

University Food Policies

DESIGNING SUSTAINABLE FOOD SYSTEMS ON CAMPUS

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Foreword

This book is one of the outcomes of the OnFoods project, a major research initiative within the Italian food system. OnFoods is coordinated by the OnFoods Foundation and supported by the Italian Ministry of University and Research (MUR) through the National Recovery and Resilience Plan (PNRR), within the framework of Extended Partnerships, large public-private alliances dedicated to fundamental research on strategic societal challenges.

The OnFoods project brings together a wide network of actors, including private companies, public research institutions, and universities and research centres, working collaboratively to address the sustainability, safety, and security of food systems. This collaborative approach reflects the increasing need to tackle food-related challenges through integrated and systemic perspectives, capable of bridging research, innovation, policy-making, and real-world applications.

OnFoods aims to promote new models of sustainable nutrition and to generate a tangible impact on the well-being and health of communities, while contributing to environmental protection and ensuring

access to adequate nutrition for all. The project involves more than 600 researchers across Italy, over 300 of whom have been recruited thanks to PNRR funding, working across seven research areas, ranging from the socio-economic sustainability of food systems to food safety, from improving food quality to promoting healthy diets, and from disease prevention to the development of evidence-based public policies. In this sense, OnFoods contributes to advancing the European and global agenda on food systems, in alignment with initiatives such as the European Green Deal, the Farm to Fork Strategy, and the Food 2030 framework.

Politecnico di Milano has played an active role in the consortium, contributing to SPOKE 1, coordinated by the University of Parma and focused on “Global sustainability: fair food market for healthy citizens”, and SPOKE 2, coordinated by the National Research Council and focused on “Smart and circular food systems and distribution”. Several projects have been developed across five departments: “Design”, “Management, Economics and Industrial Engineering”, “Architecture, Built Environment and Construction Engineering”, “Chemistry, Materials and Chemical Engineering”, and “Electronics, Information and Bioengineering”, highlighting the multidisciplinary nature of the contribution.

This book presents the results of the project “Public and Private Food Procurement and Short Food Supply Chains in Urban Areas” (PPP-URB). Following a first publication focused on the analysis of case studies on public and private food procurement and short food value chains, this second volume advances the research by presenting the outcomes of prototyping and testing activities. In particular, it explores the application of the Guidelines for University Food Policies developed within the project, with a specific focus on university campuses as experimental environments for sustainable food systems.

By positioning universities as complex food environments and as platforms for experimentation, the PPP-URB project highlights their potential to act as catalysts for innovation and transformation within urban food systems. Universities are not only places of education and research, but also institutional actors capable of influencing food practices, procurement systems, and governance arrangements at multiple scales.

This book contributes to the broader objectives of OnFoods and to the ongoing debate on the role of public institutions in shaping food policies through research, innovation, and societal engagement. At the same time, it offers practical insights and operational tools that can support universities in translating strategic visions into concrete actions, fostering a more sustainable and equitable food future.

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Introduction

Universities are emerging as strategic actors in the transformation of food systems, not only as places of knowledge production, but as environments where policies can be designed, tested, and implemented in real conditions.

Food systems are increasingly recognised as a critical domain for addressing some of the most pressing global challenges, including climate change, public health, social equity, and economic resilience. Within this evolving landscape, public institutions are called upon to play a more active role in shaping food systems through policies, procurement practices, and everyday operational choices. Among these institutions, universities occupy a particularly strategic position.

Universities are not only centres of education and research, but also complex organisational environments in which food is procured, distributed, consumed, and discussed on a daily basis. Their campuses function as microcosms of broader urban systems, bringing together diverse populations, infrastructures, and practices. As such, they represent promising arenas for experimenting with innovative

approaches to food policy, capable of linking institutional governance with behavioural change, and local action with systemic impact.

This volume is developed within the framework of the PPP-URB project (Public and Private Food Procurement and Short Food Value Chains in Urban Areas), part of the OnFoods research and innovation network. The project explores how food procurement and short food supply chains can be leveraged to enhance the sustainability, accessibility, and quality of food systems, with a specific focus on urban and institutional contexts. In particular, PPP-URB investigates the role of universities as key actors in the transition towards more sustainable and inclusive food systems.

The book builds upon a multi-phase research trajectory. An initial phase focused on mapping and analysing existing practices and case studies related to food procurement and food policies across different contexts. This work informed the identification of strategic variants, highlighting key dimensions and approaches through which universities can address food system challenges. Building on this foundation, the project developed the Guidelines for University Food Policies, which provide a structured yet flexible framework to support institutions in designing context-specific food policies. The final phase of the research, presented in this volume, focuses on the prototyping and testing of these guidelines within different university settings.

The first chapter introduces the Guidelines for University Food Policies and presents the overall conceptual and methodological framework of the project. It outlines how strategic variants derived from case study analysis are translated into categories of action and operational guidelines, and how these are further tested through prototyping activities. In doing so, the chapter establishes the foundations for understanding the subsequent contributions.

The following chapters present a series of experimental applications developed by the project partners, each exploring specific dimensions of university food systems.

The chapter by Politecnico di Milano (Design Department) focuses on the co-design process of the Polimi Food Policy, demonstrating how participatory methodologies can support the validation and implementation of policy guidelines within an institutional context. By integrating top-down strategic directions with bottom-up contri-

butions, the chapter highlights the role of co-design in translating shared principles into actionable measures.

The contribution from Department of Management, Economics and Industrial Engineering (Politecnico di Milano) addresses food waste as a critical issue within university food systems. Through the development and testing of a surplus food management strategy and a dedicated monitoring system, the chapter provides evidence on how data-driven approaches can support waste reduction and inform decision-making processes.

The chapter from the University of Bari Aldo Moro presents an empirical study on university canteen services, analysing users' perceptions and identifying key areas for improvement, including food quality, sustainability, and service organisation. The findings contribute to the definition of context-sensitive best practices and support the development of participatory approaches to food service innovation.

The University of Catania explores the role of education in promoting sustainable food systems, analysing how themes related to food and sustainability are integrated into university curricula. The results reveal the need for more interdisciplinary and systemic approaches, highlighting education as a key lever for long-term transformation.

The University of Milan examines food consumption behaviours on campus and their environmental implications, using survey data and Life Cycle Assessment (LCA) to evaluate the impact of everyday practices. The chapter demonstrates how behavioural insights, combined with infrastructural interventions, can inform evidence-based food policies.

The University of Naples Federico II focuses on stakeholder engagement and participatory governance, presenting experimental initiatives such as a permanent listening forum and awareness-raising activities. The chapter highlights the importance of continuous feedback and active involvement of the university community in shaping sustainable food services.

Finally, the University of Parma investigates the role of short food supply chains through the UNIPR Bio Bag experiment, exploring both the opportunities and challenges of integrating local and sustainable

food systems into university procurement. The results provide valuable insights into the conditions required for scaling such initiatives.

Taken together, these contributions illustrate how the Guidelines for University Food Policies can be translated into diverse and context-specific practices, generating evidence, feedback, and learning. Rather than presenting a single model, the volume demonstrates the multiplicity of possible pathways through which universities can engage with food policy, combining strategic vision, operational tools, and experimental approaches.

By framing universities as active agents within food system transformation, this book contributes to the broader debate on the role of public institutions in advancing sustainability transitions. At the same time, it offers conceptual and practical resources for researchers, practitioners, and policy-makers interested in developing and implementing University Food Policies across different contexts.

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1. Guidelines for University Food Policy

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ABSTRACT

This chapter introduces the *Guidelines for University Food Policy*, developed as the third deliverable of the PPP-URB project within the *OnFoods - Research and Innovation Network on Food and Nutrition Sustainability, Safety and Security*. The guidelines aim to support higher education institutions in promoting healthy, sustainable, and inclusive food systems by leveraging public and private procurement and short food value chains. Building on earlier research phases – including the mapping of ongoing university-based initiatives related to food, and a comparative analysis of best practices through both qualitative and quantitative desk research (ranging from local to international case studies, including those developed by the research teams involved) – the chapter provides universities with a strategic and operational framework to reconsider their role as living laboratories for food transition. Drawing on perspectives from design, management, and sustainability studies, the guidelines define shared goals, principles, and areas of action that connect campus food services with education,

research, and community engagement. Particular emphasis is placed on co-design approaches involving students, faculty, staff, and external actors, ensuring that food policies are context-specific, inclusive, and measurable over time. In doing so, the guidelines contribute to positioning universities as key actors in urban food system transformation, in alignment with the European Green Deal, the Farm to Fork Strategy, and the Food 2030 agenda.

1.1 Universities as Territorial Food Environments

Food systems have increasingly become a crucial area for public policy, addressing concerns related to health, environmental sustainability, social fairness, and local economic growth (Lang, Barling, & Caraher, 2009; Mason & Lang, 2017; Willett *et al.*, 2019). In this context, public and private food procurement has gained recognition as a significant policy instrument that can affect production methods, consumption trends, and governance structures at various territorial levels (European Commission, 2008; Kunzlik, 2013; Rejeb *et al.*, 2023). Universities, being significant public entities with considerable purchasing power and well-defined food environments, are particularly suited for the evaluation of novel and integrated food policies (Doherty, Cawood, & Dooris, 2011; Newton, Dooris, & Wills, 2016). Universities can be seen as multilayered environments where food is bought, served, and distributed every day (Kretschmer & Dehm, 2021). Campus food systems include different types of food stations, both formal and informal. These include canteens, bars, vending machines, catering services, and self-production programs like community gardens. Each may be run through different – and sometimes not integrated – governance and procurement procedures. These factors together affect the academic community's eating habits, the impact of the overall system, the work/study environment, and the way people get along with each other (Tam *et al.*, 2017; Martinez-Perez *et al.*, 2022). From a policy perspective, university campuses represent meso-scale arenas where public objectives meet the implementation capacity of private actors. Public-private

partnerships often provide food services, which means that procurement is a key link between institutional and market goals. Universities are also part of local and regional food systems, where they work with growers, suppliers, municipalities, and civil society organizations. This positioning allows campuses to serve as territorial hubs for testing short food value chains and alternative food networks, while staying closely connected to the urban fabric and communities surrounding them (Forno & Maurano, 2016; McKeon, 2019). In fact, seeing universities as territorial food ecosystems means moving from sectoral approaches to systemic governance models. In these models, food policies look at production, distribution, consumption, and waste management as parts of a whole. This viewpoint aligns with integrated food policy frameworks that prioritize multi-level governance, stakeholder engagement, and contextual adaptation, offering a conceptual foundation for perceiving universities as proactive participants in food system transformation rather than merely as venues for food consumption (Harper *et al.*, 2009; Curtabbi, 2025). This perspective aligns with the PPP-URB project (Public and Private Procurement and Short Food Value Chains in Urban Areas) objectives and final results, presented in this chapter. It is one of the flagship projects in the OnFoods research and innovation network, which is sponsored by the National Recovery and Resilience Plan (NRRP). PPP-URB looks at how food procurement tactics and short food value chains may be used to make the food served in places like university campuses more sustainable, affordable, and of higher quality. This project takes a systemic and multi-actor approach to food governance and integrated food policy. It looks at food systems as socio-technical and territorial structures instead of just sectoral supply chains (McKeon, 2019; Curtabbi, 2025).

Within PPP-URB, research endeavors have been organized into a series of project deliverables aimed at incrementally enhancing knowledge and developing operational tools for sustainable food governance. The first deliverable concentrated on the mapping and analysis of public and private food procurement case studies, focusing attention on understanding their systemic impact on their local food ecosystems, especially on university campuses, and providing a conceptual basis for the formulation of strategic food policy

for university campuses (Fassi *et al.*, 2024). The second deliverable served to the definition of strategic options, contextualized methods, and priority areas to help universities make food policies that work in different places and for different groups of people. Building on this basis, the third deliverable, detailed in this chapter, turned strategic directions into operational guidelines and tested them through prototyping and experimentation inside the contextual contexts of partner universities.

1.2 From Strategic Variants to Operational Guidelines

1.2.1 Strategic Variants and the Role of Case Studies

Moving from strategic frameworks to policies that can be effectively implemented represents a major challenge in food policy development. While strategic visions are essential for defining long-term objectives and guiding principles, they often remain abstract unless supported by tools that enable their translation into action within specific institutional and territorial contexts (Howlett, 2018). The second deliverable of the PPP-URB project addressed this challenge by developing a set of strategic variants grounded in empirical evidence and informed by the multidisciplinary expertise of the project partners, spanning design, management, agriculture, economics, and biological sciences.

Within PPP-URB, the strategic variants are conceived as a set of complementary thematic and operational contributions, each focusing on a specific dimension of university food systems. Rather than representing alternative strategies to be selected, the variants identify key areas that require coordinated policy attention, including participatory spatial and service design, procurement management and monitoring tools, legal and biodiversity frameworks, alternative food networks and social farming, life cycle assessment and eco-design approaches, sustainable public procurement models, and territorial impact indicators. Together, these variants articulate different ways of addressing shared food system challenges, such as sustainability, affordability, inclusiveness, and governance, by

combining policy vision, areas of intervention, and implementation logics. In this sense, the strategic variants function as modular components of a broader policy architecture, providing a structured yet non-prescriptive basis for informing priorities and guiding the subsequent development of operational guidelines across diverse university contexts.

The definition of the strategic variants was further informed by an extensive analysis of food policy case studies, spanning both city-level policies and those developed within universities – which often operate independently from municipal strategies. The comparative review revealed recurring areas of intervention, including nutrition, procurement, food service organisation, waste management, education, and participation, alongside significant differences in governance arrangements and degrees of stakeholder involvement. Rather than converging towards a single model, the case studies showed how universities have developed context-specific food policies aligned with their institutional missions and long-term sustainability strategies.

Table 1.1 synthesises a selection of these best practices, illustrating how different policy focuses and governance configurations contributed to shaping the PPP-URB strategic variants. Overall, the case studies indicate that University Food Policies tend to converge around a limited number of strategic dimensions, such as procurement standards, nutritional quality, sustainability criteria, participation, and monitoring, while differing in terms of governance models and levels of institutionalisation. These recurring patterns informed the definition of the PPP-URB strategic variants, which were designed to be transferable across contexts while remaining adaptable to diverse organisational structures, territorial food systems, and policy priorities. Consistent with contemporary perspectives on food policy as a dynamic and iterative process rather than a fixed set of rules, the strategic variants are intended to support multiple policy pathways rather than prescribe universal solutions (Lang, 2013; Sonnino, 2018). As emphasised in design-for-policy literature, their effectiveness ultimately depends on their capacity to be translated into situated actions through adaptive and participatory processes (Bason, 2014; Junginger, 2013).

University/ Institution	Policy focus	Key domains addressed	Governance approach	Relevance for PPP-URB strategic variants
University of Helsinki	Climate-oriented food policy	Nutrition guidelines; sustainability; transparency	Centralised, aligned with sustainability strategy	Integration of food policy within institutional sustainability plans
EPFL	Sustainable gastronomy	Procurement; monitoring; food offering sustainability	Institutional leadership with measurable targets	Use of commitments and KPIs as drivers of change
University of Cambridge	Low-carbon catering	Sustainable menus; training; waste reduction	Decentralised (college-based)	Role of training and procurement in distributed systems
Università Bocconi	Health-oriented food policy	Nutrition quality; food offering variety; communication	Centralised campus services	Alignment between nutritional standards and food services
Harvard University	Food literacy and waste reduction	Education; surplus redistribution; engagement	Hybrid, strong student involvement	Importance of participation and education

1.2.2 The Guidelines for University Food Policies as an Enabling Framework

Building on the strategic variants identified in the previous phase, the Guidelines for University Food Policies translate these thematic and operational perspectives into a coherent set of categories of action, providing a shared structure through which the variants can be operationalised within University Food Policies. The guidelines represent a key transition point within the research trajectory, translating strategic orientations into an operational framework capable of supporting universities in the definition, adaptation, and implementation of context-specific food policies.

They are grounded in a shared food policy architecture that emerged consistently across the analysed case studies, articulated around four main components: vision, values and principles, priorities, and actions. This structure reflects the way food policies are typically embedded within broader institutional sustainability strategies, while also allowing universities to align food-related decisions with their educational missions, governance models, and territorial food systems (Doherty *et al.*, 2011; Newton *et al.*, 2016).

Operationally, the guidelines are organised into seven interconnected categories of action, each addressing a key dimension of university food systems: nutritional guidelines; food offering variety; food offering sustainability; spaces and services for food consump-

Table 1.1.
Comparative overview of selected university food policy best practices.
Edited by the authors.

tion and self-production; surplus food and food waste management; training and awareness for healthy and sustainable eating habits; and assessment, co-design, and feedback. These categories, together with the corresponding sets of actions developed by each research partners according to their areas of expertise, are summarised in Table 1.2, which illustrates how strategic orientations are translated into concrete and actionable policy interventions.

A distinctive feature of the Guidelines for University Food Policies is their explicitly enabling character. Rather than functioning as a checklist of mandatory measures, they operate as a modular and flexible framework, allowing universities to select, combine, and prioritise actions according to their institutional capacities, organisational arrangements, and territorial contexts. This approach reflects a design-driven understanding of policy-making, in which guidelines act as boundary objects that facilitate dialogue among heterogeneous actors, such as administrators, food service providers, students, researchers, and local stakeholders, while supporting iterative learning and adaptation (Bason, 2014; Junginger, 2013; Curtabbi, 2020).

By integrating strategic visions, empirical evidence from case studies, and a structured set of operational actions, the guidelines bridge the gap between policy formulation and implementation. They

Table 1.2.
Categories of actions
and corresponding policy
interventions in the
PPP-URB Guidelines.
Edited by the authors.

Category of action	Policy objective	Examples of actions
Nutritional guidelines	Improve health and reduce environmental impacts of diets	Nutritional criteria in tenders; supplier training; monitoring compliance
Food offering variety	Ensure inclusivity and dietary diversity	Menu rotation clauses; feedback systems; supplier training
Food offering sustainability	Reduce environmental footprint of food services	GPP criteria integration; monitoring systems; collaborative food services
Spaces & services for food consumption and self-production	Support sustainable practices through space and service design	Hybrid food spaces; informal consumption areas; self-production initiatives
Surplus food and food waste management	Prevent waste and enhance social responsibility	Surplus recovery clauses; redistribution partnerships; impact monitoring
Training & awareness for healthy and sustainable eating habits	Promote behavioural change and food literacy	Educational programmes; workshops; food nudging strategies
Assessment, co-design and feedback	Enable continuous improvement and participation	Food environment assessments; co-design platforms; satisfaction surveys

also create the conditions for experimentation and prototyping, providing a shared reference framework against which actions can be tested, monitored, and refined within specific university contexts.

1.3 Prototyping Food Policies in University Campuses

Once defined, the Guidelines for University Food Policies do not represent an end point, but rather a shared reference framework to be tested, adapted, and refined through situated experimentation, opening the way to a phase of policy prototyping within university campuses. Within the PPP-URB project, prototyping represents a core methodological component for translating the guidelines into situated and testable actions. Rather than being conceived as isolated pilot projects, the experimental initiatives implemented by the project partners can be interpreted as policy prototypes: partial, reversible, and context-sensitive interventions designed to generate evidence, foster learning, and inform future institutional decisions (Bason, 2014; Junginger, 2013; Mortati *et al.*, 2016).

Across the different university settings involved in PPP-URB, prototyping has taken diverse forms, reflecting the specific expertise of each partner and the territorial, organisational, and cultural conditions of the campuses. Despite this diversity, the experiments share a common orientation: they operationalise the guidelines by activating concrete actions within one or more of the seven categories of intervention, while simultaneously testing governance arrangements, stakeholder engagement mechanisms, and monitoring tools.

A first cluster of prototyping activities focuses on food waste reduction and surplus food management, highlighting the role of universities as responsible food service providers and social actors. At the Politecnico di Milano, an experimental surplus food recovery programme was developed within departmental catering services, accompanied by the design and testing of a dedicated monitoring framework (Quaglia, Borsani, & Caniato, 2025). This experimentation was closely connected with a broader co-design process aimed at testing and refining the *Palimi Food Policy*, where food waste and

surplus management were addressed alongside issues of food offering, spaces and services, and training and engagement, through the active involvement of students, academic staff, and administrative actors (Corubolo & Bassi, 2025).

A second cluster of experiments addresses campuses as living labs for behavioural change and environmental impact reduction, with a specific focus on everyday consumption practices. At the University of Milan, prototyping activities centred on understanding food-related behaviours and testing the environmental implications of alternative practices through Life Cycle Assessment (LCA) (Narote, Guidetti, & Giovenzana, 2025). By comparing single-use bottled water with refillable solutions supported by campus infrastructure, this experimentation illustrates how small-scale behavioural shifts, when supported by appropriate facilities, can generate significant cumulative environmental benefits.

Other prototyping activities place strong emphasis on participatory governance and stakeholder engagement as enablers of sustainable food policies. At the University of Naples Federico II, experimental actions were designed to institutionalise participation through the creation of a permanent listening forum for university catering services, complemented by focus groups, surveys, and student-led awareness initiatives (Del Gaudio, Lupolo, & Sepe, 2025).

A further set of experiments explores short food supply chains and sustainable procurement beyond on-campus consumption. The UNIPR Bio Bag initiative at the University of Parma represents a prototype aimed at facilitating access to local, organic, and agroecological products for the university community through collaboration with local associations and farmers (Arfini *et al.*, 2025). Although the pilot revealed significant challenges related to logistics, pricing, flexibility, and user engagement, its value lies in exposing tensions between sustainability ambitions and everyday practices.

