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Sustainability, Innovation and Inclusion in the Italian Startup Ecosystem: Survey-Based Evidence from Italy

by

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Abstract

This working paper investigates how Italian innovative startups integrate sustainability, innovation, and inclusion within their strategic and organizational frameworks. Drawing on a national survey of 1,000 firms registered under the Italian *Start-up Act*, the study examines the structural, behavioral, and perceptual dimensions of sustainability-oriented entrepreneurship. The empirical analysis combines descriptive, comparative, and multivariate methods—including hierarchical and K-means cluster analyses—to identify typologies of startups that reflect different configurations of technological intensity, environmental commitment, and inclusiveness.

The results show that Italian innovative startups are predominantly small, recently founded, and highly research-oriented, with a strong concentration in knowledge-intensive sectors. Sustainability- oriented startups—those identifying as "*green*" or "*partially green*"—represent almost half of the sample. They tend to be younger, employ a higher share of R&D personnel, and meet a greater number of legal requirements for innovative status. However, gender inclusiveness remains limited: female participation among founders and managers is low, and only a minority of startups implement formal inclusion policies.

Cluster analysis reveals two main archetypes: (1) *Technological Mainstream* startups—larger, R&D- intensive firms focused on technological performance—and (2) *Sustainable and Gender- Balanced* startups—smaller but more inclusive and institutionally embedded. Within the subset of sustainability-oriented firms, two additional groups emerge: *Tech-Green Operative Firms*, focused on eco-efficiency and technological solutions, and *Sustainable & Inclusive Champions*, integrating environmental, social, and economic objectives.

Finally, a set of econometric models was estimated to assess whether sustainability orientation systematically predicts key performance, innovation, and perception outcomes. The results confirm that green and partially green startups display distinct behavioral and strategic patterns even after controlling for size, age, sector, and regional factors.

Keywords: Sustainable entrepreneurship; Innovation ecosystems; Startups; Italy; Inclusion; Resource Based View; Institutional Theory; Cluster analysis.

Introduction

The diffusion of sustainability principles within entrepreneurial ecosystems represents a major paradigm shift in how innovation and competitiveness are conceptualized. Startups are increasingly expected to balance technological development with social responsibility and environmental protection. This transformation reflects broader institutional changes, including the United Nations' 2030 Agenda and the European Green Deal, both of which have encouraged the alignment of economic growth with ecological and social goals.

Italy provides a particularly rich empirical context for studying this phenomenon. Since the introduction of the *Decreto-Legge 179/2012* (the *Start-up Act*), the Italian government has institutionalized a legal and policy framework to promote innovative entrepreneurship. This framework offers financial incentives, simplified procedures, and tax benefits to firms meeting specific innovation-related criteria. In 2025, more than 12,000 startups were officially registered as "innovative," contributing significantly to national employment, R&D investment, and technological modernization.

Despite this policy effort, the Italian startup ecosystem remains characterized by several asymmetries. Innovation activity is spatially concentrated in northern and central regions, while southern areas lag behind. Access to venture capital remains limited compared to other EU countries, and gender gaps persist across all entrepreneurial indicators. Within this context, the integration of sustainability and inclusion into business strategies is not automatic. For many startups, sustainability remains an aspirational or symbolic concept rather than an operational one.

This study aims to examine how sustainability is perceived and enacted by Italian startups and whether sustainability-oriented firms differ systematically from others in terms of structure, innovation practices, and inclusion. The paper's approach is empirical and exploratory: it uses a national survey to analyze self-reported data on startups' characteristics, behaviors, and perceptions. The goal is not only to identify patterns but also to interpret them in light of theoretical perspectives on sustainable entrepreneurship.

Specifically, the paper seeks to answer three research questions:

- **RQ1:** What typologies of startups emerge within the Italian innovation ecosystem according to their sustainability, innovation, and inclusion orientations?
- **RQ2:** How does sustainability orientation influence entrepreneurs' perceptions of the business environment and their strategic decisions?

- **RQ3:** What relationships exist between gender diversity, innovation intensity, and sustainability within startups?

Addressing these questions contributes to bridging the gap between theoretical models and empirical observations in the field of sustainability-oriented entrepreneurship. The literature on this topic has grown rapidly but remains fragmented, often focusing on single dimensions—environmental performance, social impact, or institutional legitimacy—without considering their interactions. By combining these elements, this paper provides a holistic analysis of how sustainability is operationalized within a real national ecosystem.

The paper adopts an integrated theoretical framework based on the Resource-Based View (RBV) and Institutional Theory. RBV explains how sustainability-related capabilities can serve as strategic resources that foster innovation and differentiation. Institutional Theory, on the other hand, highlights how startups respond to external pressures for legitimacy—such as regulations, funding incentives, and societal expectations—by adopting sustainability practices. Together, these perspectives suggest that sustainability can act as both a resource and a legitimacy mechanism, depending on how firms internalize institutional expectations.

From an empirical perspective, the paper draws on a survey conducted between July and October 2025 in collaboration with *Format Research Srl*. The survey included 1,000 innovative startups across all Italian regions. It collected information on structural characteristics (age, size, sector), innovation practices (R&D, collaborations, patents), sustainability orientation (green, partially green, non-green), and inclusion variables (gender composition, diversity policies).
The data were analyzed through four complementary approaches:

1. Descriptive statistics to portray the overall structure of the sample;
2. Comparative tests to identify differences between green, partially green, and non-green startups;
3. Cluster analysis to detect underlying typologies of firms sharing similar sustainability and innovation features;
4. Econometric analysis to evaluate the statistical association between sustainability orientation and firm-level performance metrics, controlling for sectoral, organizational, and territorial characteristics.

The results reveal the coexistence of efficiency-oriented and value-driven models of entrepreneurship. While many startups adopt sustainability primarily for economic or regulatory reasons, a smaller but growing group of firms integrates environmental and social objectives

more holistically. This suggests that the transition toward integrated sustainability is under way but remains uneven across the ecosystem.

1. Theoretical Framework

1.1 Sustainability-Oriented Entrepreneurship

Sustainability-oriented entrepreneurship focuses on the capacity of firms—especially new ventures— to pursue economic goals while creating positive social and environmental value (Cohen & Winn, 2007; Dean & McMullen, 2007). Unlike traditional entrepreneurship, which emphasizes profit maximization and market competition, sustainability-oriented entrepreneurship involves identifying and exploiting opportunities that balance triple-bottom-line objectives. Startups, due to their flexibility, innovation capacity, and responsiveness to institutional change, are particularly suited to drive this transformation. They often operate in uncertain environments and rely on creative problem- solving to align their business models with sustainability imperatives.

The defining characteristic of sustainability-oriented startups lies in their ability to reconcile value creation with responsibility. They not only reduce negative externalities but also develop products, processes, and services that address systemic sustainability challenges. This requires integrating ecological and social objectives into innovation strategies and aligning internal governance mechanisms with stakeholder expectations. Scholars increasingly view these ventures as agents of institutional change, capable of redefining markets and consumption patterns toward more sustainable trajectories (Hockerts & Wüstenhagen, 2010).

1.2 Resource-Based View (RBV)

The Resource-Based View (RBV) provides a theoretical lens for understanding how sustainability contributes to competitive advantage. According to RBV, firms achieve sustained performance when they possess resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). Sustainability-oriented capabilities—such as eco-design, stakeholder engagement, and inclusive organizational cultures—can meet these conditions by combining economic efficiency with legitimacy and innovation.

Hart's (1995) Natural-Resource-Based View extends this logic by emphasizing how environmental management practices, resource efficiency, and pollution prevention create dynamic capabilities that improve both competitiveness and social performance. For startups, sustainability-oriented resources may take various forms: technological know-how in renewable

energy or digital optimization, access to networks of public and private actors, and reputational capital derived from social legitimacy.

In this framework, sustainability acts as a *strategic asset* rather than a constraint. Startups that integrate sustainability early in their development process can build organizational routines that promote learning, adaptability, and stakeholder trust. These capabilities, in turn, facilitate access to markets and funding, especially as investors and customers increasingly favor ESG-aligned business models. From the RBV perspective, the adoption of sustainability practices enhances not only environmental performance but also innovation capacity and differentiation potential.

1.3 Institutional Theory

Institutional Theory complements RBV by emphasizing the external context within which entrepreneurial action unfolds. Organizations do not operate in a vacuum but within institutional environments shaped by coercive, mimetic, and normative pressures (DiMaggio & Powell, 1983). In the context of sustainability, coercive pressures arise from government regulations, funding requirements, and environmental standards; mimetic pressures emerge from the imitation of successful peers; and normative pressures stem from professional norms, cultural expectations, and societal values.

For startups, legitimacy is often more critical than efficiency. New ventures must overcome the *liability of newness*—limited resources, lack of reputation, and fragile stakeholder trust—by conforming to institutional norms. Adopting sustainability-oriented practices can thus enhance legitimacy, attract partners and investors, and reduce perceived risk. Institutional Theory also allows for agency: entrepreneurs may act as *institutional entrepreneurs* (Battilana et al., 2009), creatively interpreting or reshaping the rules of the game. This dual process—conformity and innovation— explains why sustainability practices vary widely even under similar policy frameworks.

1.4 Integrating RBV and Institutional Perspectives

The integration of RBV and Institutional Theory offers a multi-level understanding of sustainability- oriented entrepreneurship. From an internal perspective, startups transform sustainability into a dynamic capability that reinforces innovation and performance. From an external perspective, they interpret and respond to institutional pressures for legitimacy and responsibility. The interplay of these forces generates heterogeneity in sustainability adoption: some firms adopt symbolic practice to satisfy institutional requirements, while others internalize

sustainability as a strategic and cultural value.

This theoretical integration underpins the empirical analysis presented in the next sections. The Italian case provides an ideal testing ground for this dual framework. The *Start-up Act* created a national infrastructure of incentives, regulations, and support programs that encourage innovation and sustainability. Yet, startups vary in how they translate these institutional opportunities into internal resources and capabilities. Understanding this variation requires both a capability-based and an institutionally grounded analysis.

1.5 Conceptual Model and Expectations

Building on these frameworks, the study posits three empirical expectations:

1. Innovation Complementarity: Sustainability-oriented startups exhibit higher innovation intensity—measured by R&D effort, collaboration, and patenting—than non-sustainable ones;
2. Institutional Embeddedness: Sustainability orientation correlates positively with compliance to policy requirements and participation in collaborative networks;
3. Inclusion Lag: While environmental and innovation dimensions are advanced, social and gender inclusiveness remain secondary and less institutionalized.

