Ecosystem Dynamics in Sustainable Innovation: Insights from the Chocoffré Case Study

****WORKING PAPER – DO NOT DIFFUSE****

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Acknowledgements: This research has benefited from the support of the FERED (University of Strasbourg) and ANR ECO-INNOVATE ANR-24-CE26-7829 project, which is managed by Sophie Bollinger (University of Strasbourg).

Abstract: Cette recherche analyse comment les entrepreneurs durables construisent des écosystèmes d'innovation pour atteindre des objectifs économiques, sociaux et environnementaux. En se concentrant sur Chocoffré, un projet transformant des sous-produits du café en éco-matériaux d'emballage, une étude de cas exploratoire (décembre 2022 – juillet 2024) a été réalisée. Le cadre théorique mobilise le concept d'innovation ouverte et d'écosystèmes d'innovation pour examiner les interactions entre les acteurs du projet, les industriels et les structures de soutien. Les résultats soulignent le rôle crucial du leadership entrepreneurial dans la collaboration et l'alignement des parties prenantes. L'étude met en lumière comment les processus d'innovation ouverte favorisent l'intégration des ressources, améliorant ainsi les impacts économiques, environnementaux et sociaux du projet. Ces résultats enrichissent la littérature sur l'entrepreneuriat durable et les écosystèmes d'innovation, tout en proposant des recommandations pratiques pour renforcer les réseaux de soutien et maximiser le potentiel transformateur de l'entrepreneuriat durable face aux défis contemporains.

Key words: sustainable innovation; sustainable entrepreneurship; innovation ecosystem; Triple Bottom Line

Introduction

In 2022, the Intergovernmental Panel on Climate Change (IPCC) warned that half of the population was already suffering from the consequences of climate change (IPCC, 2022). In this context, society expects organizations to take responsibility and engage in a transition process (Hamel, 2020; Henderson, 2020; Nooyi & Govindarajan, 2020).However, even when organizations commit, it is often not enough and the actions implemented have their limitations (Burger-Helmchen & Siegel, 2020). The need for organizations to address grand societal challenges through innovation is becoming increasingly apparent (Gariel & Bartel-Radic, 2024; George et al., 2016). Responsible innovation is necessary for the future of organizations and their long-term survival (Neukam & Bollinger, 2022). While the role of the leader is essential in this process (Bollinger et al., 2023), this transition is complex (Nooyi & Govindarajan, 2020).

In this context, entrepreneurs play an essential role in the future of organizations (Saebi et al., 2019). Their agility, flexibility, and capacity for innovation make them a source of inspiration (Boston Consulting Group, 2022) capable of creating a positive impact. They can rethink existing business models, explore new paths, and tackle challenges with their creativity (Brunner & Bollinger, 2024). Their bold vision and entrepreneurial spirit foster adaptation to rapid changes and the exploration of new opportunities, thereby shaping the future of organizations in a positive and sustainable way. Sustainable entrepreneurs refer to entrepreneurs who support multiple objectives in their organizations by the pursuit of economic, social, and environmental goals (Filser et al., 2019). However, the pursuit of three simultaneous objectives—project profitability, social impact and environmental impact (Cohen & Winn, 2007; Hart, 2005; Thompson et al., 2011),—complicates the development of innovative sustainable projects (Taupin et al., 2024). The presence of an ecosystem that these entrepreneurs can rely on is even more important. To support this dynamic, public policies increasingly

develop initiatives, such as sustainability awards, and aim to create innovation ecosystems that support the sustainability of both large and start-up companies.

Innovation ecosystems are essential for sustainable entrepreneurship (Jacobides et al., 2018). It represents "*networks of socio-economic actors in open innovation situations*" (Ben Letaifa & Rabeau, 2012). Their characteristics include not only the innovative dimension but also a strong partnership and entrepreneurial culture (Ben Letaifa & Rabeau, 2012), which lead to a rise in business creation and cooperative relationships between large and small companies (Brunner & Schaeffer, 2021) where open innovation strategies are at the heart of these relationships. The openness of these actors allows companies to optimize their innovation processes and exploit new business opportunities (Isckia & Lescop, 2011). These strategies benefit both types of actors as each brings its specificity, enhancing innovation and strengthening ties within the ecosystem. However, these collaborations and exchanges also raise questions regarding their management, particularly in terms of the openness of their innovation processes. Moreover, when a sustainable entrepreneur starts, they do not necessarily have pre-existing relationships or an existing ecosystem supporting these sustainability efforts to rely on. Therefore, they often need to build an ecosystem around their project to carry it out, especially when the project is sustainable, as it addresses a triple objective affecting multiple actors within society.

Despite the recognition of innovation ecosystems as networks of socio-economic actors in open innovation situations (Ben Letaifa & Rabeau, 2012; Jacobides et al., 2018), there is a gap in understanding how sustainable entrepreneurs specifically leverage and shape these ecosystems to carry out their projects. Current literature has explored the general characteristics and benefits of innovation ecosystems (Isckia & Lescop, 2011), but the specific dynamics, management practices, and strategies used by sustainable entrepreneurs within these ecosystems remain under-researched.

Given the sustainability challenges faced by start-ups, entrepreneurs, established organizations, and society at large, more research is needed to understand better how sustainable entrepreneurs build and utilize their ecosystems. This includes identifying how they navigate interactions with various actors, the contributions of these actors, and the strategies used to overcome innovation process difficulties. Therefore, the research question of this article is as follows: **How does a sustainable entrepreneur build an ecosystem to develop their innovation project?**

The primary objectives of this research are threefold: (1) to analyze how the entrepreneur navigates interactions with various actors within the ecosystem; (2) to examine the contributions of these actors and the challenges encountered throughout the innovation process; and (3) to explore the roles and strategies employed by each ecosystem actor in advancing the sustainable innovation project.

The study adopts an exploratory single-case study approach, focusing on a project led by a sustainable entrepreneur within his local ecosystem. We highlight how this entrepreneur collaborates with different stakeholders within the local ecosystem and reveal the strategies of each actor involved in the project. The analysis emphasizes the entrepreneur's ability to navigate the ecosystem effectively, leveraging existing relationships and resources. Finally, we underline the entrepreneur's leadership role in creating a common language between the different actors involved in the project, enabling collective progress toward sustainable innovation.

The article is structured as follows: first we present a literature review on sustainable entrepreneurship focusing on its response to contemporary challenges, the role of innovation ecosystems in supporting such initiatives, and the relevance of open innovation. Second, we detail the research methodology, including the case study approach and data collection processes. Third, we outline the key findings, emphasizing ecosystem dynamics and actor

contributions. Finally, we conclude with a discussion of the implications of these findings for both theory and practice, and propose directions for future research.

1. Literature Review

1.1. Sustainable entrepreneurship in response to contemporary challenges

Sustainable entrepreneurship emerges as a crucial response to contemporary challenges, given the increasing environmental and societal pressures (Gariel & Bartel-Radic, 2024). The climate crisis and social inequalities compel businesses to rethink their roles and practices (IPCC, 2022). This context demands a profound transformation of traditional economic models, promoting a holistic and responsible approach to innovation (Hamel, 2020; Henderson, 2020; Nooyi & Govindarajan, 2020).