Finally, some prototyping activities focus on knowledge production, education, and the definition of best practices as foundational elements of long-term policy development. At the University of Bari Aldo Moro, experimental research activities informed the development of a Manifesto of Best Practices for sustainable university canteens (De Boni *et al.*, 2025). At the University of Catania, text mining and curriculum analysis

were used to assess how sustainability and nutrition are integrated into educational programmes, highlighting fragmentation and the need for more systemic approaches (Privitera *et al.*, 2025).

Table 1.3 provides a comparative overview of the prototyping activities developed within PPP-URB, highlighting how different universities tested specific categories of action from the Guidelines and contributed complementary insights to the overall policy framework.

University	Prototyping focus	Category of action	Main objective	Key contribution to PPP-URB
<i>Politecnico di Milano</i>	Surplus food recovery and monitoring	Surplus food and food waste management; Assessment and monitoring	Reduce food waste and test monitoring tools	Demonstrates how procurement criteria and data collection support circular food practices
<i>Politecnico di Milano</i>	Co-design of university food policy	Assessment, co-design and feedback; Spaces and services	Test participatory governance mechanisms	Validates co-design as an enabling process for food policy implementation
<i>University of Milan</i>	Behavioural change and LCA-based evaluation	Training and awareness; Food offering sustainability	Quantify environmental impacts of consumption practices	Shows how evidence-based metrics can inform food policy decisions
<i>University of Naples Federico II</i>	Stakeholder engagement and participatory governance	Assessment, co-design and feedback; Training and awareness	Institutionalise participation in food services	Prototypes governance structures rather than single services
<i>University of Parma</i>	Short food supply chains (UNIPR Bio Bag)	Food offering sustainability; Alternative food networks	Improve access to local and sustainable food	Reveals constraints and conditions for scaling SFSCs in university contexts
<i>University of Bari Aldo Moro</i>	Best practices for university canteens	Food offering variety; Nutritional guidelines	Identify shared criteria for sustainable catering	Supports the formalisation of operational benchmarks
<i>University of Catania</i>	Education and curriculum analysis	Training and awareness for healthy and sustainable eating	Assess integration of food sustainability in education	Highlights the role of knowledge production as a policy lever

Table 1.3. Overview of prototyping activities within the PPP-URB project.

Taken together, these experiences show that prototyping within PPP-URB functions as a learning ecosystem. Prototypes generate situated evidence, reveal constraints and opportunities, and feed back into the refinement of guidelines and strategic priorities. In this sense, prototyping becomes an integral part of the food policy cycle, reinforcing the conception of University Food Policies as adaptive, iterative, and context-sensitive processes (Curtabbi, 2020; Sonnino, 2018).

1.4 Conclusions

The PPP-URB process shows how universities could be used as test beds for new ideas in public-private food governance. Universities may change food systems both on and off campus by using their position as institutions, their buying power, and their ability to do research. The Guidelines for University Food Policies helped create an operational framework that shows how strategic visions may be turned into policies that people can follow through flexible, participative, and context-sensitive processes.

Importantly, the framework is meant to be used in other places. Although rooted in academic environments, the highlighted categories of action and methodological principles, co-design, prototyping, and monitoring, can influence food policy initiatives in other public institutions and urban situations. This adds to the continuing discussions about how integrated food policies can support addressing complexity through collaborative governance models (Sonnino, 2018; Marino & Mazzocchi, 2019).

This chapter has shown the third deliverable of the PPP-URB project to be an important step in the growth of University Food Policies. PPP-URB moves forward both academic discourse and policy practice in the realm of sustainable food systems by turning strategic frameworks into flexible guidelines and putting them into processes of prototyping and testing. The guidelines put universities in the role of active players in changing the food system. They can connect public goals with private resources in different areas, and they help improve, transfer, and scale up University Food Policies as a way to support sustainable urban transitions.

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2. Codesigning the Polimi Food Policy

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ABSTRACT

This chapter presents the co-design process developed for the Polimi Food Policy, outlining the experimental methodology applied to validate and test the University Food Policy Guidelines introduced in this volume. The experimentation was conducted within the institutional context of Politecnico di Milano, where the proposed framework was implemented and evaluated through a situated and iterative process. Drawing on expertise in service and spatial design, the research adopted a participatory approach grounded in co-design, integrating top-down strategic direction with bottom-up contributions through codesign workshops and multi-level collaboration tables. The activities supported the mapping of the existing institutional landscape, the validation of guiding principles, and the progressive translation of shared priorities into operational actions. The chapter provides insights into participatory processes by documenting the transition from guideline definition to the collaborative formulation and implementation of policy measures. It demonstrates how co-design methodologies

can support the development of sustainable food policies within higher education institutions, with the potential to be embedded within broader university sustainability strategies.

2.1 Universities as Food Policies actors

In recent years, higher education institutions have progressively expanded their sustainability agendas beyond research innovation and environmental performance to include the everyday systems that sustain campus life (Trencher *et al.*, 2014; Bryman, 2016). Among these, food has emerged as a particularly strategic domain. University campuses concentrate large and diverse populations, operate extensive catering and procurement infrastructures, and generate significant material flows, including food surplus and waste. These conditions position universities as influential actors capable of shaping production choices, supply relationships, consumption patterns, and resource management practices (Lang & Barling, 2012; Morgan & Sonnino, 2013).

At the same time, the societal role of universities has evolved. Their mission increasingly encompasses forms of public engagement that extend beyond teaching and research, embracing responsibilities linked to social innovation, community wellbeing, and territorial development. Food systems, situated at the intersection of environmental sustainability, public health, and social equity, offer a concrete arena in which this expanded institutional mandate can be operationalised. Interventions in food procurement, service provision, and waste reduction therefore become not only managerial adjustments but expressions of broader institutional commitments (EUROCITIES, 2017, EU Commission, 2025).

Within this landscape, universities are gaining recognition as experimental fields for the development of integrated food policies. Their organisational scale allows for the testing of systemic interventions, while their educational and research capacities enable critical reflection, monitoring, and knowledge transfer. Campus environments can thus operate as micro-cosmos: enabling prototyping places where new service models, supply chain configurations, and behavioural initiatives are collaboratively explored and developed (De Rosa, 2024). In these contexts, the academic community can be actively

engaged in co-design processes and, crucially, in the prototyping and testing of innovative solutions (Bjögvinsson *et al.*, 2012; Trencher *et al.*, 2014; Meroni *et al.*, 2018). This favourable participatory involvement allows food-related interventions to be shaped through situated knowledge and iterative experimentation, which might extend to local food networks and community-oriented food initiatives.

Indeed, food policy experimentations have demonstrated how such processes often intersects with the development of alternative and territorially embedded food services (Comune di Milano, 2015), supporting cities in fostering more resilient food ecosystems (Morgan & Morley, 2014). Food policy itself is increasingly understood as a multi-scalar field, where global agendas, urban strategies, and local practices intersect, requiring integrated and cross-disciplinary governance approaches (Edwards *et al.*, 2024). Initiatives such as urban gardens, farmers' markets, cooperative purchasing schemes, and educational food programmes contribute not only to improving food quality but also to strengthening social cohesion and place-based learning (Marino *et al.*, 2024; Fassi *et al.*, 2016; Torrijos *et al.*, 2021). Within this perspective, universities can act as intermediate arenas where these dynamics are translated into situated institutional practices. Through partnerships with municipalities, civil society organisations, and regional stakeholders, these initiatives may extend within and beyond campus boundaries, reinforcing the role of universities as catalysts for broader food system transitions (Fassi, 2024).

The case explored in this chapter is situated within this evolving institutional landscape. Politecnico di Milano operates within the metropolitan context of Milan, a city whose food governance trajectory has been significantly shaped by the legacy of Expo 2015 (Milan Urban Food Policy Pact). The event stimulated the establishment of municipal food policy infrastructures, contributed to positioning food as a strategic axis of urban sustainability, and continues to provide fertile ground for institutional experimentation.

Within this enabling urban and policy environment, the university's engagement with food system transformation has progressively taken shape through a combination of research, design, and governance initiatives. The activities presented in this chapter are situated precisely at the intersection between city-level food strategies and

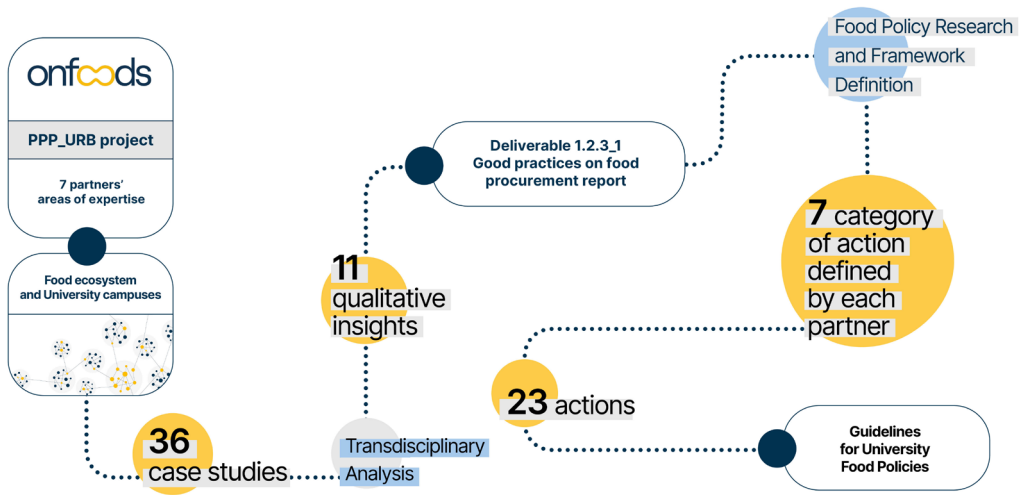


Figure 2.1.
PPP_URB process.
Credits: Polimi DESIS Lab.

campus-based experimentation, where institutional sustainability agendas converge with broader urban food policy trajectories.

More specifically, the work emerges from the wider research framework of the PPP_URB project developed within the OnFoods programme. In its earlier phases, the research focused on analysing university food procurement systems and led to the development of a set of Guidelines for University Food Policies (GUPP) intended to support institutional transitions toward more sustainable food ecosystems (Figure 2.1). The phase documented here marks a shift from analytical development to applied experimentation. The authors, researchers from the Department of Design at Politecnico di Milano, engaged in codesigning, prototyping and contextualising these guidelines within their own institutional environment. Drawing on expertise in spatial and service design, and on participatory design methodologies, the team activated a structured pathway aimed at translating policy principles into operational and governance practices.

2.2 Politecnico di Milano framework: a commitment towards sustainability

Despite the absence of a dedicated, food-specific office, Politecnico di Milano has long demonstrated a strong institutional commitment to

sustainability. Such commitment is structurally coordinated through the sustainability strategy, which oversees the environmental and social sustainability of the university's core domains, including research, teaching, third mission and campus management. Its mandate is to support the university's transition toward more sustainable models by fostering inclusion, reducing emissions, and advancing the objectives of the United Nations 2030 Agenda.

Institutional priorities include promoting sustainability-oriented research, equipping students with environmental and social responsibility competences, improving campus quality, safety, and internal mobility, advancing equal opportunities, and strengthening governance. These actions are framed within the Polimi Strategic Sustainability Plan, which ensures alignment with the Sustainable Development Goals (SDGs) and foresees dedicated actions, projects as well as structures, which have been developed to assure the scouting and implementation of measures and interventions (Politecnico di Milano, 2025). All this is sustained internally by a Sustainability Task Force which operates also through annual Sustainability Working Groups: participatory working tables conceived as idea incubators involving academic staff, technical-administrative personnel, researchers, and students. Proposals developed within these groups, when deemed viable, are operationalised by the university's technical offices.

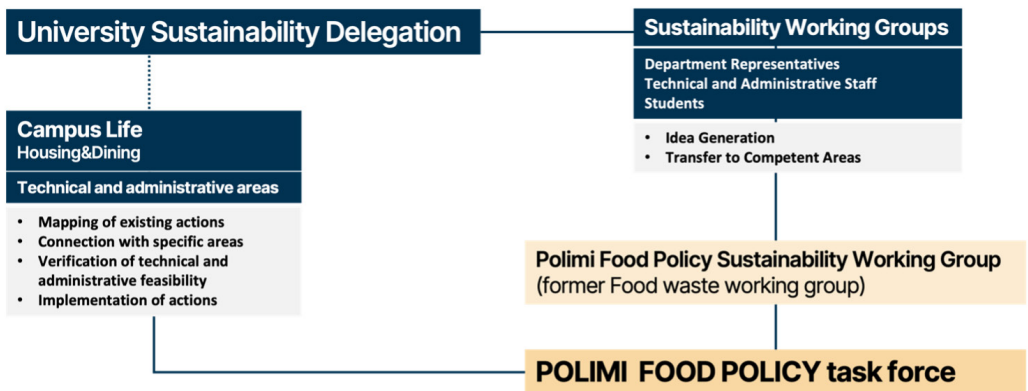
Within this institutional landscape, food has not historically been addressed as a standalone policy domain but rather as a cross-cutting theme embedded in multiple sustainability initiatives. Existing actions contribute to several SDGs: for instance, the university's zero-plastic objective, aimed at eliminating disposable or non-reusable tableware, supports SDG 12 (Responsible Consumption and Production), while the installation of drinking water fountains across campuses contributes to SDG 6 (Clean Water and Sanitation), alongside strategies and programmes designed to reduce food waste.

The work on the University Food Policy builds upon an already established internal infrastructure of distributed and structured participation. Existing governance mechanisms, particularly the Sustainability Working Groups, provided fertile ground for activating dialogue, mobilising expertise, and experimenting with collaborative agenda-setting paths. At the same time, the process brought

to light the need for a more systemic and structurally coordinated approach to food related issues. Rather than remaining confined to consumption practices alone, the OnFoods research highlighted how food sustainability challenges extend across the entire food value chain, encompassing procurement models, supply infrastructures, service organisation, spatial configurations, behavioural dynamics, and waste management systems. This recognition catalysed a process of collaborative repositioning. The Sustainability Working Group, initially focused on “Surplus and Waste”, progressively expanded its scope, reframing its focus from the circumscribed operational domain of surplus and waste management to the broader and more strategic terrain of Food Policy. Institutional momentum generated through the OnFoods partnership and related research initiatives further supported this shift, enabling the activation of a transdisciplinary dialogue.

Colleagues from multiple departments, including Design, Management Engineering, Architecture, Construction Engineering and the Built Environment, and Chemistry, were engaged alongside representatives from Campus Life, the administrative unit responsible for housing and dining services. Through this convergence of research expertise, operational knowledge, and governance perspectives, the Polimi Food Policy Task Force was established (Figure 2.2). Its mandate is to coordinate internal competences, support new initiatives and consolidate existing ones, and ensure alignment between food related actions and the Polimi Strategic Plan for Sustainability.

Figure 2.2. Establishment process of the Polimi Food Policy Task Force (PFP task force).



2.3 Codesigning the Polimi Food Policy

The experimentation conducted at Politecnico di Milano focuses on the activation of participatory process structured around scouting, co-design, assessment and feedback. The objective is twofold: to support the development of an institutional food policy and to integrate the capacity of co-design processes in facilitating its implementation.

The development of the Polimi Food Policy has been intentionally configured not merely as a participatory initiative, but as an institutionalised process that integrates governance, strategic planning, and community engagement within a coherent and actionable framework. In this sense, co-design is not treated simply as a method for idea generation, but as a design-led process through which policy directions can be collectively explored, negotiated, and progressively embedded within the organisational context of the university (Blomkamp, 2022; Richardson *et al.*, 2026).

The co-design process extends beyond the episodic nature of workshops. It contributes to the consolidation of existing initiatives, the identification of systemic gaps, and the articulation of coordinated actions, while at the same time creating the conditions for their implementation. In line with participatory design approaches that emphasise the ongoing and situated nature of design processes, co-design can be understood as an infrastructuring process, a situated and ongoing practice that links design interventions to the social, organisational, and temporal conditions through which change becomes durable (Hillgren *et al.*, 2011; Bjögvinnsson *et al.*, 2012; Karasti, 2014). This highlights that the work of policy formation does not occur through a single moment of participation, but through the progressive shaping of relations, roles, and arenas of action (Karasti *et al.*, 2018). Within this framework, participatory design assumes a central role. Rather than functioning as a consultative mechanism, it operates as a cross-disciplinary approach capable of structuring dialogue, mediating institutional complexity, and enabling shared decision-making across heterogeneous actors. By engaging students, academic staff, administrative personnel, and service providers, the process fosters the co-production of knowl-

edge and supports the emergence of policy proposals grounded in everyday practices and operational realities (Trencher *et al.*, 2014; Le Dantec & DiSalvo, 2013).

At the same time, the Polimi Food Policy process can be interpreted as operating at the intersection between commoning and institutioning. On the one hand, co-design activities enable the emergence of shared problem framings, situated knowledge, and collective interpretations across diverse actors. On the other, they contribute to embedding these contributions within formal governance arrangements, aligning them with institutional priorities and translating them into operational and decision-making processes (Teli *et al.*, 2020; Huybrechts *et al.*, 2017). From this perspective, the process does not only generate proposals, but also mediates between bottom-up contributions and top-down structures, making participation politically and organisationally consequential (Escobar, 2022).

2.3.1 Process structure: phases and tools

The design of the co-design tables was informed by seven categories of actions outlined in Chapter 1 and articulated in a collection of 23 specific actions: Nutritional Guidelines; Food Offering Variety; Food Offering Sustainability; Space and Services for Food Consumption and Self-production; Surplus Food and Food Waste Management; Training and Awareness for Healthy and Sustainable Eating Habits; and Assessment, Co-design and Feedback. To translate the seven GUPF action categories into operational discussion domains, they were clustered into four thematic co-design tables, with a monitoring system of activities integrated as a transversal dimension across all themes:

1. Spaces and Services Focusing on the spatial, infrastructural, and organisational conditions enabling sustainable food consumption, including dining environments, service logistics, and opportunities for self-production and community activation.
2. Quality and Variety Addressing the nutritional profile, diversity, affordability, and environmental sustainability of campus food offerings.

3. Training and Engagement Exploring educational programmes, awareness campaigns, and participatory initiatives aimed at fostering healthier and more sustainable eating behaviours.
4. Surplus and Waste Investigating systemic strategies for surplus redistribution, waste prevention, monitoring systems, and circular resource practices.

A fifth integrative table, referred to as “Operational Instruments”, was also established. This table brought together senior managers and administrative directors from across the university to assess the feasibility of the proposed initiatives and determine whether and how they could be operationally implemented. By involving key decision-makers, this stage ensured that selected ideas were not only conceptually robust but also practically actionable, taking into account institutional capabilities, resources, and constraints.

Each table operated as both a validation moment, reviewing the relevance of pre-identified GUPF actions, and a co-generative space for new proposals.

To ensure informed and productive dialogue, each table was “nurtured” through a structured set of preparatory materials and activation tools. Two main inputs were designed:

- Consultative materials, including existing campus mappings, prior research outputs, existing data and the GUPF framework itself. These ensured that discussions built upon consolidated evidence rather than anecdotal perceptions.
- Interactive design tools, a set of physical discussion cards structured around a “What if...?” speculative format, integrating actions already piloted within the university (Figure 2.3). These cards translated policy actions into open prompts, encouraging participants to interpret, critique, refine, or expand them. The tool was intentionally open-ended, allowing entirely new cards, and thus new policy ideas, to emerge during workshops.

Each workshop was designed to take place within a two hour time-frame. It opened with a ten minute introduction to the University Food Policy, delivered by the facilitators to provide the necessary context, followed by a brief round of introductions, allowing participants to



Figure 2.3.
Workshop operative tools:
cards.

situate themselves within the group by sharing their area of work and specific expertise. This nurturing strategy served two purposes: grounding discussions in institutional reality while simultaneously enabling imaginative and forward-looking thinking. The co-design setting fostered a dialogic environment where institutional perspectives encountered operational realities and user experiences. The card prompts functioned as boundary objects, enabling participants to negotiate meanings, surface tensions, and articulate opportunities. Discussions frequently moved beyond validation toward reframing problems, revealing hidden interdependencies across procurement, spaces, behaviours, and governance and related internal stakeholders.

2.3.2 Participants and institutional engagement

The co-design tables were embedded within the institutional participatory infrastructure activated through the PFP Task Force and brought together a heterogeneous range of actors from across the university ecosystem. While the workshops were operationally supported by coordinators and facilitators with expertise in participatory design methodologies, the process was primarily conceived as an open deliberative moment structured to enable codesign across institutional roles and knowledge domains. Participants included academic staff, technical and administrative personnel, and students, reflecting the multidisciplinary nature of campus food systems. Recruitment was conducted through targeted outreach aligned with

the thematic focus of each workshop and supported by preparatory mapping activities.

In this regard, the university's Sustainability Working Groups represented a key governance infrastructure mobilised within the Food Policy process. At the time of the pilot, nine thematic Working Groups were active. After excluding those with limited relevance to food systems, five groups were identified as strategically pertinent and were successfully engaged through existing institutional networks. Their participation across the thematic co-design tables enabled food-related discussions to intersect with ongoing sustainability initiatives, reinforcing institutional coherence while avoiding thematic fragmentation.

Participant affiliations were documented to provide an overview of the composition of the working groups (Table 2.1). Student participation was activated primarily through representative bodies and organised associations. While this ensured the presence of student perspectives within the co-design process, it also highlighted the opportunity to further broaden consultative mechanisms in future phases. Expanding direct student involvement beyond representative channels is recognised as a relevant area for development, particularly in light of the central role that everyday consumption practices and campus life experiences play in shaping food system transitions.

Table 2.1.
Codesign data collection.