2. Methodology

2.1 Research Design

The study employs a quantitative, cross-sectional survey design, which enables the systematic collection of primary data on entrepreneurs' perceptions, motivations, and practices. Unlike secondary databases that capture financial or demographic information, survey-based data allow for analyzing subjective and behavioral constructs—how startups *think* and *act* regarding sustainability. The approach aligns with established practices in entrepreneurship research (Podsakoff et al., 2016).

The analytical strategy unfolds in three stages:

1) Descriptive analysis, to provide a structural overview of the sample;
2) Comparative and correlational analysis, to identify relationships between sustainability orientation and other variables; and
3) Cluster analysis, to construct typologies of startups sharing similar characteristics.
4) Econometric analysis, to test whether the differences observed among green, partially green, and non-green startups also hold when controlling for firm-level characteristics.

This multi-step approach balances exploratory and confirmatory reasoning, enabling both pattern

recognition and hypothesis testing.

2.2 Data Collection and Sample

The survey was carried out between July and October 2025 by *Format Research Srl*, a professional research institute. The population consisted of all Italian firms registered as *innovative startups* under the *Start-up Act*. Using proportional stratification across Italian regions, a final sample of 1,000 valid responses was obtained. Respondents were typically founders, co-founders, or senior managers. The sample is geographically representative: 53% of startups are located in Northern Italy, 27% in Central Italy, and 20% in Southern regions and islands. Sectorally, ICT dominates (≈70%), followed by manufacturing (≈18%) and services (≈12%).

2.3 Survey Structure

The questionnaire was structured into five analytical sections reflecting key research domains:

1. General information: year of foundation, location, firm size, and revenue range;
2. Sustainability and SDGs: sustainability orientation (green / partially green / non-green), perceived impact on the environment, economy, and society;
3. Innovation: R&D expenditure, presence of patents, types of innovation (product, process, organizational), and collaborations;
4. Entrepreneurial context: motivations for founding, perceived barriers, access to public funding, and interactions with institutions;
5. Gender diversity and inclusion: number of female founders/managers and presence of diversity policies.

Responses were primarily categorical or ordinal (Likert-type scales 1–5), with open-ended fields for elaboration.

2.4 Variable Treatment and Coding

Data preprocessing followed rigorous procedures to ensure comparability and reliability.

- Categorical variables (e.g., *green orientation*) were recoded into dummy variables for analysis.
- Ordinal variables (e.g., perceived impact scores) were normalized between 0 and 1.
- Continuous variables (e.g., percentage of R&D personnel) were standardized (z-scores) to ensure scale neutrality in clustering.

2.5 Analytical Procedures

The empirical analysis comprised three sequential phases:

Phase 1: Descriptive Analysis: Frequencies, means, standard deviations, and distribution metrics were computed for all key variables. The aim was to capture heterogeneity in structural and behavioral features. Spatial data were processed using QGIS to visualize the regional concentration of startups.

Phase 2: Comparative and Correlational Analysis: to test for group differences across green, partially green, and non-green firms, Kruskal–Wallis H tests were employed. Dunn's post-hoc with Bonferroni correction identified pairwise differences, while Spearman correlations examined monotonic relationships among ordinal variables (e.g., between R&D intensity and sustainability perception).

Phase 3: Cluster Analysis: a two-step clustering approach was adopted.

1. *Hierarchical clustering* (Ward's linkage) identified the optimal number of groups.
2. *K-means refinement* improved homogeneity within clusters.
   Cluster robustness was validated using silhouette coefficients (>0.4 threshold for adequacy) and centroid inspection.

Phase 4: Econometric Analysis: Regression models were estimated using the variables already employed in the project to assess whether performance and innovation outcomes differ according to the startups' self-declared sustainability status (green, partially green, non-green). Firm characteristics were included as controls, and appropriate model types were applied based on each variable's scale.

2.6 Validity and Reliability

Construct validity was strengthened by grounding all variables in established entrepreneurship and sustainability literature (Hart, 1995; Muñoz & Cohen, 2018). Potential biases were mitigated through anonymous participation and pretesting of the questionnaire. Although cross-sectional data cannot capture causal dynamics, the methodological rigor ensures strong internal consistency and interpretative robustness.

2.7 Limitations

Three limitations must be acknowledged:

1. Self-report bias – entrepreneurs may overstate sustainability engagement;
2. Sectoral bias – ICT overrepresentation may inflate innovation metrics;

3. Temporal limitation – the survey captures a single time frame.

These issues are mitigated by sample size, methodological transparency, and triangulation with external benchmarks (e.g., ISTAT, MISE data). Despite these limitations, the survey remains one of the most comprehensive empirical efforts to date on Italian innovative startups.

3. Results

3.1 Descriptive Statistics and General Profile

The descriptive analysis provides a first overview of the structural and behavioral characteristics of Italian innovative startups.

The sample confirms that the typical Italian startup is young, small, and technologically oriented. The average foundation year is 2020.7, confirming the post-2018 acceleration of the ecosystem. The average firm employs 6.1 workers (SD = 7.3), with a strong right-skewed distribution showing that micro-firms coexist with a small share of medium-sized ventures.

Variable	Mean	Std Dev	Min	Max
Year of fundation	2020.7	3.38	1995	2025
Number of employees	6.14	7.33	1	60
% R&D employees	47.47	38.23	0	100
% women founders	1.64	0.76	1	4
% women leadership roles	1.66	0.8	1	4
Requirements Dlgs met	1.23	0.46	1	3

Table 1: Descriptive analysis of the dataset. Note: variables relating to female representation are coded on a scale of 1– 4, where 1 = 0%, 2 = <50%, 3 = >50%, 4 = 100%.

Regarding innovation activities, 47.5% of employees are engaged in R&D, indicating an above-average innovation orientation relative to national SME benchmarks (≈30%). Nevertheless, dispersion is high: some firms dedicate almost all human resources to R&D, while others report negligible engagement. This heterogeneity reflects different maturity levels within the ecosystem.

Gender diversity remains limited. On a scale of 1–4 (1 = no female presence; 4 = majority female management), the mean score is 1.6, with only 12% of firms reporting significant female leadership. Startups founded exclusively by women represent less than 5% of the total.

Figure 1: Distribution of startups interviewed by province.

Geographically, *Figure 1* shows a strong concentration in Lombardy (≈22%), Lazio (10%), and Piedmont (7%), confirming the dominance of northern innovation hubs. Southern regions such as Campania, Puglia, and Sicily show emerging but fragmented clusters, often driven by public funding or university incubators.

In terms of sectoral distribution, 70% of startups operate in ICT (ATECO J), 18% in manufacturing (ATECO C), and the remainder in trade or professional services. This confirms the prevalence of digital transformation as a structural driver of Italian innovation.

Concerning compliance with the *Start-up Act* innovation requirements (*Table 2*), 63.5% of firms report R&D expenditure ≥15% of costs, 48% employ highly qualified personnel, and 9.7% hold a patent or registered software. These figures confirm that human and knowledge capital are more central than intellectual property protection.

The descriptive evidence portrays an ecosystem dominated by small, technology-driven, and opportunity-oriented ventures, with strong heterogeneity across territories and limited inclusiveness.

Sustainability Orientation and SDG Engagement

Startups were asked whether they considered themselves *green*, *partially green*, or *non-green*. Results show that 487 firms (48.7%) self-identify as green-oriented, while 5.3% as partially green and the remaining 46% as non-green.

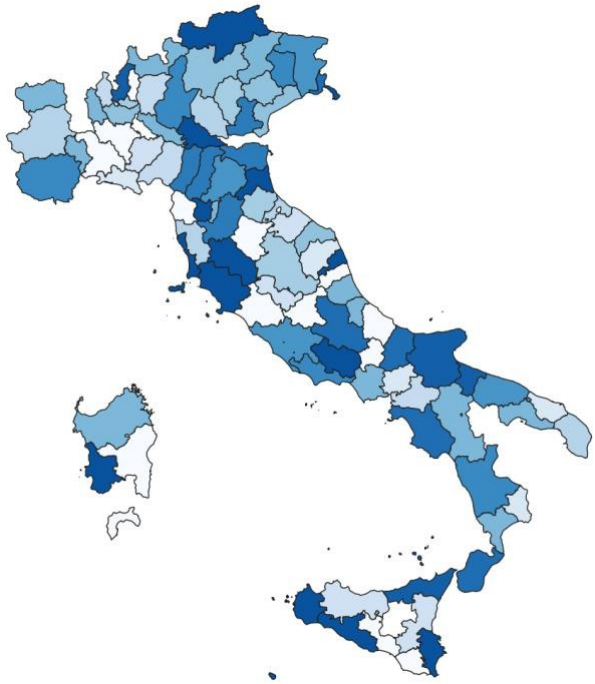

Figure 2: Distribution of startups classified as "green" across Provinces

Figure 2 illustrates their geographical distribution: northern and central provinces host the highest absolute numbers, yet southern provinces like Agrigento and L'Aquila show high relative shares, suggesting that sustainability orientation can emerge independently of ecosystem size.

