

GUIDELINES FOR THE DEVELOPMENT OF FOOD AID HUBS

Version 2-2025

Scientific coordination

POLIMI SCHOOL OF
MANAGEMENT

With contributions from


fondazione

THE
**EARTHSHOT
PRIZE**

Under the memorandum of understanding with

 **Comune di
Milano**

**Fondazione
CARIPLO** 

 **ASSOLOMBARDA**





With the support of stakeholders in the memorandum of understanding for the development of Food Aid Hubs

And participation of



POLIMI SCHOOL OF **MANAGEMENT**



SogelMi

Partners involved in the co-design process to enhance Food Aid Hubs



Guidelines for the development of Food Aid Hubs

These guidelines were developed with the valuable contribution of the **Snam Foundation** that enabled the work of a group of researchers from the **School of Management of the Politecnico di Milano**, in collaboration with the Food Poverty Office (Ufficio Povertà Alimentare) of the Food Policy Area of the **City of Milan**. Special thanks go to those who contributed to the writing of this report: Stefano Quaglia; Giulia Bartezzaghi; Andrea Magarini; Teresa Materia; Lorenza Sganzetta; Andrea Rizzuni; Giulia Valentini; Giovanni Scotti; Marco Prada; Giulia Montuori; and Giovanni Garola. Appreciation also goes to professors Paola Garrone, Marco Melacini, and Alessandro Perego for their scientific supervision and key contribution to the research. Heartfelt thanks are also extended to the project supporting partners, **Assolombarda** and **Fondazione Cariplo**, for their significant contribution to the development and evolution over the years of the Food Aid Hub system..

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Milan's promise to fighting food waste

The City of Milan has for years been committed to promoting a model of food policy development based on sustainability, social inclusion and the ability to innovate.

Within this framework, the Food Aid Hubs project represents an exemplary experience: an initiative in which we have combined the fight against food waste to support the most vulnerable communities, translating Food Policy principles into practical and measurable actions, sharing this approach with all the public and private entities involved.

We start the Hub network journey in 2019, and over the years it is through the involvement of the most important local stakeholders committed to fighting waste that it grows and shows an extraordinary ability to attract and grow good practices, while confirming itself as a laboratory of innovation.

This model has achieved real and measurable results, so much so that its value has also been acknowledged internationally with the *Earthshot Prize* in 2021, awarded by the Royal Foundation of the Prince of Wales, in the category "Build a Waste-free World". The *Earthshot Prize* is one of the world's most distinguished awards in the field of environmental innovation, and its conferral to the Milan City Council Hubs testifies to the strategic value of this project and Milan's ability to participate in the debate on these issues through good local practices. It is a matter of pride for Milan, and at the same time also an encouragement to share and replicate this experience by keeping up meaningful exchanges between cities around the world, as is already happening within the community of cities participating in the *Milan Urban Food Policy Pact*, which Milan itself has been leading since 2015. The award consolidated Milan's role as a global point of reference for urban food policies, highlighting the potential of cities in leading the transition to more equitable and sustainable food systems.

The resources made available by the award have enabled the City of Mi-

lan to adopt co-design as a methodology for developing and expanding the Hub model. This innovative approach, which has seen the active involvement of a wide and diverse network of public and private stakeholders, has made it possible to generate integrated and lasting solutions as part of high social impact programs, such as the QuBi.

Today, what was once called the Neighborhood Hubs Against Food Waste is now renamed the Food Aid Hubs, as part of a communication relaunch that aims to make the model more recognizable and straightforward for the public and to reinforce the values of inclusivity, sustainability, and solidarity by integrating communication tools, such as videos and podcasts, that are useful in raising awareness and engaging an increasingly broad audience.