	Table 1. Spaces and Services	Table 2. Quality and Variety	Table 3. Training and Engagement	Table 4. Surplus and Waste
Involved action from GUPP	7/23	10/23	10/23	4/23
N. participants	22	19	12	19
Academic staff	3	12	10	11
Technical and administrative staff	12	7	1	4
Students	7	3	2	4
N. sustainability working group involved	3	2	2	3
Cards presented	17	13	19	19
Cards generated	+5	+13	+11	+6

2.4 From ideation to structured knowledge

To ensure methodological consistency across the participatory pathway, a shared evidence-gathering framework was established for all four co-design tables. Facilitators systematically collected and mapped a common set of qualitative and quantitative indicators (Table 2.1), enabling cross-comparison between thematic arenas and supporting the consolidation of policy-relevant insights.

The co-design activities generated a substantial corpus of ideational material. Across the four thematic tables, participants collectively produced 103 discussion cards, each representing a distinct proposal, recommendation, or strategic insight (Table 2.1) These outputs constituted the raw knowledge base emerging from the participatory process and demonstrated the generative capacity of the co-design setting.

Following the workshops, a multi-step refinement process was activated to transform this ideational output into a structured policy framework. An initial screening phase was conducted by the facilitation team. Despite the thematic differentiation of the tables, overlaps among proposals quickly became evident. Facilitators therefore undertook a consolidation process that included merging identical or highly similar ideas, clarifying partially overlapping proposals removing contributions that, while relevant to sustainability broadly, fell outside the operational scope of a university food policy. This first analytical filtering reduced the total number of ideas from 103 to 68 consolidated proposals.

A second analytical step was conducted on the refined set of 68 ideas. This phase enabled the validation of the original seven GUPF action categories that had structured the co-design tables. At the same time, revisiting the contributions that emerged from the workshops and considering the university's sustainability strategy framework led to a process of thematic emergence and re-aggregation.

A first layer of analysis examined the relationship between each co-design table and the 23 actions outlined in the GUPF framework. Facilitators tracked how discussions, proposals, and critiques emerging from each table aligned with, expanded, or reframed these predefined actions. The mapping revealed differentiated yet complementary coverage:

- spaces and services: 7 out of 23 actions;
- quality and variety: 10 out of 23 actions;
- training and engagement: 10 out of 23 actions;
- surplus and waste: 4 out of 23 actions.

While each table addressed a specific subset of actions, their combined outputs covered the entire GUPF framework, confirming the effectiveness of the thematic clustering in ensuring systemic policy coverage.

On the other side, the emerging actions were reorganised into five overarching policy areas forming the structural backbone of the emerging Polimi Food Policy (Table 2.2). These macro-domains more accurately reflect the institutional context within which the policy is expected to operate:

1. variety, quality and sustainability of the food supply chain;
2. spaces and services for the food supply chain;
3. management of food surplus and food waste;
4. education and awareness for healthy and sustainable dietary habits;
5. design, evaluation and monitoring.

While four of these areas substantially mirror the original GUPF categories, the latter two domains assume a more context-specific configuration within the Polimi framework. In particular, the dimension of design, evaluation and monitoring highlights the role of co-design not only as a participatory method but as an infrastructuring process that supports continuous assessment, feedback loops, and policy adaptation over time.

Throughout the refinement process, progress was periodically reviewed with the Polimi Food Policy Task Force, ensuring governance

Table 2.2.
Codesign data collection.

Guidelines for Universities Food Policy	Polimi Food Policy
1. Nutritional Guidelines 2. Food Offering Variety 3. Food Offering Sustainability 4. Space & Services for Food Consumption and self-production 5. Surplus food and food waste management 6. Training & Awareness for Healthy/ Sustainable Eating Habits 7. Assessment, Codesign and Feedback	1. Variety, quality and sustainability of the food supply chain 2. Spaces and services for the food supply chain 3. Management of food surplus and food waste 4. Education and awareness for healthy and sustainable dietary habits 5. Design, evaluation and monitoring

oversight and strategic coherence. Simultaneously, continuous consultation was activated with the Campus Life Office, specifically the Housing and Dining Services unit responsible for managing university systems. Drawing on direct management experience, they provided insights into existing pilot initiatives, operational constraints, regulatory and safety considerations, cost structures and contractual frameworks, as well as lessons learned from both successful and unsuccessful experiments. This evidence-based contribution significantly strengthened the feasibility grounding of the proposals.

A further screening phase aligned the consolidated proposals with the priorities outlined in the University Strategic Plan for Sustainability. This evaluative step reduced the portfolio from 68 to 50 actionable measures, subdivided into 19 actions already in place and considered replicable or scalable and 31 new or partially developed actions with implementation potential. For each of these 50 actions, the relevant administrative unit was identified to assess feasibility in terms of economic costs, implementation timelines, safety regulations, and infrastructural implications. This process resulted in a final portfolio of 40 priority initiatives, which now constitute the draft structural framework of the Polimi Food Policy.

2.5 The 5 Action Categories: targeted design interventions

As an outcome of this process, the Polimi Food Policy, as above mentioned, was reorganised into five thematic action categories that address the food system across its main material, organisational, cultural, and governance dimensions. Considered together, these areas show that the emerging Food Policy does not focus only on food provision itself, but on the broader set of conditions that shape access, use, behaviour, inclusion, and long-term governance. In this sense, the categories represent not simply thematic clusters, but specific areas of design intervention through which the university can act on the campus food environment in a systemic and coordinated way.

The first category, "Variety, quality and sustainability of the food supply chain", positions universities as key actors in promoting a food

system that reflects principles of quality, diversity and sustainability while guiding the everyday choices of the academic community to ensure healthy, balanced options, directly impacting public health outcomes and disease prevention. Campus food-related services become strategic spaces for fostering mindful and healthy eating habits, valuing local and seasonal products, reducing waste and supporting ethical, transparent sourcing. Through this category, the university seeks to exceed the minimum requirements set by the Italian regulation on Minimum Environmental Criteria (CAM)¹, encouraging suppliers to provide a more diverse, plant-forward, healthy and culturally inclusive offer. By integrating new parameters into tender specifications and procurement systems, the university goal is to strengthen science-based standards for nutritional and environmental performance, to increase the availability of fresh and unpackaged foods, and to promote low-impact supply chains. This approach aims at expanding university food provision into a broader system capable of generating environmental, economic and social value for the entire community while directly contributing to public health and ecological stewardship.

Note 1.
<https://www.mase.gov.it/portale/cam-vigenti>

The second category, "Spaces and services for the food supply chain", addresses the service, infrastructural and spatial aspects of how food is accessed, transformed and consumed on campus. This category focuses on optimising existing facilities, enhancing non-conventional spaces and services, and developing innovative solutions to respond to the wide range of needs associated with food consumption. These needs concern not only nourishment, but also the social and relational dimensions of eating, including the preparation, selection, ordering, and communication practices that shape the everyday meal experience. The spaces and services dedicated to food influence attitudes, preferences and ways of interacting, contributing to the construction of a shared food culture. Promoting healthy and sustainable behaviours within campuses therefore requires designing welcoming and inclusive places that encourage mindful practices and value food as an element of both individual and collective well-being. This translates into interventions that range from upgrading existing spaces to creating new collaborative food services and areas for conviviality, food transformation and consumption and self-production.

The third category, “Management of food surpluses and waste”, recognises that preventing waste, redistributing surplus and monitoring resource flows are now priorities for universities committed to fostering more conscious and sustainable food practices. Managing surplus food, whether by planning demand more accurately, optimising portion sizes or redistributing excess meals to internal initiatives or local associations, not only reduces overall waste but also raises awareness of the environmental and social impact of discarded food. Additional measures, such as the sale of unsold items at reduced prices, the adoption of reusable or recyclable containers for take-away meals and the activation of composting systems for organic waste, support a more circular use of resources while also improving accessibility. Together, these interventions help strengthen a culture of shared responsibility, in which every food-related choice contributes to collective sustainability and supports individuals and communities in need.

The fourth category, “Education and awareness for healthy and sustainable dietary habits”, underscores the university’s responsibility in shaping food culture by promoting dedicated training, enhancing community engagement and communicating the actions undertaken. Integrating sustainability into both curricula and everyday practices strengthens the university’s capacity to generate innovation and contribute to new social and cultural models. Actions in this area include research and monitoring activities, surveys to understand students’ dietary habits, and targeted initiatives that link individual choices to global challenges such as climate change and the sustainability of agri-food systems. Proposed measures such as the creation of a Polimi Food Academy, cooking and nutrition workshops, improved labelling and storytelling on food origins, and high-visibility events and awareness campaigns all contribute to improving health literacy and fostering behavioural change. Together, these interventions build a culture of shared responsibility, empowering students and staff to recognise the broader impact of their food choices and actively participate in the transition towards healthier and more sustainable food systems.

The fifth category, “Design, evaluation and monitoring”, ensures that the Polimi Food Policy becomes a structured, long-term sys-

tem that remains adaptive and aligned with the evolving needs of the university community. Its actions aim to make the campus food environment dynamic, inclusive and sustainability-oriented through an integrated approach to listening, analysis and governance. Regular surveys targeting students and staff allow the university to track shifts in demand and perceptions of the food offer, while continuous evaluation of suppliers safeguards quality, variety and coherence with environmental and social principles. These mechanisms institutionalise shared governance by embedding ongoing monitoring, KPI-based assessment and iterative policy refinement grounded in community feedback. Central to this effort is the establishment of a dedicated Food Policy Unit, which acts as a coordinating hub and co-design process for the university community and external partners. Finally, the development of a coherent Food Identity will enhance the recognisability and cultural visibility of food-related spaces and services across campus, reinforcing the policy's long-term impact and guiding behavioural change.

At the time of writing this chapter, the outcomes of the process are developing along two complementary directions. On the one hand, they are being integrated into the university's Strategic Sustainability Plan. On the other, they are beginning to inform a first set of pilot interventions focused on new modes of access to food, including group purchasing services and disintermediation initiatives; education and awareness activities, such as anti-food-waste actions; the enhancement of monitoring systems and feedback collection; and the redesign of selected spaces as environments for the experimentation of innovative and collaborative food services. Overall, these developments suggest that the Food Policy is beginning to shift from a co-designed framework toward a more consolidated operational and strategic role within the institution.

2.6 Conclusions

From a methodological standpoint, the progressive refinement trajectory presented in this chapter illustrates how co-design outputs can evolve from generative ideation into institutional policy architec-

ture. The staged filtering process, combining screening, categorical reassignment, operational validation, and strategic prioritisation, enabled the translation of participatory knowledge into administratively actionable instruments. In this sense, the refinement pathway did not dilute the participatory nature of the process. Rather, it functioned as a governance mechanism through which co-designed insights were rendered implementable within the organisational, economic, and regulatory infrastructures of the university while also acting as a prototyping phase within a broader and ongoing co-design process.

Situating this process within its spatial and institutional context further clarifies its significance. The pilot study aimed at demonstrating that the Guidelines for University Food Policies can be effectively operationalised and can serve as a structuring reference for systematising food-related initiatives at campus level. Focusing in particular on the categories of action defined within the PPP_URB framework, the study shows that these domains provide a useful operational scaffold. At the same time, they are not sufficient on their own to generate a fully optimised campus food ecosystem. Their effectiveness depends on their integration within broader institutional visions, values, and sustainability principles, which can be further articulated through food-specific policy actions.

The case also highlights the importance of enabling conditions in initiating and sustaining such transitions. Institutional leadership plays a pivotal role in activating processes, legitimising experimentation, and mobilising actors across organisational levels. However, the pathway documented here did not emerge in an institutional vacuum. It built upon pre-existing sustainability networks, participatory infrastructures, and diffused initiatives already oriented toward shared objectives. The Food Policy process thus functioned as a coordinating platform capable of aligning, nurturing and scaling these distributed efforts.

Within this framework, codesign assumed a strategic role. The PPP_URB coordinators ensured methodological continuity, guided participatory processes, and mediated between bottom-up needs and top-down strategic orientations. The collaboration between the task force, technical and administrative offices proved essential in

mapping existing initiatives, identifying operational constraints, and integrating ongoing activities into the policy framework.

More broadly, the findings underscore the importance of combining top-down governance with bottom-up engagement in the development of University Food Policies. Institutional direction must be complemented by the active participation of the university community in order to foster shared ownership, enhance legitimacy and avoid self-referential or purely managerial policy trajectories. The case suggests that participation alone is not enough: its effects depend on the presence of organisational arrangements capable of receiving, translating, and operationalising the knowledge it generates. Transparent communication of existing initiatives and of the policy process itself further strengthens trust, awareness, and collective involvement, supporting the long-term viability of food system transitions within the campus environment.

At the same time, the chapter should be read in light of some limitations. The process documented here reflects an ongoing institutional experiment rather than a completed policy cycle, and the analysis is therefore centred more on the conditions of emergence, structuring, and refinement than on the long-term effects of implementation. Some dimensions also remain only partially addressed, including the broader diversification of student participation, the systematic evaluation of impacts over time, and the extent to which the proposed actions will be absorbed into routine institutional practice. A relevant next step lies in following the policy beyond its drafting phase and into implementation, monitoring, and iterative adaptation. In this respect, the establishment of the Food Policy Commission, together with the decision to embed co-design as a structural component of the Food Policy process rather than as a one-off participatory phase, may provide the institutional continuity needed to support this transition. These arrangements can help sustain dialogue across actors and organisational levels, accompany the testing of selected actions in practice, and strengthen the feedback and monitoring mechanisms required to assess feasibility, impacts, and organisational learning over time. In this way, the policy can continue to evolve as an infrastructuring process rather than remaining a fixed institutional document.

Taken together, the chapter demonstrates how participatory design, when embedded within institutional governance structures, can function not only as a generative method but also as an institutioning process capable of shaping policy implementation pathways. In doing so, it positions universities as strategic arenas for the development of integrated, place-based food system transformations.

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3. Experimenting Approaches to Food Waste Reduction and Monitoring in Universities

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ABSTRACT

Food waste represents a critical challenge in the transition towards sustainable and equitable food systems. Beyond prevention, complementary actions are needed, and universities can play a key role by implementing food waste reduction strategies, including surplus food redistribution.

Aligned with POLIMI's Strategic Plan, the School of Management designed and tested a surplus food management strategy within its catering services, coupled with the development of a monitoring system to quantify recovered surplus food. The experimentation was implemented between July and December 2025, focusing on lunch services. Results show that surplus redistribution is effective and that the monitoring system enables systematic data collection on user participation, surplus quantities and types, and redistribution processes. Despite some limitations, the resulting dataset provides a valuable pilot for developing standardized monitoring frameworks to support university food waste reduction initiatives.

3.1 Food waste challenges and universities' responses

Research demonstrates that the global food system is unsustainable and generates significant externalities (Halpern *et al.*, 2022; Springmann *et al.*, 2018). It plays a central role in the transgression of key planetary boundaries – the ecological limits within which human societies can safely develop (Te Wierik *et al.*, 2025) – by accelerating resource depletion, biodiversity loss, and climate change. These pressures, in turn, exacerbate food insecurity, diet-related challenges, and food waste (Boakes *et al.*, 2024; Crippa *et al.*, 2021; Willett *et al.*, 2019). Food waste represents a particular critical issue. Indeed, global estimates indicate that it accounts for 8-10% of total greenhouse gas emissions across the food supply chain and imposes annual economic costs of around USD 1 trillion (IPCC, 2019). Figures that stand in stark contrast to the persistence of high levels of food insecurity, with more than 673 million people facing hunger in 2024 (FAO *et al.*, 2025).

In response to these challenges, international agreements, including the *2030 Agenda for Sustainable Development* (SDG 12.3) and the *Global Biodiversity Framework* (Target 16), together with supranational strategies such as the EU *Farm to Fork Strategy*, have outlined a coherent roadmap for food waste reduction, stressing the need for coordinated action among public institutions, businesses, and civil society. In this view, universities are well positioned to contribute to food system transformation and food waste management through education, research, and the implementation of innovative food policies and practices. In recent years, universities worldwide have increasingly pursued sustainability objectives across campus activities, including food-related initiatives. This engagement is driven both by the significant volumes of food waste generated by university food services and by the growing emphasis on social responsibility associated with the universities' Third Mission (Quaglia, 2026; Todd & Faour-Klingbeil, 2024). Consequently, many universities have introduced strategies and programmes aimed at reducing food waste through improved management practices (Ahmed *et al.*, 2018; Doherty *et al.*, 2011). This approach also extends to food procurement strategies to prevent waste, as well as approaches to reuse or redis-

tribute surplus food generated by campus food services (Quaglia *et al.*, 2024; Cline *et al.*, 2022).

However, despite the growing relevance of this topic in higher education, research on food waste and surplus food management in universities remains limited. As noted by Leal Filho *et al.* (2024), existing studies provide only partial insights into the effectiveness of intervention models and their monitoring. Addressing this gap, this chapter illustrates an experimental initiative at the *School of Management (SOM¹)* of the *Politecnico di Milano (POLIMI)* aimed at testing a pilot food waste monitoring system.

Note 1.
The POLIMI School of Management is composed by two distinct bodies: the Department of Management, Economics and Industrial Engineering and Graduate School of Management.

3.2 POLIMI’s sustainability commitment

In recent years, POLIMI has strengthened the sustainability of its institutional activities through new programmes, governance arrangements, and monitoring systems. While earlier initiatives were already in place (e.g. the *2019 CO₂ Emissions Mitigation Plan*), substantial progress was achieved with the adoption of the *Strategic Sustainability Plan 2023-2025*, POLIMI’s first comprehensive sustainability strategy, articulating a unified vision across environmental, social, educational, and equity-related dimensions. A core element of the Plan is a systemic approach to monitoring and managing resource consumption in line with circular economy principles, integrating improved management practices, technological innovation, and active community involvement through a “leading by example” perspective. With regard to food waste, the Plan identifies two main objectives concerning reduction and monitoring, as illustrated in Table 3.1.

Table 3.1.
Food waste-related objectives in POLIMI’s *Strategic Plan 2023-2025*.

Objective	Target	Actions
Reduction of food waste	<ul style="list-style-type: none"> Zero food waste in 100% of catering services 	<ol style="list-style-type: none"> Technological innovation: implementation of an advanced food reuse system Partnerships: establishment of partnerships with companies and Third Sector organizations specialized in the redistribution of surplus food
Monitoring and reduction of waste	<ul style="list-style-type: none"> Reuse of 60% of no longer useful goods Monitoring of waste produced within the university 	<ol style="list-style-type: none"> Reduction of single-use products Prevention and separate waste collection Ecological areas and waste monitoring Innovation initiatives: local management of organic waste with the production of compost and biogas/ biomethane

In line with this, the *School of Management's Sustainability Plan 2023-2025* aims to promote sustainability-oriented initiatives within the Department. The SOM's Plan is structured around five strategic priorities and translates the POLIMI-level strategy into a set of operational objectives at the department level. With regard to waste management, and food waste in particular, the Plan identifies the following contributions:

- Reduction of food waste in catering services by promoting POLIMI initiatives.
- Promotion of waste reduction through initiatives aimed at reuse-oriented initiatives.
- Implementation of monitoring systems for waste and water consumption.

More in detail, the SOM has defined targeted actions and Key Performance Indicators (KPIs) to ensure coherence with the POLIMI's strategic objectives, as shown in Table 3.2.

POLIMI's Strategic Plan objectives	Actions	SOM's KPI	SOM's expected results
Reduction of food waste	Promote POLIMI's initiatives by developing projects for the reuse of surplus food	1. Reduction of waste in DIG catering services 2. Reduction of waste in GSoM catering services	1. 100% of catering services adopting food waste reduction practices 2. 70% of catering services adopting food waste reduction practices
Monitoring and reduction of waste	Implementation of a waste monitoring system	Activation of a monitoring system	Monitoring system effectively implemented

Within the SOM a dedicated programme – i.e. the *SOM for Food Waste Reduction* – has been activated for recovering surplus food generated through internal catering services. This requires coordinated actions across the procurement and food service value chain. Accordingly, sustainable procurement practices based on collaborative supplier partnerships play a central role. To operationalize the programme, a collaborative model involving three key actors was established:

- Catering service supplier, responsible for ensuring the safe management of surplus food and its transfer to designated beneficiaries.

Table 3.2.
SOM's food sustainability objectives.

- Internal beneficiaries, namely members of the SOM community, who can receive surplus food recovered on-site.
- External beneficiaries, including local parishes and Third Sector organizations that redistribute surplus food to individuals in need.

This configuration establishes a comprehensive food waste prevention loop, with surplus food recovered through both internal and external channels, in line with procurement guidelines on waste reduction (Boyano Larriba *et al.*, 2019). However, after two years of piloting, a robust assessment of the programme required the quantification of both surplus food generated and recovered. To this end, a monitoring system was developed and tested within catering services at the *School of Management*, in collaboration with a single catering supplier.

3.3 Experimenting a monitoring system in catering services

To assess the programme's effectiveness, a structured data collection matrix was designed for catering services. As shown in Table 3.3, the matrix defines the KPIs included in the monitoring framework, specifying for each indicator its description, calculation method, unit of measurement, and analysis dimensions (e.g. food category).

To compute the indicators, a set of methodological assumptions were defined. First, the analysis was limited to lunch catering events, as these provide nutritionally balanced meals. Events such as coffee breaks and happy hours were excluded, as the food offered does not constitute a full meal.

CO₂ emissions avoided were estimated using the *FAO Food Waste Footprint* benchmark (FAO, 2013), applying a conversion factor of 2.5 kg CO₂e per kg of mixed food waste. Water footprint avoidance was calculated based on Mekonnen and Hoekstra (2012), assuming 1,000-2,000 litres of water per kg of mixed food, reflecting the composition of meals served. This estimate refers to the avoidance of wasting embedded water rather than direct production savings.

