

The Integrated Finance in FoodTech: A Qualitative Analysis of Sustainable Startup Scalability

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Abstract

This paper investigates the interaction between radical innovation and sustainable finance in the FoodTech sector, a context characterized not only by high capital intensity and delayed returns, but also by challenges related to consumer acceptance, regulatory requirements, and scalability. Through the longitudinal qualitative case study of Futura S.r.l., an innovative startup located in Southern Italy, the research examines how sustainable ventures navigate financial constraints within a peripheral entrepreneurial ecosystem. Drawing on the triangulation of documentary and operational sources, the study reconstructs the firm's evolution. The findings reveal that startup growth is enabled by a hybrid financing architecture combining

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public grants, bank debt, private equity, and ecosystem partnerships. Moreover, the analysis shows that sustainability supports scalability through both signaling and substantive mechanisms. Indeed, transparent ESG metrics enhance legitimacy and reduce information asymmetries, while sustainability-oriented investments generate measurable capabilities that facilitate access to finance and strategic collaborations. The study contributes to the literature on sustainable entrepreneurship and entrepreneurial finance by explaining how hybrid funding strategies support innovation in FoodTech ventures. Finally, it offers managerial implications for resource orchestration and network building, as well as policy implications regarding the role of public support in fostering sustainable entrepreneurship.

Keywords: Integrated finance; Sustainable entrepreneurship; FoodTech; Case study; Innovation ecosystem; Regional development; Startup.

Sommario

Il presente studio indaga l'interazione tra innovazione radicale e finanza sostenibile nel settore FoodTech, un contesto caratterizzato non solo da un'elevata intensità di capitale e da ritorni differiti nel tempo, ma anche da sfide legate all'accettazione da parte dei consumatori, ai requisiti normativi e alla scalabilità. Attraverso uno studio di caso qualitativo longitudinale di Futura S.r.l., startup innovativa localizzata nel Sud Italia, la ricerca analizza il modo in cui le imprese sostenibili affrontano i vincoli finanziari all'interno di un ecosistema imprenditoriale periferico.

Basandosi sulla triangolazione di fonti documentali e operative, lo studio ricostruisce l'evoluzione dell'impresa nel tempo. I risultati evidenziano che la crescita della startup è stata resa possibile da un'architettura finanziaria ibrida che combina contributi pubblici, debito bancario, capitale di rischio privato e partnership ecosistemiche. Inoltre, l'analisi mostra come la sostenibilità favorisca la scalabilità attraverso meccanismi sia di segnalazione sia sostanziali. In particolare, metriche ESG trasparenti rafforzano la legittimità dell'impresa e riducono le asimmetrie informative, mentre gli investimenti orientati alla sostenibilità generano capacità misurabili che facilitano l'accesso ai finanziamenti e alle collaborazioni strategiche. Lo studio contribuisce alla letteratura sull'imprenditorialità sostenibile e sulla finanza imprenditoriale, spiegando come strategie di finanziamento ibride possano sostenere l'innovazione nelle imprese FoodTech.

Infine, il lavoro offre implicazioni manageriali per l'orchestrazione delle risorse e la costruzione di reti relazionali, nonché implicazioni di policy riguardanti il ruolo del sostegno pubblico nella promozione dell'imprenditorialità sostenibile.

Parole chiave: Finanza integrata; imprenditorialità sostenibile; FoodTech; studio di caso; ecosistema dell'innovazione; sviluppo regionale; startup.

1. Introduction

In recent years, the evolution of global markets has imposed a paradigm shift, moving attention away from the mere maximization of profit toward the generation of integrated value, capable of combining economic, environmental, and social objectives. This transition has been accompanied by evolving social expectations regarding the responsibilities of firms toward society and the environment, redefining what stakeholders perceive as appropriate and legitimate entrepreneurial behaviour (Horne & Mollborn, 2020).

Within this scenario, the FoodTech sector has emerged as one of the most advanced laboratories for experimenting with sustainable business models. The sector is not limited to the automation of production processes, but addresses crucial challenges related to the resilience of food systems, public health, and the reduction of environmental externalities (York & Venkataraman, 2010). Startups operating in this field are required to respond to a market demand increasingly oriented toward food inclusivity and radical traceability. The production of functional foods, such as gluten-free or lactose-free products, combined with the optimization of natural resources, transforms food technology into a driver of social well-being and environmental sustainability (Shepherd & Patzelt, 2011).

However, the high capital intensity required for research and development and for the industrialization of such solutions places FoodTech startups, defined as ventures that leverage technological innovation to improve food production, processing, distribution, and consumption, before a paradox: the need for substantial initial investments in the presence of returns deferred over time (Hockerts & Wüstenhagen, 2010).

FoodTech startups face distinctive commercialization and scaling challenges. The success of food innovations depends on consumer acceptance, while stringent food-safety regulations can increase time-to-market and uncertainty (Mosikyan *et al.*, 2024; Laureati *et al.*, 2024; Stephens *et al.*, 2018). Moreover, scaling often requires substantial investments in specialized production facilities and supply-chain integration (Tziva *et al.*, 2020; Stephens *et al.*, 2018), resulting in significant financing needs and complex growth trajectories.

These characteristics make access to finance a critical challenge for FoodTech startups, often requiring entrepreneurs to combine multiple funding sources, including public support, private investors, and sustainable finance instruments. In this context, financing decisions become closely linked to sustainability. On the one hand, credible ESG metrics, scientific validation, and transparent reporting reduce information asymmetries and

strengthen legitimacy among investors (Delmas & Burbano, 2011; Yang *et al.*, 2024). On the other hand, sustainability-oriented investments can generate measurable outcomes that influence valuation and financing decisions (Mansouri & Momtaz, 2022). Sustainability therefore acts not only as a signal of venture quality but also as a strategic asset that facilitates access to capital and supports scalability (Lüdeke-Freund, 2020).

