



# Working Paper Series

*Understanding Sustainability and Innovation: A Collection of Survey Evidence from Italian Contexts*

by

Davide Antonioli, Elisa Chioatto, Ginevra Coletti, Asia Guerreschi, Susanna Mancinelli, Massimiliano Mazzanti, Giuseppe Rocco, Emy Zecca

**17/2025**

SEEDS is an interuniversity research centre. It develops research and higher education projects in the fields of ecological and environmental economics, with a special focus on the role of policy and innovation. Main fields of action are environmental policy, economics of innovation, energy economics and policy, economic evaluation by stated preference techniques, waste management and policy, climate change and development.

The SEEDS Working Paper Series are indexed in RePEc and Google Scholar.  
Papers can be downloaded free of charge from the following websites:  
<http://www.sustainability-seeds.org/>.

Enquiries: [info@sustainability-seeds.org](mailto:info@sustainability-seeds.org)

SEEDS Working Paper 17/2025  
December 2025

By Davide Antonioli, Elisa Chioatto, Ginevra Coletti, Asia Guerreschi, Susanna Mancinelli,  
Massimiliano Mazzanti, Giuseppe Rocco, Emy Zecca

The opinions expressed in this working paper do not necessarily reflect the position of SEEDS as a whole.

# Understanding Sustainability and Innovation: A Collection of Survey Evidence from Italian Contexts

Davide Antonioli<sup>a</sup> Elisa Chioatto<sup>a</sup> Ginevra Coletti<sup>b</sup> Asia Guerreschi<sup>a</sup>  
Susanna Mancinelli<sup>a</sup> Massimiliano Mazzanti<sup>a</sup> Giuseppe Rocco<sup>a</sup> Emy Zecca<sup>c</sup>

## Abstract

This work brings together a set of large-scale empirical surveys designed to explore how Italian territories, firms, institutions, and communities are navigating the transition toward sustainability, innovation, and social well-being. The studies span diverse but interconnected domains—from sustainable school mobility in Ferrara to innovation dynamics in manufacturing firms, construction companies, cooperatives, and cultural heritage ecosystems. Despite their different targets, the surveys share a common analytical framework grounded in rigorous sampling strategies, mixed-method data collection, and multidimensional questionnaires. Together, they offer a comprehensive portrait of how behavioural, organisational, financial, and cultural factors shape the uptake of green practices, digital technologies, circular-economy models, and community-oriented initiatives. By combining quantitative indicators with perceptions, motivations, and contextual conditions, the research provides evidence-based insights capable of supporting policy design and territorial planning. The collection stands as a significant contribution to the understanding of Italy's twin transition—ecological and digital—while revealing the pivotal role of local contexts, social participation, and institutional frameworks in driving sustainable transformation.

---

<sup>a</sup> Department of Economics and Management, University of Ferrara; Sustainability Environmental Economics and Dynamics Studies (SEEDS)

<sup>b</sup> Department of Economics and Management, University of Ferrara; Sustainability Environmental Economics and Dynamics Studies (SEEDS); Department of Sciences, Technology and Society, Scuola Universitaria Superiore IUSS Pavia.

<sup>c</sup> Department of Chemical, Pharmaceutical and Agricultural Sciences, University of Ferrara; Sustainability Environmental Economics and Dynamics Studies (SEEDS)

## **Sustainable Mobility for School Transportation in Ferrara- financing by PNRR project ECOSISTERS – Ecosistema Territoriale di Innovazione dell’Emilia-Romagna (Missione 4 Componente 2, Investimento 1.5).**

Aim of the research is investigating the reasons why a “*Pedibus*” system, also known as Walking School Bus (WSB) is not fully adopted or in many situations fails.

WSB can be described in terms of trained adults, so called WSB drivers, who follow an assigned route, a so-called WSB line, and make stops at specified times and locations to collect children. WSB has nowadays regained popularity as a short-term action to facilitate the ecological transition towards sustainable mobility, as testified by several papers in scientific literature.