The guidelines presented here, developed by the Politecnico di Milano as a result of the research and methodology support that accompanied the first year of co-design, through the support of Snam Foundation, are for the City of Milan a major instrument in two respects: on the one hand, they consolidate the Hub model as an effective model, offering practical indications for optimizing the recovery and redistribution of food surpluses; on the other hand, they represent a vehicle for the dissemination and replicability of the experience, with the aim of incentivizing other cities to adopt and adapt this initiative to their own specificities.

This document provides an operating guide for public sector officials, Third Sector entities, and professionals interested in developing similar projects; a testimony of the course undertaken by the city, which has been able to integrate successful practices, scientific innovation, and draw attention to the social perspective.

Milan, emerging over the years as a global reference point for urban food policies, wants to make its experience available, with the ambition to build a global network of cities committed to the transformation of

food systems and, above all, to establish a principle: cities can and should be leaders in global change.

Many thanks to the offices of the City of Milan, the Politecnico di Milano, Snam Foundation, and all the partners who have contributed to this project. It is due to the work of each and every one of us that Milan can now offer an instrument capable of inspiring other Italian and international cities, starting with those participating in the *Milan Urban Food Policy Pact*.

Anna Scavuzzo
Deputy Mayor
of Milan Food Policy delegate



The collaboration against food poverty

Fondazione Snam ETS is a corporate foundation that has been operating in support of the Snam Group since 2017 to contribute to the Just-Transition and has been active in some particularly fragile contexts across the country to combat Energy, Education and Food Poverty. We operate through three main instruments, volunteer work of Snam Group personnel, training to enhance the skills of our stakeholders, and financial support to implement the initiatives, which “cube” the potential for intervention in each of the 3 Poverities.

Due to the increase in the incidence of extreme poverty in Italy, affecting nearly 1 in 10 people in 2023 (Istat, 2024), a condition that prevents access to most basic goods- including food- needed for a decent lifestyle, as Snam Foundation we have chosen to commit ourselves to alleviating food poverty. This commitment means increasing opportunities for access to healthy and sustainable food, also by supporting Third Sector Entities (TSOs) and local food supply chains. We pursue this goal by helping to increase opportunities for access to healthy and sustainable food through:

- training and raising awareness among recipients, Snam corporate volunteers and volunteers from ETS partners;
- food support to vulnerable families;
- applied research in collaboration with universities and experimentation of models of social innovation for surplus food redistribution.

Our strategy is based on concrete, immediate and proximity actions with the aim of creating shared value and facilitating communication between different players: public sector bodies, businesses, the Third Sector, universities and communities.

Snam Foundation’s support for this publication is a tangible example of our nature as a business foundation acting as an impact enabler to foster effective and lasting systemic change and the dissemination of replicable and sustainable best practices.

In this context, the Milan Food Policy and the Food Aid Hub system represent a successful model of how public-private collaboration can help to effectively address the needs of local communities to counter food poverty.

Our support for this process is part of the opportunities unleashed by the Reform of the Third Sector (Legislative Decree No. 117/2017, Art. 55 et seq.), which has redefined the regulatory framework by favoring shared administration models between Third Sector Entities and the Public Sector, contributing to the construction of more effective answers to the complex social, economic and environmental challenges of our time.

Among these challenges, climate change is central given its profound influence on food systems and its tendency to jeopardize food safety and quality. Addressing these issues requires a concerted effort in sustainable resource management, improving production chains, and reducing waste. Only through an integrated and informed approach can environmental impact be lessened and fragile individuals supported.

In this context, the 'Gadda Law' (Law No.166/2016) represents a milestone in Italian legislation. Introduced to encourage the recovery and redistribution of food surpluses, it has inspired companies and organizations like Snam to implement sound practices, turning surpluses into resources and incentivizing production and distribution models aimed at creating social value. Our experience tells us that practices inspired by circular economy, if properly integrated into corporate strategies and bolstered by synergies with expertise gained in business areas, can generate opportunities for sustainable growth, inclusion and social innovation.