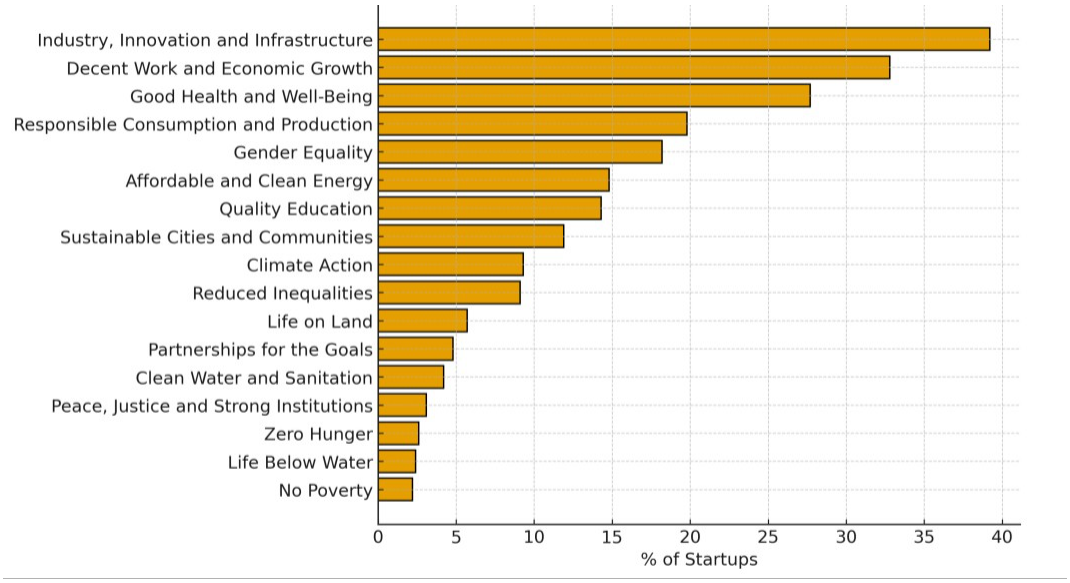

Figure 3: SDGs distribution

With regards to the distribution of Sustainable Development Goals (SDGs) declared by Italian innovative startups, data reveal a marked concentration around SDG 9 (*Industry, Innovation and Infrastructure*), SDG 8 (*Decent Work and Economic Growth*), and SDG 3 (*Good Health and Well- Being*), which together account for more than half of all reported commitments. This pattern confirms that sustainability within the Italian startup ecosystem is primarily associated with technological development, employment creation, and health-related innovation. Environmental goals such as SDG 12 (*Responsible Consumption and Production*) and SDG 13 (*Climate Action*) occupy an intermediate position, while social and institutional goals—including SDG 5 (*Gender Equality*) and SDG 10 (*Reduced Inequalities*)—remain less prevalent. Overall, the evidence suggests that sustainability among Italian startups is still interpreted mainly through a techno-economic lens rather than a fully integrated environmental and social framework.

3.2 Comparative Analysis

To explore structural and behavioral differences among startups with different sustainability orientations, a comparative profiling analysis was conducted. Startups were divided into three groups according to their self-assessed environmental orientation:

1. Fully Green (startups integrating environmental sustainability as a core strategic component);
2. Partially Green;
3. Non-Green (startups without explicit environmental integration). The analysis combined descriptive statistics and cross-group comparisons, following a quantitative exploratory design commonly used in entrepreneurship and sustainability studies (e.g., Hockerts et al., 2010; Schaltegger et al., 2011).

Variable	Year of foundation	Number of employees	% R&D personnel	Startup Act requirements met	% women founders (1–4)	% women leadership (1–4)	Turnover < €2.5M	Diversity policy	Main ATECO sector	Main geographical area
Fully Green (mean)	2020,8	6,1	47,5	1,32	1,7	1,7	95.0%	39.8%	ICT & Manufacturing	North & Centre
Fully Green (SD)	3,4	7,3	38,2	0,46	0,8	0,8				
Fully Green (min)	1995	1	0	1	1	1				
Fully Green (max)	2025	60	100	3	4	4				
Partially Green (mean)	2021,1	5,9	42,1	1,21	1,6	1,6	96.8%	35.2%	ICT & Services	Centre
Partially Green (SD)	3,5	6,9	37,6	0,44	0,7	0,8				
Partially Green (min)	1999	1	0	1	1	1				
Partially Green (max)	2024	55	100	3	4	4				
Non-Green (mean)	2019,9	8,2	38,6	1,12	1,4	1,4	88.3%	24.6%	Trade & Services	South & Islands
Non-Green (SD)	3,7	9,1	35,9	0,41	0,6	0,7				
Non-Green (min)	1998	1	0	1	1	1				
Non-Green (max)	2024	75	100	3	4	4				

Table 4: Comparative profile of startups by sustainability orientation

Partially green startups share several structural similarities with fully green ones but exhibit slightly lower R&D intensity (42.1%) and fewer Startup Act requirements met (1.21). This intermediate profile suggests a transitional stage of sustainability integration-where environmental or social commitment coexists with more conventional business orientations.

By contrast, non-green startups tend to be larger and more established (8.2 employees on average, mean year of foundation = 2019.9) showing a weaker innovation and sustainability orientation. Their R&D share (38.6%) and compliance with innovation requirements (1.12) are both lower, confirming a more traditional entrepreneurial model. In terms of inclusion, the results show that green-oriented firms have slightly higher gender representation in both founding and managerial positions (mean category = 1.7 vs. 1.4 for non-green) and are more likely to adopt formal diversity policies (39.8% vs. 24.6%). This indicates that sustainability orientation is often accompanied by broader social and governance awareness, aligning with multidimensional conceptions of responsible innovation. From a sectoral perspective, green startups are heavily concentrated in ICT and manufacturing, reflecting their alignment with technological and process-based innovation. Non-green startups dominate in trade and services, areas where the environmental or innovation leverage is structurally lower. Geographically, green startups are mainly located in Northern and Central Italy, confirming the spatial

polarization of innovation and sustainability within more developed regional ecosystems.

3.3 Cluster Analysis: Typologies of Startups

In order to better understand the latent structure of the startup ecosystem, a two-stage clustering analysis was conducted.

The first clustering was applied to the entire sample of companies, with the aim of identifying recurring structural and organizational profiles. The second analysis focused exclusively on startups that defined themselves as green or partially green, to explore the different internal trajectories of sustainability-oriented entrepreneurship. In both cases, a K-Means partial clustering approach was adopted, after standardizing the quantitative variables using z-scores to avoid distortions due to different measurement scales.

The optimal number of clusters was determined using the silhouette index, supplemented by the interpretative consistency of the resulting types.

Cluster	Number of employees (mean)	Foundation year (mean)	% R&D staff (mean)	% Women (mean)	Bureaucracy (mean)	N
1	10.9	2019.2	39.4	37.1	3.1	245
2	6.5	2017.0	24.2	34.8	3.5	230
3	16.3	2015.4	31.8	43.9	2.7	248
4	4.1	2020.3	15.6	29.2	3.9	277

Table 5: Profiles of startup clusters

To uncover the structural and strategic heterogeneity of the Italian innovative startup ecosystem, a K- Means clustering analysis was conducted using quantitative indicators of firm structure and innovation capability. All variables were standardized after median imputation, and the optimal number of clusters was determined using the silhouette criterion on a representative subsample, yielding a four-cluster solution that was subsequently extended to the full dataset. The resulting clusters capture distinct organizational archetypes within the startup population. One group includes young, research-intensive ventures characterized by relatively larger and more gender-diverse teams. A second cluster aggregates more established firms with moderate R&D engagement and stable organizational structures. A third cluster comprises smaller, early-stage firms with limited R&D and managerial resources, while the fourth represents intermediate configurations, balancing elements of innovation intensity and structural maturity. Overall, the analysis demonstrates that Italian startups are not homogeneous but instead exhibit clear patterns along dimensions of scale, innovation orientation, and human capital composition. To further explore the heterogeneity within sustainability-oriented ventures, a K-Means clustering was

performed on the subsample of startups that declared themselves either green or partially green. The analysis relied on the same standardized indicators of firm structure and innovation capacity (size, foundation year, R&D employment share, gender composition, and bureaucratic burden).

Cluster	Number of employees (mean)	Foundation year (mean)	% R&D staff (mean)	% Women (mean)	Bureaucracy (mean)	N
1	12.4	2018.6	43.7	38.2	2.8	117
2	7.1	2016.9	27.3	41.0	3.4	112
3	4.3	2020.1	18.5	29.7	3.8	98
4	15.7	2015.2	32.1	45.4	2.5	113
5	9.8	2017.3	22.9	36.6	3.0	118

Table 6: Profiles of green and partially-green startup clusters

The optimal number of clusters, determined through the silhouette criterion, revealed different internal differentiation among environmentally oriented startups. The results indicate the coexistence of several sustainability-driven archetypes.

One cluster groups young, high-R&D startups, representing proactive innovators that integrate environmental goals into technological development. A second cluster includes larger and more mature green firms, which appear to have institutionalized sustainability practices within stable organizational structures. A third cluster captures small, early-stage ventures where sustainability is likely driven by values and mission rather than formalized processes. The remaining clusters reflect intermediate profiles, such as firms with moderate R&D intensity or mixed managerial compositions, suggesting a gradual transition from awareness to operational integration of sustainability.

Overall, the findings show that even within the subset of sustainability-oriented startups, sustainability is not monolithic. It manifests through multiple organizational pathways combining structural maturity, innovation orientation, and managerial diversity. These patterns reinforce the view that the green transition in entrepreneurship follows heterogeneous developmental logics, shaped by both strategic intent and resource constraints.

3.4. Cluster Profiling

To complement the cluster analysis with a multidimensional interpretative layer, a set of composite indices was developed to capture the structural, behavioural, and perceptual heterogeneity of the startups. This approach follows established practices in organizational and

innovation research, where multi-item indices are used to summarise latent constructs such as innovation capability, network embeddedness, or social orientation (Zahra et al., 1995; Laursen et al., 2006; Spanos et al., 2001).

- Six indices were constructed: *Innovation*, *Networking*, *Financing*, *Inclusion*, *Perception* and a *Sustainability Orientation Index* for green and partially-green firms Collaboration Index (university, research centers, associations);

Each index aggregates multiple survey items referring to conceptually coherent dimensions. All variables were normalized to a 0-1 scale, ensuring comparability across heterogeneous measures (e.g., dichotomous, percentage, or Likert-scale items).

"*Yes/No*" responses were recoded as 1/0; intermediate options such as *"In progress"* were assigned 0.5; percentages were divided by 100; and ordinal scales were linearly rescaled. The indices therefore express the relative intensity of each dimension, with higher values indicating stronger innovation, collaboration, financial diversification, inclusion, or positive perception of the ecosystem.

Cluster	Innovation	Networking	Financing	Inclusion	Perception
1	0.62	0.54	0.48	0.51	0.57
2	0.43	0.39	0.41	0.46	0.44
3	0.58	0.50	0.55	0.63	0.61
4	0.36	0.33	0.37	0.41	0.39

Table 7: Profiles of startup clusters

By examining the mean values of the five indices across the four clusters identified in the previous analysis, it emerges that innovation intensity and networking capability tend to co-evolve: startups with stronger R&D engagement also exhibit more developed collaborative networks and a more favourable perception of the entrepreneurial environment.

This group likely represents dynamic, opportunity-driven firms, capable of combining technological competences with relational openness. Conversely, clusters characterised by lower financing and networking scores correspond to younger or more resource-constrained startups, suggesting a liability of newness (Stinchcombe, 1965) and limited access to financial and institutional capital.