This study employs a quantitative descriptive-analytical research design to examine parents’ attitudes, behaviours, and economic willingness related to the Walking School Bus (WSB) service. Positioned within the field of sustainable school mobility, the research investigates how social, organisational, and perceptual factors shape parents’ choices regarding active travel for their children. A comparative group design was adopted to analyse differences across three parent groups: (1) users of an active WSB service, (2) non-users in schools where the service is active, and (3) parents whose children attend schools without the service. This structure enabled a cross-sectional comparison of perceptions, barriers, trust, social participation, and economic preferences, capturing contextual factors relevant to local sustainable mobility dynamics.

The study sample includes 711 parents from 15 primary schools in Ferrara, selected through stratified purposive sampling to ensure adequate representation of areas with and without WSB services. Participation was voluntary. The final sample was balanced: 51% from schools without the service, 39% non-participants in active-service schools, and 10% active participants, ensuring strong comparability across groups.

Data were gathered through a structured online questionnaire administered between September and November 2024 by BVA Doxa using the Conformit (Forsta) platform. The self-administered Italian survey required about 10–13 minutes to complete and followed a five-section structure exploring socio-demographic characteristics, mobility patterns, perceived benefits and barriers, social participation and social capital, and parents’ personal and economic willingness regarding the WSB. Conditional logic adapted questions to respondents’ school contexts. The instrument integrated constructs from validated active school travel studies, and all items were adapted to Ferrara’s social and urban context.

The questionnaire began with socio-demographic and family characteristics, followed by questions on home–school mobility, transport modes, travel time, costs, and perceived safety. It then assessed perceived benefits (e.g., autonomy, socialisation, environmental impact) and barriers (e.g., infrastructure, schedules, distance). Additional items captured trust in volunteers and parents’ willingness to encourage participation. The social capital section examined civic engagement, interpersonal networks, trust in individuals and institutions, and environmentally responsible behaviours. The final section evaluated personal and economic willingness, including interest in volunteering, service activation, and willingness to pay (WTP) or accept compensation (WTA), with follow-up questions clarifying zero-responses.

Prior to fielding, the instrument underwent a qualitative pre-test with 27 parents, using semi-structured interviews to assess clarity, relevance, and coherence. Revisions improved alignment with local school contexts. Reliability tests showed strong internal consistency, with Cronbach’s  $\alpha = 0.82$ , confirming the robustness of the Likert-scale measures.

## **Territories, Innovations, and Knowledge for Circular Economy Research – TINKER project financing by PNRR project GRINS – Growing Resilient, Inclusive and Sustainable (Missione 4, Componente 2, Investimento 1.3)**

TINKER survey was conducted on a sample of 740 manufacturing firms operating across the entire Italian territory and financed by GRINS PNRR project. The sample was constructed to ensure a high degree of representativeness of the national industrial fabric, using stratification by firm size and macro-geographical area to capture the heterogeneity of regional production systems and sectoral structures. This methodological strategy enables a balanced depiction of micro-, small-, medium-, and large enterprises embedded in diverse local contexts, reflecting the structural complexity of Italian manufacturing.

The questionnaire served as the primary research instrument for data collection and was designed as a comprehensive tool capable of capturing both tangible and intangible dimensions of firm behaviour. Combining descriptive and analytical components, it collects systematic information on structural characteristics, investment decisions, innovation capacity, and organisational responses to the ongoing environmental and digital transitions. Quantitative indicators—such as investment levels, turnover composition, and workforce structure—are complemented by qualitative measures relating to managerial culture, strategic orientation, and awareness of sustainability goals.

The survey instrument is organised into four interrelated thematic areas. The first focuses on firm identity and organisational structure, gathering information on location, legal form, sector, size, and respondent characteristics. It also explores corporate group affiliation, year of establishment, production typology, and revenue class. Special attention is devoted to innovative business models, including start-ups and benefit corporations, for which additional questions address the adoption of impact metrics, familiarity with the United Nations Sustainable Development Goals (SDGs), and alignment with specific sustainability targets.