Our collaboration with the Milan Food Policy is proof of how philanthropic organizations can contribute to the definition and dissemination of innovative models by providing financial resources, expertise, volunteerism, and access to their network of relationships. It is also an exam-

ple of how Snam, through its foundation, can contribute positively to the development of public policy. On this course, the Food Aid Hub system represents an extraordinary opportunity to translate these principles into specific actions. These hubs not only facilitate the redistribution of food surpluses, but also become places for meeting and co-design, capable of reinforcing a sense of community and activating commendable processes of participation and social innovation.

We are confident that this paper will provide a comprehensive overview of the work that has been done and future potential to replicate this model of intervention, representing a source of inspiration for those who believe in collaboration and the need for shared commitment towards a more equitable and sustainable future.



Marta Luca
General Manager
Snam Foundation

1. Introduction

Today, more than half of the world's population lives in urban areas, and the United Nations projections indicate that by 2050, nearly 70 percent of people will reside in cities (UNDESA, 2024). This rapid urbanization process is generating new challenges on a global scale, including increasing socioeconomic inequalities, deterioration and fragmentation of natural ecosystems, complex management of climate change impact, and increased vulnerability to health crises such as pandemics.

In view of such challenges, over the past two decades the issue of food has gained increasing importance within urban planning systems and public policy, asserting itself on par with key sectors such as transportation, construction, and the urban economy (Sonnino, 2023; Morgan, 2009). Indeed, although food systems are inherently hybrid, influenced by global and local dynamics and flows, the urban dimension of food systems has become increasingly relevant insofar as the implementation of sustainable production, distribution, and consumption practices have become central issues for city governments, since they are linked to many of the challenges that urban and suburban areas face: from food security and public health to climate resilience and social justice (Sonnino, 2023).

Although with significant differences among them, cities are increasingly recognized as central nodes in global networks owing to their role as economic engines, centers of institutional and financial power, and innovation hubs. This key role in the international arena gives city administrations a strategic position within the processes of transforming food systems toward more sustainable, resilient and equitable models aimed at ensuring that deprived communities have access to healthy and nutri-

tious food. Of course, achieving this goal requires the development and implementation of innovative policies and shared strategic plans that address the different stages of the food supply chain, from production to consumption to surplus and waste management.

With this in mind, increasing attention has been directed in recent years to the final stage of the food supply chain with the aim of preventing and reducing food waste. Urban governments, in collaboration with a wide range of public and private stakeholders working in various sectors, have begun to adopt policies and practices that promote the reuse of food surpluses, that is, all those foods that are produced, processed, distributed, or prepared for human consumption but are not sold or consumed for various reasons (Garrone et al., 2014), as a strategy to make urban food systems more circular and resource-efficient (Ellen MacArthur Foundation, 2019). This approach has found wide application, especially in northern countries of the world, through the introduction of specific urban food policies, which have had the merit of facilitating the implementation of programs and initiatives to recover food surpluses along the supply chain and redistribute them for human consumption, often for charitable purposes and socio-economic inclusion. Such practices have thus gained ground as solutions to reduce, at least in part, the consequences caused by the still predominantly linear current food system, favoring instead a more circular model aimed at limiting waste (Ellen MacArthur Foundation, 2019). In fact, as evidenced by various initiatives conducted internationally in recent years, the implementation of surplus recovery and redistribution practices in cities has proven to be an effective strategy to address complex and multidimensional issues such as food insecurity and malnutrition, while helping to reduce greenhouse gas emissions and natural resource depletion (Bartezzaghi et al., 2023; Damiani et al., 2021; Facchini et al., 2018).