Research on sustainable entrepreneurship has gained momentum in recent management science literature, addressing various levels (individual and organizational) within both developed and struggling economies (Rosário et al., 2022). It identifies several forms of entrepreneurship: commercial, environmental, social, and sustainable, each with distinct objectives. "*commercial entrepreneurship*" (Smith et al., 2014) or "*traditional entrepreneurship*" (Santos, 2012) pursues solely economic objectives. "*Environmental entrepreneurship*" (Bennett, 1991), also known as "*ecopreneurship*" (Santini, 2017; Schaltegger, 2002), aims at both economic and environmental goals (Filser et al., 2019). "*Social entrepreneurship*" (Doherty et al., 2014; Saebi et al., 2019; Zahra et al., 2009) targets economic and social objectives. "*Sustainable entrepreneurship*" (Dean & McMullen, 2007; Schaltegger & Wagner, 2011) strives for a triple objective: economic, environmental, and social goals.

The notion of sustainable entrepreneurship, which has emerged more recently, adopts a comprehensive approach. It uses economic gains as both a means and an end to address societal and environmental problems (Filser et al., 2019). By pursuing a triple objective, this concept is

often associated with the "*triple bottom line*" introduced by Elkington (1994). This corresponds to a triple measure of performance: social impact, environmental impact, and project profitability project (Cohen & Winn, 2007; Hart, 2005; Thompson et al., 2011). Bocquet and Mothe (2011) emphasize that aligning Corporate Social Responsibility (CSR) and innovation creates opportunities for organizations to simultaneously pursue these goals, highlighting the strategic potential of linking responsibility-driven initiatives with innovation practices. Pursuing a dual objective is complex, and a triple objective is even more challenging (Belz & Binder, 2017). Therefore, it is essential for these entrepreneurs to rely on their ecosystem to develop their projects and maintain their triple objective.

1.2. Sustainable entrepreneurship through the lens of innovation ecosystems

Regardless of the form of entrepreneurship, in building their project, entrepreneurs develop relationships with their environment, contributing to the construction of their ecosystem. "*The notion of ecosystem prompts the entrepreneur to question and appropriate their environment*" (Schmitt, 2018). This concept denotes a co-evolutionary process where actors engage in both competitive and cooperative relationships (Moore, 1993). Initially localized in specific geographical areas like industrial districts or clusters, ecosystems now evolve towards managerial and innovation logic where openness and knowledge sharing are essential within territories (Ben Letaifa & Rabeau, 2012).

Recent work by Beaudry and al. (2021) emphasizes the dynamic interplay within innovation ecosystems, particularly the need for flexible and iterative approaches to manage the inherent tensions between openness and appropriation strategies. These tensions underscore the importance of strategic alignment, where actors must simultaneously engage in collaborative and competitive behaviors. This aligns with the concept of ecosystems as co-evolutionary processes that drive innovation through both competition and collaboration.

The approach to innovation ecosystems and sustainable entrepreneurship involves a complex integration of economic, social, and environmental objectives. This hybrid strategy, where multiple goals coexist, aligns closely with the work of Martinet and Payaud (2007), who propose a typology of CSR approaches ranging from cosmetic efforts to deeply integrated strategies. The latter are characterized by embedding social and environmental objectives into the core business models of organizations. In this context, the sustainable entrepreneur not only innovates in response to external constraints but also uses these constraints as levers to build innovative and collaborative solutions. Bollinger et al. (2023) build on this perspective by highlighting how constraints, often perceived as obstacles, can instead become drivers of strategic innovation. Their analysis of innovation ecosystems demonstrates how entrepreneurs and organizations transform social, economic, or environmental limitations into creative opportunities. This insight aligns closely with the challenges faced by sustainable entrepreneurs, who must navigate complex environments and leverage limited resources to achieve their triple-bottom-line objectives.

Today, we know that innovation alone is no longer sufficient for long-term survival (Bollinger & Neukam, 2021). Companies are encouraged to rethink their business models and integrate social and environmental responsibility (Gimenes, 2021; Wilenius, 2014). A recent study (Boston Consulting Group, 2022) showed the positive impact on large corporations from collaborating with start-ups, particularly on cultural issues (evolving mindsets, agility in development and decision-making, etc.). These issues are fundamental for supporting sustainable transition. These observations present a significant challenge for management science researchers, who have generally highlighted the superiority of large companies in terms of culture and recommended that small companies emulate them (Damanpour, 1992; Terziovski, 2010). Sustainable entrepreneurs can contribute to building a sustainable ecosystem by developing their projects and becoming a source of inspiration for established organizations,

often lacking flexibility, helping them integrate a more responsible dimension into their business models (Brunner & Bollinger, 2024).

1.3. Open innovation and its relevance to sustainable entrepreneurship

Innovation ecosystems reflect the principles of open innovation (Chesbrough et al., 2006), where innovation arises from collective interactions among external actors, blending internal and external ideas to create market-ready solutions. This broader approach to innovation underscores the active participation of all ecosystem actors and is especially pertinent to sustainable entrepreneurship, which seeks to address environmental and social challenges that engage diverse societal stakeholders. To innovate effectively and rapidly, sustainable entrepreneurs often rely on external partnerships. This reliance on openness necessitates an understanding of the ecosystem in which projects are developed and ways to optimize its business support structures.

The pursuit of a triple bottom line— economic, social, and environmental objective—compels sustainable entrepreneurs to engage with a wide array of actors, including established corporations, public institutions, and entrepreneurial support organizations. Opening their innovation processes enables entrepreneurs to innovate more cost-effectively and efficiently (Isckia & Lescop, 2011). For example, Stengel (2017) found that 18% of large companies collaborate with start-ups to cultivate a culture of innovation, signalling the growing necessity for exchange and collaboration within ecosystems. This trend raises critical questions about how sustainable entrepreneurs construct ecosystems to facilitate cooperation, organize exchanges, and share the value derived from innovation.

Open innovation, as articulated by Chesbrough et al. (2006), shifts the focus from closed, internalized models to collaborative networks that integrate diverse ideas and resources to accelerate innovation. For sustainable entrepreneurs, open innovation provides access to critical

resources, such as technical expertise, funding, and stakeholder networks, essential for realizing their triple-bottom-line objectives. Collaborating with external entities like established companies, research institutions, and public bodies helps reduce innovation costs, enhance creativity, and expedite impactful solutions (Isckia & Lescop, 2011). This openness also enables entrepreneurs to overcome the resource constraints inherent in starting up a business (Aldrich & Martinez, 2001).

Pénin et al. (2011) further highlight that the processes of open innovation involve a complex interplay between external knowledge flows and internal capabilities, requiring companies to not only absorb external ideas but also strategically share their own resources and technologies to foster mutual value creation. This dual dynamic is particularly significant in sustainable entrepreneurship, where the goals extend beyond mere profitability to include social and environmental impact.