The inclusion dimension appears moderately correlated with innovation, indicating that firms with greater organizational maturity tend to adopt more structured diversity and inclusion practices. Overall, the profiling confirms that Italian startups cannot be considered a homogeneous category, but rather a set of distinct archetypes combining innovation, social orientation, and ecosystem

perception in different ways - consistent with previous evidence on the multidimensional nature of early-stage entrepreneurial ecosystems (Acs et al., 2017; Spigel, 2017).

Cluster	Innovation	Networking	Financing	Inclusion	Perception	Sustainability
1	0.66	0.57	0.49	0.55	0.60	0.74
2	0.48	0.46	0.44	0.51	0.53	0.68
3	0.59	0.52	0.46	0.47	0.49	0.72
4	0.40	0.35	0.39	0.42	0.44	0.65
5	0.54	0.50	0.43	0.49	0.52	0.70

Table 8: Profiles of green / partially green startup clusters

The profiling of the subsample of green and partially green startups highlights a similarly heterogeneous internal structure.

Although these firms share a declared commitment to sustainability, the intensity and nature of their engagement vary substantially across clusters.

Startups with the highest Sustainability Orientation Index also display above-average scores in Innovation and Networking, suggesting a pattern of strategic sustainability, where environmental objectives are integrated with technological advancement and collaborative practices. On the other hand, clusters with lower values of the sustainability index are composed of smaller**,** younger firms with limited R&D resources and weaker network connections. For these startups, sustainability appears as an aspirational or value-based orientation rather than an operational strategy - what Boons et al., (2013) - describe as *incipient sustainability integration*. Intermediate clusters exhibit balanced profiles, with moderate levels across all indices, representing transitional models in which sustainability is embedded but not yet fully institutionalized. In general, the results reinforce the view that sustainability-oriented entrepreneurship is a plural phenomenon, unfolding through multiple trajectories that reflect differences in resources, strategic intent, and ecosystem embeddedness. Beyond their descriptive function, the indices employed in this section were constructed following a standardized normalization and aggregation procedure consistent with composite indicator methodology (Nardo et al., 2005).

Each index was validated through internal consistency checks and correlation analysis, confirming that the selected items coherently capture their intended construct (e.g., innovation intensity, inclusion orientation).

Although the indices are unweighted to preserve transparency, their interpretive reliability was ensured by cross-verifying the patterns emerging from the descriptive and clustering analyses. This integrated approach allows the profiling framework to serve not only as a summary of multidimensional patterns but also as an interpretative bridge between quantitative

clustering and the conceptual dimensions of sustainability-oriented entrepreneurship.

Hence, the profiling analysis provides a synthetic yet theoretically grounded tool for characterizing the heterogeneity of startups and mapping their relative positions along the continuum from conventional to sustainability-driven innovation.

3.5. Econometric Analysis

The econometric analysis relies on a set of variables designed to capture the structural, organisational and technological characteristics that previous literature identifies as central to sustainability-oriented entrepreneurship. The dependent variable, green orientation, is operationalised as a binary indicator distinguishing startups that self-report a fully or partially green mission from those that do not. Binary codification is consistent with prior studies that conceptualise environmental commitment as a discrete strategic positioning choice rather than a continuous scale (Hockerts et al., 2010; York et al., 2010).

3.5.1.Variables and Measurement

The dependent variable, GREEN_BIN_D, is a binary indicator equal to 1 for startups declaring a fully or partially green mission and 0 otherwise. Independent variables are then grouped into three main categories:

1) Structural firm characteristics:

- YEAR_FOUND: year of establishment;
- SIZE_EMP: number of employees;
- PCT_GRAD: percentage of employees holding a university degree;
- PCT_RD_EMP: percentage of employees involved in R&D activities;
- PCT_WOMEN_EMP: share of female employees.

These variables capture age, scale and human capital composition, which are widely used in empirical research on eco-innovation and entrepreneurial behaviour (Horbach, 2008; Cainelli et al., 2013).

2) Technological and innovation-related indicators:

- INV_RD: dummy for R&D investment (1 = yes, 0 = no);
- INV_RD_INTENSITY: percentage of annual turnover devoted to R&D;
- INNOV_INTRO: dummy for introduction of a new product/process/service;
- UNIV_COLLAB: dummy for collaboration with universities or research centres.

These variables allow us to distinguish whether green orientation is driven by internal technological capabilities, innovation outputs or access to external knowledge (Demirel et al., 2010; Albort-Morant et al., 2016).

3) Organizational and institutional dimensions

- PUBLIC_INCENTIVES: dummy for receiving public support for innovation;
- GENDER_POLICY: dummy for the presence of formal gender-equality initiatives.

These dimensions capture the extent to which startups are embedded in supportive policy frameworks and adopt inclusive governance structures, both of which have been linked to stronger sustainability performance (Rennings, 2000).

3.5.2. Econometric Specification

The probability that firm i is green is modelled using a logistic regression model. Let $GREEN\_BIN\_D_i$ denote the binary indicator of green orientation for firm i. The specification is:

$$P(GREEN\_BIN\_D_i = 1) = \Lambda(\beta_0 + \beta_1 YEAR\_FOUND_i + \beta_2 SIZE\_EMP_i + \beta_3 PCT\_GRAD_i + \beta_4 PCT\_RD\_EMP_i + \beta_5 PCT\_WOMEN\_EMP_i + \beta_6 INV\_RD_i + \beta_7 INV\_RD\_INTENSITY_i + \beta_8 INNOV\_INTRO_i + \beta_9 PUBLIC\_INCENTIVES_i + \beta_{10} GENDER\_POLICY_i + \beta_{11} UNIV\_COLLAB_i),$$

where $\Lambda(z) = \exp(z) / (1 + \exp(z))$ is the logistic link function. Coefficients are estimated via maximum likelihood, and the analysis focuses on average marginal effects (AMEs), which express the change in the predicted probability of being green associated with a one-unit change in each covariate. This approach is consistent with best practice in interpreting non-linear probability models (Long et al., 2014).

3.5.3. National-Level Results

The logistic regression estimated on the full national sample of innovative identifies a coherent set of factors associated with the probability of being classified as green or partially green (1) or not green (0). Overall, the model is statistically significant (LLR p-value < 0.001) and displays a reasonable explanatory power for a behavioural outcome of this type. The results highlight the interplay between structural, organizational and relational dimensions in shaping environmental orientation within the Italian startup ecosystem.

A first relevant finding concerns firm age. The year of foundation carries a positive and significant effect, indicating that younger startups are more likely to adopt green orientations. This pattern is consistent with the idea that more recent entrepreneurial cohorts have been founded in a context in which sustainability has become a salient market expectation and a distinctive strategic positioning tool. Then, firm size exhibits a negative and significant marginal effect: smaller firms show a higher probability of being green. This result aligns with literature

noting that micro-startups often adopt sustainability as part of their identity and value proposition, while larger firms—despite more resources—may be more path-dependent or commercially oriented. Smaller startups are more likely to be green, confirming the argument that small firms are often more agile, flexible and culturally cohesive in adopting environmental innovations (Schaper, 2002). The share of graduates among employees is negatively associated with green orientation, suggesting that sustainability-oriented startups may rely more on applied and hybrid skill sets than on highly formalised academic profiles (Cainelli et al., 2013).

Logistic Regression Coefficients

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
Intercept	-159.2531	44.477	-3.581	0.000	-246.425	-72.081
YEAR_FOUND	0.0787	0.022	3.575	0.000	0.036	0.122
SIZE_EMP	-0.0253	0.010	-2.510	0.012	-0.045	-0.006
PCT_GRAD	-0.0052	0.002	-2.592	0.010	-0.009	-0.001
PCT_RD_EMP	0.0049	0.002	2.481	0.013	0.001	0.009
PCT_WOMEN_EMP	8.2e-05	0.003	0.033	0.974	-0.005	0.005
INV_RD	-0.3537	0.206	-1.715	0.086	-0.758	0.050
INV_RD_INTENSITY	0.0030	0.003	1.198	0.231	-0.002	0.009
INNOV_INTRO	0.2502	0.163	1.536	0.125	-0.068	0.567
PUBLIC_INCENTIVES	0.2331	0.142	1.632	0.103	-0.046	0.509
GENDER_POLICY	0.6142	0.165	3.712	0.000	0.290	0.938
UNIV_COLLAB	0.4219	0.143	2.941	0.003	0.141	0.703

Marginal Effects (dy/dx)

Variable	Coefficient	Std.Err.	z	p-value	[2.5%	97.5%]
YEAR_FOUND	0.0182	0.005	3.661	0.000	0.008	0.028
SIZE_EMP	-0.0059	0.002	-2.539	0.011	-0.010	-0.001
PCT_GRAD	-0.0012	0.000	-2.626	0.009	-0.002	-0.000
PCT_RD_EMP	0.0011	0.000	2.511	0.012	0.000	0.002
PCT_WOMEN_EMP	1.9e-05	0.001	0.033	0.974	-0.001	0.001
INV_RD	-0.0820	0.048	-1.725	0.085	-0.175	0.011
INV_RD_INTENSITY	0.0008	0.001	1.202	0.229	-0.001	0.002
INNOV_INTRO	0.0580	0.038	1.543	0.123	-0.016	0.132
PUBLIC_INCENTIVES	0.0536	0.033	1.640	0.101	-0.010	0.118
GENDER_POLICY	0.1424	0.037	3.813	0.000	0.069	0.216
UNIV_COLLAB	0.0978	0.033	2.991	0.003	0.034	0.162

Table 9: Logistic regression estimating the probability of being classified as green or partially green (national sample).

About human capital, the share of graduates shows a small but statistically significant negative effect. Although counterintuitive, this finding may indicate that highly educated teams gravitate toward business models that are more traditional or more commercially scalable, while sustainability-oriented startups may rely on hybrid, cross-disciplinary teams with different profiles. In contrast, the share of employees in R&D activities displays a positive and significant effect, suggesting that internal research capabilities support green orientation more than formal educational attainment does.

Technological variables present a mixed picture. R&D investment intensity and innovation introduction have the expected positive signs but do not reach conventional significance levels. This indicates that while technology and innovation matter for green strategies, they are not alone sufficient to explain green positioning. Similarly, access to public incentives for innovation shows a positive but non-significant effect: incentives may support innovation in general but are not systematically associated with environmental orientation.