The second thematic area examines firms' innovation and investment behaviour. It investigates resources allocated to research and development in 2023–2024 and the introduction of technological, process, organisational, and digital innovations. Distinguishing between incremental and radical innovations, the questionnaire evaluates their degree of novelty—new to the firm, sector, or market—and assesses the adoption of enabling technologies such as artificial intelligence, the Internet of Things, blockchain, and digital twins. This section also analyses the financial mechanisms supporting innovation, including internal funds, bank credit, public subsidies, and alternative finance instruments such as venture capital and crowdfunding, while exploring firms' perceptions of the adequacy of existing financial tools.

The third section addresses circular economy and sustainability practices, examining investments and innovations aimed at resource efficiency, waste minimisation, and product redesign. Activities such as recycling, reuse, and the use of renewable or bio-based materials are investigated alongside related financing strategies. Emphasis is placed on firms' participation in green public procurement and exposure to green finance mechanisms. The section also assesses awareness of the European Emissions Trading System (ETS), expectations for investment trends in 2025–2026, and the extent to which sustainability principles are incorporated into corporate governance. Respondents are asked about the adoption of international reporting standards—including GRI, ESRS, and TCFD—and their perceptions of climate change and its implications for business operations.

The final thematic area centres on human capital, organisational culture, and firms' innovation capabilities. It gathers quantitative data on training activities, skills development, and the relevance attributed to scientific, digital, linguistic, managerial, and social competencies. The section further explores recruitment dynamics and firms' involvement in broader innovation ecosystems, identifying collaborations with universities, research centres, start-ups, clusters, and local development agencies. These partnerships are conceptualised as critical enablers for technological upgrading and organisational renewal.

Overall, the survey and questionnaire together constitute an integrated analytical framework that provides a multidimensional interpretation of how Italian manufacturing firms are responding to the challenges posed by sustainability and innovation. By combining quantitative evidence with qualitative insights, the study offers a nuanced understanding of the transformation processes shaping the national industrial system. The findings support both academic inquiry and policy design, providing valuable guidance for policymakers, regional authorities, and industrial stakeholders engaged in advancing the twin transition and promoting Italy's post-pandemic economic renewal.

## **State of circular economy implementation in the construction sector – SPIDER project financing by PNRR project GRINS – Growing Resilient, Inclusive and Sustainable (Missione 4, Componente 2, Investimento 1.3)**

The objective of this research is to assess the level of innovation among construction firms in the Emilia–Romagna region, with a particular focus on the adoption of circular-oriented innovation practices. The study aims to evaluate how extensively these firms have integrated circular economy principles into their activities, in alignment with both regional priorities and European policy frameworks promoting the transition toward a more sustainable, resource-efficient construction sector.

The survey was administered to construction firms located in Emilia–Romagna using CATI/CAWI methodologies, with technical support from the survey company Demetra. The reference period for the collected information primarily covers the triennium 2022–2024, although some items also refer to previous years. The sample consists of 1,200 firms stratified by geographical area (according to Istat classifications), technological intensity (based on the Eurostat taxonomy of low-tech, medium-low-tech, medium-high-tech, and high-tech sectors), and firm size (small: 10–49 employees; medium: 50–249; large:  $\geq 250$ ). A subset of respondents had also participated in an earlier data collection covering the period 2018–2020, allowing for a broader temporal perspective for these firms. The surveyed firms operate in the construction domain with ATECO codes 23.2 (manufacture of refractory products), 23.32 (manufacture of bricks, tiles, and other construction materials in clay), 23.5 (manufacture of cement, lime, and plaster), 23.6 (manufacture of concrete, cement, and plaster products), 41 (construction of buildings), 42 (civil engineering), and 43 (specialized construction works, excluding 43.2).

The questionnaire is organized into three main sections. The introductory section collects general information about the firm (identification details, location, ATECO code, size) and about the respondent's position and educational background.