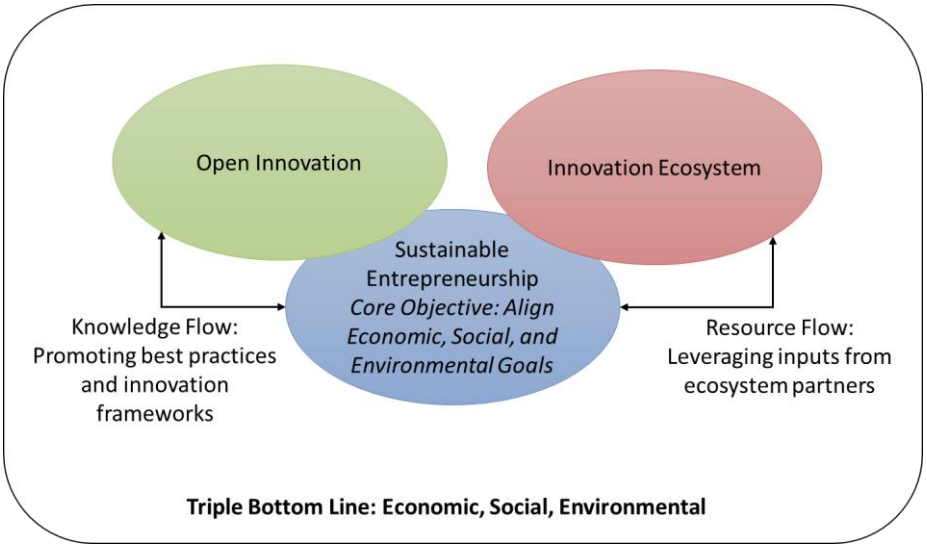
In the context of sustainability, open innovation supports the dissemination of best practices and technologies that align with circular economy principles, environmental stewardship, and social inclusion. By fostering trust, promoting knowledge exchange, and aligning values among stakeholders, open innovation strengthens ecosystem dynamics and co-creation processes (Ben Letaifa & Rabeau, 2012). However, managing open innovation comes with challenges. These include concerns over intellectual property, cultural and organizational differences, and the need to balance competition with collaboration (Brunner & Schaeffer, 2021; Pénin et al., 2011). Navigating these complexities is critical for sustainable entrepreneurs aiming to build ecosystems that are not only innovative but also inclusive and resilient.

To conclude the literature review, the figure 1 illustrates the conceptual integration of open innovation and the innovation ecosystem within the framework of sustainable entrepreneurship.

Knowledge flows and resource flows represent the dynamic exchanges between open innovation and the innovation ecosystem, reinforcing sustainable entrepreneurship's role as the central driver of innovation.

Figure 1: Integration of open innovation and innovation ecosystems in sustainable entrepreneurship

Source: own



2. Methods

2.1. Research context

An exploratory single case study (Yin, 2013) was conducted from December 2022 to July 2024 on the sustainable entrepreneurial project Chocoffré, led by an entrepreneur from Strasbourg within her association, l'Atelier CIRCULR. The Chocoffré project aims to provide a tangible example of using by-products for manufacturing items, specifically focusing on creating chocolate boxes made from coffee grounds and husks. This new manufacturing process is carried out in two main stages: (i) the preparation of the raw material, which consists of collecting coffee husks and grinding them, and (ii) thermocompression, which includes filling the mold, compressing the material, and then demolding.

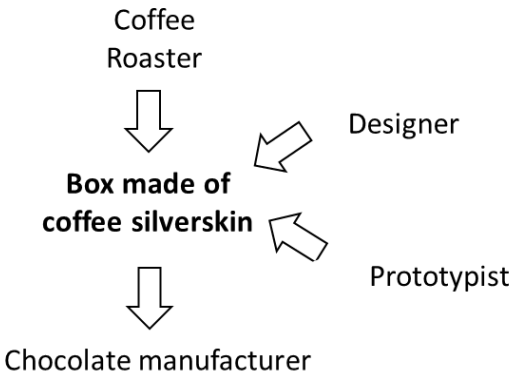
Chocoffré represents a product innovation, introducing eco-material-based packaging solutions, and reflects the entrepreneurial pursuit of the triple bottom line: (i) ensuring

profitability (economic objective), (ii) supporting local economic development by creating employment and engaging local suppliers (social objective), and (iii) promoting environmental sustainability by upcycling organic waste into compostable materials, engaging in material reuse, and fostering local awareness activities (environmental objective).

Chocoffré is an open innovation project around which several actors are working with the entrepreneur. The actors involved in Chocoffré include (Figure 2):

- A professor of design, contributing expertise in 3D software and prototyping while conceptualizing the use of coffee film for chocolate packaging.
- A prototypist, who developed molds for scaling the production process.
- A coffee roaster, supplying raw materials such as coffee skins and grounds.
- An independent chocolatier, interested in utilizing sustainable chocolate boxes for product packaging.
- A co-project leader, a materials science researcher, providing technical expertise in thermocompression and fostering environmental awareness.

Figure 2: Chocoffré: an open innovation project

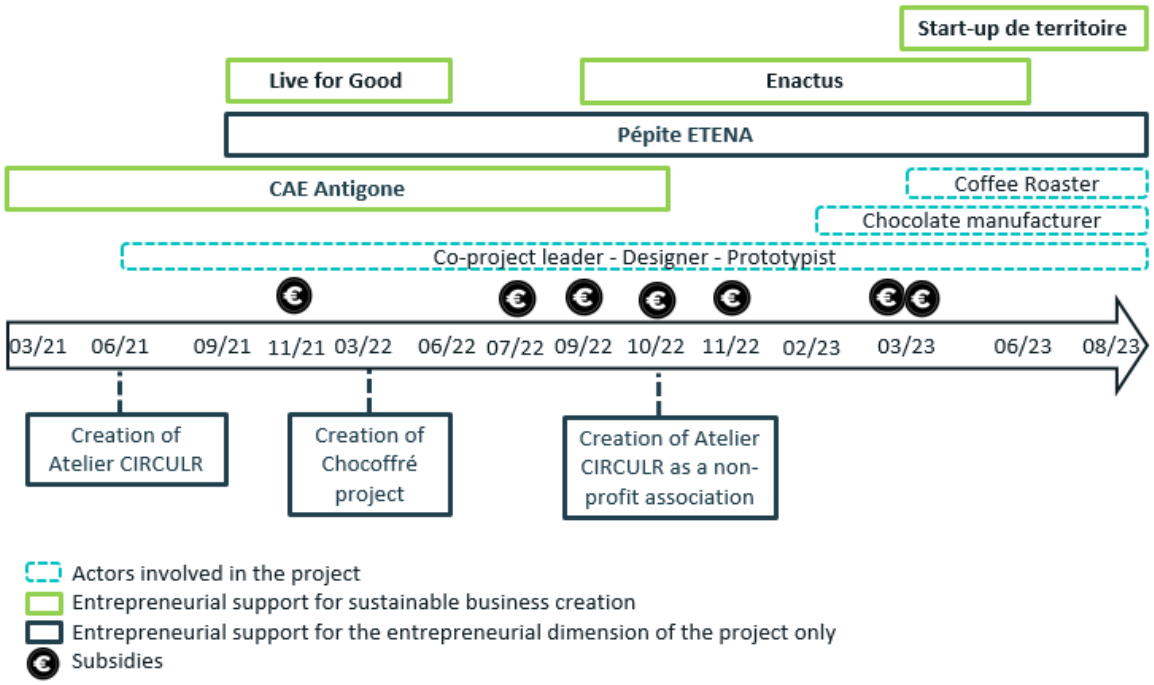


The project's development highlights the interdisciplinary and collaborative nature of open innovation, with contributions from technical, creative, and business stakeholders. This

ecosystem of actors not only enriched the project's technical development but also enabled the entrepreneur to embed sustainability into the broader production and value chain.

The figure 3 illustrates the actors and structures involved in the development of the Chocoffré project at various stages. The project owner co-constructed the initiative with five different actors, benefited from five distinct entrepreneurial support structures, and secured seven public subsidies throughout its progression.

Figure 3: Actors and structures involved in the project over time



A critical dimension of Chocoffré's progression was securing financial resources to sustain and expand its activities. Table 1 presents the different funding received from various programs, totalling 51200€. These funds were obtained through regional, national, and municipal initiatives, some of which explicitly emphasized sustainability criteria.