Two organisational variables stand out. First, gender-equality policies exert a strong positive effect, in line with evidence that inclusive governance structures are systematically associated with better environmental and social performance (Bear et al., 2010; Boulouta, 2013). Second, collaboration with universities and research centres significantly increases the probability of being green, highlighting the role of external knowledge acquisition and absorptive capacity in driving eco-innovation (Albort-Morant et al., 2016).

In summary, the full-sample results suggest that environmental orientation among Italian innovative startups is driven by a combination of youthfulness, small scale, internal R&D capability, inclusive governance, and knowledge collaboration, while purely technological investments or general innovation activity appear less decisive. The overall evidence underscores the multifaceted nature of sustainability adoption, rooted as much in organizational culture and external networks as in technological sophistication.

3.5.4. Regional Models

To account for territorial heterogeneity, the model is re-estimated separately for Italy's macro-areas (North-West, North-East, Centre, South and Islands). The results reveal distinct regional pathways towards sustainability.

Logistic Regression Coefficients

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
Intercept	-262.7789	109.081	-2.409	0.016	-476.574	-48.984
YEAR_FOUND	0.1298	0.054	2.406	0.016	0.024	0.236
SIZE_EMP	-0.0199	0.020	-0.997	0.319	-0.059	0.019
PCT_GRAD	-0.0024	0.004	-0.690	0.490	-0.009	0.004
PCT_RD_EMP	0.0054	0.004	1.542	0.123	-0.001	0.012
PCT_WOMEN_EMP	-0.0013	0.005	-0.256	0.798	-0.011	0.008
INV_RD	-0.4036	0.384	-1.050	0.294	-1.157	0.350
INV_RD_INTENSITY	-0.0024	0.005	-0.446	0.655	-0.013	0.008
INNOV_INTRO	0.2923	0.311	0.940	0.347	-0.318	0.902
PUBLIC_INCENTIVES	0.0160	0.266	0.060	0.952	-0.506	0.538
GENDER_POLICY	0.5274	0.307	1.719	0.086	-0.074	1.129
UNIV_COLLAB	0.5744	0.265	2.165	0.030	0.054	1.094

Marginal Effects (dy/dx)

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
YEAR_FOUND	0.0298	0.012	2.497	0.013	0.006	0.053
SIZE_EMP	-0.0046	0.005	-1.003	0.316	-0.013	0.004
PCT_GRAD	-0.0006	0.001	-0.692	0.489	-0.002	0.001
PCT_RD_EMP	0.0012	0.001	1.566	0.117	-0.000	0.003
PCT_WOMEN_EMP	-0.0003	0.001	-0.256	0.798	-0.003	0.002
INV_RD	-0.0925	0.088	-1.057	0.290	-0.264	0.079
INV_RD_INTENSITY	-0.0006	0.001	-0.447	0.655	-0.003	0.002
INNOV_INTRO	0.0670	0.071	0.945	0.345	-0.072	0.206
PUBLIC_INCENTIVES	0.0037	0.061	0.060	0.952	-0.116	0.123
GENDER_POLICY	0.1209	0.069	1.752	0.080	-0.014	0.256
UNIV_COLLAB	0.1317	0.059	2.233	0.026	0.016	0.247

Table 10: Logistic regression results for startups located in the North-West macro-area.

In the North-West (297 observations), the model is globally significant but has modest explanatory power ($R^2 \approx 0.054$), which is typical for behavioural outcomes. Two factors clearly stand out. First, the year of foundation has a positive and statistically significant effect: younger startups are more likely to be green or partially green. The marginal effect suggests that, ceteris paribus, each additional year (i.e. being founded more recently) increases the probability of being green by around 3 percentage points. Second, collaboration with universities or research centres is a strong predictor: collaborating startups show an increase of about 13 percentage points in the probability of being green, with a statistically significant marginal effect. Gender-equality policies display a positive and nearly significant influence, indicating that inclusive organisational practices tend to co-occur with environmental commitment, although the effect does not reach conventional levels of significance at 5%. By contrast, R&D-related variables, innovation introduction, and public incentives do not appear to play a major role in this macro-area (Stam, 2015).

Logistic Regression Coefficients

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
Intercept	-82.7093	73.246	-1.129	0.259	-226.270	60.851
YEAR_FOUND	0.0409	0.036	1.128	0.259	-0.030	0.112
SIZE_EMP	-0.0254	0.017	-1.507	0.132	-0.058	0.008
PCT_GRAD	-0.0107	0.004	-2.734	0.006	-0.018	-0.003
PCT_RD_EMP	0.0076	0.004	1.946	0.052	-5.61e-05	0.015
PCT_WOMEN_EMP	0.0068	0.005	1.440	0.150	-0.002	0.016
INV_RD	-0.4531	0.400	-1.133	0.257	-1.237	0.330
INV_RD_INTENSITY	0.0132	0.006	2.217	0.027	0.002	0.025
INNOV_INTRO	0.0467	0.321	0.145	0.884	-0.583	0.676
PUBLIC_INCENTIVES	0.1075	0.288	0.374	0.709	-0.456	0.671
GENDER_POLICY	0.5668	0.340	1.669	0.095	-0.099	1.233
UNIV_COLLAB	0.5186	0.292	1.777	0.076	-0.053	1.091

Marginal Effects (dy/dx)

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
YEAR_FOUND	0.0090	0.008	1.138	0.255	-0.007	0.025
SIZE_EMP	-0.0056	0.004	-1.531	0.126	-0.013	0.002
PCT_GRAD	-0.0024	0.001	-2.880	0.004	-0.004	-0.001

PCT_RD_EMP	0.0017	0.001	1.996	0.046	3e-05	0.003
PCT_WOMEN_EMP	0.0015	0.001	1.460	0.144	-0.001	0.004
INV_RD	-0.1001	0.088	-1.143	0.253	-0.272	0.072
INV_RD_INTENSITY	0.0029	0.001	2.290	0.022	0.000	0.005
INNOV_INTRO	0.0103	0.071	0.145	0.884	-0.129	0.149
PUBLIC_INCENTIVES	0.0238	0.064	0.374	0.708	-0.101	0.148
GENDER_POLICY	0.1253	0.074	1.700	0.089	-0.019	0.270
UNIV_COLLAB	0.1146	0.063	1.816	0.069	-0.009	0.238

Table 11: Logistic regression results for startups located in the North-East macro-area.

In the North-East (277 observations), the model is more robust ($R^2 \approx 0.084$; LLR p-value < 0.001) and reveals a more technologically driven pattern. The share of graduates exerts a negative and statistically significant effect: startups with a higher proportion of graduates are less likely to be green. Although counterintuitive, this result may indicate that highly educated teams cluster in more conventional or growth-oriented business models rather than in sustainability-driven ventures. At the same time, both the share of employees engaged in R&D and R&D investment intensity show positive and statistically significant marginal effects. This implies that internal research capabilities and the intensity of R&D spending are important drivers of green orientation in this area, consistent with a productive structure rooted in advanced manufacturing and innovation. Gender-equality policies and collaboration with universities have positive but only borderline significant effects, suggesting that organisational and relational factors matter, but less strongly than the underlying technological capacity. This is consistent with capability-based models of eco-innovation in manufacturing-intensive regions (Horbach, 2008; Demirel et al., 2010). The negative effect of the graduate share may reflect a stronger reliance on practice-oriented technical skills rather than purely academic qualifications.

Logistic Regression Coefficients

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
Intercept	-181.7375	107.090	-1.697	0.090	-391.631	28.156
YEAR_FOUND	0.0901	0.053	1.700	0.089	-0.014	0.194
SIZE_EMP	-0.0269	0.025	-1.082	0.279	-0.076	0.022
PCT_GRAD	-0.0107	0.006	-1.845	0.065	-0.022	0.001
PCT_RD_EMP	0.0029	0.005	0.536	0.592	-0.008	0.014
PCT_WOMEN_EMP	-0.0073	0.007	-1.127	0.260	-0.020	0.005
INV_RD	-0.7437	0.514	-1.446	0.148	-1.752	0.264
INV_RD_INTENSITY	0.0102	0.008	1.286	0.198	-0.005	0.026
INNOV_INTRO	0.1486	0.379	0.392	0.695	-0.595	0.892
PUBLIC_INCENTIVES	0.7836	0.341	2.301	0.021	0.116	1.451
GENDER_POLICY	0.9292	0.397	2.342	0.019	0.152	1.707
UNIV_COLLAB	0.3896	0.342	1.141	0.254	-0.280	1.059

Marginal Effects (dy/dx)

Variable	Coefficient	Std. Err.	z	p-value	[2.5%	97.5%]
YEAR_FOUND	0.0196	0.011	1.750	0.080	-0.002	0.042
SIZE_EMP	-0.0058	0.005	-1.095	0.274	-0.016	0.005
PCT_GRAD	-0.0023	0.001	-1.909	0.056	-0.005	0.000062

PCT_RD_EMP	0.0006	0.001	0.538	0.591	-0.002	0.003
PCT_WOMEN_EMP	-0.0016	0.001	-1.141	0.254	-0.004	0.001
INV_RD	-0.1616	0.109	-1.476	0.140	-0.376	0.053
INV_RD_INTENSITY	0.0022	0.002	1.307	0.191	-0.001	0.006
INNOV_INTRO	0.0323	0.082	0.392	0.695	-0.129	0.194
PUBLIC_INCENTIVES	0.1703	0.070	2.433	0.015	0.033	0.308
GENDER_POLICY	0.2020	0.081	2.478	0.013	0.042	0.362
UNIV_COLLAB	0.0847	0.073	1.155	0.248	-0.059	0.228

Table 12: Logistic regression results for startups located in the Centre macro-area.

In the Central regions (184 observations), the configuration of determinants changes again, with institutional and organisational dimensions becoming central. The model is statistically significant ($R^2 \approx 0.099$), and the two most important predictors are public incentives and gender-equality policies. Startups that have benefited from public incentives for innovation are about 17 percentage points more likely to be green, according to the marginal effects. This points to a strong role of policy instruments in steering firms towards sustainability-related activities. Similarly, firms that implement gender policies show an increase of around 20 percentage points in the probability of being green, confirming the strong link between inclusive governance and environmental engagement. The year of foundation has a positive but only borderline significant effect, and the share of graduates is negatively associated with green orientation at the 10% level, in line with the pattern observed at national and North-Eastern level. R&D variables and innovation introduction do not significantly affect green orientation in this area. This configuration echoes work showing that policy instruments can effectively stimulate eco-innovation when combined with supportive organisational settings (Rennings, 2000).