*Section 1* focuses on firm characteristics, gathering data on group affiliation, year of establishment, market orientation, employment levels, and the presence of quality and environmental certifications such as ISO 9001, ISO 14001, and EMAS. This section also examines firms' awareness of EU protocols concerning the management of C&D waste.

*Section 2* investigates innovation behaviour and investment efforts. Firms are asked whether they introduced product or process innovations in the reference period, the main obstacles faced during these innovation processes, and the external actors or institutions from which they would have benefited by receiving support. Additional items collect information on R&D investments, collaboration activities, and patent applications.

*Section 3* examines the adoption of circular-oriented innovations, focusing on specific practices related to the reuse and recovery of C&D waste. Firms were asked whether they had implemented any of six specific practices between 2022 and 2024: i) Replacing natural inert materials with high environmental impact with more sustainable alternatives; ii) Reducing the generation of construction waste; iii) Implementing selective demolition; iv) Carrying out decontamination activities; v) Reusing C&D waste within their own production processes; vi) Transferring C&D waste to other companies for reuse in their production processes. Complementary questions explore the financial resources used to support circular actions, the role of peer influence in circular innovation diffusion, awareness of End-of-Waste processes, market demand trends for recycled materials, and participation in public tenders requiring compliance with Minimum Environmental Criteria (CAM).

Overall, the questionnaire offers a comprehensive assessment of innovation dynamics, and circular-economy diffusion within the Emilia–Romagna construction sector, contributing to a deeper understanding of the transition toward more sustainable production models.

## **Ecosistema Territoriale di Innovazione dell'Emilia-Romagna- ECOSISTER financing by PNRR project - Missione 4 Componente 2, Investimento 1.5**

The objective of this research is to gather detailed information on the structural, organizational, and innovative characteristics of firms operating in Emilia–Romagna, with a particular focus on sustainability and the transition toward a circular economy. The study aims to assess both firms' awareness of and engagement with sustainability (social and green dimensions) and circular economy practices, as well as their capacity to undertake environmental investments.

The survey was conducted within the framework of the ECOSISTER project (PNRR) and targeted firms operating in the Emilia–Romagna region (Italy). It was administered using CATI/CAWI methodologies, with technical support provided by the research company Format Research. Data collection took place between January and May 2025. The information gathered refers primarily to the period 2019–2023. The final sample comprises 2,308 firms with more than five employees, active across both manufacturing and service sectors. The sample design follows a stratified structure based on firm size, province, and sector, ensuring robust representativeness of the diverse segments characterizing the regional production system.

The questionnaire was structured into the following sections:

*Section A* gathers basic firms' information, including identification data, location of operational units, ATECO code, and the firm's classification within the Emilia–Romagna Smart Specialisation Strategy (S3) framework.

*Section B* examines ownership and organizational structure, investigating whether firms belong to corporate groups, the characteristics of ownership and managerial control, family involvement across generations, and educational profiles of top managers. This section provides a picture of the governance arrangements that may influence sustainability decision-making.

*Section C* explores workforce composition and labour organization, collecting data on employment levels by occupational category and qualitative information on skills, training, and the involvement of employees in sustainability-related activities. This allows us to assess the human capital conditions underpinning the adoption of innovative and circular practices.

The most substantial sections (*Sections D, E, F, G*) focus specifically on green investments, environmental management practices, and the adoption of circular economy strategies. Firms are asked to report on the types of environmental investments carried out in recent years and on the financial sources used to support these actions, including dedicated regional or European instruments. A core component of this section examines circular-oriented innovation, including the drivers and obstacles to their implementation.

Finally, *Section H and Section I* investigate firms' familiarity with regulatory frameworks and certification schemes (e.g., ISO 14001, EMAS), their participation in public tenders requiring Minimum Environmental Criteria (CAM), and the market conditions influencing the demand for recycled or low-impact materials. Finally, it explores mechanisms of knowledge diffusion, including the role of peer influence, networks, and external actors in facilitating the adoption of circular practices.