However, despite growing attention to sustainable entrepreneurship and sustainable finance, limited research has examined how evolving social expectations surrounding sustainability become translated into legitimacy mechanisms that shape startups' access to heterogeneous sources of finance. This gap appears particularly relevant in FoodTech contexts, where high capital intensity, regulatory complexity, and societal demands for transparency and inclusiveness intersect. Existing studies have predominantly examined these dimensions in isolation, focusing either on sustainable entrepreneurship, legitimacy processes, or entrepreneurial finance. Less attention has been devoted to understanding how these elements interact over time and how legitimacy-building practices enable sustainable ventures to orchestrate hybrid financing trajectories. Addressing this gap, we propose that sustainability-related expectations do not merely constrain entrepreneurial action but can be strategically translated into signals that facilitate the mobilization of heterogeneous financial resources.

The analysis of the evolutionary dynamics of Futura S.r.l. aims to investigate how sustainability-related expectations are transformed into legitimacy-enhancing practices that facilitate access to hybrid financial architectures. More specifically, the study develops a process-based explanation of how sustainable ventures mobilize heterogeneous sources of capital by converting sustainability commitments into credible signals recognized by investors, intermediaries, and other ecosystem actors. In doing so, the study contributes to the literature on sustainable entrepreneurship by connecting insights from institutional theory and the emerging literature on social norms, showing how legitimacy functions as a dynamic mechanism linking sustainability and resource mobilization.

From this perspective, the use of a qualitative approach based on a case study appears to be the most suitable choice for capturing the complexity of phenomena that are intrinsically embedded within their context and characterized by non-linear process dynamics (Pillai *et al.*, 2024). While quantitative research often tends to prioritize measurement precision, the case study allows for the reconstruction of the decision-making processes and relationships that define value creation (Bergh *et al.*, 2017), exploring how evolving social expectations become translated into institutional legitimacy mechanisms that shape entrepreneurial access to heterogeneous sources of

finance (Suchman, 1995; DiMaggio and Powell, 1983; Horne and Mollborn, 2020).

Within this framework, the role of human capital emerges strongly as a fundamental pillar for activating such pathways. The success of a high-impact entrepreneurial initiative, in fact, does not depend exclusively on the effectiveness of financial models or the solidity of the technological infrastructure, but finds its genesis in the complementarity of aptitudes and in the strategic vision of its founders, characterized by a strong operational background.

In the case of Futura S.r.l., the complementarity between the founders' profiles contributed significantly to the venture's development. Fabio Biondi brought extensive expertise in the food sector and product innovation, while Giuseppe Russo contributed to managerial, financial, and institutional competences. Their combined capabilities facilitated the alignment of technological innovation, strategic governance, and access to external resources.

The remainder of the article is structured as follows. Section 2 presents the conceptual background, Section 3 describes the case study methodology, Section 4 reports the findings, and the final sections discuss the results and present the conclusions.

2. Conceptual background

2.1 Sustainable entrepreneurship, legitimacy, and value creation

Sustainable entrepreneurship has progressively consolidated itself as an interpretative paradigm capable of describing forms of entrepreneurial action oriented not only toward the creation of economic value, but toward the integrated generation of environmental and social benefits.

From this perspective, the firm is no longer interpreted exclusively as a productive unit aimed at profit maximization, but as a strategic actor capable of actively contributing to the ecological transition and to the resilience of socio-economic systems through radical innovation in products, processes, and business models (Elkington, 1997; Porter & Kramer, 2011).

A central theoretical reference in this field is provided by the definition proposed by Shepherd and Patzelt (2011), according to whom sustainable entrepreneurship consists in the discovery and exploitation of opportunities aimed at developing future products and processes capable of generating “broadly construed gains”, while preserving nature and supporting local communities. This perspective is particularly relevant precisely because it

integrates sustainability into the core logic of entrepreneurial opportunity, avoiding its relegation to a merely ethical, philanthropic, or reputational dimension.

Within this framework, several contributions have highlighted how environmental and social criticalities do not merely represent constraints, but genuine sources of opportunity. Dean and McMullen (2007) and Cohen and Winn (2007), for example, underline how market inefficiencies related to environmental degradation generate spaces for the emergence of new models capable of internalizing negative externalities. Consequently, sustainability is transformed into a competitive driver that enables the creation of new markets and unprecedented industrial configurations (York & Venkataraman, 2010).

More recent literature has further clarified that sustainable entrepreneurship manifests itself through business models that incorporate impact directly into the value proposition and organizational processes (Lüdeke-Freund, 2020). This approach shifts attention away from a simple value-oriented perspective toward the firm's ability to industrialize and scale a responsible value proposition (Schaltegger, Hansen & Lüdeke-Freund, 2016).

Recent contributions have further emphasized that sustainable entrepreneurship should be understood as a process embedded within broader socio-technical systems, in which value creation depends on the alignment between organizational capabilities, stakeholder expectations, and enabling institutional conditions (Muñoz & Cohen, 2018). This perspective highlights that the scalability of sustainable business models is contingent not only upon entrepreneurial agency but also upon the broader environments in which ventures operate.

A crucial theoretical issue related to sustainable entrepreneurship concerns the fact that it develops within systems of socially shared expectations that define what behaviours are considered appropriate and desirable. Horne and Mollborn (2020) define social norms as collectively recognized expectations that guide behaviour through social approval and disapproval mechanisms. In the context of entrepreneurship, these norms influence how stakeholders evaluate the legitimacy of ventures and their claims regarding sustainability. While social norms refer to informal expectations and shared understandings, institutions encompass broader systems of formal and informal rules that structure organizational action (DiMaggio & Powell, 1983). Social norms may therefore be understood as one of the mechanisms through which institutional pressures emerge and shape organizational behaviour. Firms tend to adapt to these pressures in order to obtain legitimacy and, consequently, access to critical resources (Suchman, 1995). Such legit-

imacy is not static but continuously negotiated through interactions with multiple audiences, whose evaluations evolve over time as societal expectations change (Bitektine, 2011). Consequently, ventures must constantly demonstrate congruence between their sustainability claims and observable organizational practices. Sustainability may therefore be interpreted as a process of progressive institutionalization that redefines the criteria of economic acceptability for entrepreneurial action. This process is consistent with evidence showing that deviations from socially accepted expectations may trigger sanctions, while conformity enhances organizational acceptance and access to opportunities (Ody-Brasier & Vermeulen, 2020).