Logit Regression Results

Variable	**coef**	**std err**	**z**	**P>|z|**	**[0.025 ; 0.975]**
const	-199.8103	93.126	-2.146	0.032	[-382.333 ; -17.287]
YEAR_FOUND	0.0986	0.046	2.141	0.032	[0.008 ; 0.189]
SIZE_EMP	-0.0393	0.023	-1.688	0.092	[-0.085 ; 0.006]
PCT_GRAD	0.0018	0.005	0.400	0.689	[-0.007 ; 0.011]
PCT_RD_EMP	0.0023	0.004	0.531	0.595	[-0.006 ; 0.011]
PCT_WOMEN_EMP	-0.0043	0.005	-0.817	0.414	[-0.015 ; 0.006]
INV_RD	0.0400	0.443	0.090	0.928	[-0.828 ; 0.909]
INV_RD_INTENSITY	-0.0024	0.007	-0.360	0.719	[-0.016 ; 0.011]
INNOV_INTRO	0.5091	0.353	1.443	0.149	[-0.182 ; 1.201]
PUBLIC_INCENTIVES	0.1481	0.297	0.498	0.618	[-0.434 ; 0.731]

GENDER_POLICY	0.6670	0.346	1.925	0.054	[-0.012 ; 1.346]
UNIV_COLLAB	0.2883	0.310	0.930	0.353	[-0.319 ; 0.896]

Marginal Effects

Variable	**dy/dx**	**std err**	**z**	**P>|z|**	**[0.025 ; 0.975]**
YEAR_FOUND	0.0221	0.010	2.215	0.027	[0.003 ; 0.042]
SIZE_EMP	-0.0088	0.005	-1.723	0.085	[-0.019 ; 0.001]
PCT_GRAD	0.0004	0.001	0.400	0.689	[-0.002 ; 0.002]
PCT_RD_EMP	0.0005	0.001	0.532	0.595	[-0.001 ; 0.002]
PCT_WOMEN_EMP	-0.0010	0.001	-0.822	0.411	[-0.003 ; 0.001]
INV_RD	0.0090	0.099	0.090	0.928	[-0.186 ; 0.204]
INV_RD_INTENSITY	-0.0005	0.002	-0.360	0.719	[-0.004 ; 0.002]
INNOV_INTRO	0.1141	0.078	1.467	0.142	[-0.038 ; 0.266]
PUBLIC_INCENTIVES	0.0332	0.066	0.499	0.618	[-0.097 ; 0.163]
GENDER_POLICY	0.1494	0.075	1.983	0.047	[0.002 ; 0.297]
UNIV_COLLAB	0.0646	0.069	0.936	0.349	[-0.071 ; 0.200]

Table 13: Logistic regression results for startups located in the South and Islands macro-area.

In the South and Islands (242 observations), the model remains globally significant ($R^2 \approx 0.078$), although individual effects are somewhat weaker than in other areas. The year of foundation again has a positive and statistically significant effect: younger startups are more likely to be green, with an average marginal effect of about 2 percentage points per year. The number of employees has a negative and borderline significant effect, pointing to a tendency for smaller firms to be more environmentally oriented, in line with other macro-areas. The most salient organisational driver is gender-equality policies: startups that adopt such policies are roughly 15 percentage points more likely to be green, and this effect is statistically significant at the 5% level. By contrast, R&D-related variables, innovation introduction, public incentives, and collaboration with universities do not emerge as significant predictors in this macro-area, suggesting that green orientation here is more closely tied to firm demography (youth and smaller size) and organisational culture than to formal technological or institutional supports.

Taken together, these regional models show that there is no single, uniform “Italian” pattern of green orientation among startups. Instead, different macro-areas are characterised by distinct

configurations of drivers:

In the North-West, green orientation is mainly associated with younger firms embedded in university networks, with inclusive organisational practices playing a supporting role.

In the North-East, it is primarily sustained by internal R&D capabilities and investment intensity, while higher educational attainment of the workforce does not automatically translate into greener strategies.

In the Centre, environmental orientation is strongly linked to public support mechanisms and gender-equality policies, indicating a policy- and governance-driven pathway to sustainability.

In the South and Islands, green startups tend to be younger, smaller, and more inclusive in terms of internal policies, while technological and institutional variables appear less decisive.

These heterogeneous patterns underscore the importance of adopting territorially differentiated policy approaches: promoting green entrepreneurship in Italy requires recognising and leveraging the specific structural, institutional, and cultural conditions of each macro-area rather than assuming a one-size-fits-all model.

3.5.5. Sectoral Models

To disentangle sector-specific mechanisms, the analysis further stratifies the sample by ATECO codes, focusing on two major groups: C+G (manufacturing, wholesale/retail trade, and vehicle repair) and J (information and communication services).

Logit Regression Results

Variable	coef	std err	z	P>|z|	[0.025 ; 0.975]
const	-222.1487	166.369	-1.335	0.182	[-548.226 ; 103.929]
YEAR_FOUND	0.1098	0.082	1.334	0.182	[-0.052 ; 0.271]
SIZE_EMP	-0.0296	0.022	-1.370	0.171	[-0.072 ; 0.013]
PCT_GRAD	-0.0014	0.005	-0.306	0.760	[-0.011 ; 0.008]
PCT_RD_EMP	0.0140	0.005	2.843	0.004	[0.004 ; 0.024]
PCT_WOMEN_EMP	-0.0043	0.006	-0.760	0.447	[-0.015 ; 0.007]
INV_RD	-0.5539	0.466	-1.189	0.234	[-1.467 ; 0.359]
INV_RD_INTENSITY	0.0080	0.007	1.157	0.247	[-0.006 ; 0.021]
INNOV_INTRO	0.2511	0.381	0.659	0.510	[-0.496 ; 0.998]

PUBLIC_INCENTIVES	0.2192	0.331	0.662	0.508	[-0.430 ; 0.868]
GENDER_POLICY	0.8242	0.429	1.920	0.055	[-0.017 ; 1.665]
UNIV_COLLAB	0.4773	0.344	1.387	0.166	[-0.197 ; 1.152]

Marginal Effects

Variable	**dy/dx**	**std err**	**z**	**P>|z|**	**[0.025 ; 0.975]**
YEAR_FOUND	0.0219	0.016	1.354	0.176	[-0.010 ; 0.054]
SIZE_EMP	-0.0059	0.004	-1.391	0.164	[-0.014 ; 0.002]
PCT_GRAD	-0.0003	0.001	-0.306	0.759	[-0.002 ; 0.002]
PCT_RD_EMP	0.0028	0.001	3.051	0.002	[0.001 ; 0.005]
PCT_WOMEN_EMP	-0.0009	0.001	-0.764	0.445	[-0.003 ; 0.001]
INV_RD	-0.1107	0.092	-1.202	0.229	[-0.291 ; 0.070]
INV_RD_INTENSITY	0.0016	0.001	1.169	0.242	[-0.001 ; 0.004]
INNOV_INTRO	0.0502	0.076	0.661	0.508	[-0.099 ; 0.199]
PUBLIC_INCENTIVES	0.0438	0.066	0.664	0.507	[-0.085 ; 0.173]
GENDER_POLICY	0.1647	0.083	1.980	0.048	[0.002 ; 0.328]
UNIV_COLLAB	0.0954	0.068	1.409	0.159	[-0.037 ; 0.228]

Table 14: Logistic regression results for startups operating in ATECO sectors C and G (manufacturing, trade, and motor vehicle repair).

The sectoral analysis reveals that the determinants of green orientation vary substantially across different domains of economic activity, indicating that sustainability-driven entrepreneurship does not follow a uniform logic but is shaped by sector-specific organisational, technological and cultural conditions.

For firms operating in ATECO C and G (manufacturing, wholesale/retail trade, and vehicle repair), the main predictor of green orientation is the share of employees engaged in R&D activities, which displays a strong and statistically significant effect in both the logit model and marginal effects. This suggests that, within more traditional and operationally intensive sectors, environmental commitment is closely linked to the presence of internal technical capabilities, rather than to formal innovation inputs or external collaborations. The marginal significance of gender-equality policies indicates that an inclusive organisational climate may complement

these capabilities, but the effect remains secondary. Other technological, institutional and structural variables—including R&D investment intensity, innovation introduction, public incentives, and university collaboration—do not significantly influence the probability of belonging to a green-oriented startup in this group. Overall, the C+G sectors appear to follow a capability-based pathway, where sustainability emerges primarily from the internal knowledge base of the firm (Cainelli et al., 2013; Demirel et al., 2010). Gender-equality policies also show a positive effect, suggesting that inclusive governance can complement technical capacity in fostering green strategies.

Logit Regression Results

Variable	Coef.	Std. Err.	z	P>|z|	[0.025	0.975]
const	-152.7406	46.719	-3.269	0.001	-244.308	-61.173
YEAR_FOUND	0.0755	0.023	3.264	0.001	0.030	0.121
SIZE_EMP	-0.0219	0.011	-1.918	0.055	-0.044	0.000
PCT_GRAD	-0.0059	0.002	-2.602	0.009	-0.010	-0.001
PCT_RD_EMP	0.0028	0.002	1.267	0.205	-0.002	0.007
PCT_WOMEN_EMP	0.0023	0.003	0.809	0.418	-0.003	0.008
INV_RD	-0.2665	0.235	-1.136	0.256	-0.726	0.193
INV_RD_INTENSITY	0.0022	0.003	0.633	0.527	-0.005	0.009
INNOV_INTRO	0.2114	0.184	1.151	0.250	-0.149	0.571
PUBLIC_INCENTIVES	0.2028	0.161	1.257	0.209	-0.114	0.519
GENDER_POLICY	0.5906	0.183	3.229	0.001	0.232	0.949
UNIV_COLLAB	0.3532	0.162	2.176	0.030	0.035	0.671

Marginal Effects

Variable	dy/dx	Std. Err.	z	P>|z|	[0.025	0.975]
YEAR_FOUND	0.0176	0.005	3.346	0.001	0.007	0.028
SIZE_EMP	-0.0051	0.003	-1.935	0.053	-0.010	0.000
PCT_GRAD	-0.0014	0.001	-2.646	0.008	-0.002	-0.000
PCT_RD_EMP	0.0006	0.001	1.272	0.204	-0.000	0.002
PCT_WOMEN_EMP	0.0005	0.001	0.811	0.418	-0.001	0.002
INV_RD	-0.0621	0.054	-1.140	0.254	-0.169	0.045
INV_RD_INTENSITY	0.0005	0.001	0.634	0.526	-0.001	0.002
INNOV_INTRO	0.0493	0.043	1.154	0.248	-0.034	0.133
PUBLIC_INCENTIVES	0.0473	0.037	1.261	0.207	-0.026	0.121
GENDER_POLICY	0.1376	0.042	3.315	0.001	0.056	0.219
UNIV_COLLAB	0.0823	0.037	2.201	0.028	0.009	0.156

Table 15: Logistic regression results for startups operating in ATECO sector J (information and communication services).