Table 1: Subsidies

Name	Level	Criteria	Sustainable criteria	Funder	Amount
Entrepreneurial des jeunes	Regional	Project leader < 30 years old	No	Grand Est region	5 000 €

Déclics Jeunes contest	National	Project leader < 30 years old Project with impact	Yes	Fondation de France	6 000 €
Pépite Etena award	National	Student-entrepreneur status	No	Pépite Etena	2 000 €
SEVE	City	Student or enterprise of Strasbourg Eurometropolis	Yes	Strasbourg Eurometropolis	7 100 €
Tango&Scan	City	Creative project of Strasbourg Eurometropolis	No	Accro	14 000 €
FERED project call	City	Interdisciplinary project	Yes	FERED	9 000 €
Zero Déchet project call	City	Waste reduction project	Yes	Strasbourg Eurometropolis	8 100 €
Total					**51 200€**

The Chocoffré project serves as an exemplary case for exploring the dynamics of sustainable innovation within a localized ecosystem. By leveraging open innovation principles, the project illustrates how collaborations among diverse stakeholders contribute to the development of eco-material-based products. This case is particularly relevant for understanding the interplay between internal strategies aimed at securing and consolidating resources, external strategies focused on building and maintaining collaborations, and the broader dimension of economic development through sustainable practices.

2.2. Data collection

This research adopts a constructivist epistemological stance, acknowledging that knowledge is co-constructed through the interactions between the researcher and the participants, as well as within the broader context of the innovation ecosystem. This perspective aligns with the study's focus on understanding the dynamic and relational processes of sustainable entrepreneurship and open innovation within specific ecosystems.

A participant observation was conducted from March to August 2023. During this period, the researcher participated in all events related to the Chocoffré project and conducted semi-structured interviews. A total of 18 semi-structured interviews were conducted, including 5 with the project leader (PL), 2 with other actors involved in the project, 2 with partners and suppliers, 5 business creation supports, and 4 institutional actors within the ecosystem that provided support (Table 2).

Table 2 : Interviews

Interviews	**Actors**	**Function and Activity**	**Date**	**Duration(*min*)**
1	Entrepreneur	Project Leader (PL)	08/12/2022	60
2	Entrepreneur	Project Leader for writing a response to a FERED call for projects[1]	15/12/2022	184
3	Entrepreneur	Project Leader for the launch of participant observation	02/03/2023	19
4	Industry	Roasting Workshop: Supplier of compostable materials	19/04/2023	42
5	Institutional actor	Tango&Scan: Project support manager for award-winning projects	20/04/2023	33
6	Business creation support	Pépite ETENA: Project manager and support officer	25/04/2023	41
7	Actor involved in the project	Co-project Leader: CNRS researcher in materials science	26/04/2023	31
8	Industry	Independent Chocolatier: Project partner	09/05/2023	30
9	Business creation support	CAE Antigone: Support officer	10/05/2023	35
10	Business creation support	Start-up de Territoire: Facilitator and support officer	17/05/2023	42
11	Business creation support	La Fabrique: Co-founder of shared workshops	25/05/2023	41
12	Institutional actor	Grand Est Region: Entrepreneurship support officer	20/06/2023	55
13	Institutional actor	Eurometropolis of Strasbourg: Zero waste project support officer	21/06/2023	46

[1] FERED: Environment and Sustainability Research Federation

14	Business creation support	Fondation de France: Youth program support officer	28/06/2023	45
15	Actor involved in the project	Research engineer on by-product transformation involved in the project	28/06/2023	20
16	Institutional actor	University of Strasbourg: FERED mission and communication officer	18/08/2023	22
17	Entrepreneur	Project Leader (PL)	15/04/2024	15
18	Entrepreneur	Project Leader (PL)	03/07/2024	120
Total				**881**

The interviews were based on a guide developed from our literature review, which allowed us to: 1) identify the entrepreneur's navigation between the different actors in the ecosystem; 2) understand the contribution of each actor as well as the difficulties encountered during the innovation process; and 3) understand the role and strategy of each ecosystem actor in the sustainable innovation project.

To grasp the complexity of the subject, a series of events was followed during our research, including participation in meetings, visits to workspaces, and various entrepreneurial events organized by support structures and actors within the local ecosystem. These observations, detailed in Table 3, provided additional essential data for our case study.

Table 3: Secondary Data

Events	**Date**	**Duration (min)**
Presentation of l'Atelier CIRCULR	08/12/2022	60
Visit to the Cronenbourg campus where the press used by l'Atelier CIRCULR is located	03/03/2023	120
"Envol des solutions" evening by Start-up de territoire	09/03/2023	180
Meeting with l'Atelier CIRCULR stakeholders	10/03/2023	120
Day with l'Atelier CIRCULR stakeholders	11/03/2023	360
Meeting with Tango&Scan	21/03/2023	60
Progress review of participant observation	28/03/2023	120
Training by Start-up de territoire	04/04/2023	120
Visit to a partner's workshop	12/04/2023	120
Progress review of participant observation	02/05/2023	120
Meeting with the project leader	16/05/2023	120
Meeting with Start-up de territoire	22/05/2023	120
Half-day with l'Atelier CIRCULR stakeholders	03/06/2023	180

Visit to the Fab-Lab La Fabrique	03/06/2023	180
Progress review of participant observation	05/06/2023	120
Progress review of participant observation	06/06/2023	120
Progress review of participant observation	05/07/2023	120
Restitution of the participant observation	16/08/2023	120
Restitution of the project funded by FERED	18/08/2023	120
Presentation of l'Atelier CIRCULR	03/07/2024	120
Total		2700

Following these events, numerous documents were produced by the researcher, including a journal, observation reports, and meeting minutes. Secondary data were also collected from the press, the project website, and the social media channels of the Chocoffré entrepreneurial project.

2.3. Data analysis

The data collected for this study were analysed using a structured coding process to uncover recurring themes and patterns. The coding process was iterative and followed the guidelines of Miles and Huberman (2003). Each interview was recorded, transcribed, and systematically coded using the qualitative data analysis software Nvivo, which facilitated the organization, visualization, and cross-referencing of data.

The coding framework was developed based on the analytical grid proposed by Bollinger et al. (2023). This framework emphasizes the strategic role of constraints in driving innovation within ecosystems, providing a theoretical lens to explore the interactions, strategies, and contributions of ecosystem actors in the Chocoffré project. The structure incorporates three main dimensions—internal strategies, external strategies, and economic development—reflecting the complex interplay between the entrepreneur, stakeholders, and the broader innovation ecosystem. In fact, to address the research question of how a sustainable entrepreneur navigates and builds an ecosystem to develop an innovation project, it is essential first to understand how the foundation for long-term innovation is established. This entails examining the strategies that

focus on both internal and external dynamics as well as their interplay with economic development. The external strategy emphasizes the importance of engaging with diverse stakeholders to co-create value and align market expectations with sustainability principles. Economic development strategies further enhance this foundation by leveraging financial incentives and capacity-building initiatives to transform constraints into opportunities for innovation.

The resulting coding framework is presented in table 4, offering a comprehensive overview of the categorized data.

Table 4: Coding table for data analysis

Source: inspired by Bollinger et al. (2023)

Main category	Subcategory	Description
Internal strategy: innovating for the long term	Innovating securely	Developing actions focused on stabilizing internal conditions to encourage innovation.
	Consolidating	Developing organizational capabilities to support long-term innovation.
External strategy: interacting and maintaining	Attracting and acting	Collaborations with external stakeholders to co-create value.
	Differentiating and preparing	Developping responsible innovations to stand out and anticipate market changes.
Economic development	Creating incentives for innovation	Using constraints as opportunities to drive innovative solutions.
	Developing innovation capabilities	Strengthening internal resources and processes to sustain innovation.