In this regard, Muñoz and Cohen (2018) emphasize how increasing accountability represents a strategic response to the evolution of the regulatory framework. Within the European context, for example, these dynamics have been accelerated by stringent regulatory frameworks linked to the green transition and ESG disclosure, as demonstrated by the Corporate Sustainability Reporting Directive (European Parliament and Council, 2022). In this scenario, sustainability can no longer be treated as a purely narrative or accessory dimension: Binder and Belz (2015) observe that a firm's credibility depends on its ability to make impact measurable and verifiable. As sustainability claims increasingly become subject to scrutiny, measurable indicators and transparent reporting systems reduce informational ambiguity and support legitimacy judgments by external audiences (Delmas and Burbano, 2011). This represents a fundamental transition. In order for sustainability to become a financial lever, it must be translated into metrics and standards capable of reducing informational ambiguity toward external actors. Moreover, this necessity has now been intensified by the risk of greenwashing, to the extent that the market has been driven toward a strengthening of certification and transparency systems (Delmas & Burbano, 2011), thereby attributing to sustainability a distinctly informational and governance-oriented dimension.

2.2 Sustainable finance and access to capital: sustainability as a selection criterion

Access to capital has historically represented one of the most critical issues for the survival and growth of sustainable startups. The literature highlights how these firms must face structurally more severe financial constraints than conventional business models, due to the need for substantial initial investments in Research and Development, the complexity of regulatory compliance, and the creation of physical production infrastructures that

generate returns deferred over time (Hall & Wagner, 2012; Hockerts & Wüstenhagen, 2010). This scenario creates a genuine funding gap, because it forces entrepreneurs to translate sustainability into observable and measurable signals capable of generating trust within a market often characterized by informational asymmetries (Schaltegger & Wagner, 2011).

Entrepreneurial finance literature has long highlighted the coexistence of bank debt and venture capital as alternative yet complementary sources of funding. Venture capital is generally associated with ventures characterized by high growth potential, severe information asymmetries, and intangible assets, whereas bank debt tends to be more suitable when firms can rely on collateral and more predictable cash flows (de Bettignies & Brandner, 2007). Despite the prominence of venture-backed success stories, bank financing remains the predominant source of external funding for new firms (Robb & Robinson, 2014).

Despite these challenges, recent regulatory and market developments have progressively reshaped the relationship between sustainability and access to finance. The introduction of the EU Taxonomy Regulation (2020) and the Sustainable Finance Disclosure Regulation (SFDR) has begun to codify objective criteria for the identification of “green” activities, directly influencing the risk assessment models of credit institutions and investment funds. Recent studies indeed suggest that the integration of ESG (Environmental, Social, and Governance) parameters is transforming sustainability from a reputational asset into an essential criterion of economic selection (Derdabi & Dvouletý, 2025).

At the same time, entrepreneurial finance literature suggests that investors do not follow a uniform selection logic. Traditional studies portray venture capital as relying on staged financing and intensive monitoring mechanisms designed to mitigate agency problems and information asymmetries (Gompers, 2022). However, more recent evidence indicates that reductions in experimentation costs have encouraged some venture capitalists to adopt “spray-and-pray” strategies, characterized by smaller investments across a larger portfolio of ventures (Ewens *et al.*, 2018).

For sustainable startups, these heterogeneous investment approaches imply that access to capital depends not only on growth potential but also on the ability to reduce uncertainty through credible sustainability signals. Recent studies further suggest that sustainability-related information increasingly enters investors’ screening processes by complementing traditional financial indicators rather than replacing them. ESG-related disclosures may therefore contribute to reducing perceived risk and improving investment attractiveness, particularly in contexts characterized by uncertainty and intangible assets (Mansouri & Momtaz, 2022; Yang *et al.*, 2024).

Transparent reporting practices, measurable impact indicators, and verifiable certifications may help entrepreneurs mitigate informational asymmetries and strengthen their legitimacy in the eyes of different categories of investors (Delmas & Burbano, 2011).

2.3 Integrated finance and hybrid funding models: a strategic trajectory

The financing of sustainable innovation rarely follows linear or monochromatic trajectories. Rather, it takes the form of a complex, hybrid, and sequential architecture, and this dynamic finds its theoretical foundation in the concept of blended finance, which involves the strategic use of public resources to mobilize additional private capital toward sustainable development objectives (OECD, 2018). Within this framework, the role of the State and development agencies changes radically: they no longer act merely to provide subsidies, but assume an enabling role by intervening during the highest-risk phases and facilitating the derisking of operations (Mazucato, 2013).

Blended and hybrid financing arrangements have increasingly been interpreted as governance mechanisms through which heterogeneous actors coordinate distinct objectives and risk preferences around common sustainability goals (Geddes *et al.*, 2018). Rather than representing exceptional funding configurations, these arrangements are becoming characteristic of innovation processes involving high uncertainty and significant societal impact.

Looking at the structure of an integrated finance pathway, it is possible to observe how the entire system rests upon three fundamental pillars, necessary to ensure long-term solidity.

First, there is institutional derisking, where instruments such as public guarantees and non-repayable grants function as a “shield” protecting the entry of private investments and commercial banks. Second, there is the sequentiality of funding sources, which triggers signaling mechanisms: each financing round obtained – whether a European grant or a business angel investment – acts as a certificate of quality that reduces perceived risk for the subsequent stage (Spence, 1973; Connelly *et al.*, 2011). Finally, there is the strategic allocation toward intangible assets, which distinguishes sustainable startups from purely digital (asset-light) firms.