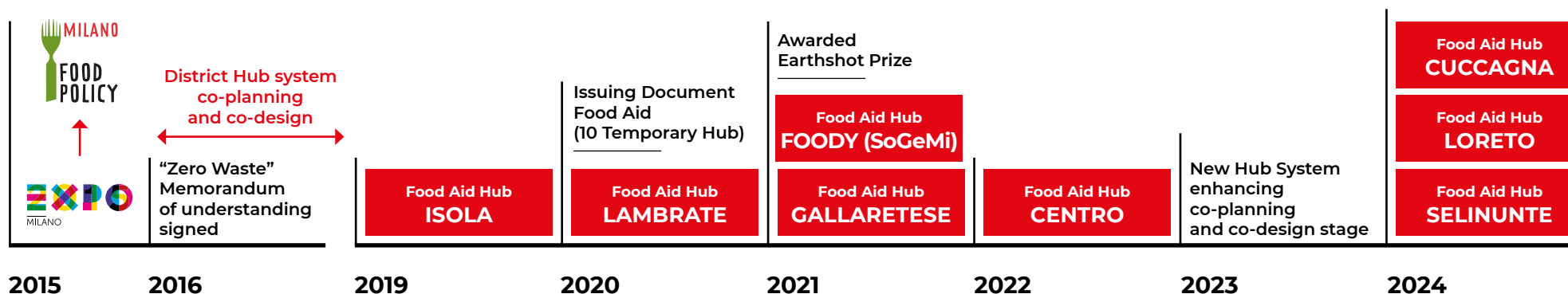
This is the context of the Milan Food Aid Hubs project, designed to recover food surpluses generated by supermarkets, company canteens and city markets, and redistribute them to the most vulnerable citizens. This innovative model, accomplished through collaboration between various local public and private stakeholders, was designed and implemented in response to the socio-economic challenges affecting the population of Milan, in parallel with the increasing attention to food and environmental issues on the city's agenda. Despite the fact that Milan is one of the richest cities in Europe in terms of GDP per person (OECD, 2020), a portion of its population has difficulty accessing healthy and nutritious food, a problem that has intensified in recent years due to the introduction of austerity measures also due to rising inflation and the Covid-19 pandemic related crisis that has significantly affected the city's socio-economic structure (ActionAid, 2023).

In response to these critical issues, and in the wake of EXPO 2015 dedicated to the theme "Feeding the Planet. Energy for Life", whose merit

was to place Milan at the center of the international debate on the sustainability of urban food systems, the first Food Aid Hub was inaugurated in 2019 in the Isola neighborhood, serving Municipality 9. This pilot project, resulting from the collaboration between the City of Milan, Fondazione Cariplo, Politecnico di Milano and Assolombarda, was developed with the specific goal of halving food waste by 2030 and alleviating the food insecurity of Milan's citizens, in line with the priorities defined by the Milan Food Policy.

As illustrated in Figure 1, following the positive performance of the first Hub, the initiative was expanded by opening four more Hubs – Lambrate, Gallarate, Foody Zero Waste and Centro – between 2020 and 2022, and three more – Hub Cuccagna, Loreto and Selinunte, between 2023 and 2024 – as a result of the co-programming and co-design process initiated and led by the Food Policy Area of the City of Milan. Furthermore, it should be noted that in 2020, with the evolution of the Covid-19 emergency and the consequent increase in the number of vulnerable families

Figure 1. Milestone of the Food Aid Hub project



and individuals, the Food Aid Device was launched, which provided for the opening of 10 temporary Hubs dedicated to the distribution of food packages throughout the Milan area, which adopted and adapted the Food Aid Hub model to respond to the emergency.

Based on the positive results achieved in recent years, the Food Aid Hubs have proven to be an effective model for addressing some of the main critical issues that generally characterize surplus recovery and redistribution initiatives, such as, for example, the inefficiency of recovering small amounts of food from multiple donors and the difficulty of ensuring the distribution of balanced and nutritious food to the final recipients (Bartezzaghi et al., 2022).

The positive impact of the project has also gained international recognition, with the *Earthshot Prize 2021*¹ in the category “Build a Waste-Free World” awarded by the Royal Foundation of the Prince and Princess of Wales, which highlighted the importance of the Hubs as an innovative tool to counter food waste and promote social equity in cities.