3. Results

3.1. Internal strategy: innovating for the long term

3.1.1. Innovating securely

The Chocoffré project demonstrates the importance of securing structural, technical, and financial stability during its initial stages. As shown in table 5, each actor played a specific role in stabilizing the project, offering financial resources, technical expertise, and administrative support.

Table 5: Key actors, their contributions, and representative verbatims in the "Innovating Securely" dimension

Type of Actor	Role	Contributions	Representative Verbatims
Institutional Actors	Providing financial and structural stability through different programs.	- Financial support for young entrepreneurs. - Emphasis on local integration to enhance project viability.	*"Young creators who have just started their business or are about to create one [...] can apply for these programs and benefit from a subsidy that can range from €2,000 to €5,000."* (Entrepreneuriat des Jeunes) *"Young entrepreneurs must not be disconnected from their territory and must have all the tools to make their business as sustainable as possible."* (Entrepreneuriat des Jeunes)
Actors involved in the project	Collaborating with the entrepreneur to bring technical expertise and environmental perspectives.	- Research on materials and thermocompression. - Raising environmental awareness. - Strengthening the project's technical and strategic security.	*"She is a co-leader of the project. We both conduct research on materials."* (Project Leader) *"Marion facilitated this climate workshop [...] and we started discussing her project and these new materials."* (Co-Project Leader)
Business creation Supports	Providing legal and administrative assistance to stabilize the project's foundation.	- Support with grant applications. - Legal hosting and strategic guidance. - Administrative stability during the initial phase of the project.	*"They helped me with grant applications and provided legal hosting for the launch of the activity."* (Project Leader) *"Her goal was to develop the project itself [...] and she did very well in her first years."* (Support Advisor, CAE ANTIGONE)

3.1.2. Consolidating

To ensure the long-term stability and scalability of the Chocoffré project, consolidation efforts focused on strengthening the entrepreneurial ecosystem, enhancing technical expertise, and leveraging critical resources. Targeted initiatives, contributions from specialized actors, and

access to essential infrastructure supported these efforts. The table 6 outlines the key actors involved in the consolidation process, their contributions, and representative verbatims illustrating their impact on the project.

Table 6: Key actors, their contributions, and representative verbatims in the "Consolidating" dimension

Type of Actor	Role	Contributions	Representative Verbatims
Institutional actors	Strengthen networks and foster ecosystem development through initiatives like *Prix Pépite*.	- Putting entrepreneurs in touch with panels of experts and mentors. - Preparing sustainable innovation by developing entrepreneurial capacities.	*"We have an extremely diverse jury, composed of individuals from areas such as the circular economy, social and solidarity economy, and organizations like Enactus."* (Pépite ETENA)
Actors involved in the project	Providing technical expertise in design and prototyping.	- Designer: Support for the practical aspects of product development. - Contribution to the design of moulds for serial production and offered a unique perspective beyond scientific boundaries.	*"She provides me with her skills in 3D software design, cardboard prototyping, and also a 'non-scientific' perception to have another perspective on the project."* (Project Leader)
	Providing technical contributor to the thermo-compression process.	- Prototypist: Helping to design and develop tools such as the thermo-compression press. - Transformed technical ideas into functional tools.	*"He helps me develop the plans for the press used for thermo-compression of future materials."* (Project Leader)
Business creation supports	Providing access to resources and equipment necessary for project development.	- Providing access to critical infrastructure such as laboratories and Fab-Labs, reducing upfront costs.	*"Pépite ETENA allowed me to access equipment without which I could not have carried out this project in this way."* (Project Leader)

		- Expanding local and national networks to support project growth.	*"We focus on ecosystem openness, enabling connections with the right people to activate the necessary levers to achieve their projects."* (Pépite ETENA)

3.2. External strategy: interacting and maintaining

3.2.1. Attracting and acting

Attracting external resources and partnerships played a pivotal role in the development of the Chocoffré project. By establishing strategic collaborations with institutional actors, project partners, and support structures, the entrepreneur was able to leverage interdisciplinary expertise, create value, and align with sustainability goals. The table 7 presents this dimension.

Table 7: Key Actors, their Contributions, and representative verbatims in the "Attracting and Acting" Dimension

Type of Actor	Role	Contributions	Representative Verbatims
Institutional Actors	Promoting interdisciplinary collaboration and sustainability through programs like FERED and Zero Déchet.	- Facilitating interdisciplinary research. -Encouraging waste reduction and circular economy initiatives.	*"FERED brings together over 200 researchers from different disciplines [...] to develop research across disciplines."* (FERED) *"It's a program that drives waste reduction and involves local actors in sustainable practices."* (Zero Déchet)
Actors involved in the project	Providing materials and exploring circular economy solutions.	- Coffee roaster: Supply of raw materials and support for prototyping. - Chocolatier: Testing sustainable packaging and exploring the competitive advantages for brand strategy and sales.	*"He provides us with the raw material that allows us to conduct our tests and prototypes."* (Project Leader) *"If we can turn our waste into a product that we supply to our customers, it aligns with a circular concept and almost a complete loop."* (Coffee Roaster)

Business creation supports	Connecting the project with resources, networks, and training programs.	- Start-up de Territoire: Monthly training and co-development workshops. - Live for Good: Mentorship and training focused on ecological and social transitions. - Enactus: Social and environmental business development support. - CAE ANTIGONE: Administrative and legal support. - Pépite ETENA: Providing workspaces and networking opportunities.	*"Start-up de Territoire offers monthly training, co-development workshops, and a network within the circular economy."* (Start-up de Territoire) *"Live for Good's main contribution was the exchanges with other entrepreneurs during workshops and online training."* (Project Leader) *"Pépite ETENA gave us access to equipment and networks, which were crucial for project development."* (Project Leader)

3.2.2. Differentiating and preparing

To ensure long-term success and sustainability, the Chocoffré project focused on differentiation by creating innovative, functional, and environmentally friendly solutions. The table 8 highlights the contributions of key actors and structures in positioning Chocoffré as a unique and responsible product.

Table 8: Key Actors, their contributions, and representative verbatims in the "differentiating and preparing" dimension

Type of Actor	Role	Contributions	Representative Verbatims
Institutional Actors	Promoting interdisciplinary collaboration and sustainability through programs like FERED and Zero Déchet.	- Facilitating interdisciplinary research. - Encouraging waste reduction and circular	*"FERED brings together over 200 researchers from different disciplines [...] to develop research across disciplines."* (FERED) *"It's a program that drives waste reduction and involves local actors in sustainable practices."* (Zero Déchet)

		economy initiatives.	
Actors involved in the project	Providing materials, and exploring circular economy solutions.	- Coffee roaster: Supply of raw materials and support for prototyping. - Chocolatier: Testing sustainable packaging and exploring the competitive advantages for brand strategy and sales.	*"He provides us with the raw material that allows us to conduct our tests and prototypes."* (Project Leader) *"If we can turn our waste into a product that we supply to our customers, it aligns with a circular concept and almost a complete loop."* (Coffee Roaster)
Business creation supports	Connecting the project with resources, networks, and training programs.	- Start-up de Territoire: Monthly training and co-development workshops. - Live for Good: Mentorship and training focused on ecological and social transitions. - Enactus: Social and environmental business development support. - CAE ANTIGONE: Administrative and legal support. - Pépite ETENA: Providing workspaces and networking opportunities.	*"Start-up de Territoire offers monthly training, co-development workshops, and a network within the circular economy."* (Start-up de Territoire) *"Live for Good's main contribution was the exchanges with other entrepreneurs during workshops and online training."* (Project Leader) *"Pépite ETENA gave us access to equipment and networks, which were crucial for project development."* (Project Leader)

3.3. Economic development

3.3.1. Creating incentives for innovation

Institutional actors, project partners, and business support structures played critical roles in providing the necessary resources and creating a conducive ecosystem for sustainable innovation. The table 9 highlights the contributions of these actors in transforming waste into value, fostering entrepreneurial capabilities, and supporting the project's progression through various stages.