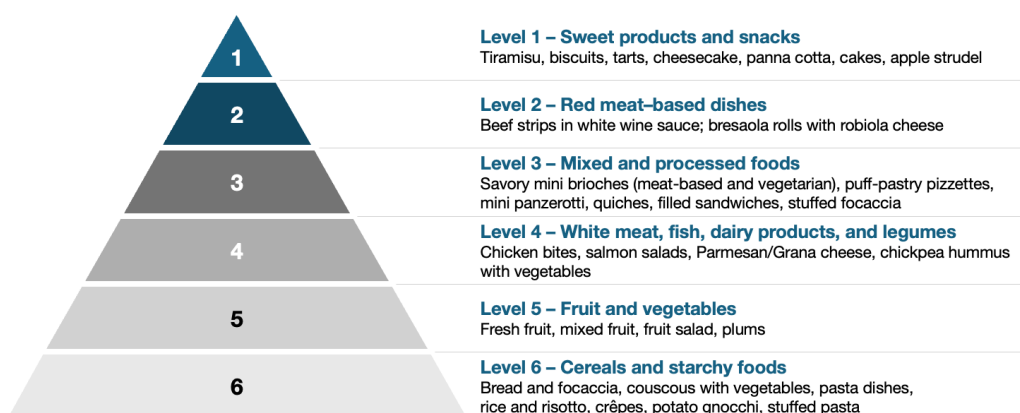
Moreover, equivalent meals donated were calculated using a standard factor of 500 g per meal, as defined by Fondazione Banco Alimentare (2024) and based on LARN guidelines (SINU, 2024).

KPI	Description	Metric	Unit of Measure	Analysis Dimension	Reference
Total amount of surplus food generated	Measures the quantity of food ordered for catering services that remains uneaten and becomes surplus	(Total amount of food provided)	[kg]	Food category (*)	
Total amount of surplus food reused	Measures the quantity of food ordered for catering services that is effectively recovered and redistributed for human consumption	(Total amount of food provided)	[kg]	Food category (*)	
Percentage of surplus food reused	Measures the proportion of surplus food that is effectively recovered and redistributed for human consumption	(Total amount of food recovered [kg] / Total amount of surplus food [kg]) * 100	Percentage (%)	Food category (*)	
CO₂ emissions avoided	Measures the reduction of CO ₂ emissions avoided by preventing food waste through redistribution	(2.50) * total amount of surplus food reused	CO ₂ equivalent	Food category (*)	<i>FAO Food Waste Footprint (2013)</i> assumed an average of 2.5 kg CO ₂ e per kg of food waste
Avoided water footprint	Liters or cubic meters of water embedded in food that would have been wasted if the food had been discarded	[1,000-2,000] * total amount of surplus food reused	Liters or cubic meters	Food category (*)	<i>Mekonnen and Hoekstra (2012)</i> assumed 1kg of mixed food requires 1,000-2,000 litres of water
Equivalent meals donated	Number of meal portions provided through redistribution	(Total amount of food redistributed / Average weight of a meal)	Absolute number	Food category (*)	<i>Fondazione Banco Alimentare (2024)</i> assumed an average meal weight of 500 g for the estimation
Total number of participants	Number of participants to be served by the catering service				

Table 3.3.
The data collection matrix tested.

Drawing on above assumptions, authors collaborated with the catering supplier to define standardized operational procedures. For each event, measurements were conducted onsite by a trained, dedicated student, temporarily hired for the experimentation, and carried out in compliance with food safety and hygiene protocols. At the end of each service, surplus food was weighed prior to distribution to internal or external recipients, distinguishing total surplus food from the share suitable for recovery. Food items were classified according to a six-level food pyramid (Figure 3.1), adapted from Romero-Tapiador *et al.* (2024), enabling the analysis of differences across food groups in surplus generation and recovery rates.

Figure 3.1.
Six-level food category pyramid (based on Romero-Tapiador *et al.*, 2024).



3.4 Results and implications

The monitoring covered 26 lunch events held at the SOM between July and December 2025 (see Table 3.4). Across all events, total surplus amounted to 115.39 kg, of which 111.16 kg were recovered, corresponding to a recovery rate of 96.3%. On average, each event generated 4.44 kg of surplus food, with 4.28 kg effectively recovered and redistributed.

Most recovered food was redistributed and consumed internally within the SOM community, with occasional external redistribution to local parishes. This arrangement reinforces the programme's social purpose of the programme and is supported by trust-based agreements with external partners ensuring timely collection and compliance with food safety requirements.

Table 3.4.
Amount of surplus
food generated and
recovered.

Code event	Number of participants	Amount of surplus food [kg]	Amount of surplus food recovered [kg]	Percentage of surplus food reused (%)
1	40	3.3	3.3	100%
2	20	2.3	1.3	55%
3	50	5.5	3.6	66%
4	30	5.2	5.2	100%
5	35	7.0	7.0	100%
6	30	1.4	1.4	100%
7	30	5.7	5.7	100%
8	35	1.1	1.1	100%
9	20	4.6	4.6	100%
10	35	6.1	6.1	100%
11	40	5.0	5.0	100%
12	25	5.0	5.0	100%
13	20	1.9	1.9	100%
14	20	1.9	1.8	91%
15	15	3.8	3.8	100%
16	35	1.2	1.2	100%
17	25	7.5	7.5	100%
18	27	5.1	5.1	100%
19	60	5.4	5.4	100%
20	75	1.7	1.7	100%
21	50	0.1	0.1	100%
22	20	3.5	3.5	100%
23	90	6.9	6.9	100%
24	45	9.6	9.6	100%
25	40	5.0	5.0	100%
26	50	9.5	9.5	100%

Table 3.5 indicates that *Level 6* (cereals and starchy foods) and *Level 3* (mixed and processed foods) account for the largest share of re-covered surplus, reflecting their prominence in menu composition. Recovery rates are close to complete across all categories, except for *Level 5*, where approximately one-quarter of surplus remains unrecovered, likely due to the higher perishability of items such as fruits and vegetables.

Table 3.5.
Surplus food categories.

Food category	Surplus (kg)	Recovered (kg)	Recovery rate
Level 1	9.1	9.1	100.0%
Level 2	0.3	0.3	100.0%
Level 3	21.9	21.9	100.0%
Level 4	5.6	5.6	99.6%
Level 5	13.2	10.1	76.5%
Level 6	65.0	63.9	98.3%

With regard to the socio-environmental impacts of the programme, and considering recovered quantities only, the 111.16 kg of food recovered during the monitoring period correspond to around 278 kg of CO₂-equivalent emissions avoided. In terms of water use, this amount translates into estimated savings ranging from roughly 111,000 to 222,000 litres. When expressed in equivalent meals, using the Fondazione Banco Alimentare's standard of 500 grams per meal, the recovered surplus food corresponds to 222 meals redistributed.

Considering these figures and extrapolating the results to the total of 133 lunch catering events held at SOM in 2024 (excluding those held at the Graduate School of Management), authors estimate the programme's annual potential impact (Table 3.6). Indeed, assuming a constant recovery rate, the programme could generate approximately 502 kg of surplus food, of which about 483 kg would be recovered and redistributed. This would correspond to 1,207 kg of CO₂-equivalent emissions saved, a water footprint reduction of 490,000 and 960,000 litres, and the redistribution of around 965 equivalent meals.

Table 3.6.
Socio-environmental impacts of surplus food recovered.

KPI	Projected annual value	Assumption
Total amount of surplus generated	501.52 kg	<i>The annual number of lunch events was estimated at 133, drawing on historical data on lunches held at the SoM in 2024</i>
Surplus recovered	482.96 kg	<i>Constant recovery rate (96.3%)</i>
CO₂ emissions avoided	1,207.41 kg CO ₂ e	<i>FAO factor: 2.5 kg/kg</i>
Water footprint avoided	490.000-960.000 L	<i>Mekonnen & Hoekstra (2012): 1000-2000L per kg</i>
Equivalent meals	965 meals	<i>500 g/meal (Banco Alimentare)</i>

The monitoring system tested can be considered effective in providing a more granular understanding of the functioning of the *SOM for Food Waste Reduction programme*. By systematically measuring surplus food generated within internal catering services, the system produced evidence indicating that the programme enables the annual recovery of half a tonne of surplus food. This result reflects the effective implementation of redistribution measures by the actors involved and demonstrates significant socio-environmental benefits, while contributing to the objectives of the Strategic Sustainability Plans of both POLIMI and the SOM.

The experimentation also generated insights to inform potential refinements to SOM procurement and operational processes. Although overall recovery rates are high, surplus generation appears to be largely driven by structural factors inherent to catering services. Event-level data suggest that surplus is influenced by attendance variability and menu composition, whereby some categories (e.g. Levels 6 and 3) are supplied in larger quantities, while others (e.g. Level 5) are less suitable for redistribution due to higher perishability. Additional factors include portioning practices linked to precautionary over-preparation and buffet service formats requiring a perception of abundance. Taken together, these elements highlight the importance of more flexible, data-informed forecasting practices in food procurement to reduce surplus generation at source and improve overall efficiency.

Despite positive results obtained, this experimentation presents some limitations, primarily related to data collection. These include the limited availability of sensitive information that catering suppliers are not always willing or able to share (e.g. precise quantities of food served). Additional challenges emerged during the initial phase, notably operational constraints associated with weighing surplus food within the short time window between the end of the service and its internal or, in some cases, external redistribution. In this regard, future experimentation could expand the monitoring framework by incorporating additional analytical dimensions, such as participant characteristics (e.g. gender composition), attendance variability, and menu formats, and their influence on surplus food generation.

In this light, further development is needed to move from an experimental setup to a systematic and continuous monitoring system.

Although event-by-event measurement by a dedicated operator ensured high data accuracy, this method is unlikely to be scalable or economically viable if applied on a daily basis across all catering services. Future efforts should therefore focus on the design of a lightweight, periodic monitoring plan that combines different measurement strategies. For example, direct weighing could be applied to a sample of representative events, while routine events could rely on estimation models based on historical averages, participant numbers, and menu composition. Such a hybrid approach would ensure ongoing oversight of surplus food trends while substantially reducing the associated operational burden.

In conclusion, it is important to stress that the monitoring system should be understood as a component of a broader university strategy addressing sustainability in general and, more specifically, the development and implementation of University Food Policies. Its application may be relevant not only for other POLIMI departments but also for universities operating under different food waste prevention and surplus redistribution arrangements. Extending the recovery model and monitoring framework in other settings would enable cross-contextual comparisons, enhance institutional learning, and inform the formulation of a standardized university-wide approach.

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4. A Roadmap Towards Best Practice Enhancement in University Canteens

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ABSTRACT

This chapter presents an empirical study aimed at identifying the best practices for improving university canteen services. Firstly, existing practices within the school canteen system were mapped, with a focus on a case study in the province of Bari. The results of this analysis informed the design of an online, structured questionnaire which was administered to 349 users of the University of Bari Aldo Moro canteens. The questionnaire covered five main areas: quality of food on offer, sensory quality of meals, sustainability, organisation of services and environmental comfort, and interest in additional services. The data were analysed using descriptive statistics and cross-sectional analyses by subgroup, namely gender, age, and area of residence.

The results highlighted specific areas for improvement, namely: improving menu variety and sensory quality; strengthening the sustainability of the supply chain by adopting local and organic production methods; providing incentives for conscious and informed participation through management committees and

nutritional counselling services. Finally, better organisation of the service and greater environmental comfort were found to generate greater user satisfaction.

Overall, the findings provide a solid empirical basis for translating user perceptions into targeted, context-sensitive best practices and support the development of a participatory Manifesto for improving university canteen services.

4.1 Introduction

In recent years, the role of university canteens has progressively evolved from a simple catering service into a strategic component of academic welfare systems, with significant implications in terms of public health, environmental sustainability, and social responsibility. In this context, universities represent privileged environments for the experimentation and implementation of sustainable food models, capable of influencing not only students' dietary habits but also procurement policies and the management of collective catering services (Franchini *et al.*, 2023).

With the aim of developing a Manifesto of Best Practices for the improvement of university catering services, with particular attention to their overall sustainability, a study was conducted based on an integrated analysis of existing practices and the direct involvement of end users, acknowledging the central role of students in assessing the quality and impact of the services provided.

4.2 First phase: mapping practices in the school canteen system

The first phase of the study involved mapping the practices adopted within the school canteen system, taking the Province of Bari as a case study. This analysis constituted the knowledge base for the design of a survey instrument addressed to university students, with the aim of exploring perceptions, expectations, and critical issues related to the quality and sustainability of canteen services.

Preliminary focus of the mapping activity was the analysis of the relevant regulatory framework. Public procurement regulation in Italy, including contracts for school and collective catering services, is based on a set of national and European regulations. At the national level, the main reference is the Public Contracts Code (Legislative Decree No. 36/2023), in force since 1 July 2023 and replacing the previous Legislative Decree No. 50/2016. This decree governs procurement procedures for works, services, and supplies, including specific sections dedicated to social services and collective catering (Annex IX). At the European level, the Directive 2014/24/EU establishes the general principles of competition, transparency, and equal treatment (European Parliament, 2014), which have been transposed into the Italian legal system. In addition, contracting authorities frequently rely on guidelines issued by the National Anti-Corruption Authority (ANAC), particularly with regard to transparency and control mechanisms.

A key element for collective catering is represented by the Minimum Environmental Criteria (MECs), defined by the Ministerial Decree of 10 March 2020 (Legislative Decree No. 10/2020). The MECs are mandatory for contracting authorities and establish minimum requirements across three main areas: technical specifications (environmental characteristics of products and services), contractual clauses (obligations for operators, such as the use of detergents bearing the EU Ecolabel), and execution conditions (waste management, energy efficiency, etc.). Among the requirements for food products, minimum percentages of organic products are specified: fruit, vegetables, legumes, and cereals at least 50% by weight; eggs and milk/yogurt 100% organic; cured meats and cheeses at least 30% by weight; extra virgin olive oil at least 40%; peeled and processed tomatoes at least 33%; juices and nectars 100% organic.

In addition to mandatory requirements, the MECs include award criteria that contracting authorities may use to enhance bid evaluation. These include packaging reduction (e.g. water dispensers connected to the public water supply), short supply chains and zero-kilometer products, environmental certifications (REGULATION (EC) No 1221/2009; ISO 14001: 2005), fair trade for exotic products, the use of low-impact vehicle fleets, and the submission of sustainability reports.

Although both school and university catering services refer to the same MEC framework, practical implementation differs according to the characteristics of users and service objectives. Common elements include the obligation to provide minimum percentages of organic food, the use of certified products, and environmental monitoring. Differences instead emerge with regard to nutritional guidelines (more stringent and validated by local health authorities for schools, more flexible in universities), the role of food education (mandatory in schools), portion and food waste control, and award criteria (greater emphasis on short supply chains in schools, and on efficiency and digital effectiveness in universities) (Table 4.1).

Aspect	School catering	University canteens
Users	Children and adolescents (nursery, primary and secondary schools)	Young adults (students, faculty, staff)
Nutritional guidelines	Strictly defined by local health authorities/ Regions (e.g. LARN, MIUR guidelines)	More flexible, often based on free choice via self-service
Rotating menus	Mandatory, validated by dietitians and health authorities	Greater freedom in menu design, fixed or optional choices
Food education	Integrated into the service (educational component)	Not mandatory
Portion and waste control	High attention to waste reduction and balanced meals	Less control; greater user autonomy
Award criteria	Greater emphasis on short supply chains and seasonality	Greater emphasis on efficiency, digital services, flexible schedules

At the territorial level, the Apulia Region has issued guidelines for collective catering that integrate national MECs, providing additional guidance on food education and sustainability. The Municipality of Bari manages school catering services through a municipal regulation governing enrolment, payments, and exemptions based on income (ISEE). The Municipality of Monopoli has adopted a regulation that explicitly refers to the MECs (Ministerial Decree 10/03/2020 No. 65), emphasizing quality, reduced environmental impact, and working conditions along the supply chain; particularly relevant is City Council Resolution No. 4 of 16 February 2024. These local instruments complement the MECs and require participating companies to adapt their bids and operational practices accordingly.

Table 4.1.
Differences in the application of regulations between school catering and university canteens.

For companies participating in collective catering tenders in Apulia and in the municipalities considered, the operational implications are clear: strict compliance with national MECs, adherence to regional guidelines (with a focus on health, education, and sustainability), and conformity with municipal regulations.

The mapping of practices adopted within the school canteen system was completed through interviews conducted both with a company contracted to provide school catering services and with school principals from the Municipality of Monopoli, acting as service users.

The company Ferrara Ristorazione provides catering services to 90 school facilities across 12 municipalities in the Province of Bari. At full capacity, the company employs approximately 500 workers and operates 21 cooking centers distributed throughout the province. Among the main challenges highlighted by the company in securing public contracts is the difficulty of simultaneously meeting requirements for organic products and for “zero-kilometer” products (Law 61/2022), defined as agricultural and livestock products originating from production and processing sites located within a radius of no more than 70 kilometers from the place of sale, or within the same province as the place of sale or consumption.

A key strength of Ferrara Ristorazione lies in its ownership of an agricultural enterprise, which allows it to fully meet its demand for fresh organic fruit and vegetables through self-production (Figure 4.1).

Figure 4.1.
Taproots of a local variety of carrot (*Dacus carota L.*) called “Carota di San Vito” harvested at “Azienda Agricola Pasquale Ferrara”.



For raw materials of animal origin, the company relies on approximately 12 suppliers in order to meet requirements for organic and zero-kilometer products. The company's strategy is based on the exclusive use of organic products (100%), which maximizes scores related to MEC award criteria and simplifies organizational and operational management. Another strength is its consistent focus on both quality and sustainability, ensured through an internal quality control system managed exclusively by in-house staff.

Subsequent interviews with school principals highlighted the importance of continuous monitoring of the service provided. In this regard, the mapping exercise emphasized the relevance and effectiveness of the canteen committee, a consultative and participatory body composed of parents, teachers, and representatives of the local authority, which can report service issues and participate in inspections of cooking centers or dining facilities.

At the end of the mapping phase, a state-of-the-art analysis was conducted on the university canteen service contracted by ADISU Puglia for users of the University of Bari Aldo Moro. The results of this document-based analysis were compared with the information emerging from the mapping of practices adopted in the school canteen system (Table 4.2).

Table 4.2.
Differences between school catering and university canteens based on practice mapping and analysis of the ADISU Puglia university canteen service.

Aspect	School catering	University canteens
Users	Children and adolescents (under adult supervision)	Adults autonomous in choice and consumption
Educational involvement	Strong educational focus (healthy eating, schedules, behaviors)	Limited, mainly oriented toward user satisfaction
Service structure	Fixed menus approved by health authorities	Self-service, multiple-choice menus, greater flexibility
Canteen committee	Present and well-structured (parents and teachers)	Rare; feedback mainly through surveys and complaint desks
MEC monitoring	Mandatory and highly detailed (ingredients and origin)	Mandatory, but more focused on supply and logistics
Portion control	Strict, based on age-specific LARN nutritional needs	Flexible; users choose portions and dishes

4.3 Second phase: survey on university canteens

To identify good practices for improving university canteen services, a structured questionnaire was developed and distributed to users of the canteens at the University of Bari Aldo Moro. The questionnaire was completed on a voluntary and anonymous basis. It was divided into five main thematic areas, with perception-related questions formulated using five-point ordinal scales. Dichotomous questions were used to assess interest in additional services. A total of 349 valid and complete questionnaires were obtained.

Descriptive statistics were used to analyse the data, after which a cross-sectional analysis was conducted to highlight differences in perception of service quality according to the age, gender and area of residence of users, enabling the critical interpretation of the data and the identification of good practices (see Figure 4.2).

Figure 4.2.
Phases of the direct inquiry.



The results of the cross-sectional analysis (Tables 4.3-5) showed that perception and appreciation of the canteen service is significantly shaped by gender, age and area of residence.

	Women			Men			
Ordinal indicators							
Indicator	Negative (%)	Positive (%)	Synthetic evaluation	Negative (%)	Positive (%)	Synthetic evaluation	Comparative judgement
Variety of daily food offerings	41.0	13.3	Negative	42.1	20.0	Negative	Similar
Seasonal products	36.9	22.1	Negative	41.4	22.8	Negative	More negative among men
Local products	51.0	11.8	Negative	46.2	14.5	Negative	More negative among women
Short supply chain (km 0) products	58.3	6.7	Very negative	58.3	6.7	Very negative)	Similar
Organic / integrated farming products	55.8	8.1	Very negative	51.7	7.9	Very negative	Similar
Sensory quality	61.1	7.0	Very negative	42.1	20.0	Negative	More negative among women
Nutritional information	48.4	22.2	Negative	42.1	26.9	Negative	More negative among women
Environmental and ethical sustainability	46.8	13.3	Negative	41.4	15.9	Negative	More negative among women
Sustainability of tableware	41.5	26.1	Negative	36.6	28.3	Moderate	More negative among women
Environmental comfort	36.9	32.7	Moderate	35.9	34.5	Moderate	Similar
Service organisation	49.2	20.4	Negative	44.1	24.1	Negative	More negative among women
Dichotomous indicators							
Indicator	Yes (%)	No (%)	Synthetic evaluation	Yes (%)	No (%)	Synthetic evaluation	Comparative judgement
Nutritional tutoring	71.3	28.7	Very favourable	62.1	37.9	Moderate	More favourable among women
Users' representatives participation	92.4	7.6	Very favourable	89.0	11.0	Very favourable	Similar

Table 4.3.
Cross-analysis between gender and perceived quality indicators of the university canteen service.