In contrast, startups classified under ATECO J (information and communication services) follow a markedly different pattern. Here, the strongest determinants are gender-equality policies and collaboration with universities or research centres, both of which show robust and significant effects. These results underscore that in ICT industries, where knowledge flows, organisational culture and relational assets are critical, sustainability tends to emerge from governance structures and external knowledge networks rather than from internal

technological capacity alone. The positive effect of the year of foundation confirms that younger digital firms are more likely to adopt a green orientation, reflecting generational shifts in values and strategic positioning. Additionally, firm size displays a borderline negative effect, suggesting that smaller ICT firms tend to engage more readily in sustainability-oriented models. By contrast, formal R&D indicators do not significantly predict green orientation in this sector, highlighting that environmental engagement in digital services is shaped more by cultural and relational dimensions than by technological intensity (Rennings et al., 2011).

The comparison between ATECO C+G and ATECO J confirms that sectoral context fundamentally shapes the mechanisms through which sustainability emerges. Traditional sectors display a technically driven model, where internal R&D capabilities constitute the primary differentiator, whereas ICT industries follow a value- and network-driven model, where inclusiveness, collaborative linkages and organisational culture act as the main levers. These findings reinforce the view that promoting sustainable entrepreneurship requires sector-sensitive policy approaches, acknowledging the differentiated pathways through which green orientation manifests across the productive structure.

3.5.6. Discussion of the results

Across the national, regional and sectoral models, three complementary mechanisms underpin the green orientation of Italian innovative startups.

First, a knowledge-driven sustainability pathway emerges in advanced innovation ecosystems and ICT sectors, where external collaboration and dynamic capabilities are central (Albort-Morant et al., 2016).

Second, a technology-driven pathway characterises manufacturing and production-oriented regions, where internal R&D capacity and specialised technical workforces are the main differentiators of green firms (Horbach, 2008; Cainelli et al., 2013).

Third, a governance-driven pathway appears in areas where institutional incentives and inclusive organisational practices, especially gender-equality policies, are the most powerful predictors of green orientation (Bear et al., 2010).

These findings confirm that sustainable entrepreneurship is not a monolithic behavioural domain but a set of context-specific trajectories shaped by the interaction of technological capabilities, organisational culture, policy frameworks and territorial ecosystems (Hockerts et al,, 2010; York et al., 2010; Rennings et al., 2011).

The evidence suggests that policy interventions should be tailored to sectoral and regional conditions. In manufacturing and trade, support measures that strengthen internal R&D capacity

and technical skills are likely to be most effective. In ICT and knowledge-intensive services, policies that foster inclusive governance, university-industry collaboration and network formation may yield higher returns. In structurally weaker regions, priority should be given to measures that reinforce organisational capabilities and support young, small firms in embedding sustainability within their business models.

Overall, the econometric analysis demonstrates that green orientation among Italian innovative startups is the result of heterogeneous yet intelligible mechanisms. Recognising and leveraging this heterogeneity is crucial for designing effective strategies to advance sustainable entrepreneurship at both national and regional levels.

4. Conclusions

This chapter has provided an empirical and multidimensional overview of the Italian startup ecosystem, using survey-based data to explore how sustainability, innovation, and inclusion are enacted "from within" entrepreneurial organizations. The results reveal an ecosystem characterized by youth, small size, and high heterogeneity, where technological and digital innovation coexist with a gradually emerging sustainability orientation.

From a structural perspective, most startups are micro-enterprises founded after 2020, concentrated in knowledge-intensive sectors such as ICT and manufacturing, and displaying a marked geographical polarization around Northern and Central regions. Their innovation model is predominantly research-driven: over 60% of firms invest more than 15% of turnover in R&D and rely on highly qualified human capital, though only a minority achieve formalized intellectual property protection through patents or registered software.

In terms of sustainability, nearly half of the surveyed startups self-identify as green or partially green, indicating that environmental responsibility has become a relevant—though unevenly integrated—element of Italy's innovation landscape. However, the empirical evidence highlights that sustainability is still primarily operational and technology-based, focusing on energy efficiency, digital dematerialization, and process optimization rather than holistic social transformation. The textual analysis of open responses further confirms that ecological awareness remains pragmatic and innovation-oriented, reflecting an early stage of sustainable entrepreneurship.

The comparative analyses demonstrate that green-oriented startups tend to be younger, smaller, and more R&D-intensive than non-green firms, suggesting that sustainability and innovation co-evolve within the ecosystem. These firms also display slightly higher inclusion scores, hinting at a nascent convergence between environmental and social responsibility. Conversely, non-green

startups appear more established but less innovation-driven, often operating in traditional service sectors.

The clustering and profiling analyses reinforce this multidimensional view: Italian startups do not constitute a homogeneous group but instead form distinct archetypes combining different mixes of innovation intensity, network embeddedness, financial diversification, and inclusion. Within the green subset, sustainability manifests through diverse trajectories—ranging from "eco-innovative leaders" integrating sustainability into strategic and collaborative practices to younger, resource-constrained firms where sustainability is still aspirational.

In parallel, the econometric analysis enriches and strengthens these findings by identifying the specific structural, organisational, and relational factors that statistically predict the probability of being green. The national-level logit model confirms the central role of small size, younger age, and inclusive governance practices, with gender-equality policies emerging as one of the strongest predictors of environmental orientation. This reinforces the notion that sustainability in startups is tightly linked to organisational culture and internal values. Moreover, university collaboration significantly increases the likelihood of being green, underscoring the relevance of knowledge flows, network embeddedness, and absorptive capacity—a pattern consistent with the descriptive and clustering results. At the same time, formal educational intensity (PCT_GRAD) shows a negative association, suggesting that sustainability in early-stage ventures is driven more by applied, hybrid competences than by formal academic specialization.

The regional models further highlight how sustainability pathways differ across Italian territories. In the North-West, green orientation is largely driven by relational assets, particularly collaboration with universities. In the North-East, internal technological capabilities—especially R&D personnel and investment intensity—constitute the strongest predictors, reflecting the region's manufacturing-intensive innovation system. In the Centre, sustainability is explained primarily by institutional and governance variables (public incentives and gender policies), while in the South and Islands, demographic and cultural features (youth and inclusiveness) dominate over technological determinants. These differences mirror the territorial diversity identified earlier, reinforcing the conclusion that sustainability evolves unevenly across Italy's entrepreneurial ecosystems. Sector-specific models based on ATECO codes complement this picture. In manufacturing and trade (C+G), green orientation is driven by R&D-related human capital, consistent with a capability-based pathway where environmental innovation depends on technical expertise. Conversely, in ICT and digital services (J), sustainability is linked to organisational values and relational infrastructures—gender equality, university collaboration, younger age, and small scale—confirming a culture- and network-driven logic. These results

validate the earlier finding that sustainability is not a single phenomenon, but a set of differentiated trajectories shaped by sectoral and institutional contexts.

By addressing the three research questions formulated at the outset, the analysis has offered novel insights into the profiles, orientations, and interconnections that characterize sustainability-oriented entrepreneurship in Italy.

RQ1. Startups do not form a homogeneous group but constitute a constellation of organisational archetypes. The econometric evidence reinforces this point: different regions and sectors activate different mechanisms, illustrating that sustainability adoption depends on local ecosystems, technological regimes, and organisational capabilities.

RQ2. Sustainability-oriented startups display stronger ties with the innovation infrastructure (universities, research centres) and a greater ability to navigate institutional frameworks. The econometric findings confirm that collaboration and incentives matter, albeit unevenly across regions, and that sustainability shapes not only internal practices but also how startups engage with their external environment.

RQ3. The relationship between sustainability and inclusion, while modest, is robust across methods: gender-equality policies are consistently among the strongest predictors of green orientation. The econometric analysis therefore strengthens the conclusion that environmental and social responsibility, though distinct dimensions, tend to converge within the Italian startup ecosystem.

Overall, the results indicate that Italy is in a transitional phase. Sustainability is increasingly recognized as a source of differentiation and legitimacy but remains more frequently pursued through technological rather than social pathways. The coexistence of multiple entrepreneurial trajectories—from eco-innovative leaders to aspirational green ventures—illustrates the dynamic and evolving nature of sustainable entrepreneurship. Policy implications point to the need for territorially and sectorally tailored instruments capable of supporting the scaling-up of sustainable ventures, enhancing the diffusion of inclusive practices, and strengthening the alignment between innovation and sustainability agendas. Strengthening collaboration infrastructures, promoting inclusive organisational cultures, and supporting region-specific innovation capabilities appear to be essential levers for accelerating the transition toward a more sustainable and competitive entrepreneurial ecosystem.

4.1. Limitations and future research

As with any survey-based investigation, this study is subject to several limitations that should be acknowledged.

First, the analysis relies on self-reported data, which may be affected by perceptual biases or social desirability effects, particularly concerning sustainability and inclusion practices. Second, while the survey provides a large and diverse sample, it represents a cross-sectional snapshot of the Italian startup ecosystem at a specific point in time. Consequently, the findings capture associations rather than causal dynamics, limiting the ability to trace the temporal evolution of sustainability integration within firms.

Third, the operationalization of some constructs - such as inclusion or networking - was necessarily simplified to ensure comparability across respondents, which may have constrained the depth of analysis on these dimensions.

Future research could address these limitations by integrating longitudinal data to examine how sustainability-oriented startups evolve over time, especially in relation to resource accumulation and scaling processes.

Additionally, mixed-method approaches, combining quantitative indicators with qualitative interviews or case studies, would enable a more nuanced understanding of how entrepreneurs translate sustainability values into concrete organizational practices. Finally, comparative studies across countries or regional ecosystems could help contextualize the Italian case within broader European or global patterns, contributing to the refinement of theoretical models linking sustainability, innovation, and institutional environments in early-stage ventures.