Overall, the questionnaire offers a multidimensional and integrated dataset capable of capturing firms' innovation capabilities, and progress toward green and circular transformations. It provides a solid empirical basis for analysing how different organizational, financial, and regulatory factors shape the transition to sustainability in the regional production system.

## Survey Climate Circular Coop 2025 – University of Ferrara

The survey is designed specifically to study innovation behaviour among Italian manufacturing cooperatives. In particular, the aim of this study is to collect detailed information on cooperatives' engagement in circular economy and digital innovation, in order to examine their role in fostering the so-called twin transition.

The survey was administered from January until May 2025 to worker and producer cooperatives in the manufacturing sector (NACE Rev. 2 Section C) in Italy, using CATI/CAWI methodologies, with technical and data collection support from the survey company IZI. The updated database of these cooperatives, extracted from InfoCamere, comprises 2,118 units and constituted the final reference population. The survey achieved the planned 10% coverage, yielding a final sample of 212 manufacturing cooperatives, stratified by geographical area (North, Centre, and South and Islands), and firm size (micro: 0-9 employees; small: 10-49; medium: 50-249; large:  $\geq 250$ ). Moreover, the reference time for the collected information covers the triennium 2021-2023, although some topics refer to the years prior 2021. The final outcome is a cross-sectional dataset. The survey is structured into four distinct sections:

*Section 1: "General Information and Level of Innovation."* This section is including 12 questions regarding the sector activity, the composition of the workforce, and the general innovation behaviour of the cooperative in the reference period; in particular, if they have adopted a process, product or organizational innovation during the three-year period analysed. Additionally, information about R&D investments is collected in this section.

*Section 2: "Circular Economy and Eco-Innovation."* In this section it is examined the adoption of circular economy innovations. In particular, the cooperatives were asked whether they implemented (or not) any of these eleven specific practices in the reference period: i) increase in the use of renewable energy sources; ii) reduction in water consumption; iii) reduction in material use; iv) reduction in electricity consumption (from any kind of source); v) reduction in the amount of waste generated (per unit of output); vi) reuse of waste within the firms' own production cycle; vii) transfer of waste to other firms that reuse it in their production cycles; viii) sustainable sourcing of raw materials; ix) modification of product design to improve recyclability; x) development or sale of products made with recovered or recycled materials; and xi) change in the production process to reduce greenhouse gas emissions. In addition, the section also has questions on the perceived internal and financial barriers to introducing such practices, and on future intentions regarding the implementation of these innovations.

*Section 3: "Twin Transition."* In this part the questionnaire broadens the aspect of digital innovation adoption and its relationship with environmental applications. Cooperatives in particular were asked whether they adopted in the reference period one of these Industry 4.0 technologies: i) 3D printing; ii) artificial intelligence; iii) big data; iv) information technology infrastructure; v) internet of things; vi) others. Moreover, as in the previous section, information about the perception on internal and financial barriers were collected. Finally, a segment of this section was dedicated to employee training.

*Section 4: "Relationship with Third Parties and External Stakeholders."* The closing section of the survey delved deeper into the collaboration of cooperatives with other firms or stakeholders, as well as relationships within the supply chain and strategies for exporting.

Overall, the Climate Circular Coop survey gives a comprehensive original dataset on innovation practices in the Italian manufacturing cooperative movement, with specific focuses on the circular and digital dimensions of innovation adoption. The combination of detailed information on circular and technological innovation adoption, organizational behaviour, perceived barriers, and cooperation with external stakeholders, the survey could offer unique opportunity to analyse how cooperatives respond to emerging environmental and digital challenges. The cross-sectional dataset lays the groundwork for empirical investigations into the drivers and barriers of innovation in the cooperative sector, contributing to a better understanding of their role in shaping the twin transition.