	≤21 years old			22–25 years old			≥26 years old			
Ordinal indicators										
Indicator	Negative (%)	Positive (%)	Synthetic evaluation	Negative (%)	Positive (%)	Synthetic evaluation	Negative (%)	Positive (%)	Synthetic evaluation	Comparative judgement
Variety of daily food offerings	19.6	21.7	Favourable	55.3	13.2	Negative	40.9	27.3	Negative	The most negative 22–25 years old
Seasonal products	38.0	21.7	Negative	45.0	20.0	Negative	31.8	27.3	Moderate	The most negative 22–25 years old
Local products	46.7	14.1	Negative	53.9	10.5	Negative	31.8	27.3	Moderate	The most negative 22–25 years old
Short supply chain (km 0) products	50.0	8.7	Very negative	57.9	5.3	Very negative	36.4	27.3	Moderate	The most negative 22–25 years old
Organic / integrated farming products	47.8	10.9	Negative	56.6	6.6	Very negative	31.8	27.3	Moderate	The most negative 22–25 years old
Sensory quality	56.5	10.9	Negative	60.8	6.6	Very negative	54.5	9.1	Very negative	The most negative 22–25 years old
Nutritional information	39.1	26.1	Negative	49.3	20.4	Negative	31.8	36.4	Favourable	The most favourable ≥26 years old
Environmental and ethical sustainability	34.8	26.1	Moderate	46.1	17.1	Negative	45.5	18.2	Negative	The most negative 22–25 years old
Sustainability of tableware	39.1	30.4	Moderate	43.4	25.0	Negative	31.8	36.4	Favourable	The most favourable ≥26
Environmental comfort	43.5	28.3	Negative	35.5	32.9	Moderate	31.9	36.5	Favourable	The most favourable ≥26 years old
Service organisation	52.2	18.5	Negative	44.7	21.1	Negative	44.4	22.2	Negative	The most negative ≤21 years old
Dichotomous indicators										
Indicator	Yes (%)	No (%)	Synthetic evaluation	Yes (%)	No (%)	Synthetic evaluation	Yes (%)	No (%)	Synthetic evaluation	Comparative judgement
Nutritional tutoring	60.9	39.1	Moderate	67.3	32.7	Moderate	81.8	18.2	Very favourable	The most favourable ≥26 years old
Users' representatives participation	91.3	8.7	Very favourable	90.8	9.2	Very favourable	90.9	9.1	Very favourable	Similar

Table 4.4. Cross-analysis between age groups and perceived quality indicators of the university canteen service.

	Urban area			Rural area			
Ordinal indicators							
Indicator	Negative (%)	Positive (%)	Synthetic evaluation	Negative (%)	Positive (%)	Synthetic evaluation	Comparative judgement
Variety of daily food offerings	41.2	16.8	Negative	44.1	17.6	Negative	Similar
Seasonal products	38.1	22.5	Negative	50.0	17.6	Negative	Rural people the more negative
Local products	48.5	14.4	Negative	58.8	8.8	Very negative	Rural people the more negative
Short supply chain (km 0) products	53.9	7.4	Very negative	67.6	5.9	Very negative	Rural people the more negative
Organic / integrated farming products	52.8	8.3	Very negative	67.6	5.9	Very negative	Rural people the more negative
Sensory quality	58.4	9.6	Very negative	61.8	8.8	Very negative	Similar
Nutritional information	44.9	24.6	Negative	47.1	23.5	Negative	Similar
Environmental and ethical sustainability	44.6	15.0	Negative	58.8	11.8	Negative	Rural people the more negative
Sustainability of tableware	36.9	29.2	Moderate	58.8	11.8	Negative	Rural people the more negative
Environmental comfort	38.4	31.3	Moderate	32.4	35.3	Very favourable	Rural people the more favourable
Service organisation	49.4	21.8	Negative	44.1	26.5	Negative	Urban people more negative
Dichotomous indicators							
Indicator	Yes (%)	No (%)	Synthetic evaluation	Yes (%)	No (%)	Synthetic evaluation	Comparative judgement
Nutritional tutoring	67.0	33.0	Moderate	70.0	30.0	More favourable	Rural people the more favourable
Users' representatives participation	91.1	8.9	Very favourable	91.2	8.8	Very favourable	Similar

Table 4.5.
Cross-analysis between area of residence and perceived quality indicators of the university canteen service.

The sensory quality of meals and the variety of daily food options emerged as critical structural issues affecting all analysed subgroups. Overall, these two characteristics received low ratings, highlighting systemic weaknesses in the canteen service. The combined perception of a limited menu and poor sensory quality reduces satisfaction with the dining experience and undermines the educational and preventive role of university catering, i.e. its ability to encourage healthy eating habits and prevent diet-related diseases (Chang *et al.*, 2014; Kourouniotis *et al.*, 2016; Garg and Kumar, 2017; Li *et al.*, 2022).

A stronger difference in perception of sustainability indicators (seasonality, locality, short supply chains, organic/integrated farming products, and ethical and environmental issues) was observed among users from different territorial contexts, and to a lesser extent among users of different genders.

Users from rural areas were more critical overall, highlighting a substantial gap between their expectations and their perception of the quality of the service.

This suggests that sustainability is assessed not only on the basis of actual service provision, but also in comparison with territorial food models that are perceived as being more authentic, coherent and transparent (Akbara *et al.*, 2021; Son, 2024; Del Gaudio *et al.*, 2024; Aboueldahab *et al.*, 2026).

Female users exhibited greater evaluative severity across several environmental and ethical dimensions and were more attentive to the value-based implications of food choices. These differences highlight that perceptions of sustainability are significantly shaped by gender, reflecting cultural orientations that are more closely linked to environmental responsibility, health, collective well-being, and the ethical quality of food choices. These value systems attribute not only a nutritional function to food, but also a social and moral one (Schaubroeck *et al.*, 2018; Pandey *et al.*, 2023; Manzano Fischer *et al.*, 2026).

Appreciation of the service organisation is strongly influenced by age. Younger users tend to be more critical, particularly regarding waiting times, queue management and perceived efficiency. As age increases, evaluations progressively improve, suggesting either an adaptation effect or a different organisational tolerance threshold. This pattern indicates that the organisation of services is a particular-

ly sensitive issue for younger users, for whom the canteen is embedded in daily routines characterised by tight time constraints and high organisational pressure (Garg & Kumar, 2017; Czarniecka-Skubina *et al.*, 2019; Roy *et al.*, 2019).

Similarly, satisfaction with the clarity of the nutritional information provided increased with the age of respondents. However, an overall negative trend suggests that informational transparency is a structural weakness of the service, independent of socio-demographic characteristics. Insufficient information limits users' ability to make informed food choices, reducing the educational potential of the university canteen as a health promotion tool (Hilger *et al.*, 2017; Czarniecka-Skubina *et al.*, 2019; Cooreman-Algoed *et al.*, 2020; Bonito *et al.*, 2026). The evaluation of environmental comfort is strongly influenced by the area of residence. Urban residents were less satisfied, whereas rural residents gave more favourable evaluations. This suggests that comfort assessments depend on everyday environments (Serhan & Serhan, 2019; Rahman, 2024).

Interest in the involvement of users to monitor the efficiency and quality of the canteen service is extremely high and consistent across all subgroups, as participation is perceived as a collective and stable need among users. According to a logic of public service co-production, the canteen is not only a service to be evaluated, but also a space that can potentially be co-governed by users (Wongprawmas *et al.*, 2023).

Interest in nutritional tutoring increases progressively with age, suggesting a growing awareness of food throughout the university experience. This demonstrates the educational potential of the university canteen, which could be further enhanced throughout the entire university career (Sogari *et al.*, 2018).

Overall, the cross-sectional analysis shows that the perception of the university canteen service is not a single, static judgement, but a dynamic, stratified and socially constructed phenomenon. The observed differences reflect the interaction between individual characteristics, the cultural context and the organisational structure of the service. This evidence confirms the need for a modular improvement model that can adapt to diverse user profiles and is differentiated to address specific needs. It should also be participa-

tory to enhance users' active role and integrated to connect quality, sustainability, and food education (Wongprawmas *et al.*, 2023; Franchini *et al.*, 2023).

4.4 Good practices for enhancing the university canteen service

The results of the cross-sectional analysis allowed us to define a set of operational good practices aimed at improving the quality of the university canteen service, which are suitable for inclusion in a 'Manifesto'. These practices are organised into eight strategic areas, each of which addresses a critical issue identified in the analysed sample. The objective is to transform the university canteen into an integrated space for sustainability, food education and participation, thereby increasing user satisfaction (Franchini *et al.*, 2023; Blennerhassett *et al.*, 2025).

1. *Improving menu variety and quality*

Menu variety is perceived as insufficient by over 40% of users. Menu repetitiveness reduces service attractiveness and may compromise adherence to a balanced diet.

Operational good practices:

- planning seasonal menus with genuine weekly rotation;
- systematic introduction of regional and traditional dishes;
- daily availability of vegetarian, vegan, and special-diet options;
- user involvement in periodic menu selection;
- experimentation with themed menus and gastronomic weeks.

Increasing variety enhances satisfaction, nutritional diversity, and reduces food waste.

2. *Strengthening short supply chains and sustainability*

Over 50% of users evaluate the presence of local, organic/integrated farming, and short supply chain products negatively, indicating a strong misalignment between expectations and service perception.

Operational good practices:

- establishing agreements with local agricultural producers;
- transparent communication of product origin;
- use of visual labels to indicate local and sustainable products;
- monitoring raw material traceability.

Strengthening short supply chains reduces environmental impact, supports local economies, and increases user trust.

3. *Improving sensory quality*

Sensory quality represents a major critical issue, with nearly 60% of negative evaluations.

Operational good practices:

- continuous training of kitchen staff;
- review of cooking and storage techniques;
- periodic control of food temperature and texture;
- introduction of internal quality audits;
- tasting panels involving users.

Improved sensory quality directly affects dish acceptability and waste reduction.

4. *Improving clarity of nutritional information*

Almost half of users judge nutritional information as unclear or insufficient.

Operational good practices:

- simplified nutritional sheets with intuitive icons;
- clear indication of allergens and energy values;
- QR codes for access to detailed information;
- use of non-technical, accessible language;
- integration with food education campaigns.

Informational transparency supports informed choices and protects user health.

5. *Optimising service organisation*

Service organisation is negatively evaluated by nearly 50% of users.

Operational good practices:

- digital meal booking systems;
- rescheduling service time slots;
- dynamic queue management;
- monitoring average waiting times.

Improved organisation enhances perceived efficiency and overall satisfaction.

6. *Improving environmental comfort*

Environmental comfort is predominantly rated as moderate.

Operational good practices:

- increasing seating capacity;

- improving and monitoring cleanliness and maintenance;
- creating differentiated functional areas;
- improving lighting and acoustics;
- ergonomic adjustment of furnishings.

Environmental comfort significantly contributes to overall service quality perception.

7. *Active user involvement*

Approximately 90% of users desire active representation in service management.

Operational good practices:

- establishing a canteen user committee;
- structured periodic consultations;
- digital feedback systems;
- public reporting of results;
- user involvement in decision-making processes.

Participation strengthens sense of belonging and managerial transparency.

8. *Introduction of nutritional tutoring service*

Approximately 67% of users support the introduction of nutritional tutoring.

Operational good practices:

- periodic presence of nutritionists in the canteen;
- information desks;
- support for special diets;
- educational workshops;
- integration with university health services.

Nutritional tutoring transforms the canteen into an educational as well as catering environment.

4.5 Conclusions

This study provides a comprehensive and empirical assessment of how university canteen services are perceived by users, showing that such perceptions are shaped by the interaction between individual characteristics, socio-cultural context and service organisation.

The cross-sectional analysis identified specific critical indicators – especially limited menu variety and poor sensory quality – as structural weaknesses of the service, which were reported across gender, age groups and areas of residence. These issues undermine the users' satisfaction and weaken the educational and preventive role of university canteens, understood as their capacity to promote healthy dietary habits and contribute to the prevention of diet-related diseases.

Sustainability-related indicators (e.g. seasonal and local products, short supply chains, organic and integrated farming products, and ethical aspects) were evaluated more critically by users from rural areas and, to a lesser extent, by female users. This suggests that sustainability perceptions are strongly mediated by territorial food cultures and gender-related values, which attribute social, ethical and environmental functions to food. Service organisation emerged as a generational issue, with younger users expressing greater dissatisfaction, while older users report more favourable evaluations, possibly reflecting adaptive behaviours or different tolerance thresholds.

Nutritional information revealed a structural deficit in informational transparency.

At the same time, the study highlighted strong demand for participation and nutritional tutoring. A large share of respondents supported the introduction of users' representation, and interest in nutritional tutoring increased with age, pointing to a significant yet underexploited educational and social potential of university canteens.

The best practices identified are directly connected with these findings. Structural interventions are justified where criticalities are transversal (e.g. sensory quality, menu variety and nutritional transparency), while socio-demographic variability in other dimensions (e.g. sustainability, comfort and organisation) calls for flexible and context-sensitive strategies.

The results confirm that improving university canteen services requires a modular, differentiated and participatory governance approach, capable of transforming the canteens into a strategic space for health promotion, sustainability education and active citizenship.

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5. Promoting Sustainability in Higher Education: A Case Study Analysis

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ABSTRACT

The aim of this study is to analyze the role of universities, and in particular the University of Catania, in promoting sustainable lifestyles, with a specific focus on food and nutrition. By examining the syllabi of degree programs and applying text mining tools (Voyant Tools), the present research analyzes the frequency and distribution of concepts related to sustainability and nutrition across various disciplinary areas.

This study thus underlines the need to promote a systemic and interdisciplinary perspective within academic curricula, one that can overcome traditional disciplinary boundaries and contribute more effectively to the goals of sustainability.

The results reveal a heterogeneous distribution: while the medical and scientific fields tend to focus more on nutrition, the technical-scientific, economic-legal, and humanities areas address greater attention to sustainability and the goals of the 2030 Agenda. The analysis also highlights specific correlations between key concepts and disciplinary sectors, revealing the persistence of

fragmented approaches. However, the transition towards sustainable models of life and consumption requires stronger integration of themes related to health, food, and environmental and social sustainability inside education.

5.1 Introduction

Educating citizens and future leaders in values compatible with sustainable development is a priority at all levels of education, especially in higher education, as academic institutions play a strategic role in preparing professionals and shaping decision-makers who are aware of sustainability challenges (Leal Filho *et al.*, 2023; Lewis, 2014; Niu *et al.*, 2010; Yuan *et al.*, 2013).

Sustainability is a complex and multidimensional concept, involving the simultaneous achievement of productive, ecological, temporal, economic, and socio-cultural objectives (Gaspar *et al.*, 2022). In this context, education is essential for providing students with the knowledge and skills necessary to make responsible decisions for the well-being of present and future generations (UNESCO, 2017; Didham & Ofei-Manu, 2020; Leal Filho *et al.*, 2025).

From this perspective, Education for Sustainable Development (ESD) aims to develop the skills to critically reflect on one's actions and their impacts, promoting responsible behaviors, innovative ideas, and participation in socio-political processes (UNESCO, 2017). It fosters transformative learning, capable of shaping perspectives, values, and skills essential for building more equitable, resilient, and sustainable societies (Laurie *et al.*, 2016).

The concept of ESD has undergone significant development since the 1990s, thanks to international initiatives, and has also been consolidated through specific policies implemented by European Union member states (and beyond). In 2015, the adoption of the 17 SDGs emphasized the importance of quality education, with Goal 4.7 aiming to ensure the acquisition of skills for sustainable development, global citizenship, and respect for human rights by 2030 (Elmassah *et al.*, 2020; United Nations, 2015). In this context, the document "ESD for 2030: A Roadmap" outlines five priority areas for the implementation

of ESD: policy development, transformation of learning environments, teacher training, youth engagement, and concrete actions within local communities (UNESCO, 2020).

In light of the above, this article examines the role of sustainability education in higher education, with particular reference to the University of Catania (Italy), focusing on the promotion of sustainable lifestyles and dietary habits among students. By analyzing degree program syllabi and applying text mining tools (Voyant Tools), the study investigates the frequency and distribution of concepts related to sustainability and nutrition across different disciplinary areas.

5.2 State of art of sustainability education

The role of the university has evolved beyond its traditional function as a producer of knowledge, taking on an active role as an agent of change (Robinson *et al.*, 2011; Peer e Stoeglehner, 2013; Brugmann *et al.*, 2019; Leal Filho *et al.*, 2023). Universities train students to apply knowledge, make informed decisions, and understand the global context of their actions, enabling them to become agents of change; as future experts and leaders, they can drive significant social transformations (Al-Nuaimi & Al-Ghamdi, 2022; Rosenau *et al.*, 2024). Universities should therefore position themselves as learning institutions that foster interdisciplinarity and transdisciplinarity, active participation, problem-solving, and the integration of formal and informal learning (AdomBent *et al.*, 2014; Holm *et al.*, 2015). To achieve this goal, universities must integrate sustainability across all curricula, enabling graduates to apply its principles in their future professions and contribute to social well-being (Xue, 2022).

Among the areas where adopting sustainable behaviours is essential, food and nutrition play a crucial role, as individual and collective choices directly impact the environment, public health, and social dynamics. Universities have the responsibility to promote healthy and sustainable eating habits among students by fostering awareness within the academic community and supporting the transformation of the food system (Franchini *et al.*, 2023; Gaspar *et al.*, 2022).

5.3 Material and methods

5.3.1 Materials

The materials analyzed include the course programs publicly available on the official web pages of the University of Catania, in the section dedicated to course descriptions for the 2024/2025 academic year, as well as a structured questionnaire administered online.

The curricula, downloaded in PDF format between January and February 2025, represent the official educational offerings and detail learning objectives, teaching methods, prerequisites, course content, reference materials, and assessment criteria.

The analysis focused on the curricula of 109 degree programs (out of 116) offered across the University's 17 departments. Only curricula updated for the 2024/2025 academic year, corresponding to active courses and written in Italian, were included. Programs that were outdated, taught in English as part of international programs, or not available online were excluded.

Disciplinary area	Name of departments
Medical area	General Surgery and Medical-Surgical Specialties (CHIRMED) Clinical and Experimental Medicine (MEDCLIN) Biomedical and Biotechnological Sciences (BIOMETEC) Medical, Surgical Sciences and Advanced Technologies (DGFI)
Scientific area	Physics and Astronomy (DFA) Mathematics and Computer Science (DMI) Biological, Geological and Environmental Sciences (DSBGA) Chemical Sciences (DSC) Drug and Health Sciences (DSF)
Technical-scientific area	Agriculture, Food and Environment (DI3A) Electrical, Electronic and Computer Engineering (DIEEI) Civil Engineering and Architecture (DICAR)
Economic, political-social and legal area	Economics and Business Law (LEX) Political and Social Sciences (DSPS)
Humanities area	Educational Sciences (DISFOR) Humanities (DISUM)

Table 5.1.
Distribution of syllabi
by thematic area and
department.

To highlight potential differences between disciplinary areas and facilitate comparative analysis, the degree programs were grouped into five broad disciplinary areas: (1) medical, (2) scientific, (3) technical-scientific, (4) economic, political-social, and legal, and (5) humanities (Table 5.1).

5.3.2 Content Analysis Methodology

Content analysis was employed as the methodological approach to systematically and objectively support the present study, drawing on the scientific examination of communication content.

This type of analysis focuses on the meanings, contexts, and intentions embedded within messages, thus enabling a deeper understanding of communication processes. More generally, the content of a message or document can be considered the basis for drawing inferences and formulating conclusions (Devi Prasad, 2008; Mustapha & Ebomoyi, 2019; Nachmias & Nachmias, 1976).

Specifically, the analysis of the course syllabi was carried out using Voyant Tools (<https://voyant-tools.org/>), a free, open-source, web-based suite that offers a wide range of tools for textual analysis (Brenner, 2014; Cortés Sánchez, 2018; Elhersh & Alqawasmeh, 2024; Miller, 2018; Schumann, 2022).

The syllabi of the degree courses were initially compiled into a single PDF file for each department. These organized files, were subsequently uploaded to the Voyant Tools platform, dividing them into five distinct corpora corresponding to their respective disciplinary areas.

For the analysis, keywords belonging to two broad conceptual areas were selected: *sustainability* and *nutrition*. The selection of these categories aims to identify sustainable development concepts in the syllabi and to analyze the topic of nutrition from both nutritional and environmental perspectives, while also allowing for the exploration of potential connections between the two dimensions.

Since the selection process included only syllabi written in Italian, the keywords were initially defined in Italian; however, to maintain consistency with the English text of the article, they were later translated and used in English during the analysis phase (Table 5.2).

Table 5.2.
Selected keywords by
conceptual area.

Sustainability	Nutrition
Sostenibilità → Sustainability	Alimentazione → Nutrition
Sostenibile → Sustainable	Alimentare → Nutritional
Sostenibili → Sustainable	Alimentari → Groceries
Agenda	Alimenti → Foodstuffs
Dell'agenda → Of the agenda	Cibo → Meal
2030	Dieta → Diet
Goal/s/*	Diete → Diets
Target	Food
Sdg/s/*	Nutrizione → Nourishment

(*) Indicates the simultaneous analysis of multiple forms of the same word.

To account for all possible variations of certain words, an asterisk (*) was used in some cases as a truncation operator, allowing for the simultaneous analysis of multiple forms of the same term. For example, the term *goal* includes both *goal* and *goals*.

Additionally, to optimize the analysis, customized *stopwords* were defined based on the content of the syllabi and the specificity of the terms under examination.