Table 9: Key actors, their contributions, and representative verbatims in the "Creating Incentives for Innovation" dimension

Institutional Actors	Supporting innovation through programs like Tango&Scan, encouraging responsible innovation.	- Promoting partnerships between creatives and technical experts. - Aligning projects with local and international sustainability standards.	*"There are several projects in responsible innovation, particularly to combat climate change, environmental disruption, or pollution."* (Tango&Scan)
Project Partners	Co-development of sustainable and functional products tailored to customer needs.	- Chocolatier: Contributing to sustainable packaging design and market differentiation. - Designer and prototypist: Providing expertise in prototyping and thermo-compression.	*"What attracted me was the idea of reusing what could be called waste in the cacao production process."* (Chocolate Manufacturer) *"Doing something that is just sustainable but lacks functionality makes no sense. It must always have functionality, a reasonable cost, and, if possible, be recyclable."* (Chocolate Manufacturer) *"She provides me with her skills in 3D software design, cardboard prototyping, and also a non-scientific perspective."* (Designer)
Business creation supports	Helping to structure the entrepreneur's ideas, and	- Enactus Étudiants: Supporting the project with	*"This support mainly helped me take the time to regularly assess my ideas with the advisor and myself."* (Enactus)

	encouraging social entrepreneurship.	practical advice on social and environmental differentiation. - Enabling experimentation in social entrepreneurship.	*"Enactus Étudiants offers experimentation in social entrepreneurship to develop young people's skills."* (Enactus)

3.3.2. Developing innovation capabilities

The Chocoffré project demonstrates how tailored training, collaborative partnerships, and institutional support can build innovation capabilities. The table 10 shows that institutional programs, project partners, and support structures provided the resources, networks, and guidance needed to align the project with sustainability goals while fostering creative and functional solutions.

Table 10: Key actors, their Contributions, and representative verbatims in the "Developing Innovation Capabilities" Dimension

Type of Actor	Role	Contributions	Representative Verbatims
Institutional Actors	Providing methodological tools, funding, and mentorship to enable impactful innovation.	- Déclics Jeunes Contest: Focusing on sustainable impact with long-term project guidance. - Zero Déchet Project Call: Encouraging circular economy practices. - FERED: Facilitating interdisciplinary research on sustainability.	*"The goal is not just to give them money, but to offer them support, resources, and long-term guidance to implement their projects."* (Déclics Jeunes) *"It must target waste reduction and create circular loops."* (Zero Déchet) *"FERED brings together over 200 researchers to develop cross-disciplinary research."* (FERED)
Project Partners	Contributing to innovation by co-creating sustainable,	-Chocolatier: Exploring packaging solutions that balance functionality and	*"The idea is to be able to neatly close this durable packaging whenever you feel like having some chocolate."* (Chocolate Manufacturer)

	functional solutions.	sustainability while addressing customer needs.	*"They have the idea, the technicality, the technology, and we have a need for packaging."* (Chocolate Manufacturer)
Business creation supports	Strengthening the entrepreneur's capacity through strategic networking and practical training.	- Start-up de Territoire: Providing training on storytelling and hosted informal networking opportunities. - Tango&Scan: Funding for prototypes and creative collaborations.	*"We had a collective training session on storytelling. Additionally, we had informal monthly lunches and a meeting with Start-up de Territoire partners."* (Start-up de Territoire) *"The funding is used to create a prototype. If a prototype is presented at the end, the objectives are fulfilled."* (Tango&Scan)

4. Discussion

The Chocoffré case study provides valuable insights into the interplay of leadership, ecosystem dynamics, and the sustainability-driven innovation process. This discussion addresses three critical dimensions: (1) the entrepreneur's role as a leader and orchestrator in navigating a fragmented ecosystem, (2) the hybridization of social, environmental, and economic goals through the creation of a common language, and (3) the strategies and interests of diverse ecosystem actors in supporting sustainable entrepreneurship.

4.1. The entrepreneur as ecosystem leader

The Chocoffré case underscores the transformative role of the entrepreneur as an ecosystem leader, illustrating her ability to align diverse actors and objectives. While this leadership capacity has been framed as essential in fostering sustainable ecosystems (Schmitt, 2018; Terziovski, 2019), the case reveals nuanced dimensions of leadership that go beyond conventional coordination.

The entrepreneur's bridging capacity—linking sustainability-driven and traditional business networks—addresses a critical tension in ecosystem literature: the balance between fostering specialized sustainability initiatives and integrating these within broader market frameworks. Adner (2006) emphasizes that ecosystem diversity enhances innovation potential, but they also warn against the risk of fragmented networks leading to siloed activities. By engaging with CAE ANTIGONE, Pépite Etena, and Zero Déchet, the entrepreneur mitigated such risks, exemplifying how participation in varied networks can prevent path dependency (Martinet & Payaud, 2007). As Pénin et al. (2011) emphasize, open innovation relies on both the absorption of external knowledge and the strategic sharing of internal resources to create a common ground for collaboration. In the Chocoffré project, the entrepreneur exemplified this dual dynamic by not only leveraging external expertise but also sharing knowledge and aligning diverse stakeholders around a shared vision of sustainability.

However, this approach raises questions about the sustainability of such ecosystems. For instance, while the integration of non-sustainability-oriented actors brings resources and legitimacy, it may also dilute the transformative potential of the sustainability agenda. This echoes Schaltegger and Wagner's (2011) argument that aligning divergent goals requires deliberate strategies to maintain the integrity of sustainability objectives amidst economic pressures.

A key insight is the development of a "common language," facilitating alignment among stakeholders with diverse priorities. The Chocoffré entrepreneur operationalized this language to mediate between actors like the chocolatier, seeking functional and cost-effective packaging, and sustainability advocates prioritizing environmental impact. This capacity aligns with Martinet and Payaud's (2008) framework of hybrid strategies but also introduces questions

about the boundaries of such hybridization. Can the alignment of fundamentally different priorities ever be complete, or will tensions remain intrinsic to these ecosystems?

Moreover, the findings challenge conventional notions of leadership as primarily strategic. Instead, the entrepreneur's role encompassed fostering trust, negotiating values, and creating shared narratives—tasks that require emotional intelligence and adaptability. As Bollinger et al. (2023) note, such "soft" capabilities are increasingly critical in navigating complex ecosystems. However, this also introduces vulnerabilities, as the ecosystem's coherence may overly depend on individual leadership, risking fragility if that leadership is absent or weakened.

The Chocoffré case also highlights conditions for translating entrepreneurial intentions into actionable outcomes. Institutional programs, like Déclics Jeunes provided mentoring and resources, reflecting Chesbrough's (2006) principle that open innovation thrives on the interplay of external support and internal capability-building. However, the reliance on such programs raises concerns about scalability. The collaborations and strategies put in place by start-ups also depend on ecosystem factors, including public intervention (Brunner & Schaeffer, 2021). As George et al. (2016) argue, ecosystems that rely heavily on public interventions may struggle to sustain momentum without continued external input.