**Cultural Heritage Impact Survey 2025 – University of Ferrara | PNRR MISSIONE 4, COMPONENTE 2 - Dalla ricerca all'impresa – Linea di investimento 1.5 finanziato dall'Unione europea – NextGenerationEU Titolo del progetto: Ecosystem for Sustainable Transition in Emilia-Romagna**

This survey has been designed and coordinated by the University of Ferrara, Department of Economics and Management, with the aim of examining how cultural heritage influences local communities and visitors. In particular, the study collects detailed information on both the economic and non-monetary impacts of cultural heritage, focusing on quality of life, employment opportunities, community identity, and overall well-being. The questionnaire is part of the activities of SPOKE 4, funded under Italy's National Recovery and Resilience Plan (PNRR). The survey was selected between June – September 2025 using a mixed-method approach combining CAWI/CATI. For both target groups—tourists/visitors and residents—the survey followed structured sampling procedures: CAWI interviews were administered through an online panel, while CATI interviews were carried out by trained interviewers under supervised conditions. Each target group consisted of 1,900 respondents, achieved through a combination of 1,300 CAWI and 600 CATI interviews divided by 50% of tourists and 50% residents per macro area. The division was carried out with a control question where the user replies if they have visited any cultural area in the last six years.

The concept of cultural heritage follows the UNESCO definition and includes objects, buildings, sites, and museums of historical, artistic, scientific, or social value. It encompasses both tangible heritage—such as monuments, artworks, archaeological sites, and industrial heritage—and intangible elements only when integrated into cultural or natural assets. Traditions unrelated to heritage sites (e.g. festivals, celebrations) are excluded from this scope.

The survey targets two distinct populations: (i) tourists and visitors, who provide perceptions based on one or multiple visits to cultural heritage sites; and (ii) residents, who report their views as inhabitants of the area where the heritage is located. Respondents are asked to answer freely, drawing on their own experience, as there are no right or wrong responses. The survey results supported the assessment of the socio-economic contribution of cultural heritage and its relevance for community well-being and territorial development.

The questionnaire is structured into four thematic sections, tailored to each group.

*Section 1: Demographic and Socio-Economic Profile.* This section gathers essential background information, including age, gender, education level, employment status, household composition, income group, and—where relevant—whether the respondent works in sectors linked to cultural heritage. For those employed in such sectors, additional questions explore perceived effects on job creation and key non-monetary benefits for the local community.

*Section 2: Visitation Patterns and Cultural Preferences.* Tourists and residents are asked about the frequency with which they visit cultural heritage sites, preferred periods of the year, typical destinations, and the types of sites that attract them most (e.g. archaeological sites, historic towns, industrial heritage, museums, cultural landscapes). This section also investigates the main barriers that limit visitation, including time constraints, accessibility issues, costs, or lack of interest.

*Section 3: Monetary Valuation.* This part of the survey focuses on respondents' willingness to pay for access to cultural heritage sites and for additional on-site services such as guided tours, educational activities, or digital enhancements. It includes questions on willingness to contribute financially to heritage maintenance (e.g. through voluntary contributions or targeted cultural fees) and a set of attitudinal statements rated on a 1–5 scale, covering topics such as subscription models, donation-based access, cost sensitivity, cultural expenditure habits, and support for public funding.

*Section 4: Non-Monetary Valuation and Well-Being.* The final section assesses how cultural heritage contributes to personal and community well-being. Respondents rate their agreement with statements regarding personal satisfaction, relaxation, historical awareness, sense of belonging, community identity, participation in cultural activities, and interest in preservation efforts. An open question explores broader perceptions of how cultural heritage affects the overall well-being of residents in the areas visited or inhabited.

Overall, the survey provides a comprehensive dataset combining economic, behavioural, and perceptual dimensions of cultural heritage valuation. By integrating both tourist and resident perspectives, the survey offers an original empirical basis for analysing how cultural heritage shapes local development, community identity, and social well-being. The dataset will support evidence-based research and policy discussions on the role of cultural heritage within territorial and cultural planning frameworks.