The need to invest in laboratories, validation tests, and intellectual property protection shifts the focus of finance toward the construction of enduring and difficult-to-imitate competitive advantages (Barney, 1991).

Building on these theoretical insights, this study adopts the term integrated finance as an interpretative construct to describe the coordinated and sequential orchestration of heterogeneous funding sources throughout a venture's development trajectory. In this sense, integrated finance does not refer to the technological integration of financial services, as commonly understood in fintech contexts, but to the way different financial instruments perform complementary functions across successive stages of venture development. Public support mechanisms, debt instruments, and equity investments are therefore viewed as components of a broader financing architecture whose effectiveness depends on their alignment with evolving organizational needs and strategic objectives.

Viewed from this perspective, hybrid financing arrangements can be interpreted not only as mechanisms for resource acquisition but also as cumulative processes of legitimacy building. Each funding milestone functions as a signal that reduces uncertainty and influences subsequent evaluations by external audiences (Connelly *et al.*, 2011). In line with evidence showing that social influence and prior affiliations shape the recognition of entrepreneurial quality and opportunity (Azoulay *et al.*, 2017), the ability to attract heterogeneous funding sources may reinforce a venture's perceived credibility and facilitate access to additional resources. Integrated finance thus becomes a cumulative process of legitimization: the capital raised is not used solely to cover burn rate but is transformed into reputational capital and technological assets that reinforce and protect the firm's market positioning.

2.4 Entrepreneurial Ecosystems and Innovation Intermediaries as Enabling Infrastructures

If sustainability acts as a driver of innovation, the firm's ability to consolidate itself depends closely on ecosystemic conditions. Entrepreneurship does not develop in isolation, but within networks composed of interdependent actors such as universities, investors, institutions, and incubators (Isenberg, 2010; Stam, 2015). The ecosystem therefore represents an enabling infrastructure capable of reducing transaction costs and accelerating organizational learning.

For sustainable startups, which simultaneously face technological and regulatory complexities, access to scientific knowledge and legitimization networks directly conditions the possibility of transforming an intuition into an industrializable model (Schlange, 2009). Furthermore, the definition of innovation ecosystem proposed by Granstrand and Holgersson (2020)

emphasizes the evolutionary nature of these processes, where technological complementarity often requires collaborations that extend beyond the boundaries of the single firm (Adner, 2017). However, the effectiveness of these collaborations depends not only on formal governance arrangements but also on shared norms regulating what actors perceive as appropriate uses of transferred knowledge. As shown by Di Stefano *et al.* (2014), informal expectations can shape knowledge exchange by defining acceptable behaviours and fostering trust among ecosystem participants.

Digitalization has further strengthened these dynamics: Elia *et al.* (2020) highlight that, within digital entrepreneurial ecosystems, technology functions as an infrastructure capable of reshaping interactions. In the field of sustainability, moreover, the use of digital tools for traceability and data collection makes impact measurement more credible, reducing informational asymmetries toward consumers and investors (Delmas & Burbano, 2011).

Ultimately, ecosystems should be viewed not merely as contextual settings but as relational infrastructures that simultaneously support organizational learning, legitimacy building, and resource mobilization.

In this collaborative context, innovation intermediaries may be defined as organizers or actors that facilitate the innovation process by connecting different subjects, supporting knowledge exchange, and providing services that sustain innovative activities (Howells, 2006).

Within the context of entrepreneurship, these entities — including incubators, accelerators, and innovation hubs — assume a crucial role in fostering the transition from the laboratory phase to the market phase; consolidated literature has extensively documented the importance of the mentoring services and logistical support they are able to provide (Bruneel *et al.*, 2012). More recent studies have highlighted how incubators increasingly perform boundary-spanning functions, connecting ventures with investors, regulators, industrial partners, and knowledge providers while facilitating access to complementary resources required for scaling (Pauwels *et al.*, 2016; Autio *et al.*, 2018). However, in the context of high-impact entrepreneurship, their function has progressively evolved toward a form of financial orchestration.

The modern incubator therefore operates within a genuine capital architecture dimension, connecting startups that are often technically brilliant but financially fragile with the complexity of subsidized finance instruments and equity markets. According to the entrepreneurial ecosystem perspective, incubators reduce territorial fragmentation and guide firms through the dense framework of ESG compliance, helping them structure impact reporting systems that are attractive to institutional investors (Autio *et al.*, 2018).

By acting as informal certifiers and quality gatekeepers, incubators contribute to the social validation of entrepreneurial projects, signaling that ventures have undergone rigorous processes of selection and evaluation. This function is particularly important in contexts characterized by uncertainty, where conformity to accepted standards and expectations facilitates organizational acceptance and resource mobilization (Ody-Brasier & Vermeulen, 2020). By reducing uncertainty for external stakeholders, incubators facilitate interactions between startups and heterogeneous providers of capital and strengthen the legitimacy of entrepreneurial initiatives within the broader ecosystem.

Ultimately, intermediation transforms the ecosystem from a passive network of relationships into an active financing infrastructure, ensuring that sustainable startups possess the resources necessary to face the challenge of international scalability without losing their territorial roots.

2.5 FoodTech as a Context for Sustainable Entrepreneurship

As agri-food systems face growing pressures to feed a rising global population while reducing environmental impacts and adapting to climate challenges, FoodTech is gaining prominence as a key driver of innovation. FoodTech refers to innovative ventures and ecosystems that develop technological solutions across the food value chain, from production and processing to distribution, retail, and waste management. As a multidisciplinary field, it combines expertise from areas such as biotechnology, engineering, food science, and digital technologies to address challenges related to sustainability, efficiency, food security, and supply-chain management (OECD, 2026). As an empirical setting, FoodTech provides a particularly suitable context for examining the interplay between sustainability, legitimacy, and hybrid financing because it combines high technological uncertainty, strong regulatory pressures, significant capital intensity, and growing societal demands for transparency and inclusiveness (Stephens *et al.*, 2018; Tziva *et al.*, 2020).