This document is the result of the work of a multidisciplinary group of professors and researchers from the Food Sustainability Lab and the Smart Urban Logistics Center pertaining to the School of Management of Politecnico di Milano, supported by the Snam Foundation and the Food Policy Area of the City of Milan. With its role as official scientific partner in the project and its in-depth knowledge of issues related to the sustainable management of food surpluses, this research group was able to develop these guidelines aimed at providing clear references for public authorities, operators engaged in the recovery and redistribution of food



aid, and the scientific community for planning and implementing Food Aid Hubs.

In particular, given the significance of this approach and the importance of sharing learnings from the Milan experience, the objective of these guidelines is to illustrate in more detail how Food Aid Hubs work and then provide practical guidance on the drivers that made their development and replicability possible. Sharing this knowledge will enable other cities to adopt and replicate this model, adapting it to the specific urban context, providing additional instruments to reduce food waste and address food insecurity, thus contributing to the transformation of their urban food systems in a sustainable way.

¹) cfr. <https://earthshotprize.org/winners-finalists/city-of-milan/>

2. The institutional context

To effectively plan and manage surplus food recovery and redistribution practices in urban areas, it is essential to create a legislative, policy based, and operating system that can facilitate the implementation of such initiatives. This system should include a set of norms and policies aimed at simplifying the management of food waste and surplus, focusing on recovery and redistribution activities at various levels, from neighborhood scale to the metropolitan area. In addition, the role of a favorable institutional environment is to promote cooperation among the various players involved in the agri-food sector, including public agencies at various levels, private parties (profit and nonprofit), and civilian society. Indeed, it is only through an integrated approach that the complex social, economic, and environmental challenges facing contemporary cities can be addressed, including the reduction of food waste and access to healthy and nutritious food for the most vulnerable segments of the population.




With this in mind, although legislation and policies may vary depending on the context of reference as well as the related needs that characterize each city, it is useful to describe the circumstances under which the Milan Food Aid Hubs project was planned and implemented to illustrate how a well-designed system of rules can support successful initiatives. Sharing here what emerged from the Milan experience may inspire other urban realities to formulate specific regulations and policies appropriate to their local contexts and, therefore, to create systems of sustainable management of food surpluses for social purposes also in contexts other than Milan.

2.1 Global agreements and surplus food management

At the global level, while there are no legally binding regulations regarding the management of food surpluses, it is essential to take into account the recommendations outlined by some of the most significant international agreements of recent years, as these have often influenced the actions of national and local governments.

The 2030 Agenda for Sustainable Development, endorsed by the UN General Assembly in 2015, provides strategic guidance to address major global challenges such as food waste and food insecurity. In particular, the Agenda promotes the creation of sustainable and resilient cities where food is “sufficient, safe, affordable, and nutritious” (UN General Assembly, 2015:4). In this regard, as illustrated in Table 1, through the recovery of food surpluses, the Food Aid Hubs represent a practical example of how global recommendations, with particular reference to *Sustainable Development Goals 2, 11, and 12* and related targets, can be translated into local actions that genuinely affect the well-being and health of urban communities.

Table 1. **Role of Food Aid Hubs in Achieving the Sustainable Development Goals**