The first phase of the analysis used the *Terms* tool to calculate the absolute frequency of key terms; subsequently, *Links*, *Collocates*, and *Contexts* were used to examine co-occurrences and semantic relationships.

5.4 Results

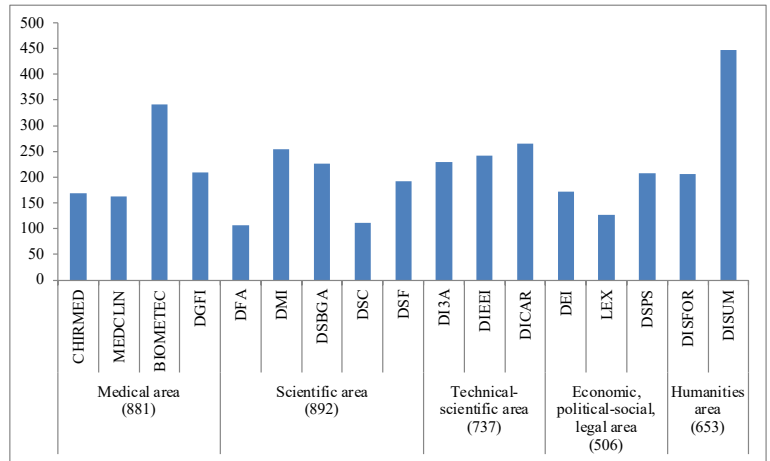
5.4.1 Distribution of Key Terms Across Disciplinary Areas

The analyzed corpus consists of a total of 3,669 syllabi, divided by thematic area and department as shown in Figure 5.1.

The use of the *Terms* tool reveals a different incidence of these concepts across the various areas.

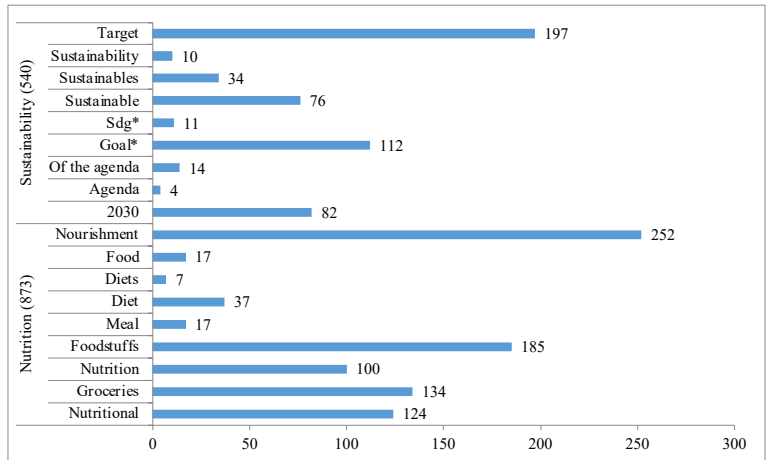
In the medical area, terms related to nutrition predominate, with *Nourishment* being the most frequent at 252 occurrences, followed by *Foodstuffs*, *Groceries*, and *Nutritional*, suggesting a focus on the effects of diet on health. Terms such as *Nutrition* and *Diet* also highlight attention to dietary patterns. The presence of terms like

Figure 5.1.
Distribution of syllabi
by thematic area and
department.



Target, *Goals!**, *2030*, and *Sustainable* indicates a reference, albeit less pronounced, to the sustainability goals (SDGs) (Figure 5.2).

Figure 5.2.
Term frequency in the
syllabi of medical area.



In the scientific area, terms related to nutrition predominate, with *FOODSTUFFS* being the most frequently used term (228 occurrences), and a centrality of words such as *NUTRITIONAL* and *GROCERIES*, suggesting a focus on processes related to the production, processing, and quality of food. The terms *GOALS!*, *2030*, and *target* reflect attention to the objectives of the 2030 Agenda, but the low presence of *Sustainability* and the absence of *SDG/s!* and *Agenda* indicate a less in-depth treatment of the topic (Figure 5.3).

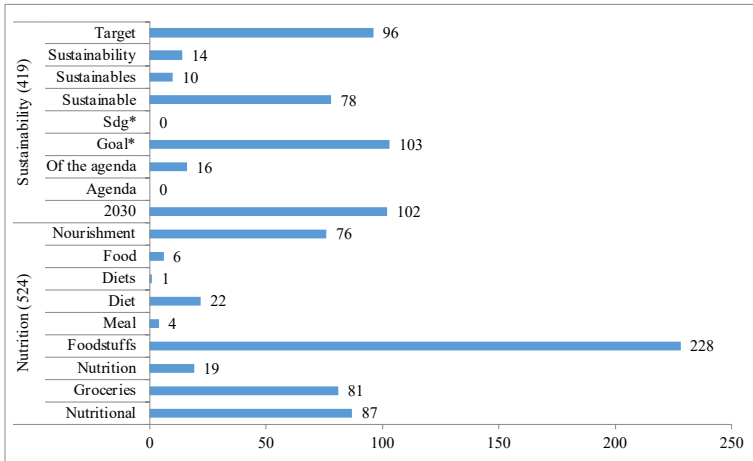


Figure 5.3. Term frequency in the syllabi of scientific area.

In the technical-scientific area, terms related to sustainable development are particularly prominent. *Sustainable* is the most frequent term in this corpus, with 411 occurrences, followed by other key terms such as *2030*, *Goal**, *Target*, *Sustainability* and *Sustainables*, indicating a strong commitment to promoting sustainability in educational content. Nutrition-related themes are also present, with terms like *Foodstuffs*, *Groceries*, *Nutritional*, and *Diet* highlighting attention to food production, quality, and management (Figure 5.4).

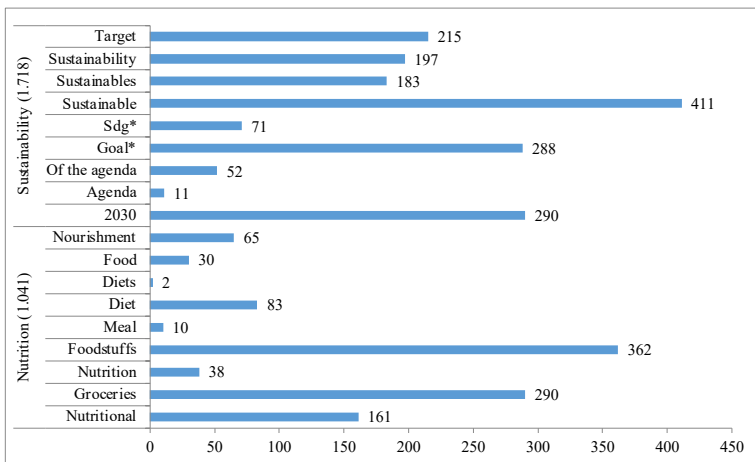
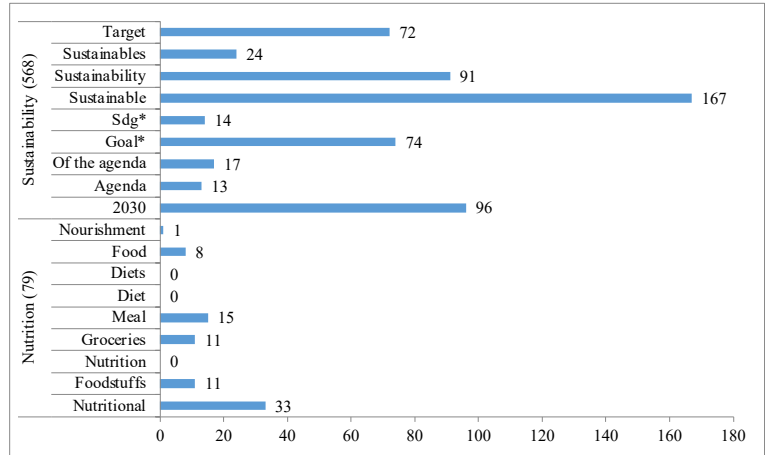


Figure 5.4. Term frequency in the syllabi of technical-scientific area.

In the economic, political-social, and legal area, terms related to sustainability are the most recurrent, with *Sustainable* ranking first at 167 occurrences, followed by *2030*, *Sustainability*, and

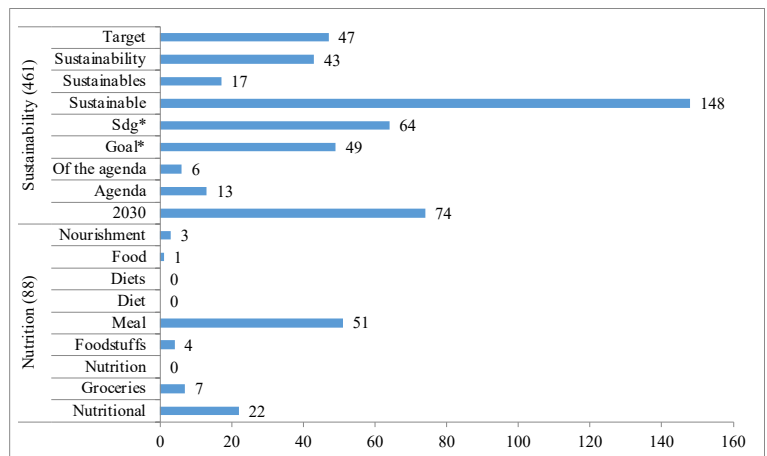
target, highlighting significant attention to the objectives of the 2030 Agenda. *Sustainables* and *Of the Agenda* further confirm this trend. The topic of nutrition is less central, with *Nutritional*, *Meal*, *Foodstuffs*, *Groceries*, and *Food* present but at lower frequencies (Figure 5.5).

Figure 5.5.
Term frequency in the syllabi of economic, political-social, and legal area.



In the humanities area, terms related to sustainability are predominant, with *Sustainable* being the most frequently used term and a prevalence of words such as *2030*, *Sdg/s/*, *Goal/s/*, *target*, and *Sustainability*. Terms related to nutrition are less represented: *Meal* is the most relevant, while *Nutritional* and *Groceries* have a marginal presence (Figure 5.6).

Figure 5.6.
Term frequency in the syllabi of humanities area.



The analysis of the course syllabi reveals a heterogeneous distribution of the concepts of sustainable development and nutrition across the different disciplinary areas. The medical and scientific fields are characterized by a strong presence of terms related to nutrition, with sustainability and the 2030 Agenda goals playing a secondary role. The technical-scientific area shows greater attention to sustainability, while still including nutrition content. The economic, political-social, and legal areas focus primarily on sustainable development goals, with limited emphasis on nutrition, highlighting a focus on regulatory and economic aspects. Finally, the humanities area places significant emphasis on sustainability and the 2030 Agenda, while nutrition is addressed less centrally, although the term meal appears notably.

5.4.2 Analysis of Relationships Between Key Terms

Links tool in Voyant Tools, along with the *Collocates* and *Contexts* tools, allowed the analysis of the connections between the keywords. The exploration focused on the top 10 terms identified by the terms analysis for each disciplinary area. To ensure a clear representation of the connections, a co-occurrence window of 5 words before and after each key term was set.

In the medical area syllabi, certain terms emerge as central in the network of connections. *Nourishment*, the most frequent term, is linked to *Human* (54 co-occurrences), *Hygiene* (28), and *Clinical* (27). Its connection with the key terms *Foodstuffs* (27) and *Nutrition* (18) highlights a direct relationship with food composition and quality. Regarding sustainable development, there is a reference to *goal 3*, dedicated to health and well-being. In fact, the keyword *Target* is connected to *Health* (36 co-occurrences) and the numbers *3* (58) and *3.9* (24). In particular, the number *3* is central in the semantic network, linked to *Goal/s/** (35 co-occurrences) and *Sustainable* (34), emphasizing the key role of health within the sustainability framework (Figure 5.7).

The analysis of the scientific area shows that *Foodstuffs* is the central term, linked to *Chemistry* (63 co-occurrences), *Nutraceuticals*, and *Preservation* (32), indicating a focus on food safety and quality. *Nutritional* and *Groceries* are also connected to *Pharmaceuti-*

Nutrition, in particular, emerges as a crucial theme, but its treatment varies significantly: in the medical and scientific areas, nutritional and food safety aspects prevail, while in the technical-scientific area, the focus shifts to connections with sustainable production. However, a comprehensive perspective integrating the various dimensions of nutrition – including health, environmental, social, and economic aspects – is lacking.

This fragmentation highlights the need for a holistic approach to sustainability that transcends disciplinary boundaries and fosters greater synergy across different fields. Universities, as educational and research institutions, play a fundamental role in promoting sustainable development. To achieve this, it is necessary to strengthen the interdisciplinary dimension of the curriculum, encouraging collaboration among instructors and researchers from different areas and promoting teaching projects that integrate the various dimensions of sustainability.

It is important to note some limitations of this analysis and the need for future research. This study focuses exclusively on syllabi and does not examine how sustainability concepts are actually applied in courses (e.g., in practical teaching, laboratories, or field activities). Furthermore, relying solely on course descriptions may not fully capture the university's overall commitment to sustainability, which also encompasses other forms of education, extracurricular activities, and research initiatives.

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6. Campus as a Living Lab: Shifting Food Habits to Shape Urban Sustainability

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ABSTRACT

Universities have a unique role in fostering sustainable food systems by influencing the habits of diverse and dynamic communities. This chapter presents findings from a survey conducted at the University of Milan, aimed at understanding food consumption behaviours on the university campus and their environmental implications. The data reveals that while most respondents rely on home-packed meals, there is a high awareness and willingness to engage in sustainability initiatives, despite limited existing infrastructure.

Building on this behavioural profile, we explore how shifting consumption patterns, particularly through the adoption of reusable containers and reduced reliance on single-use plastic, such as bottled water, can significantly lower environmental impacts. Using Life Cycle Assessment (LCA), we quantify potential reductions in greenhouse gas emissions associated with alternative food practices, illustrating how even small habit changes at the university level can scale to meaningful environmental benefits.

Importantly, the university campus functions as a microcosm of an urban community, with a representative mix of age groups, professions, and daily routines. As such, the results of this study are highly transferable to the design of municipal food policies, offering a valuable model for sustainable urban food planning. By aligning student and staff preferences with evidence-based sustainability strategies, this chapter outlines actionable policies for food provision, waste management, and facility planning. The case of bottled water vs. refillable bottles serves as a concrete example of how targeted interventions can promote low-impact, community-driven change in institutional food environments.

6.1 Introduction

Universities play a distinctive and influential role in the development of sustainable food systems. By hosting large communities of students, academics, and staff, university campuses operate as micro-urban environments, characterized by specific patterns of mobility, energy consumption, and food-related practices. These daily choices create environmental impacts that mirror those of broader cities. Because of this, universities are increasingly recognised as “living labs”: places where new ideas, practices, and policies for sustainability can be tested in real conditions before being scaled to society (Evans *et al.*, 2015; Purcell *et al.*, 2019).

Food plays a central role in this transformation. What and how people eat on campus reflects a mix of personal habits, cultural norms, convenience, and affordability. At the same time, food provisioning in universities involves procurement, infrastructure, waste management, and behavioural engagement. This makes campus food environments fertile ground for experimenting with low-impact practices, from reducing single-use plastics to increasing the availability of sustainable meal options.

Within this context, the University of Milan illustrates how food and drink choices take shape in a large academic environment. As a diverse and commuter-heavy institution, it hosts a population whose habits are both varied and broadly reflective of wider

urban behaviour. The findings presented in this chapter are based on a survey conducted among students and staff to capture food consumption patterns, levels of sustainability awareness, and the practical constraints that influence their decisions. These insights offer a clearer understanding of current preferences and the availability of facilities on campus, forming the basis for assessing where changes in habits or infrastructure could support more sustainable practices.

Building on this understanding of current preferences and campus conditions, the chapter then explores what these behaviours might mean from an environmental perspective. To do this, the chapter combines these insights with Life Cycle Assessment (LCA), allowing to compare the potential impacts of common practices with those of more sustainable alternatives. This combined approach helps show how relatively small shifts, such as using reusable food containers, relying on refillable water bottles, or reducing dependence on single-use packaging can gradually lower the overall environmental footprint of campus life. Although the analysis is centred on the University of Milan, the patterns observed here reflect broader dynamics seen in many academic environments and can support discussions on how cities design food policies that encourage low-impact daily routines (Barnett-Itzhaki *et al.*, 2025).

6.2 Campus Food Behaviours at the University of Milan

The survey collected 94 responses from across the University of Milan community, offering a broad view of food choices within a large academic setting. Respondents were diverse in age, profession, and gender, reflecting a population typical of many urban campuses. Ages ranged from young adults to senior staff, with ~42% under 35 and ~38% between 35 and 54. The gender distribution was nearly balanced, with the sample comprising students (~25%), professors (~24%), researchers (~22%), technical and administrative staff (~18%), and PhD candidates (~12%). This diversity supports insights that are broadly representative of campus behaviours.

A striking pattern is the dominance of home-prepared food. While 83% reported eating or drinking on campus, 78% bring lunch from home, compared to only 4% using the university canteen. Breakfast is rarely consumed on campus, with 63% not eating on-site and 27.4% bringing it from home. Snacks also favor home or nothing (42.7% and 29.3% respectively), with only 16% using vending machines. Near-by cafés, food trucks, or supermarkets are minor sources. Overall, home-prepared meals dominate daily consumption, cited as healthier, cheaper, tastier, and more varied than external options.

Dietary patterns show most respondents (91%) identify as omnivores, with only 3% vegetarian and 2% vegan. Yet plant-forward habits are common: ~47% eat fruits and vegetables daily, and ~30% consume vegetables 3–4 times/week. Red meat is rarely eaten, with 71.5% consuming it rarely or never. White meat and dairy are moderate: 40.8% eat white meat 1–2 times/week, and 9.3% consume dairy daily. Carbohydrates such as pasta and rice are also common (~46.8% 1–2 times/week). These patterns align with recommended sustainable diets that emphasize plant-based foods while moderating meat and dairy intake.

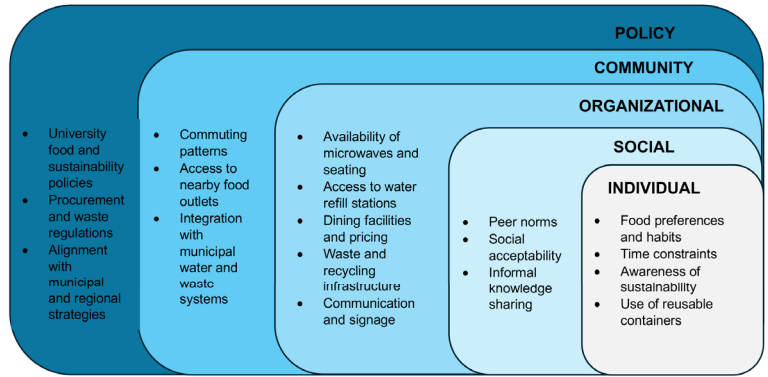
Awareness of food's environmental impact is high, with ~86% moderately to extremely aware. Support for sustainability initiatives is strong with 91% favouring programs to reduce single-use packaging. Regarding engagement, 41% expressed a clear intention to participate in sustainable eating workshops, and 34% reported potential willingness to do so. Yet actual participation remains low, with only 16% involved in campus programs and 22% unaware of their existence. This gap suggests high readiness to engage if opportunities are more visible and accessible.

Waste management shows mixed behaviours. Most respondents avoid wasting food, with 66% never leaving leftovers and 30% rarely doing so. However, 54% dispose of leftovers in general trash, only 13% use campus compost bins, and 29% take leftovers home. Packaging disposal is better, with 59% using recycling bins and 31% still using general trash. Respondents noted limited compost infrastructure as a barrier, suggesting that enhancing facilities could strengthen sustainable practices.

Campus facilities also influence food practices. Among on-campus eaters, 62% use microwaves or ovens, with 63% using them daily.

Access to heating equipment is important, rated *very important* by 41 respondents. Comments frequently highlighted the need for more microwaves, seating, and a proper dining hall. Expanding canteen services with healthy, seasonal, and affordable options could support both convenience and sustainability, reducing reliance on single-use packaging and fast-food alternatives. Figure 1 summarizes the multi-level drivers influencing campus food practices, based on the policies, systems, and environment framework (Landry *et al.*, 2024).

Figure 6.1.
Conceptual framework illustrating multi-level drivers influencing food-related behaviours on university campuses spanning individual, organizational, community, and policy contexts.



These behavioural insights provide a clear picture of current habits, preferences, and infrastructure gaps on campus. They set the stage for assessing environmental implications, which the next section explores through Life Cycle Assessment, illustrating how different choices and potential interventions could influence the campus' overall sustainability footprint.

6.3 Environmental Implications

Building on the behavioural insights from the previous section on campus food and drink practices, this part examines a concrete environmental hotspot identified in the survey: the widespread reliance on packaged water bottles and the growing, but still limited, use of refillable alternatives. Since drinking water is consumed daily and in large volumes, even small shifts in behaviour have the potential to influence campus-wide environmental performance. To quantify these

effects, a simplified Life Cycle Assessment (LCA) was carried out comparing packaged PET water bottles with stainless steel refillable bottles used at campus water dispensers.

6.3.1 Goal and Scope Definition

The goal of the study is to compare the environmental impacts associated with consuming drinking water on campus through two systems:

1. packaged water purchased from vending machines;
2. refillable water consumed using a stainless-steel bottle filled at campus dispensers.

The study boundary covers bottle production and water consumption at campus level. End-of-life disposal is not included and is considered a future extension of the analysis. For the refillable option, the stainless-steel bottle is modelled once, without defining a fixed lifetime. Its longevity is acknowledged as an important parameter for future research.