The startups in this sector are faced with a paradox: the need for substantial initial investments in the presence of returns deferred over time (Hockerts & Wüstenhagen, 2010).

FoodTech startups face different challenges related to the commercialization of food innovations, which depends strongly on consumer acceptance (Mosikyan *et al.*, 2024; Laureati *et al.*, 2024). Moreover, many FoodTech innovations are subject to stringent food-safety standards and regulatory approval procedures, which can extend time-to-market and in-

crease uncertainty surrounding commercialization (Stephens *et al.*, 2018). Then, scaling FoodTech innovations often requires substantial investments in specialized production facilities, manufacturing capabilities, and supply-chain integration, creating challenges that go beyond those typically faced by digital ventures (Tziva *et al.*, 2020; Stephens *et al.*, 2018). These characteristics contribute to a distinctive entrepreneurial context in which financing requirements, growth trajectories, and commercialization risks may differ from those observed in other technology-intensive sectors.

This means that access to finance is a critical challenge for FoodTech startups, which often exceed the capacity of traditional financing channels. Consequently, entrepreneurial growth increasingly depends on the ability to combine multiple funding sources, including public support schemes, impact-oriented investors, venture capital, corporate partnerships, and other forms of sustainable finance. Sustainable finance is therefore not merely a source of capital but a mechanism through which startups can align economic viability with environmental and social objectives while reducing financing constraints and supporting scalability. Understanding how entrepreneurs combine these financial instruments becomes relevant in ecosystems, where access to large speculative investors may be limited and financial sustainability depends on a more diversified funding architecture.

It is precisely here that the link with sustainable finance becomes inseparable. To be financeable, FoodTech startups must translate their technological innovation into objective impact metrics and defensible assets. Sustainability operates through two complementary mechanisms. First, it acts as a signaling device that reduces information asymmetries between entrepreneurs and investors. Through credible impact metrics, scientific validation, and transparent reporting, startups can demonstrate the quality and legitimacy of their business models, thereby mitigating concerns about greenwashing and technological failure (Delmas & Burbano, 2011; Yang *et al.*, 2024). Second, sustainability contributes to scalability through the actual implementation of sustainable investments. When sustainability is embedded in production processes, resource efficiency, traceability systems, and supply-chain management, it generates measurable ESG outcomes that can be incorporated into investors' valuation and financing decisions (Mansouri & Momtaz, 2022). Sustainability therefore acts not only as a reputational signal but also as a strategic asset that facilitates access to capital and supports the creation of new markets, where scientific validation and supply-chain transparency become critical requirements for investors and industrial partners (Lüdeke-Freund, 2020).

3. Method

The present work adopts the single case study method with an exploratory and theory-oriented purpose, an approach that proves particularly effective when the objective is to analyze contemporary phenomena within their real-life context, where the boundaries between phenomenon and context are not clearly defined (Yin, 2014). The choice of this methodology responds to the need to capture the complexity of the interactions between technological innovation, institutional legitimization, and financial architectures, variables that could hardly be isolated through standardized quantitative methods (Johnson *et al.*, 2006). Consistent with process-oriented case study research, the aim of the study is not to establish causality in a statistical sense, but to reconstruct the sequence of decisions, interactions, and organizational responses through which hybrid financing arrangements emerge within a specific context. The analytical objective is therefore explanatory and theory-building, seeking analytical rather than statistical generalization (Yin, 2014; Hoon, 2013).

Following the indications of Eisenhardt and Graebner (2007), the case of Futura S.r.l. was selected because of its emblematic nature; it allows the observation of the operationalization of an “integrated finance” model within a research-intensive sector such as FoodTech. The analysis focuses on how these dynamics translate into operational realities within the context of Southern Italy, historically characterized by informational asymmetries and capital gaps, with the aim of understanding the mechanisms through which sustainable ventures mobilize heterogeneous financial resources and transform environmental and territorial constraints into patentable competitive advantages.

The rigor of the research is ensured through the use of multiple sources of evidence, including documentary data, Chamber of Commerce records, chronologies of public funding, and ESG certification protocols, thereby ensuring the data triangulation necessary for internal validity (Patton & Appelbaum, 2003). The triangulation of multiple data sources also allowed the reconstruction of convergent evidence regarding the timing, purpose, and conditions associated with different financing decisions, thereby enhancing the credibility and robustness of the explanatory account (Yin, 2014).

The analysis adopts a longitudinal perspective to reconstruct the venture’s financing trajectory over time and identify the mechanisms through which successive funding events contributed to reducing uncertainty and enabling subsequent resource mobilization. Particular attention was devoted to the sequencing of financing decisions and to the interactions among

public support schemes, debt instruments, and private investment, in order to understand how legitimacy accumulated throughout the venture's development process. More specifically, the study examines the financing timeline to explore how national and regional support measures, guaranteed bank debt, and private investment combined over time into a hybrid funding configuration. Rather than conceptualizing integrated finance as a moderating variable, the analysis interprets it as a dynamic and sequential architecture through which different sources of capital become progressively aligned with the venture's evolving needs and legitimacy requirements. Such a systematic approach is consistent with the need to strengthen the link between qualitative methods and managerial theorization, offering an analysis that is rich, context-sensitive, and capable of capturing the complexity of a strategic orchestration aimed at sustainable scalability (Cornelissen, 2017; Wickert *et al.*, 2021).

4. Empirical evidence: The case of startup Futura S.r.l. as a pathway of “Integrated Finance”

Like a closed-box mechanism, in which outside observers see only the external casing while remaining unaware of the complex internal gears, the Southern Italian financial ecosystem is often labeled according to its structural limitations, determined by dependence on bank credit and the chronic gap in venture capital funds. Yet empirical evidence suggests the emergence of a silent and extremely effective “hybrid model.” Precisely because of the limited presence of large speculative funds, entrepreneurs in Southern Italy cannot afford to rely on a single instrument. On the contrary, in order to ensure survival and scalability, they must implement a complex and carefully calculated process of financial engineering.