	<p>SUSTAINABLE DEVELOPMENT GOALS – SDG2 “End hunger, achieve food security, improve nutrition, promote sustainable agriculture”</p>
<p>TARGET – 2.1. “By 2030, eliminate hunger and ensure that all people, particularly the poor and people in vulnerable situations including children have access to safe, nutritious, and sufficient food throughout the year”</p> <p>TARGET – 2.2. “By 2030, eliminate all forms of malnutrition, including meeting internationally agreed targets against stunting and emaciation of children under 5 years of age by 2025; meet the nutritional requirements of adolescent girls, pregnant and breastfeeding women, and the elderly”</p>	<p>CONTRIBUTION OF FOOD AID HUBS – Food Aid Hubs can contribute significantly to address food and nutritional insecurity by improving access to food for the most vulnerable citizens, including minors, through the recovery of food surpluses and their redistribution</p>
	<p>SUSTAINABLE DEVELOPMENT GOALS – SDG11 “Making cities and human developments inclusive, safe, durable, and sustainable”</p>
<p>TARGET – 11.6 “By 2030, reduce the negative environmental impact per person of cities, particularly with regard to air quality and waste management”</p>	<p>CONTRIBUTION OF FOOD AID HUBS – Food Aid Hubs can help reduce the per-head environmental impact in cities by reducing food waste production and thereby ‘saving’ greenhouse gas emissions and natural resources used to produce and distribute food through the redistribution of food surpluses for charitable and social inclusion purposes</p>
	<p>SUSTAINABLE DEVELOPMENT GOALS – SDG12 “Ensure sustainable production and consumption models”</p>
<p>TARGET – 12.3 “By 2030, reduce global per person waste of retail and consumers food waste by half and reduce food losses along production and supply chains, including post-harvest losses”</p>	<p>CONTRIBUTION OF FOOD AID HUBS – Well-planned Food Aid Hubs can contribute significantly to reducing the amount of food waste generated in cities through effective and sustainable management of food surpluses recovered from large retailers, city markets, soup kitchens, and other possible sources generating surpluses</p>

In addition, the *Milan Urban Food Policy Pact* (MUFPP) is a further example of a significant agreement in this field. Launched by the City of Milan in 2015 as one of the most meaningful legacies of the Expo, the MUFPP aims to promote the development of sustainable, equitable and resilient urban food systems. Signed by more than 290 cities around the world, the MUFPP provides

a platform for the exchange of best practices and knowledge between the signing cities, offering recommendations related to food security, waste reduction, and the promotion of responsible consumption and production. Recommendations outlined in its *Framework for Action* pertaining to the sustainable management of food waste and surplus include:

- **Recommended action n.34** – Bring together food system stakeholders to assess and monitor the reduction of food loss and waste at all stages of the city/regional food supply chain (production, processing, packaging, safe food preparation, presentation and handling, reuse, and recycling), ensuring comprehensive planning and design, transparency, accountability, and integrated policies.
- **Recommended action n.35** – Raise awareness about food waste and scraps through targeted events and campaigns; identify focal points such as institutions in the education sector, social markets, farm stores, and other solidarity or circular economy initiatives.
- **Recommended action n.36** – Collaborate with the private sector, research, educational, and local organizations to develop and review, as appropriate, city policies and legislation (e.g., procedures, decoration and categorization criteria, expiration dates, etc.) for the prevention of food waste or to safely recycle food and packaging through a system that promotes the use and not the waste of food.
- **Recommended action n.37** – Promote and encourage, when possi-

ble, the recovery and redistribution of surplus food for human consumption.

Again, it can be said that the experience of the Food Aid Hubs translates MUFPP suggestions into practice, demonstrating the effectiveness of the recommendations provided by the Pact even in the absence of a legally binding force.

The MUFPP also has a *Monitoring Framework*² consisting of 44 indicators developed by FAO and RUAF to monitor urban food policies, four of which are entirely dedicated to food waste:

- **Indicator 41** – Total annual volume of food waste and surplus.
- **Indicator 42** – Annual number of events and campaigns targeting food waste and surpluses.
- **Indicator 43** – Existence of policies and legislation that address prevention, recovery, and redistribution of food waste.
- **Indicator 44** – Total annual volume of food surplus recovered and redistributed for direct human consumption.