In sum, while the Chocoffré entrepreneur exemplifies effective leadership in navigating and shaping a sustainable ecosystem, the findings provoke critical reflections on the fragility of the ecoystems, the challenges of balancing divergent priorities, and the reliance on individual leadership. Future research should explore how such ecosystems can institutionalize mechanisms that reduce dependency on individual actors, enabling long-term resilience and scalability.

4.2. Hybridizing goals: social, environmental, and economic

The Chocoffré case highlights the complexities and opportunities involved in integrating social, environmental, and economic goals within an innovation ecosystem. Contrary to the simplistic notion that these goals naturally align, this study reveals that their coordination requires ongoing negotiation and management, often under tension. As emphasized by Beaudry et al. (2021), ecosystems must balance openness and inclusivity with the practical challenges of aligning diverse priorities, highlighting the inherent fragility in sustaining collaborative innovation over time.

The involvement of diverse stakeholders—including institutional programs like Zero Déchet, private collaborators such as the chocolatier and the coffee roaster, and academic partners—demonstrates a dynamic hybridization process where each actor contributes based on its specific priorities. Public institutions, by providing frameworks for promoting circular economy practices, complement the efforts of private enterprises, which bring market-oriented resources and insights. However, these collaborations expose structural tensions, particularly regarding the short-term priorities of institutions versus the long-term strategies essential for ensuring the sustainability of innovations. These tensions echo Schaltegger and Wagner's (2011) observations on the need for a dynamic balance between institutional pressures and entrepreneurial flexibility.

Furthermore, this hybridization of goals presents limitations, notably the risk of imbalance where certain dimensions (economic or environmental) overshadow others (social). For instance, while the chocolatier and the coffee roaster adopted sustainable practices, their initial motivations were predominantly economic, focusing on commercial gains or competitive advantages. This raises questions about the longevity of their commitments once immediate benefits have been achieved. The findings underscore the critical role of ecosystem governance

in sustaining such alliances over time. While public institutions can provide frameworks and initial support, the long-term sustainability of these ecosystems requires shared governance mechanisms. Public actors should act as facilitators rather than central controllers, enabling private stakeholders—including entrepreneurs, private firms, and civil society actors—to co-develop and co-maintain the ecosystem's objectives and operations. This approach balances the benefits of institutional support with the need to avoid over-reliance on external interventions, fostering resilience and adaptability in the ecosystem.

Finally, the study reveals that hybridizing goals is not a static state but an ongoing process. This process relies not only on the contributions of various actors but also on strategic adjustments that respond to emerging constraints while maintaining overall coherence. Rather than assuming a natural complementarity between social, environmental, and economic goals, the Chocoffré case demonstrates that these alignments must be actively constructed, sometimes requiring individual actors to sacrifice their own interests for the greater collective vision**.** As Beaudry and al. (2021) note, the transition toward sustainable ecosystems demands both shared vision and the flexibility to navigate inherent contradictions in stakeholder objectives.

This analysis contributes to the literature by illustrating that achieving hybridization within an ecosystem supporting sustainable innovations requires not only diverse contributions but also a collective capacity to manage tensions, and adapt strategies in response to shifting priorities.

4.3. Strategies and interests of ecosystem actors

The strategies and interests of ecosystem actors reveal the multifaceted value generated through open innovation but also expose tensions in aligning diverse objectives. While existing literature highlights the benefits of collaborative ecosystems (Chesbrough, 2006; Martinet & Payaud, 2008), the Chocoffré case illustrates the complexities and trade-offs inherent in such collaborations.

The Chocoffré entrepreneur's engagement with private and institutional actors aligns with Chesbrough's (2006) open innovation framework, where entrepreneurs leverage external resources to overcome internal constraints. Programs, such as Déclics Jeunes and Tango&Scan, provided financial resources, mentorship, and validation, enabling the entrepreneur to scale innovative solutions. However, navigating institutional requirements imposed bureaucratic constraints, challenging the seamlessness often assumed in open innovation processes (Chesbrough et al., 2006). The entrepreneur acted as a mediator, balancing the rigidity of institutional frameworks with the dynamic needs of the project.

Private actors, including the coffee roaster and chocolatier, used their involvement in Chocoffré to explore sustainable practices with reduced costs and risks, aligning with Wilenius's (2014) view of sustainability as an opportunity for differentiation. These collaborations helping them to integrate a more responsible dimension into their business models (Brunner & Bollinger, 2024). Their also enhanced brand image and market positioning while externalizing innovation risks. However, the case also reveals that private actors prioritized economic returns over shared sustainability goals. This observation questions the idealized view of unified goals in ecosystems (Martinet & Payaud, 2008), highlighting persistent tensions between profitability and collective sustainability.

The Chocoffré case underscores the dual nature of ecosystem dynamics: while collaborations generate significant value for stakeholders, they also reveal tensions. Entrepreneurs must balance resource access (Aldrich & Martinez, 2001) with institutional constraints, private actors must reconcile sustainability with profitability, and institutional actors must design adaptable programs that align with dynamic entrepreneurial needs. These findings expand Martinet and Payaud's (2008) framework by showing that hybridizing goals requires ongoing negotiation

and adaptability rather than seamless integration. Table 11 summarizes the strategy, benefits and challenges of each stakeholder.

Table 11: Strategy, benefits, and challenges identified in the literature

Stakeholder	**Strategy**	**Benefit**	**Challenges Identified**
Entrepreneur	Resource access, scalability, legitimacy	Viable business model, network expansion	Institutional rigidity limits entrepreneurial flexibility (Chesbrough et al., 2006)
Private actors	Experimentation, competitive differentiation	Brand image enhancement, cost-effective sustainability	Profit motives often overshadow sustainability goals (Wilenius, 2014)
Institutional actors	Societal impact, regional economic growth	Addressing societal challenges, policy visibility	Framework rigidity challenges entrepreneurial adaptability (Martinet & Payaud, 2007)

In summary, while the Chocoffré case reinforces the significance of open innovation, it also exposes the practical complexities of aligning diverse ecosystem actors. Achieving hybrid goals requires not only shared resources but also deliberate negotiation and adaptability among stakeholders. These insights contribute to a nuanced understanding of the tensions and synergies that define ecosystems supporting sustainable innovations.

Conclusion

Theoretical contributions

This study advances the understanding of the process of creating an ecosystem (George et al., 2016; Jacobides et al., 2018) around a sustainable innovation project over time. By investigating the dynamic interactions and the roles of various actors within these ecosystems, this research contributes to the broader literature on sustainable entrepreneurship and innovation ecosystems. The study addresses the need for a more nuanced understanding of how sustainable entrepreneurs navigate and leverage their ecosystems to achieve their triple bottom line goals (Cohen & Winn, 2007; Filser et al., 2019; Hart, 2005; Thompson et al., 2011).

Unlike prior studies that focus on static roles of actors within ecosystems, the Chocoffré case illustrates the dynamic and iterative process by which entrepreneurs actively construct, adapt, and sustain their ecosystems. This extends Martinet and Payaud's (2007) notion of hybridization, showing how leaders not only navigate but also shape ecosystems to reconcile conflicting interests and enable co-creation.

The hybridization of social, environmental, and economic goals has been widely acknowledged as a hallmark of sustainable entrepreneurship (Martinet & Payaud, 2007). However, the Chocoffré case deepens this understanding by demonstrating how these goals are operationalized in practice. Specifically:

- **Alignment through a common language**: The entrepreneur played a key role in mediating between militant actors focused on environmental and social values and private-sector actors driven by economic imperatives. This "common language" concept highlights a practical mechanism for aligning diverse goals within ecosystems supporting sustainable innovations.
- **Balancing tensions**: The case provides empirical evidence of the tensions inherent in hybridization, such as differing time horizons and risk tolerances among stakeholders.