The case of Futura S.r.l. is therefore emblematic. It is the chronicle of how, within a compressed timeframe, the entire spectrum of funding sources is combined: equity capital (bootstrapping), triggering measures (Smart Money), national subsidized finance (Invitalia) and regional subsidized finance (Campania Startup 2023), guaranteed bank credit, and a targeted injection of equity from private investments.

4.1 Profile and Value Proposition: Innovation within tradition, the patent asset, and the ESG dimensions

Futura S.r.l. operates through the brands “Pizza Giusta” and “4 Morsi”, and represents a disruptive FoodTech case deeply rooted in Southern Italy, specifically in the Caserta area. Its value proposition moves across particularly challenging terrain: producing and commercializing a highly inclusive frozen pizza – gluten-free, lactose-free, and available in vegan variants – without sacrificing the taste of tradition.

The triggering technological element lies in the use of a sulfur-water-based dough with high hydration levels, as it guarantees greater digestibility, a higher calcium intake, and perfect visual mimicry with wood-fired Neapolitan pizza.

The intuition was subsequently validated and legally protected. Through the funds obtained from the Voucher 3i program, the company initiated the process of protecting its know-how, and although it filed two applications, the true strategic asset that the company ultimately secured and safeguarded was the patent for the sulfur-based dough (Patent No. 102021000025886).

From an ESG perspective, moreover, the company does not merely rely on declarations of intent, but operates according to rigorous protocols. Its social impact has been validated through the acquisition of the “Spiga Barata” mark from the Italian Celiac Association (AIC), the highest guarantee standard for celiac consumers. In addition, the company employs short supply-chain raw materials and is equipped with an advanced supply-chain tracking system accessible to the final consumer through a QR code placed on the eco-sustainable packaging.

4.2 The financing timeline: the architecture of capital accumulation

The capitalization pathway of Futura S.r.l. is not a random sequence of public calls, but rather a form of hybrid funding architecture structured with chronological precision. The construction of this financial architecture followed a logic of progressive risk reduction and accumulation of reputational capital, where each individual funding source was activated according to a specific stage of project maturity. In order to understand the effectiveness of this orchestration, the startup’s financing trajectory may be broken down into the following sequential and interdependent phases:

1. *Triggering Phase – Bootstrapping and Smart Money.* The mechanism begins with an initial share capital of €10,000 (€2,500 paid in) and interest-free loans from the founders. The first public leverage instruments

then act as accelerators: Invitalia's Smart Money measure for the purchase of specialized services and the Voucher 3i program to support patenting expenses for the dough. Subsequently, the Digital Vouchers 4.0 2023 from the Chamber of Commerce of Caserta financed the first instrumental assets;

2. *Scale-Up Phase – National Subsidized Finance*. The paradigm shift occurs through Invitalia's ON – Oltre Nuove Imprese a Tasso Zero measure. Against an industrialization plan worth €1,399,700, Invitalia injected €1,209,840 into the system, of which €1,008,200 consisted of a zero-interest loan and €201,640 of non-repayable grants;
3. *Strategic Debt – Banking Finance*. To cover the private risk share required by Invitalia, in May 2024 the startup finalized an unsecured loan worth €500,000 with UniCredit;
4. *Opening the Safe – External Investments (Equity)*. With the debt structure consolidated, in July 2024 the company approved a capital increase. At this stage, the role of the incubator (012factory S.p.A. Società Benefit) proved crucial: by organizing targeted meetings and leveraging the fiscal incentives and tax deductions available for investments in innovative startups, the company attracted MV2 (MVQuadro S.r.l.). The partner entity therefore contributed liquidity (up to €360,000 for a 15% shareholding) as well as fundamental engineering know-how;
5. *The Research Push – Regional Finance*. In perfect synergy, the startup intercepted the resources of the Campania Startup 2023 call. This non-repayable grant (covering 70% of expenses) was not used for working capital, but for a precise structural objective: the creation of an internal Research and Development laboratory.

Within this architecture, public finance effectively acted as a derisking instrument. The €500,000 loan with UniCredit existed only thanks to the shield provided by the Central Guarantee Fund (MCC), which covered 80% of the amount and unlocked a credit channel that would otherwise have remained sealed in Southern Italy. This cumulative process contributed to the development of organizational legitimacy, which, in turn, facilitated access to increasingly diverse forms of capital.

At the same time, the solid patent base, combined with a validation pathway that includes the already obtained UNI/PdR 125 Gender Equality Certification, as well as the ISO 14001 and ISO 9001 certifications currently under implementation, sent unequivocal signals of reliability to the market, reducing informational asymmetries even before the entry of the private investor.

From an ecosystem perspective, 012factory S.p.A. Società Benefit was not merely a service provider, but the true architect of the operation's financial structure.

From the early phases facilitated by Smart Money, the incubator guided the startup through the management of the so-called “double funding prohibition,” ensuring that the regional funds allocated to the R&D laboratory did not overlap with Invitalia’s national resources. Yet the key move occurred on the private side, as the incubator accompanied the firm through a genuine roadshow, managing negotiations with several industrial entities. By placing the solidity of the project and the leverage of tax incentives for investors on the table, it created the ideal conditions for MVQuadro’s equity entry.

Finally, the ability to attract financial resources became intertwined with ESG-oriented value creation. The true “currency” of Futura S.r.l. was, in fact, the translation of its business model into rigorous ESG metrics:

- Environmental Dimension (E) – Procurement privileges local suppliers such as Olio EVO Mastroberardino and Bioagricert tomatoes. The company is currently implementing ISO 14001 and ISO 9001 certifications in order to reinforce its production processes and reduce the environmental impact of the new plant.
- Social Dimension (S) – The product addresses food vulnerabilities, guaranteed not only through the analyses conducted by the Spanish partner Neatique, but also through the stringent “Spiga Barrata” certification of the AIC. Internally, solidity is certified through the achievement of the UNI/PdR 125 Gender Equality Certification.
- Governance Dimension (G) – The advanced Supply Chain tracking system, accessible through QR codes, eliminates informational opacity between production and final consumers.