For further information about MUFPP
www.milanurbanfoodpolicypact.org



²) cfr. <https://www.milanurbanfoodpolicypact.org/resources/the-milan-urban-food-policy-pact-monitoring-framework-handbook-and-resource-pack/>

2.2 European Union policies

In accordance with the guidelines outlined by international agreements, the European Union has recently introduced several laws aimed at reducing food waste and regulating surplus recovery and redistribution practices, promoting a circular vision of food systems, including at the urban scale. In particular, in 2015, the European Commission launched the “Closing the loop – An EU action plan for the Circular Economy”³ action plan aiming to stimulate the development of sustainable and circular approaches in strategic sectors, including food waste management. Over the years, this plan has played a crucial role in helping:

- the adoption of *EU Food Donation Guidelines*, 2017⁴ to facilitate food surplus recovery and redistribution activities;
- the development of a web platform, called *EU Platform on Food Waste and Losses*⁵, dedicated to exchanging knowledge between the various stakeholders involved in this field with the ultimate goal of addressing food waste by sharing best practices and developing common approaches;
- the introduction of a common European Union methodology for measuring food waste⁶, the introduction of a common European Union methodology for measuring food waste instrumental to promoting the quantification of the issue at the national level enabling to inform decisions and establish legally binding reduction targets for Member States.

3) cfr. <https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A52015DC0614>

4) cfr. https://food.ec.europa.eu/food-safety/food-waste/eu-actions-against-food-waste/food-donation_en

5) cfr. https://food.ec.europa.eu/food-safety/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste_en

6) cfr. <https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:32019D1597>

In addition, as part of the *European Green Deal*⁷, the framework approved in 2020 by the European Commission to achieve climate neutrality by 2050, the *Farm to Fork strategy*⁸ (Producer to Consumer Strategy) promotes the transition to more sustainable food systems by adopting a comprehensive holistic approach that encompasses the entire food supply chain. Among the main goals, this strategy aims to ensure food and nutrition security for all European citizens and to reduce per -person food waste at the retail and consumer levels by 50 percent within 2030, in line with the 2018 *EU Bioeconomy Strategy*. Supporting these goals, the EU Directive 2018/851 amending Directive 2008/98/EC on waste, calls on member states to implement national programs to prevent and reduce food waste at every stage of the supply chain by encouraging human consumption of surplus food and its monitoring, in line with the 2030 Agenda Goals.

2.3 National legislation and local strategies

The European Union’s vision and commitment to promoting sustainable food systems, developing a circular economy, and countering food insecurity is a key pillar in encouraging member states to initiate targeted legislative and policy reforms. These reforms are aimed at establishing uniform standards to reduce food waste and facilitate the distribution of surplus food to the most vulnerable. In this regard, a case in point is France, with National Law No. 2016-138, which requires supermarkets to

7) cfr. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_it

8) cfr. https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en?prefLang=it&trans=it

donate unsold food and restaurant owners to offer free *doggy bags* to customers, and Spain, with the introduction of similar measures in 2022.



For further information about Food Policy
www.comune.milano.it/food_policy

In Italy the national government has drafted legislation in recent years that has facilitated surplus food recovery and redistribution practices, influencing both national policy and local regulations. Among the most relevant national laws is what is known as Good Samaritan Law⁹ (Law No. 155/2003), which acknowledged nonprofit organizations as ‘final consumers,’ exempting them from legal responsibilities related to food safety, in line with the procedures for sanitation and hygiene safety provided by Law No. 147/2013. A further step was taken with Law No.166/2016, known as the ‘Gadda Law,’ which reformed and made the regulatory framework related to donations of surplus food and support for the most vulnerable more organic. This law introduced significant innovations, including:

- simplifying bureaucratic processes related to the donation of food surpluses;
- introducing a clear definition of the players involved in surplus food recovery and redistribution processes (e.g., food handlers, surplus donors) and the difference between minimum shelf life and expiration date of a food product.

- prioritizing the use of surplus food for human consumption, as recommended by the *Food Waste Hierarchy*⁹;
- introducing the possibility for local government at the city level to provide fiscal incentives to donors of surplus food through a reduction in garbage tax.