The functional unit represents the use of a drinking-water container over a defined period, with five usage scenarios: 1 day, 1 week, 2 weeks, 1 month, and 1 year.

The reference flow corresponds to the amount of water consumed per person in each scenario. A consumption of 2 L of drinking water during time spent on campus was assumed, based on adult daily adequate intake values reported by Armstrong and Johnson (2018).

6.3.2 Life Cycle Inventory (LCI)

Inventory modelling was carried out in SimaPro 10.1.0.6, using datasets from EF 3.1. The LCI reflects only the processes included within the defined system boundaries: bottle production and water provision. End-of-life treatment is excluded and considered a future improvement.

The LCI highlights the key structural difference between the two systems: the PET option requires continuous material inputs proportional to consumption, while the stainless-steel bottle requires a single upfront input that does not change with use. All additional flows associated with bottling processes, water treatment, and tap water distribution are already embedded in the EF 3.1 datasets.

Table 6.1.
Life Cycle Inventory by Scenario. (Quantities are shown conceptually and scaled based on the functional unit. Exact stainless-steel bottle, tap water and PET dataset specifications are part of the ecoinvent background system.)

Scenario	Reference flow (L water)	PET bottles required	Steel bottle units	Water type
1 day	2 L	2 bottles	1	2 L tap water
1 week (5 days)	10 L	10 bottles	1	10 L tap water
2 weeks (10 days)	20 L	20 bottles	1	20 L tap water
1 month (~20 days)	40 L	40 bottles	1	40 L tap water
1 year (~200 days)	400 L	400 bottles	1	400 L tap water

6.3.3 Life Cycle Impact Assessment (LCIA)

Impact assessment used the EF 3.1 single score method expressed in μPt , allowing aggregation of impacts across multiple environmental categories characterised by different units (Andreasi Bassi *et al.*, 2023). The results show clear differences in how impacts accumulate over time. In the PET system, the impact scale almost linearly with the number of bottles required. In contrast, the refillable system shows a steep initial impact due to steel production, followed by a negligible increase over time, since tap water supply has very low environmental burdens relative to PET production.

Table 6.2.
Single Score Impact Results (μPt).

Scenario	Packaged water (μPt)	Refillable bottle (μPt)
1 day	72.21	324.89
2 weeks	722.13	331.51
1 month	1444.26	338.87
1 year	14442.65	471.38

6.3.4 Interpretation

The impact results reveal two fundamentally different environmental profiles (Table 6.2, Figure 6.1). In the short term, a reusable stainless-steel bottle appears more impactful because its production involves energy-intensive metal processing. When used for only a single day, the refillable bottle carries about four times the total impact of consuming one PET bottle of drinking water. However, this interpretation shifts quickly once the assessment moves beyond day one.

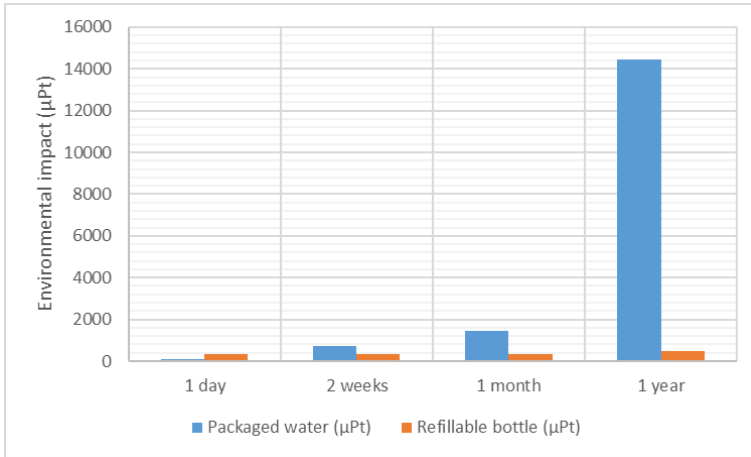


Figure 6.2. Cumulative environmental impact (µPt, single score) of bottled water and a reusable bottle over different time periods.

Over a typical two-week period, the PET system requires 10 separate bottles, and its impact reaches more than 720 µPt. The refillable option, in contrast, increases only slightly from the first day because it does not require additional bottles. At this stage, the stainless-steel bottle already outperforms the PET system. By the one-month scenario, the difference becomes clearer: PET reaches more than 1400 µPt, while the reusable bottle remains slightly above 330 µPt. The environmental burden of PET bottle production becomes the dominant driver of impacts, overshadowing the more modest impacts of tap water consumption in the refillable case.

The divergence becomes especially pronounced in the one-year scenario. With 200 PET bottles required for daily consumption, the packaged water option reaches approximately 14442 µPt, compared with about 471 µPt for the refillable bottle. Even without modelling bottle lifetime, the reusable option already shows a substantial advantage. The impact curve for the refillable system remains nearly flat because its dominant process, steel production, occurs only once, while PET production accumulates continuously throughout the year.

A further insight emerges when considering the omitted aspect of bottle lifetime. Stainless steel bottles generally last multiple years under normal use. If the one-time production impact were allocated over two or three years of use, the per year footprint of the refillable option would decrease significantly. In contrast, the PET system would continue to scale linearly regardless of the period evaluated.

Including bottle lifespan in future assessments will likely strengthen the environmental preference for reusable bottles even further.

These results demonstrate why interventions targeting high-frequency, low individual impact behaviours can create substantial cumulative benefits in institutional settings. Given the strong support expressed by survey respondents for reducing single-use packaging, promoting refillable bottle infrastructure offers a practical and measurable pathway to lowering the campus environmental footprint.

6.4 Shifting Habits: Opportunities and Strategies

Barriers identified in the survey include insufficient microwaves, limited seating, and unreliable refill points. Yet, willingness to act remains high: 91 percent support initiatives reducing single-use packaging, and 75 percent would participate in sustainable eating activities. These findings align with evidence that infrastructure is a key enabler of sustainable behaviour (Nunes *et al.*, 2018). Improving heating facilities, shared spaces, and refill accessibility would strengthen already positive habits.

6.4.1 Policy Pathways for Universities

While the campus community appears generally environmentally aware, additional institutional measures could help better support sustainable behaviours. While 86 percent report awareness of the environmental impacts of food choices, only 16 percent have taken part in sustainability programs, and 22 percent were unaware any existed. This gap between awareness and action is consistent with sustainability transition research.

Policy efforts should prioritise the behaviours already widely practiced. Since 78 percent bring lunch from home, universities should expand microwave availability, improve shared kitchens, and provide adequate seating.

Finally, the community expressed a clear need for an affordable, healthy dining hall. The findings suggest that the promotion of healthier and environmentally sustainable food practices in universities

depends on coherent policy frameworks that integrate food consumption patterns, institutional food provision, and the broader political and sociocultural context, as emphasized by Graça *et al.* (2022).

6.4.2 From Campus to City: Transferability

The demographic diversity of the respondents strengthens the relevance of campus findings for municipal food policy.

Waste management practices on campus reflect challenges commonly observed in urban contexts. In this study, 54 percent of respondents reported disposing of food leftovers in general waste, while only 13 percent used compost bins, indicating limited capture of organic waste streams. Similar patterns have been documented in higher education institutions where resource constraints restrict the implementation of comprehensive waste management systems (Chang, 2024). Evidence suggests that even in settings with limited financial and human resources, targeted and low-cost interventions such as adequate waste bin provision and clear signage can significantly improve waste diversion rates (Ebrahimi and North, 2017).

Because universities sit between household and municipal scales, they offer effective settings to test interventions requiring both behavioural change and infrastructural support. Measures such as water refill networks, improved waste separation systems and better shared dining spaces can be transferred to public offices, libraries and tech parks.

Overall, the campus case illustrates how accessible and well-designed infrastructure enables sustainable choices, a principle increasingly recognised in urban environmental policy (Derrible *et al.*, 2018).

6.5 Conclusion

The findings presented in this chapter demonstrate that university settings offer valuable insight into how everyday food habits shape environmental outcomes. The survey shows that a large majority of respondents already engage in low impact routines, with 78% bringing lunch from home and 91% supporting initiatives to reduce single use packaging. At the same time, the LCA comparison of drinking water systems highlights the scale of improvement achievable through

simple behavioural shifts: annual impacts associated with PET bottled water reached about 14442 μ Pt, compared with roughly 471 μ Pt for long term use of a stainless-steel bottle. These quantitative results show that even modest changes can produce substantial reductions when adopted across a university community.

Looking ahead, the study suggests several areas for further development. The lifetime of refillable containers, the long-term performance of water refill infrastructure, and the environmental implications of broader institutional changes such as a new campus dining hall warrant deeper assessment. Future work could also integrate more detailed waste management modelling, particularly for composting and packaging recovery, which were not fully captured in the present analysis. Finally, the transferability of campus-based insights to municipal food systems remains an important research direction, especially as cities seek scalable interventions that combine behavioural evidence with robust environmental metrics.

Overall, the University of Milan case shows that aligning behavioural preferences with supportive infrastructure can meaningfully advance sustainable food practices. By applying analytical tools such as LCA within real-world institutional contexts, universities can help design and test strategies that contribute to more sustainable food systems, both on campus and within the wider urban environment.

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7. Engaging Stakeholders for Sustainable Food Procurement

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ABSTRACT

Active stakeholder involvement and systematic collection of feedback are essential components of participatory governance in public services, particularly in universities. By engaging students, scholars and food service operators, critical issues can be identified, effective solutions can be co-designed and sustainable, inclusive consumption models can be promoted. As part of the OnFoods Public and Private food Procurement and short food value chains in Urban areas (PPP-URB) project, the University of Naples Federico II implemented two experimental initiatives. A permanent listening forum was set up as the first action to encourage key people involved in university canteen services to talk to each other in a planned way. Focus groups and periodic surveys were used to collect qualitative data and proposals regarding service efficiency, menu variety and quality, environmental sustainability and cultural inclusiveness. The second initiative promoted the proactive involvement of students in disseminating healthy and sustainable eating habits through activities, workshops and

awareness campaigns. Preliminary findings suggest that food awareness has increased and that people are more inclined to make nutritionally balanced and environmentally friendly choices, confirming the effectiveness of the participatory approach as a sustainable and socially innovative tool.

7.1 Introduction

In the current context of transition toward more sustainable food systems, universities are increasingly positioned as living labs for the experimentation of innovations capable of integrating public health objectives, environmental sustainability and social equity (Evans *et al.*, 2015; Purcell *et al.*, 2019). Several studies highlight university canteen services as a strategic leverage point for promoting sustainable dietary patterns (Grech *et al.*, 2020; Franchini *et al.*, 2023; Pandey *et al.*, 2023). However, to avoid change being perceived as imposed, it is essential to move beyond top-down decision-making models toward forms of stakeholder engagement that extend beyond a purely consultative dimension.

This approach is rooted in the paradigms of food citizenship, according to which the democratization of food systems is intrinsically dependent on the creation of permanent spaces for dialogue and deliberation (Wilkins, 2005; O’Kane, 2016). From this perspective, active participation in decision-making processes transforms users from passive consumers into informed individuals capable of recognising and understanding the social, political and environmental implications of their food choices (Booth & Coveney, 2015; Meyer *et al.*, 2021).

It is precisely within this theoretical and operational framework that the initiative by the University of Naples Federico II is situated. The University participated in a research initiative as part of the On-Foods PPP-URB project, which conceptualised public and private food procurement as a strategic lever for the transformation of local food systems. The project was initiated with the objective of enhancing the quality, diversity, affordability and sustainability of food throughout the entire supply chain. It was structured over a three-year period. The project’s initial phase concentrated on the identification and

analysis of prevailing best practices. This was followed by the definition of strategic guidelines and policy recommendations. Finally, the project evaluated pilot initiatives aimed at testing and implementing these approaches in real-world contexts.

In this final phase, the University of Naples Federico II has initiated a series of experimental initiatives within its university catering system. The objective of these initiatives is twofold: firstly, to enhance the quality of the service provided, and secondly, to promote more conscious and sustainable eating habits among students. These initiatives adopt a stakeholder-centric approach, engaging key actors in university food services in a structured and participatory manner.

Therefore, the present work describes the activities implemented and analyses preliminary results, with particular attention to the establishment of a permanent listening forum and the active involvement of students in the dissemination of good food practices through workshops and awareness-raising campaigns.

7.2 Permanent listening forum

The first initiative of the project involved the activation of a permanent listening forum, conceived as a structured and ongoing space for dialogue among the main actors involved in university catering services. The forum was implemented through a focus group that brought together students, researchers, representatives of the university administration and food service operators. The focus group aimed to discuss recurring issues, expectations and potential operational solutions.

The primary objective of the focus group was to collect articulated contributions from stakeholders in order to identify structural and organizational criticalities within the catering service and to co-design solutions oriented toward sustainability, inclusivity and overall service quality improvement. By using the focus group as a qualitative research technique enabled a substantial amount of relevant information, opinions and experiences to be collected within a limited timeframe (Freitas *et al.*, 1998; Akyıldız & Ahmed, 2021).

7.2.1 Participants and selection criteria

The focus group involved a heterogeneous group of 12 participants, selected through purposive sampling to ensure representation of the main stakeholder categories within the university catering system. Specifically, participants included undergraduate and graduate students from different academic programs, PhD candidates, researchers and food service operators involved in the management or monitoring of the catering service. Selection criteria included direct and continuous experience with university food services, as well as willingness to actively participate in a collective discussion. Students who regularly used the university canteen were prioritised to ensure that evaluations were based on consolidated experience. Food service operators and institutional representatives were selected based on their operational or decision-making roles within the service delivery system. All participants were informed about the study objectives and took part on a voluntary basis. The inclusion of diverse profiles facilitated the emergence of multiple perspectives and enriched the discussion (Nyumba *et al.*, 2018; Ahmad & Wilkins, 2025).

7.2.2 Focus group procedure

The focus group was conducted in person and had a total duration of approximately 90 minutes. The discussion was moderated by a researcher with expertise in qualitative methodologies, supported by a research assistant responsible for note-taking and logistical support. The presence of a trained moderator ensured a balance between participants' free expression and adherence to the research objectives, fostering equitable participation (Greenbaum, 1999; Sim & Waterfield, 2019). The discussion was guided by a semi-structured topic guide, which was developed based on existing literature concerning collective catering services, participatory governance and food sustainability. This guide was then adapted to the specific university context under investigation. Open-ended questions encouraged participants to reflect on their experiences, perceived challenges and potential strategies for service improvement (Ryan *et al.*, 2014; Akyıldız & Ahmed, 2021).

7.2.3 Data Analysis

Focus group discussions were audio-recorded with the informed consent of the participants and subsequently transcribed verbatim. Prior to analysis, the transcripts were subjected to a process of review, with a focus on ensuring the accuracy and comprehensiveness of the data (Chand, 2025). A thematic analysis approach was adopted for the analysis of the data, as this is considered to be particularly suitable for the identification of recurring patterns and shared meanings within qualitative data (Braun & Clarke, 2006; Onwuegbuzie *et al.*, 2009).

The initial coding framework was developed in accordance with the research objectives and the focus group guide. This framework

Table 7.1.
Themes, illustrative quotes and implications for policy or practice.

Theme	Illustrative quotes	Implications for policy or practice
Perceived value and price-quality ratio	"The price is too high compared to the quality of the food provided". "If the quality improved, students would be more willing to pay and use the service regularly".	Review pricing policies in relation to meal quality; improve ingredient quality and portion balance to strengthen perceived value and affordability.
Menu variety	"Menus are often repetitive during the week, which reduces interest in eating at the canteen". "A greater weekly rotation would encourage students to choose the canteen more often".	Introduce structured weekly menu rotation and diversify offerings to increase attractiveness and user satisfaction.
Waiting times and service efficiency	"Waiting times are excessive, especially during lunch hours". "A pre-order system through the app could help reduce queues and improve organization".	Implement digital pre-ordering systems and optimize service flow during peak hours to enhance efficiency.
Dietary preferences	"Vegetarian options are limited compared to the growing demand". "More plant-based dishes would reflect current dietary trends among students".	Expand vegetarian and plant-based menu options to better align with evolving dietary preferences.
Cultural and religious inclusivity	"It is not always clear which ingredients are used in the dishes". "Having pork-free options clearly labeled would make the service more inclusive".	Provide clear and transparent ingredient labeling; ensure availability of culturally and religiously appropriate meals.
Food waste reduction	"When students do not like the food, much of it ends up being wasted". "Meals tailored to preferences would reduce leftovers".	Introduce meal customization options and monitor preferences to reduce food waste and improve consumption rates.
Environmental sustainability	"Using local products would improve both quality and sustainability". "Students are increasingly sensitive to environmental issues related to food".	Strengthen local supply chains and integrate sustainability criteria into procurement policies.
Participation and feedback mechanisms	"Online surveys would allow continuous feedback from users". "A permanent listening forum makes students feel heard and involved".	Institutionalize regular online surveys and maintain a permanent listening forum to support participatory governance and continuous service improvement.

was then refined through an iterative process, allowing for new codes to emerge and existing ones to be reorganised (Morgan & Nica, 2020). The analytical process was conducted in accordance with the principles of constant comparative analysis, which entailed the continuous comparison of data segments, codes and emergent themes (Glaser, 1965). The research team convened regularly to deliberate interpretations, address discrepancies and finalise the thematic structure. The analysis identified macro-themes, which are presented in Table 7.1.

Thematic saturation was confirmed by the absence of new relevant themes in the final stages of the analysis.

7.3 Discussion

The present initiative provides insight into the perceptions and proposals of a heterogeneous group of stakeholders involved in university catering services. It contributes to the wider discussion about the importance of participation in public services and sustainable food systems. The findings emphasise that the direct involvement of users is essential for identifying operational issues and guiding collaborative improvement processes.

Participants emphasised the need to strengthen communication and active participation mechanisms through structured tools, such as a permanent listening forum. They also identified the opportunity to be heard and contribute to decision-making processes as a factor capable of fostering a stronger sense of institutional belonging and encouraging greater use of the service.

Another central issue that emerged from the study concerns the relationship between perceived quality, meal cost and the variety of food on offer. Although the service is structured and accessible, users are dissatisfied with the perceived poor quality relative to price, which may lead to disengagement and food waste. Participants highlighted that limited alignment between menu offerings and user preferences can lead to increased leftovers. They suggested that meal personalisation strategies and greater attention to food quality could contribute to reducing waste and improving the sustainability of the service. In this context, introducing local products and strengthening territori-

al supply chains were seen as ways of reconciling quality, environmental sustainability and the promotion of the local area.

Requests for greater attention to dietary preferences, particularly vegetarian options and for cultural and religious inclusivity, confirm that university catering services are required to respond to a wider range of needs. By providing transparent ingredient information and offering dishes that align with different cultural and religious preferences is therefore essential for ensuring equitable access and inclusion, while simultaneously strengthening users' trust in the institution.

Overall, the results indicate that the challenges encountered by university catering services cannot be resolved through top-down regulatory or organisational interventions alone. Instead, there is a clear need to shift towards strategies that focus on the practical implementation of policies integrating nutritional standards, sensory quality, service efficiency and user participation. From this perspective, the next phase of the project will involve extending listening and monitoring activities through periodic online surveys accessible via institutional email and QR codes displayed in canteens, as well as using social media channels to publicise initiatives, updates and results.

7.4 Active role of students in promoting healthy eating habits

The second initiative of the project was aimed at strengthening the active role of students in promoting healthy, conscious and sustainable eating habits. It recognised students as key players in the dissemination of food culture. From this perspective, the initiative included awareness-raising campaigns and periodic workshops designed to encourage the consumption of local, organic and seasonal produce and to stimulate critical reflection on the relationship between food, health and environmental sustainability.

The primary objective of the initiative was to increase students' awareness of the importance of everyday food choices, both in terms of individual well-being and environmental and social impact.

The activities aimed to improve understanding of the connection between food consumption patterns, production chains and sustain-

ability, while encouraging a more open attitude towards balanced, environmentally friendly options. Two thematic workshops were organised and hosted, one at the University of Naples Federico II and one at the Gustus, Professional Exhibition of Agri-food, Enogastronomy and Technology at the Mostra d'Oltremare in Naples.

A central contribution to the workshops was provided by CIR-FOOD's presentation of their experience, particularly their "hospitality catering" model developed at the CHORA – WineArcheoFood Experience venue in Pompei. This model was presented as an exemplary case of integration between gastronomic quality, environmental sustainability and territorial enhancement. The presentation examined the shift from traditional collective catering to a more experience-focused approach, where food is seen as a means of promoting culture, society and the environment.

Specifically, the CHORA offering was described as based on the selection of typical and traditional local dishes organized according to seasonal criteria and on the use of local raw materials sourced from suppliers recognized as territorial excellences. Suppliers are selected in accordance with rigorous environmental and quality standards, in line with the principles of corporate social responsibility. The aim is to deliver a catering service that is gastronomically excellent and consistent with sustainability principles. Particular attention was devoted to short supply chains, Km 0 products and promoting local food and wine culture. It was highlighted how these choices contribute to improved nutritional quality and reduced overall environmental impact. Operational aspects related to service sustainability were also discussed, including the use of energy-efficient equipment, reducing resource waste in kitchens and responsibly managing consumable materials, with a particular focus on limiting single-use plastic.

As well as the productive and gastronomic aspects, the workshops focused specifically on the role of public procurement in collective catering as a means of steering food systems towards more sustainable models. The intervention illustrated procurement procedures and the relevant regulatory framework, paying particular attention to the Minimum Environmental Criteria, (from the Italian "Criteri Ambientali Minimi") (CAM) applicable to university catering services. The presentation emphasised how the CAM enables contracting

authorities to promote higher quality, sustainable and inclusive food provision through requirements related to product seasonality, the use of organic and local raw materials, reducing logistical environmental impacts and promoting short supply chains.