Conclusions

The findings depict an ecosystem that is young, research-oriented, and highly heterogeneous, where technological innovation coexists with an emerging, though uneven, sustainability orientation. Italian startups are mainly micro-enterprises founded after 2020, concentrated in ICT and manufacturing, and geographically polarized toward northern and central regions. Sustainability has gained visibility—nearly half of the surveyed firms identify as fully or partially green—yet it remains predominantly operational and technology-based, focused on energy efficiency and process optimization rather than systemic transformation.

Comparative analyses show that green startups are younger, smaller, and more R&D-intensive than non-green ones, suggesting that sustainability and innovation co-evolve. A modest convergence with inclusion is emerging environmentally oriented startups exhibit slightly higher female participation and a greater tendency to adopt diversity policies. Cluster results confirm the multidimensional nature of the ecosystem, highlighting distinct entrepreneurial archetypes that combine varying degrees of innovation, sustainability, and inclusion.

Overall, the Italian startup ecosystem is in transition. Sustainability is increasingly recognized as

a lever of competitiveness and legitimacy, but its integration remains largely technological. Policy efforts should now aim to scale sustainable ventures and foster inclusiveness as a structural component of innovation.

4.2. Limitations and Future Research

The study's cross-sectional nature limits causal inference. Future research should employ longitudinal data to capture evolutionary dynamics and conduct comparative analyses across European countries. Combining survey data with financial performance metrics and qualitative interviews would enrich understanding of how sustainability transitions unfold at the firm level.

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Appendix

Survey

Business survey - the role of start-ups

Date:	10/07/2025
Research code:	2025-141UFE
Document:	Questionnaire Q02
Research methodology:	Cati/Cawi

The start-up ecosystem is playing an increasingly central role in economic development, innovation, the transition to sustainable business models and inclusion policies. However, several factors can influence start-ups' ability to innovate, grow and face market challenges.

This questionnaire aims to analyse:

1 **The role of sustainability**: To examine whether and how 'green' start-ups differ from 'non-green' start-ups in terms of their approach to innovation and access to resources.

2 **The propensity for innovation:** Understanding the extent to which Italian start-ups invest in research and development, adopt new technologies and address the main barriers to innovation.

3 **Entrepreneurial challenges and opportunities**: Identify the main obstacles encountered by entrepreneurs in the start-up and growth phases of a start-up, as well as the most effective levers to support them.

4 **The impact of public policies and financing instruments:** Assessing the effectiveness of available incentives and the role of the regulatory and financial environment in the development of start-ups.

5 **Inclusion, diversity and gender equality:** Assess the presence of women in founding teams and management roles, the implementation of corporate policies for gender equality and diversity management, and the impact of diversity on innovation and the success of start-ups.

The information collected will provide a detailed picture of the current situation, offering useful insights for optimising policies to support innovation and entrepreneurship in Italy.

The questionnaire will take approximately 10 minutes to complete.

SECTION 1 - GENERAL INFORMATION

1.1 Please enter the following information:

- Town and municipality where the company has its registered office
- Turnover range
- Year of establishment
- ATECO code

1.2 Indicate the number of employees and their percentage composition in the years

2023-2024:

- Total number of employees in the company
- % Graduates
- % Employees engaged in research and development
- % of women

1.3 Which of the three requirements of Legislative Decree 2012 does it meet in order to be considered an innovative start-up? [multiple]

- It incurs research and development (R&D) expenses equal to at least 15% of the greater of the cost and total value of production;
- It employs highly qualified personnel (at least 1/3 PhDs, PhD students or researchers, or at least 2/3 with a master's degree);
- It is the owner, depositary or licensee of at least one patent or the owner of registered software.

SECTION 2 - THE ROLE OF SUSTAINABILITY

2.1 Is your start-up considered 'green', i.e. does it integrate environmental sustainability as a central element of its business model, developing products, services or technologies that reduce environmental impact or promote the transition to a sustainable economy?

- Yes
- No
- Partially (specify)

If yes/or partly D2.1 = 1 or 3

2.1.2 The term "impact" refers to the concrete and measurable effects generated by the startup's activity in three fundamental areas. What impacts does your startup pursue? [Multiple - one answer for each item Yes = 1 - No = 2]

1 **Social:** improvement of living conditions, inclusion, well-being of individuals and communities;

2 **Economic:** creation of economic value, jobs, competitiveness, growth;

3 **Environmental**: reduction of pollution, efficient use of resources, protection of ecosystems.

If D.2.1.2 = 1 (for each selected impact)

2.2 Assess the relevance of the impacts pursued on a scale of 0 to 5, where 0 = not at all relevant, 5 = completely relevant:

Social impact	0	1	2	3	4	5
Economic impact	0	1	2	3	4	5
Environmntal impact	0	1	2	3	4	5

ALL

2.3 Which of the following UN 2030 Agenda Goals are pursued or achievable by your start-up?

[Select up to 5 Goals from those listed (SDGs list)]

Presence/Absence - [Multiple of 5]

SDG	Objective	Brief Description
1	End poverty	End poverty in all its forms everywhere.
2	End hunger	End hunger, achieve food security and promote sustainable agriculture.
3	Health and wellbeing	Good health and well- Ensure healthy lives and promote well-being for all at all ages.
4	Quality education	Ensure inclusive, equitable and quality education and learning opportunities for all.
5	Gender equality	Achieve gender equality and empower all women and girls.
6	Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all.
7	Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all.
8	Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
9	Industies, innovation and infrastructures	Build resilient infrastructure, promote sustainable industrialisation and innovation.
10	Reduce inequality	Reduce inequality within and among nations.
11	Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable.
12	Responsible consumption and	Ensure sustainable consumption and production patterns.

	production	
13	**Combat climate change**	**Take urgent action to combat climate change and its impacts.**
14	**Life below water**	**Conserve and sustainably use the oceans, seas and marine resources.**
15	**Life on land**	**Protect, restore and promote sustainable use of terrestrial ecosystems.**
16	**Peace, justice and strong institutions**	**Promote peaceful and inclusive societies, access to justice and effective institutions.**
17	**Partnerships for the goals**	**Strengthen the means of implementation and revitalise the global partnership for sustainable development.**

SECTION 3 - THE PROPENSITY FOR INNOVATION

ALL

3.1 What do you consider to be the main difficulty in innovation? [Single]

- Access to finance
- Bureaucracy
- Lack of talent
- Unresponsive market
- Other (please specify)

Only one difficulty Innovation Q3.1

3.1 How difficult do you think innovation is to pursue? (Rate on a scale of 0 to 5, where 0 = not difficult at all, 5 = very difficult). [Single]

- Access to funding
- Bureaucracy
- Lack of talent
- Unresponsive market
- Other (please specify)

ALL

3.2 Did you invest in R&D in the two-year period 2023-2024?

- Yes

- No

If yes (D3.2 = Yes)

3.2.1 - % of investment on turnover (numerical value from 1 to 100)

ALL

3.2.2 Do you have any future investments planned?

- Yes
- No

If yes (D3.2 = Yes)

- % planned on turnover (numerical value from 1 to 100)

3.3 Did you introduce any innovations in the two-year period 2023-2024?

Yes

No

If yes, D3.3=Yes

3.3.1 What do the innovations concern: [multiple]

- services and products
- services only
- process only

ALL

3.4. Is your company currently active in any of the following areas of the bioeconomy? (You may select more than one answer)

- Sustainable agriculture
- Bioenergy (e.g. biogas, biofuels)
- I Use of biomass or organic waste for the production of new products or energy
- I Green chemistry/industrial biotechnology
- I Production of biodegradable or biobased materials
- I Circular economy (e.g. reuse, advanced recycling, industrial symbiosis)
- We are not active in the bioeconomy sector
- Other (please specify):

If no, D.3.4. = 7

3.4.1. Do you intend to develop projects or activities in this area in the next 3 years?

• Yes

• No

ALL

3.5 Do you collaborate with universities or research centres?

- Yes
- No

- Planned

If yes, D.3.5. = 1

3.5.1 In what way? [Multiple]

- Internships and/or work placements for students
- Industrial research contracts
- Joint research projects
- Other (specify)

ALL

3.6 Have you benefited from public incentives for innovation?

- Yes
- No

ALL

3.7 What sources of funding did your start-up use? [Multiple]

- Private investors,
- Public funds,
- Venture capital,
- Crowdfunding,
- Other (please specify),
- None

ALL

3.8 Did your start-up register any patents or intellectual property in the two-year period 2023-2024?

- Yes
- No
- Planned

SECTION 4 - ENTREPRENEURIAL CHALLENGES AND OPPORTUNITIES AND THE IMPACT OF PUBLIC POLICIES AND FINANCING INSTRUMENTS

4.1 What were your reasons for starting the start-up? [Multiple]

- Passion for innovation
- Economic independence
- Market opportunity
- Social impact
- Other (please specify)

4.2 What were the main difficulties you encountered in the initial phase? [Multiple]

- Bureaucracy
- Access to financing

- Finding talent
- Unresponsive market
- Other (please specify)

4.3 On a scale of 0 (very unfavourable) to 5 (very favourable), how favourable do you think the Italian context (entrepreneurial culture, regulation, ecosystem, access to capital) is to the creation and growth of new start-ups?

	0	1	2	3	4	5

4.4 What tools or resources would have been most useful in developing your startup more successfully? [Multiple]

- Mentorship
- Public incentives
- Training
- Investor network
- Other (please specify)

4.5 What skills do you consider essential for entrepreneurship? (max 3 choices)

Previous experience in the specific sector

- University or postgraduate level of education (Master's, PhD)
- Level of managerial skills
- Level of technical skills
- Level of leadership
- Communication and relationship management skills
- Strategic analysis skills
- Problem-solving skills level
- Other (please specify)

SECTION 5 - INCLUSION, DIVERSITY AND GENDER EQUALITY

5.1 Has the start-up adopted specific policies to promote gender equality and inclusion?

- Yes
- No
- Planned

5.2 What is the percentage of women/female entrepreneurs in the startup's founding team?

- 0%
- 1 to 50%
- 51% to 99%

- 100%

5.3 What percentage of women are in leadership roles in the start-up?

- 0%
- 1 to 50%
- 51% to 99%
- 100%

5.4 Are there policies in place to actively promote diversity in recruitment processes?

- Yes
- No
- Planned

If yes, 5.4=1

5.4.1 What measures are taken? [Multiple]

- Flexible working
- Smart working
- Equal opportunities in promotions
- Parenting support
- Mentoring programmes
- Other (please specify)