Taken together, these dimensions show how the adoption of ESG metrics does not represent an accessory element, but rather a strategic lever capable of strengthening the firm’s credibility and facilitating its access to financial resources. In the Futura case, ESG-related practices were embedded within the financing trajectory itself. Certifications, traceability systems, and formalized governance mechanisms contributed to making the venture’s value proposition observable and verifiable, thereby supporting interactions with heterogeneous providers of capital operating under different risk assessments and decision criteria.

Against this backdrop, the empirical evidence suggests that integrated finance is not simply characterized by the coexistence of multiple funding sources, but by the capacity to align them with the evolving needs and developmental stages of the venture. Public support did not substitute for private investment, nor did private capital merely complement subsidized finance. Instead, each instrument fulfilled a distinct function within a broader financing architecture: grants enabled experimentation and the protection of

knowledge assets, bank debt supported industrialization requirements, while equity investors contributed both financial resources and strategic competences. The effectiveness of the overall trajectory therefore stemmed from the complementarities among these instruments and from their alignment with the firm's evolving resource needs, organizational capabilities, and growth objectives.

4.3 Ecosystem Collaborations and Territorial Impact

The resilience of the “Futura model” lies in the fluidity of its alliances. Initially, scientific validation relied upon the Department of Agriculture of the University Federico II of Naples: a crucial triggering phase for studying dough chemistry.

However, when the project expanded and required a broader international perspective, the startup implemented a strategic switch. For continuous laboratory analyses and for managing a complex internationalization process, the company relied on Neatique, a highly specialized entity based in Barcelona, Spain. This transition marked the evolution from a local hub toward a borderless European expansion logic, where Neatique became the guarantor of both microbiological safety and entry into new markets. On the social front, entry into the AIC Campania network and the acquisition of the “Spiga Barrata” certification further reinforced the ethical commitment toward vulnerable consumer groups.

Within this collaborative context, the Campania Startup 2023 call forced Futura S.r.l. to move beyond a closed operational logic. The most tangible impact of this liquidity injection was the establishment of an internal R&D laboratory, a move that shifted the company's center of gravity from the “assembly of recipes” to the “production of food technology.” At the same time, the synergy with the incubator's technological branch (012Tech) made it possible to develop an advanced short supply-chain tracking software, a “human-centered” system that rendered transparent the path of raw materials from the field to the freezing process.

Moreover, the Futura case dismantles the prejudice of “adaptive behavior,” namely the tendency of certain Southern Italian firms to intercept funds solely for survival purposes. Here, liquidity was not consumed as working capital. The Voucher 3i funds were used surgically to secure the sulfur-based dough patent (No. 102021000025886). This asset was capitalized on the balance sheet under “Intangible Fixed Assets,” transforming public money into competitive advantage and demonstrating genuine value creation.

In particular, Futura's procurement relationships with Mulino Caputo, Mastrobardino, and Sorgenti di Telese constitute a territorial development strategy. The attracted funds were transformed into contracts for the local ecosystem, ranging from MVQuadro's engineering services to 012Tech's IT support and Mar Costruzioni's construction activities. In this sense, the firm does not merely operate within the territory, but actively contributes to its economic structuring, functioning as a catalyst of relationships and value flows. Moreover, this impact is also coherent with the ESG dimension, insofar as the valorization of local suppliers, supply-chain traceability, and attention to certified standards simultaneously contribute to environmental sustainability, social value creation, and strengthened transparency within governance processes.

The case also suggests that the impact generated by integrated finance extends beyond the focal venture and contributes to the reconfiguration of the surrounding entrepreneurial ecosystem. Financial resources were not directed exclusively toward firm-level growth objectives, but were transformed into investments in local supply chains, specialized services, technological capabilities, and collaborative relationships. In this sense, the value generated through hybrid financial architectures appears to be distributed across a broader network of actors, reinforcing the ecosystem's absorptive capacity and future innovation potential (Autio *et al.*, 2018; Stam, 2015). At the same time, the findings indicate that embeddedness and openness should not be interpreted as alternative strategic orientations. Futura's development trajectory combined strong territorial anchoring with the selective activation of extra-local partnerships, allowing the venture to access complementary knowledge, specialized expertise, and international opportunities without weakening its local roots. The collaboration with Neatique exemplifies how sustainable ventures may achieve scalability by connecting local legitimacy and production capabilities with transnational networks of validation and market expansion.

Viewed through this lens, sustainable scalability appears to depend not solely on securing larger volumes of capital, but on the venture's ability to convert financial resources into relational, technological, and territorial assets capable of reinforcing both organizational competitiveness and ecosystem development.

5. Conclusion and Implications

The analysis of the Futura S.r.l. case contributes to ongoing debates in sustainable entrepreneurship by illustrating how access to hybrid financial

architectures is shaped not only by the availability of resources or the intrinsic quality of technological innovation, but also by ventures' ability to align with evolving societal expectations surrounding sustainability. Consistent with studies emphasizing the importance of legitimacy for entrepreneurial resource mobilization (Suchman, 1995; DiMaggio & Powell, 1983), the findings suggest that sustainability-related expectations become financially consequential when they are translated into organizational practices that external audiences can recognize and evaluate. Integrated finance therefore emerges as a process through which measurable sustainability commitments progressively support access to heterogeneous sources of capital.

