various activities... the only thing that changes is an accessory... these accessories become part of the equipment system" (E1).

This process demonstrates the ability to transform a common technological base into flexible and adaptable solutions. Complementarily, E2 notes: "*Most of the time, since the equipment is similar, we use practically the same basic structures*" (E2).

In sum, sustainable innovation emerges from the ability to combine knowledge and reconfigure resources through routines of interaction and collaboration. This process enables the development of new machines, processes, and work methods focused on safety and operational efficiency. By integrating knowledge and continuous adaptation, the organization transforms challenges into customized solutions, strengthening its capacity to innovate in dynamic environments.

4.5 Sustainable Innovation Outcomes

The results on the social dimension show innovation driven by training initiatives for employees and the market through "schools" or open programs. E1 noted: "*After automation, more people sought technical training... operators now think about equipment operation... the difference is substantial*".

Since 2022, over 1,000 people were trained, with 10% women, enhancing qualification and diversity. Yet, low female presence in the plant highlights inclusion limits. These programs strategically develop and retain skilled labor, strengthen knowledge cycles, and enhance operations' appeal. E6 stated: "*It's now a better workplace as manual tasks were unhealthy*". Innovation improved safety by reducing risk exposure.

Efficiency gains showed activity time rising from 15% in 2023 to 22% in 2025, linking productivity to risk mitigation. Automation cut exposure to hazards and boosted resource efficiency. Environmentally, resource management improved. Water consumption deviation dropped from 19% in 2023 to 16% in 2025, and waste went from 12% above target to 10% below, marking improvement. E12 noted water and waste reduction. E8 added: "*Process optimization reduces time, resources, and CO2 emissions*".

However, unstructured data for some indicators limits sustainability monitoring. Social and environmental advances connect to economic outcomes, aided by knowledge-based capabilities. Training and knowledge sharing boost productivity, quality, and talent retention, as E18 noted: "*We achieve productivity gains... skilled employees... better productivity and quality... and talent retention*". In summary, integrating innovation and dynamic capabilities extends beyond technical efficiency, generating social and environmental benefits sustaining economic performance. Improved conditions, human capital, and resource optimization make sustainability crucial for organizational viability.

5. Discussion

The study addresses a gap in literature on knowledge-based dynamic capabilities (KBDCs) in sustainability-oriented innovation. Despite recognition by Zheng et al. (2011), Denford (2013), and Altintas (2023), empirical evidence on KBDCs' operationalization is limited. Analyzing a specific project, the study shows KBDCs manifest through knowledge acquisition, generation, and combination, emphasizing their processual, context-dependent nature. Innovation stems from operational demands like safety, reliability, and efficiency, supporting Karaman Kabadurmus (2020) by linking innovation to problem-solving. These demands trigger knowledge mobilization, integrating economic, social, and environmental dimensions (Elkington, 1994; Rajeev et al., 2017; Kayikci et al., 2022; Melander and Pazirandeh, 2019).

Knowledge acquisition involves identification, capture, and systematization beyond external search. Interaction with suppliers, operational data, and field engagement show network-based knowledge construction, supporting Phelps et al. (2012) and Wang et al. (2014). Networks enable knowledge translation into operations, with data use reinforcing Hernández-Linares et al. (2023) on real-time decision-making. Knowledge formalization sustains innovation, complementing Bhardwaj et al. (2023), but introduces tensions and governance challenges.

Knowledge generation exploits existing knowledge (Zheng et al., 2011; Denford, 2013), reflecting incremental innovation for problem-solving. Specialists and accumulated knowledge indicate generation through recombination, aligning with Teece (2007). Internal consulting shows capability in knowledge mobilization, with specialists and focal personnel facilitating knowledge circulation, extending Bhardwaj et al. (2023). Knowledge generation is inherently relational.

Knowledge combination materializes innovation, integrating heterogeneous knowledge through multidisciplinary teams and interactions (Denford, 2013; Zheng et al., 2011). This process, coordinated by organizational structures, expands within supply networks (Hernández-Linares et al., 2023). It enables resource reconfiguration (Teece, 2007) via technological adaptation and procedural revisions. Sustainable innovation

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arises from transforming practices, highlighting the cumulative, path-dependent learning nature (Denford, 2013).

Acquisition, generation, and combination form an interdependent system, each reinforcing the others. This extends Faccin et al. (2019) by empirically showing this articulation and highlights microfoundations' importance (Mehrabi et al., 2025), indicating continuous knowledge transformation.

The social dimension of sustainability improves working conditions, safety, and qualifications, addressing Rajeev et al. (2017). Training initiatives impact beyond organizational boundaries (D'Eusanio et al., 2019; Melander and Pazirandeh, 2019). However, low female representation reveals inclusion limitations, showing tensions among sustainability dimensions. Environmentally, gains relate to operational efficiency, reducing resource consumption and waste (Melander and Pazirandeh, 2019), but lack robust indicators, reinforcing Kayikci et al. (2022). Economically, value creation and viability are evident (Kayikci et al., 2022), though supplier dependence suggests tensions between collaboration and autonomy, reshaping power relations in networks.

6. Final Considerations

The findings demonstrate that sustainability-oriented innovation emerges from interrelated practices of knowledge acquisition, generation, and combination, highlighting the role of knowledge-based dynamic capabilities in articulating learning and collaboration. By empirically evidencing these practices, the study advances the understanding of their microfoundations and addresses a gap in the literature, offering insights for knowledge management in interorganizational contexts (Ortiz-Avram et al., 2024; Kalantary and Farzipoor Saen, 2022; Olson, 2018).

The study provides three main contributions. First, it advances the KBDC literature by empirically demonstrating their operationalization through organizational practices in interorganizational contexts, moving beyond predominantly conceptual approaches (Zheng et al., 2011; Denford, 2013; Altintas, 2023). Second, it deepens the understanding of sustainability-oriented innovation by highlighting relevant impacts on the social dimension, which remains underexplored. Third, it offers managerial contributions by identifying practices that guide the mobilization and integration of knowledge in collaborative projects.

Despite these contributions, the study has limitations. It focuses on a single project in the petrochemical sector, which restricts the generalizability of the findings to other contexts, particularly those characterized by higher dynamism or radical innovation. In addition, the collaborative arrangement analyzed, marked by strong interdependence, may influence the manifestation of KBDCs, especially in terms of dependency and governance. Finally, the deductive approach with a priori categories may have limited the identification of emergent elements.

Future research may explore multiple cases across different sectors and institutional contexts, enhancing analytical robustness. It may also further examine governance mechanisms in collaborative projects, particularly regarding dependency and value distribution. In addition, processual and inductive studies may investigate the evolution of knowledge acquisition, generation, and combination practices over time.

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