It underscores the need for adaptive leadership and collaborative frameworks to sustain these ecosystems over time.

These insights extend hybridization theory by illustrating the micro-level processes that underpin goal alignment and the conditions necessary for successful implementation.

Furthermore, it builds on the existing frameworks of open innovation (Chesbrough et al., 2006), innovation ecosystem dynamics (Ben Letaifa & Rabeau, 2012), and strategic corporate social responsibility (Neukam & Bollinger, 2022). The findings provide insights into the collaborative and competitive interactions that shape ecosystems supporting sustainable innovations.

The Chocoffré case exemplifies how open innovation frameworks can be adapted to sustainability-driven entrepreneurship. Chesbrough's (2006) open innovation model emphasizes collaboration across organizational boundaries to co-create value. The Chocoffré entrepreneur expanded this concept by integrating actors with varying capacities and interests into a shared innovation process. Existing literature often conceptualizes ecosystems as relatively static structures (Beaudry et al., 2021; Jacobides et al., 2018; Moore, 1993). This perspective tends to emphasize predefined roles and interactions among actors within these systems, suggesting a degree of rigidity in their composition and operation. However, the Chocoffré case challenges this view by demonstrating the dynamic interplay of actors, resources, and networks, highlighting the adaptability required to address sustainability-driven objectives effectively. Specifically:

- **Ecosystem adaptability**: The entrepreneur's ability to engage with both sustainable and traditional networks underscores the importance of ecosystem flexibility. This adaptability mitigates risks of path dependency and ecosystem isolation, particularly in sustainability-driven projects.

- **Multi-level interactions**: The study highlights how actors at different levels (local, national, and international) contributed to the ecosystem, each providing complementary resources and opportunities. At the local level, programs like Zero Déchet facilitated collaboration with community stakeholders, such as local coffee roasters, and promoted the adoption of circular economy practices, embedding the project within the region's sustainability agenda. Nationally, initiatives such as Pépite ETENA offered crucial technical resources, including access to FabLabs, while also connecting the project to a wider network of experts and funding opportunities. Similarly, the Déclics Jeunes program provided visibility and recognition, positioning Chocoffré as a model for innovative sustainability practices and attracting additional support. These multi-level interactions illustrate how localized engagement, paired with national-level resources and visibility, enabled the Chocoffré project to leverage diverse capabilities and align the objectives of various stakeholders, thereby strengthening the ecosystem's capacity to foster sustainable innovation.

These findings enrich the literature on ecosystem dynamics by emphasizing the need for continuous adaptation and integration across levels.

The dynamics of cooperation within innovation ecosystems often involve hybrid strategies that blend economic and social objectives. Martinet and Payaud (2007) offer a comprehensive taxonomy of CSR strategies, highlighting the continuum from "cosmetic" CSR actions to integrated approaches that deeply embed social objectives into the company's core activities. This perspective provides valuable insights into the Chocoffré leader's role in forging partnerships with diverse actors, from local non-governmental organization to public bodies, to address sustainability challenges.

Building on Martinet and Payaud's analysis, the Chocoffré case illustrates how a local entrepreneur can navigate and operationalize these hybrid strategies within his ecosystem. This raises pertinent questions: How can these strategies evolve to balance economic and social goals effectively? What role does leadership play in fostering trust and commitment among stakeholders, especially in localized ecosystems?

Practical implications

This study provides actionable insights into fostering sustainable innovation and supporting entrepreneurs in transitioning from vision to execution. It identifies the critical conditions for entrepreneurial success, emphasizing the importance of robust ecosystems, diverse networks, and targeted support structures.

One significant finding is the necessity of enabling entrepreneurs to move from intention to action by addressing systemic barriers. Tailored support programs such as Pépite ETENA and Déclics Jeunes play a crucial role by providing mentoring, funding, and access to resources. Moreover, entrepreneurs must engage with both sustainability-oriented and traditional business networks to broaden their resource base, overcome challenges, and mitigate the risks of ecosystem isolation.

The study highlights the centrality of leadership in ecosystems supporting sustainable innovations. Entrepreneurs act as mediators, aligning the often conflicting goals of economic viability, environmental stewardship, and social impact. This leadership involves creating a "common language" to facilitate cooperation among diverse stakeholders. Such a framework not only drives innovation but also enhances the adaptability and resilience of the ecosystem.

Policymakers are urged to strengthen existing ecosystems rather than creating new structures. By embedding sustainable values into established innovation frameworks and fostering

interdisciplinary collaborations (e.g., FERED), they can optimize resources and accelerate progress towards sustainability goals. Public policy should also prioritize partnerships between diverse actors, encouraging established companies to collaborate with entrepreneurs to co-create sustainable solutions. These collaborations not only enrich corporate innovation strategies but also help start-ups access technical expertise and scale their innovations (Taupin et al., 2024). This can take the form of project funding and the creation of events bringing together different actors in the ecosystem.

Finally, this study underscores the importance of viewing ecosystems holistically, focusing on the interactions and interdependencies among actors rather than hierarchical relationships. This approach encourages a more inclusive, integrated strategy for sustainable entrepreneurship, fostering long-term economic, social, and environmental benefits.

Limitations and future research

This research provides valuable insights into the role of sustainable entrepreneurs in building innovation ecosystems, but it also highlights several limitations that open avenues for future investigation.

First, the research focuses on Strasbourg, a city with a favourable environment for entrepreneurship that has been extensively studied (Matt & Schaeffer, 2018). However, entrepreneurial ecosystems are deeply influenced by local contexts, and differences likely exist between cities, regions, and countries (Audretsch & Keilbach, 2007). Extending the scope of future research to include other geographic areas would allow for a more nuanced understanding of how ecosystems supporting sustainable innovations function in diverse settings. Such comparative studies could shed light on how variations in public policies, cultural attitudes, and local stakeholder networks influence sustainable entrepreneurship. These findings

would help to identify adaptable strategies for fostering innovation ecosystems across different contexts.

Then this study relies on a single case, offering a detailed understanding of the dynamics within one specific ecosystem. While the in-depth focus provides valuable insights, the findings may not fully capture the diversity of strategies and outcomes across other contexts. Broader research could explore whether the patterns observed in Chocoffré apply to other sustainable innovation projects. Future studies involving multiple case analyses in varied settings could uncover general principles of ecosystem-building while also identifying the unique factors shaped by specific contexts. This would enhance the applicability of findings to both theory and practice.

Our research research highlights the entrepreneur's pivotal role in aligning diverse stakeholder objectives, from environmental and societal goals to strategic and economic priorities. This alignment requires navigating competing interests and fostering collaboration among actors from different domains, including public institutions, corporate partners, and grassroots initiatives. Future research could explore the mechanisms through which entrepreneurs create a shared language among stakeholders and address tensions between sustainability and profitability. Examining the processes of change management, leadership influence, and stakeholder negotiation could provide a deeper understanding of the conditions for success in achieving alignment.

The hybridization of economic, social, and environmental strategies within the Chocoffré project reflects a growing trend in sustainability-focused ecosystems. However, scaling such hybrid models to broader contexts remains a challenge. While local ecosystems offer fertile

ground for experimentation, the systemic integration of hybrid strategies across industries and regions is less well understood. Investigating how localized successes can be scaled systematically would help uncover enablers such as policy frameworks, cross-sector partnerships, and leadership practices. This would provide actionable insights for replicating sustainable innovation models beyond their original contexts.

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