The empirical evidence further supports prior research highlighting the strategic role of transparency and accountability in sustainable entrepreneurship (Binder & Belz, 2015; Muñoz & Cohen, 2018). In the Futura case, impact reporting, certifications, intellectual property protection, and collaborations with reputable intermediaries did not constitute peripheral activities aimed at reputation management. Instead, they functioned as mechanisms through which entrepreneurial claims were substantiated and uncertainty reduced. The ability to transform entrepreneurial vision into verifiable ESG practices and protected intangible assets, such as the sulfur-based dough patent, enabled stakeholders to assess venture quality through observable indicators of commitment, reliability, and growth potential.

At the same time, the findings extend existing literature by refining the relationship between social norms, legitimacy, and entrepreneurial finance. While previous studies have shown that social norms shape perceptions of appropriate organizational conduct (Horne & Mollborn, 2020; Ody-Brasier & Vermeulen, 2020), the present study suggests that their influence on financing outcomes is indirect. Social norms contribute to defining the evaluative criteria through which investors, intermediaries, and institutional actors interpret sustainability claims and allocate resources. Legitimacy thus appears less as a static organizational attribute and more as an evolving accomplishment that develops throughout the venture's growth trajectory.

From an entrepreneurial finance perspective, the findings also nuance existing understandings of hybrid funding arrangements. Rather than viewing integrated finance simply as the coexistence of multiple funding sources, the case illustrates how different instruments fulfil distinct functions at different stages of venture development. Grants supported experimentation and capability building, debt facilitated industrialization, whereas equity investors contributed both financial resources and complementary competences. The effectiveness of hybrid architectures therefore depended

not merely on diversification itself, but on the alignment between financing instruments, organizational maturity, and evolving resource requirements.

Collectively, these findings integrate insights from sustainable entrepreneurship, institutional legitimacy, and entrepreneurial finance into a process-oriented framework explaining how sustainable ventures mobilize resources under conditions of uncertainty. Although derived from a single case study, this interpretation offers a theoretically informed lens through which similar dynamics may be explored in other sectors and institutional contexts beyond FoodTech.

The findings also contribute to a broader understanding of the challenges faced by innovative startups. Prior studies have shown that entrepreneurial ventures often struggle not only with resource constraints but also with the development of managerial capabilities, the acquisition of strategic knowledge, and the ability to navigate increasingly complex support ecosystems (Passaro *et al.*, 2017; Passaro *et al.*, 2020). In this respect, the Futura case suggests that startup growth depends on more than the availability of financial resources. The presence of intermediaries capable of facilitating learning processes, connecting entrepreneurs with relevant stakeholders, and supporting the interpretation and combination of available opportunities may substantially influence the venture's capacity to scale. The ability to orchestrate relationships, acquire legitimacy, and progressively align financing choices with organizational development therefore emerges as a critical capability for innovative startups operating under conditions of uncertainty.

From the perspective of managerial implications, the study offers several operational indications for business decision-makers and actors within innovation ecosystems. First, there emerges a need for management to develop specific competencies in hybrid financial orchestration. Founders must not limit themselves to product management, but must be capable of navigating the sequentiality of funding sources, understanding how public capital may function as a catalyst for the derisking of private equity operations (Mazzucato, 2013). This suggests that founders should actively plan financing trajectories rather than individual fundraising rounds, combining grants, public incentives, incubator programs, impact investors, and private equity according to the firm's stage of development. In doing so, entrepreneurs should also view incubators, competitions, and support programmes not merely as sources of funding, but as learning environments through which strategic capabilities and relational resources can be developed (Passaro *et al.*, 2017; Passaro *et al.*, 2020).

Second, managerial practice must orient itself toward a “governance of transparency.” The implementation of traceability systems based on digital

technologies and the pursuit of high-profile certifications, such as gender equality or ISO environmental standards, become strategic levers for reducing the cost of capital. For the contemporary manager, this implies integrating ESG dimensions not as accessory communication elements, but as pillars of the value proposition capable of reinforcing competitive positioning and facilitating internationalization. Managers should therefore invest early in impact measurement systems, ESG reporting practices, traceability technologies, and certification processes that can provide verifiable information to investors and strategic partners. Finally, the role of external collaborations and incubator intermediation must be understood as a structural function for scalability; the manager must act as a network orchestrator, capable of connecting local scientific know-how with global distribution and analytical networks, thereby transforming the firm into a catalyst of both territorial and international value (Autio *et al.*, 2018).

From a policy perspective, the findings highlight the importance of public support in strengthening the FoodTech startup ecosystem. In particular, public funding schemes can play a catalytic role by reducing the financing constraints associated with high capital requirements, long commercialization horizons, and regulatory uncertainty. The case also suggests that policymakers should design support programs that not only provide financial resources but also encourage collaboration among startups, investors, research institutions, and industrial partners through networking activities and partnership-oriented call requirements. Furthermore, policy interventions can foster sustainable entrepreneurship by promoting the adoption of measurable sustainability practices and impact metrics, thereby facilitating access to sustainable finance and enhancing the scalability of innovative ventures.

From a methodological perspective, the study confirms that case-based research remains a fundamental tool for understanding emerging managerial phenomena that cannot be fully captured through standardized indicators (Reinecke *et al.*, 2016). The ability to reconstruct the processes of reputational and technological capital accumulation made it possible to identify a development model that integrates local roots with international ambitions. Despite the limitations intrinsically linked to the statistical generalizability of a single case, the work offers a basis for future research aimed at testing these dynamics through comparative or multi-actor designs (Hoon, 2013). While the empirical evidence is drawn from the specific context of Southern Italy, the mechanisms identified may be relevant for other entrepreneurial ecosystems characterized by limited access to venture capital, high innovation uncertainty, and strong reliance on public support and collaborative networks. Future research could test the transferability of these findings through comparative case studies or larger-scale quantitative analyses.

Thereby, future research may investigate whether the legitimacy-building trajectory identified in this study characterizes sustainable ventures operating in other sectors and institutional contexts, thereby assessing the transferability of the proposed interpretative framework through comparative and multi-case designs.

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