A further point of reflection concerned the distinction between mandatory requirements and award criteria in tender procedures. This showed how public administrations could encourage good practices, such as adopting menus inspired by the Mediterranean diet, providing food options suitable for specific nutritional needs and promoting educational initiatives for service users. These elements are fully consistent with the findings of the focus group, particularly with respect to requests for greater attention to food quality, environmental sustainability and the valorization of local products.

Through a participatory and interactive approach, the activities fostered active student engagement, encouraging participants to critically reflect on their own eating habits and to recognize the role they can play in promoting more responsible consumption models. These events represented meaningful opportunities for dialogue and learning, facilitating direct interaction between students, agri-food sector experts, nutrition professionals and operators along the production chain.

7.5 Conclusions, implications and limits

The initiatives developed at the University of Naples Federico II within the OnFoods PPP-URB project demonstrate that policy instruments, such as a permanent listening forum, structured stakeholder engagement and student-oriented educational activities, enable critical issues in university food services to be systematically identified and shared operational solutions to be co-designed. The permanent listening forum has facilitated continuous dialogue among the key stakeholders, replacing episodic consultation practices and encouraging the integration of diverse viewpoints. This engagement has led to improvements in areas that are often overlooked, such as the price-quality ratio, cultural and religious inclusivity, reducing food waste and environmental sustainability. The role of students as informed actors and agents of change is another element of origi-

nality. They are involved in workshops, training activities and awareness-raising campaigns that strengthen their understanding of the relationship between food choices, health and environmental impact. Moreover, the integration of exemplary cases of sustainable catering and the analysis of public procurement practices have made it possible to connect bottom-up inputs with concrete policy tools and organizational models. This highlights the potential of universities as experimental settings for more sustainable food systems.

The present study offers significant theoretical and managerial implications by suggesting the adoption of permanent participatory mechanisms and responsible procurement practices. It also provides an empirical contribution to the debate on participation in public services.

However, the qualitative and context-specific nature of the study, the limited number of participants and the lack of a quantitative assessment of long-term effects limit the generalizability of the findings.

Future research could adopt comparative and longitudinal designs, integrating quantitative methods and extending the analysis to a broader range of university contexts.

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Web site

<https://www.cirfood.com/>

<https://www.chorapompei.com/>

8. Driving Sustainable Food Procurement Through the University Campus Community: Insights from the *UNIPR Bio Bags* Experience in Parma

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ABSTRACT

University campuses, as significant public purchasers, can directly and indirectly drive local sustainable transitions through their food procurement choices. Directly, because EU regulations promote Green Public Procurement (GPP) as a key strategy to enhance sustainable food offerings in universities. Indirectly, as they can act as a promoter and driver for change towards more sustainable consumption patterns. In both cases, greener procurement can strengthen links with local and organic supply chains, generating positive impacts on both the agricultural sector and campus well-being. Within this framework, the PNRR OnFoods project of the University of Parma has conducted the “*UNIPR Bio Bag*” experiment in collaboration with local associations, to: (I) improve student access to high-quality and sustainable food, and (II) support local farmers. This chapter will present the process of development of the initiative and the pilot’s outcomes. The analysis highlights critical issues, insights and conditions for the effective integration of Short Food Supply Chains in university procurement.

8.1 Introduction

As public institutions and large purchasers, universities play an important role in transforming food systems through their food procurement choices, promoting environmental and social sustainability goals (Revez *et al.*, 2023). In recent years, growing attention to European sustainability goals has encouraged the integration of Green Public Procurement (GPP) principles in tendering procedures, redefining university procurement priorities (Kunzlik, 2013). Based on these, public authorities can steer the market toward products and services with reduced impacts (Boyano *et al.*, 2019; Neubauer *et al.*, 2017). GPP supersedes the traditional *value-for-money* approach by including environmental and social criteria in purchasing decisions (Revez *et al.*, 2023). In Italy, GPP is applied through the Minimum Environmental Criteria (CAM), which aim to promote more sustainable consumption and production, the circular economy and sustainable supply chains (Baisi, 2023). Considering university canteens and cafeterias, this implies the growing inclusion of organic, local, and Geographical Indication (GI) certified products (Sirsi, 2019). Moreover, since sustainability requires a balance between economic, environmental, and social factors, innovative strategies to promote food access could be developed relying on local Short Food Supply Chain (SFSCs) (Malak-Rawlikowska, 2019; Michel-Villarreal, 2019; Kneafsey *et al.*, 2013). At the same time, the university can act as an indirect driver by facilitating the transition to more sustainable lifestyles of its students and staff via their domestic purchases.

In this context, the Department of Economics and Management (DSEA) of the University of Parma (UNIPR), involved in the OnFoods project, developed the “*UNIPR Bio Bag*” experiment with the aim of integrating university demand with the local organic supply chain. The initiative was designed as a pilot project to test the feasibility of an SFSC in collaboration with local associations. As illustrated in the following sections, it highlights critical issues, insights and conditions for the effective integration of SFSCs in university procurement.

8.1.1 Green Public Procurement in the university campus context: the Parma case

As a major consumer that also performs an educational and cultural function (Lozano, 2006), universities are an ideal context to experiment with sustainable procurement. However, there is a lack of uniformity among European universities in the implementation of GPP and the adoption of green criteria, often due to a lack of advanced management tools, supporting documents, and dedicated offices (Pacheco-Blanco *et al.*, 2016).

At UNIPR, catering is managed in collaboration with the Emilia-Romagna Regional Agency for the Right to Education (ER.GO), which offers services to students, including scholarships and accommodation. University tenders integrate principles of nutritional quality and food variety, food safety, affordability, inclusiveness – with menus dedicated to different ethical, religious, and dietary needs – and environmental sustainability. Planned measures include the use of local, GI and organic products, sustainable packaging, and waste reduction, including flexible menus, half portions, and the monitoring of leftovers.

However, an analysis of the offers' specifics shows that the involvement of local non-GI food supply chains remains limited: although considerable attention is paid to product type, less emphasis is placed on the value chain and the direct relationship between producers and users. This observation led to the idea, within the PNRR OnFoods project, of launching a pilot project to fill this gap and bring organic and SFSCs closer to the university community, promoting the consumption of organic products at home by making them easier to purchase.

Note 1.
The Participatory Guarantee Systems (PGS) is a primary and second-party certification based on mutual trust between producers and consumers. In Parma it is managed and coordinated by the Parma Solidarity Economy District Association with the aim to enhance agroecological and social justice principles.

8.2 The UNIPR Bio Bag Project

8.2.1 Objectives and partnership

From May 2025, DSEA established a dialogue with the association *Parma Sostenibile* APS (PS-APS). The latter coordinates organic and Participatory Guarantee Systems (PGS)¹ for farmers through the *MercaTiAmo* project, organising three weekly farmers' markets (FMs) in the city. Leveraging on its experience in organising an online scheme that delivers boxes of organic and PGS products from local farmers,

the *Io Mangio Locale* (IML) association was also involved in the project through PS-APS, where it was tasked with managing the logistical aspects of the preparation of the bags. This dialogue led to the development of the *UNIPR Bio Bag* initiative, aimed at promoting healthy and sustainable lifestyles within the university community by encouraging the domestic consumption of fresh fruit and vegetables (F&Vs) produced locally from agroecological practices. The initiative provides weekly bags of seasonal, local, and sustainable F&Vs to participating students and university staff.

8.2.2 Feasibility study phase

8.2.2.1 Student profiling

Before the pilot launch, a feasibility study was conducted through a questionnaire designed to explore students' eating habits, purchasing patterns, organic product awareness, and potential interest in the initiative. The main highlights of the questionnaire were as follows: I) the sample of 111 respondents (72% women and 28% men) was composed of 60% students aged between 20 and 23; II) the majority (61%) of the students live in the city of Parma, 24% are commuters, and only 15% come from the province, with 55% of those living in the city residing in rented accommodation, student housing, or other accommodations; III) in terms of food purchasing, a large part of the sample (about 61%) shops individually, while about 38% shop together with roommates or family, suggesting that most students tend to be independent in their food choices; IV) the data collected reveals that meals are eaten at home quite frequently, especially dinner, while lunch is often eaten out; V) F&V consumption is present but not optimal, with the majority consuming 1-2 servings per day, which is below nutritional recommendations (WHO/FAO, 2003); VI) despite this, there is a clear preference for fresh vegetables, with 60% consuming them regularly, while consumption of packaged or frozen products is limited; VII) expenditure on F&V is typically between €10-20 per week; VIII) supermarkets are the most frequently used retail channel, whereas hypermarkets and discount stores are used less often, and small neighbourhood retailers represent the least used option; IX) although 64% of respondents stated the importance of knowing the origin of products, only a limited number were already familiar with

MercaTiAmo FMs; X) while barriers such product variety and low market frequency emerge, a high interest in seasonal products and direct relationships with producers is registered. Finally, a potential interest in purchasing *UNIPR Bio Bags* was observed. On the basis of the responses, measured on a Likert scale from 1 (not at all interested) to 5 (very interested), 34 students were moderately interested (3) and 37 were highly or very highly interest (4-5), totalling 71 potentially interested students. The greatest interest was expressed by students from the Department of Economics (DSEA), which deals with these issues in some of its Bachelor and Master courses, followed by the Food and Drug Sciences Department, which examines dietary and sustainability topics.

8.2.2.2 Comparison between expected demand and feasible supply

Alongside this analysis on potential consumers, the associations conducted an internal feasibility study, assessing logistics and related costs. The analysis led to the definition of a feasible offer in response to student requests and the logistical capacities of the associations (Table 8.1). The associations also recruited and trained students to involve them during the implementation phase (including the assembly and distribution of the Bio Bags).

Table 8.1.
Results of feasibility survey on students compared to the feasible offer of the *UNIPR Bio Bag* initiative.

Issues	Student preferences (demand)	Association feasibility (offer)
Delivery/ Pick up	University campuses	<i>MercaTiAmo</i> FM, 10-minute walk from the Humanities and Economics Department campus
	Home delivery without surcharge	No home delivery
	Afternoon pick-up	Pick-up point at the existing FM on Friday mornings
Type of products	Seasonal products	Seasonal, fresh, organic and PGS products
	Direct relationship with farmers	Direct interaction with farmers at the FM
Bag format	"Free choice" Bags	"Surprise" Bags
Costs	Average weekly F&V spending: €10-20	Small Bio Bag: €12.50 for 2.5 kg of F&Vs; Large Bio Bag: €24 for 5 kg of F&Vs
	Sales for students	Coupons and discount programmes
Number of Bags	71 Bags (potential interest)	At least 80 weekly grants to cover costs

In terms of logistics, students stated their preference for a pick-up point close to the university campuses and, if possible, in the afternoon, and their unwillingness to pay extra for home delivery. The associations managed to secure a pick-up point in a square 10 minutes away from the Humanities and Economics campuses, which are attended by the majority of interested students, taking advantage of an existing *MercaTiAmo* FM and meaning it could be reached on foot, by bike, or by car, with parking available nearby. As the FM is permanently scheduled in the morning, it was impossible to guarantee afternoon hours without incurring additional costs.

This arrangement also permits direct contact with the farmers present in the market square, as requested by the students. In addition, the products are not only seasonal and fresh but also organic and PGS-certified, as the chosen market requires farmers to have these quality certifications to participate.

A major point of divergence between expectations and possibilities concerns the format of the bags: students expressed a preference for choosing the content of the bags; however, *MercaTiAmo* could not manage such logistical complexity. Indeed, the bags are assembled based on the availability of each farmer's harvest, making the available supply less stable and predictable when matched with consumers' requests.

In terms of costs, considering the average students' expenditure on F&Vs of around €10-20, the offer is aligned with this with 2.5 kg of F&Vs available at a price of €12.5 (ideally for one person), or alternatively 5 kg for €24 (two to three people). In terms of discounts requested by students, excluding the existing 10% discount for students at *MercaTiAmo* FMs, an additional €10 discount was available for the first 100 students signing up to the *UNIPR Bio Bag*, as well as an incremental discount proportional to the number of bags purchased (€5 for the 5th and €5 for the 10th).

Finally, the profiling of potentially interested students resulted in a total of 71 users, while the feasibility analysis conducted by the associations showed an average of 80 Bio Bags per week to cover the costs. This led to the extension of the initiative to the rest of the university population, including administrative staff, professors and researchers, research fellows, and doctoral students.

8.2.3 Pilot Test Implementation Phase

The implementation phase was prefaced by a facilitation process led by the university research group. This role involved coordinating with local associations and with the university's administrative and executive offices to establish a collaborative framework between the parties involved. In addition, the university's communications office was involved in launching a campaign aimed at raising awareness of the initiative across the university community.

Operational implementation began in September 2025, with outreach activities conducted during the university's Open Day and Researchers' Night activities, including a quiz game on SFSCs and quality labels, through which €10 of vouchers were distributed to participants for registering with IML, responsible for managing online orders on its website and storing the *UNIPR Bio Bags*. The pilot phase of the *UNIPR Bio Bags* initiative began in the first week of October 2025 and ended in December 2025.

8.2.4 Monitoring Phase

8.2.4.1 Order trends and participation in the initiative

The pilot project counted a total of 10 delivery days, across almost three months of activity, involving 91 participants, 66% of whom belonging to the university population: 48% students; 12% teachers; 5% staff and researchers. Of those enrolled, 78% were reached through the communication campaign launched by the university via its web channels, email, and flyers, the rest through word of mouth and social media.

An additional questionnaire was administered to participants during the project to map and record their purchasing habits and awareness of sustainable eating habits. The 28 respondents, mainly women (78.6%) and residents of the city of Parma (71.4%), are guided in consumption choices by the seasonality of F&Vs (50%) and personal preferences (32%), also giving great importance to origin (50%), organic products (43%), and Zero Pest certification (36%). They consider PGS certification to be very or extremely useful (82%) and, finally, prefer to buy fresh F&Vs in bulk (93%), with 50% spending up to €20. In terms of retail outlets, it emerged that FMVs are not greatly used, with 53% of students saying they never go to them and

33% frequenting them at most once a month. Finally, all participants expressed a positive intention to complete their shopping by adding products from FM stalls and to purchase *UNIPR Bio Bags* weekly (25%) or fortnightly (50%).

However, of the 91 participants, 57% never placed an order. The remaining 43% during the 10-week pilot purchased a total of 75 orders, on average 1.9 bags per person. Among the purchasers, 56% bought only one bag, 28% a total of 2-3, and only 18% more than 4. Therefore, the number of orders is well below the forecasts of the feasibility studies. Furthermore, the purchases are characterised by a downward trend: from a maximum of 14 orders recorded in the first week to 4 orders in the last week (Figure 8.1).

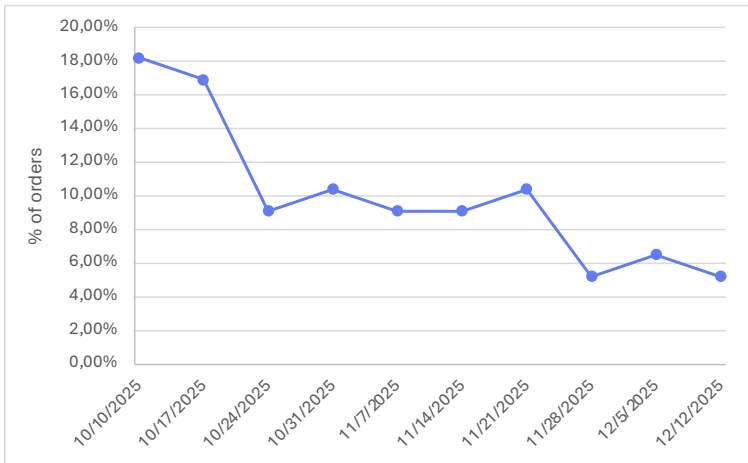


Figure 8.1. *UNIPR Bio Bag* Order Trend.

Therefore, the initiative proved unsuccessful, despite: I) a communication campaign that successfully reached the target audience; II) the participant group being characterised by high sensitivity towards seasonal and certified sustainable products and by a tendency to consume fresh food; III) average expenditure being consistent with the *UNIPR Bio Bag* proposal, and, IV) the initial stated intention of making weekly or fortnightly purchases.

8.2.4.2 Focus group discussion

These results prompted the organisation of a focus group with the aim of understanding the reasons for the reluctance to purchase

UNIPR Bio Bags. Twenty people participated in the focus group, including organisational staff and representatives of the associations, producers who supply the initiatives, students, professors, researchers and the university research group. The critical discussion revealed three main issues: (1) the price of *UNIPR Bio Bags* in relation to their perceived value, (2) the lack of choice regarding content and non-alignment with students' needs, (3) logistical and communication difficulties.

Although product quality was unanimously recognised as high, many students perceive the bag as expensive compared to the quantity that can be purchased through other supply channels for the same price. Furthermore, the 'surprise' format is perceived as inflexible in terms of personal tastes or eating habits. The lack of choice led to waste and contributed to a decline in the willingness to repurchase. In fact, the only product exclusion option regarded allergies, not product preferences. Only in a few cases was the "surprise" element positively perceived as an incentive to discover and consume different products, and these cases involved buyers who had already participated in SFSCs and were sensitive to sustainability and critical consumption issues.

Logistically, the pick-up point in the FM square adjacent to the university, together with the collection time concentrated in the morning hours, proved inconvenient in relation to university schedules and students' lack of knowledge of the area. The Friday distribution day was also perceived as problematic, especially for commuters and students with classes until late afternoon. In terms of communication, participants reported that the initiative is not well known, and above all, the concept of "organic" is poorly understood by the student target audience, reducing the symbolic and economic value attributed to the *UNIPR Bio Bag* and thus affecting their willingness to pay a premium compared to other shopping environments.

The focus group also highlighted that the student target audience – due to financial resources, eating habits, limited kitchen space, and lack of time to cook – may not be the most suitable for supporting a mixed, non-customisable bag service. Several participants suggested that the initiative would be more effective if primarily targeted at university staff and professors, who have greater financial resources.

The participating students and farmers provided suggestions for possible future developments: the possibility of expressing preferences/exclusions, smaller or themed formats, the sale of 'ready-made kits', additional or mobile pick-up points, presentation events with farmers, and greater communication on the benefits of organic and local consumption.

8.3 Final reflections

The process described represents an attempt to include organic SFSCs in university food policy to promote the consumption of fresh and seasonal F&Vs within the university community. Despite some points of convergence between supply and demand, the project did not succeed during the pilot phase.

The focus group organised to understand the possible causes reiterated the same points that emerged in the feasibility study, such as the students' request to choose the bags' products and more convenient pick-up points in terms of location and opening hours. However, these requests were considered impossible to fulfil by the associations due to cost and logistical issues. This demonstrates that the supply of seasonal products directly from farmers has not been enough to sufficiently actively involve the target university population in a SFSC.

The literature shows that the main drivers that encourage citizens to participate in initiatives that require a commitment in terms of organisational and logistical costs (e.g. solidarity purchasing groups, food consumption cooperatives, fair consumption initiatives, FMs etc...) are solidarity/altruism (willingness to support the local economy), sense of belonging, and participation which lead to co-production practices (Sacchi *et al.*, 2022; Sciarelli *et al.*, 2021; Kumar *et al.*, 2021; Brunori *et al.*, 2012). In the case of *UNIPR Bio Bags*, all these aspects seem to be lacking among the university population. This could be due to a failure in communicating the importance of participating in such an initiative, not only as consumers of organic, seasonal and fresh products, but also to potentially contribute to local socio-economic development. Thus, focusing

communication mainly on product quality and characteristics is insufficient considering that a similar offer can be purchased via a multitude of other sales channels.

Another aspect in contrast with the characteristics of participatory SFSCs relates to the origin of the project. *UNIPR Bio Bags* was not a response to student demands but stemmed from a joint proposal by the associations to reach younger targets and by a group of researchers to implement a university food policy initiative driven by sustainability principles. This highlights the need to engage the university community in a co-creation process aimed at raising awareness on fair consumption practices and the importance of strengthening SFSCs, and addressing the logistical barriers that limit the ability to fully meet demand.

Furthermore, if the University aims to develop a food policy that also includes organic SFSCs, it needs to engage in internal dialogue and discussion to understand how it can support and plug the gap that still exists between the university community and local organic and PGS producer associations, also considering its educational role and its responsibility to mould informed citizens. In this sense, universities can serve as a laboratory for social and territorial innovation through their direct purchasing choices and indirect stimulus, and establish new relationships with local producers, strengthen local economies, and promote a culture of sustainable dietary patterns among the student population. In conclusion, universities can be pivotal actors in Urban Food Policy, contributing to the definition of local models of food governance.

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Universities are increasingly recognised as key actors in the transition towards more sustainable, inclusive, and resilient food systems. As complex socio-technical environments, where food is variously produced, procured, distributed, consumed, and embedded within spatial, organisational, and social practices, university campuses can be understood as *cities within the city*, offering unique opportunities to connect policy, design, and everyday life.

This book presents the results of the *PPP-URB* project, developed within the PNRR OnFoods research, and explores how universities can design and implement integrated food policies by acting across multiple dimensions, including procurement, services, spaces, community engagement, and short food supply chains. The volume introduces a set of guidelines for university food policies and investigates their application through prototyping activities carried out in different Italian institutional contexts. Bringing together contributions from multiple disciplines and universities, the book shows how campuses can function as living laboratories for food system innovation, where strategic visions are translated into concrete actions through participatory and design-driven approaches. By linking research, experimentation, and policy-making, it offers both a conceptual framework and practical insights for scholars, practitioners, and policy-makers engaged in food system transformation.