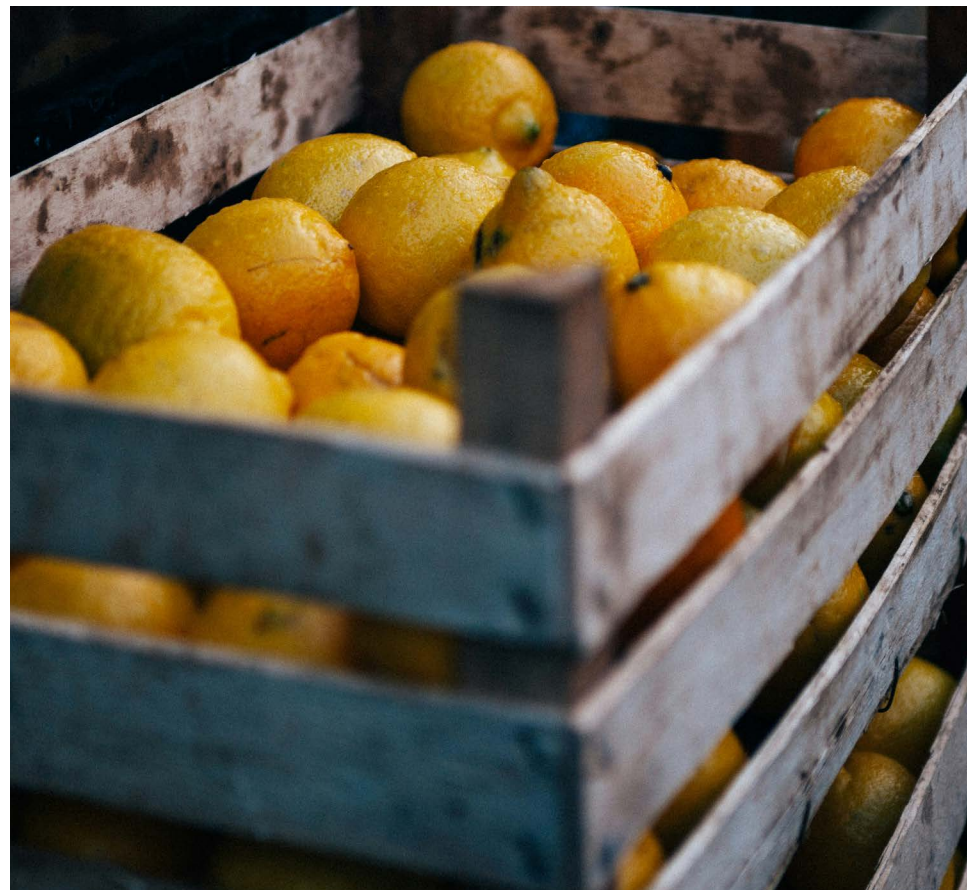
Although national legislation has created fertile ground for the widespread donation of surplus food for social purposes, the Gadda Law has not yet been fully implemented. In fact, the cities that have introduced waste tax breaks for donors are still just a few. The processing of surpluses by nonprofits is still encountering some regulatory barriers. Therefore, the role of city councils becomes crucial in facilitating the implementation of urban initiatives for the recovery and redistribution of surplus food. Indeed, intervention on an urban scale enables public institutions to innovate local policies, introducing new regulatory approaches and administrative procedures and facilitating participation and collaboration among the various stakeholders to address local issues such as food and nutrition insecurity among citizens. To this end, urban food policies designed to address specific issues are becoming more widespread, depending on local needs and priorities, though the degree to which these policies are adopted and integrated into urban plans and regulations may vary and they are still not well established on a national level.

In this regard, the case of Milan certainly represents a relevant example at global level in terms of the strategic approach adopted and the actual actions implemented. As a further legacy of Expo 2015, the City

⁹) cfr. https://food.ec.europa.eu/food-safety/food-waste/eu-actions-against-food-waste/food-waste-measurement_en

of Milan has developed the *Milano Food Policy 2015-2020*, a strategic document aimed at rethinking the local food system to generate multiple benefits for the Milan community. The *Milano Food Policy*, that among its priorities identifies guaranteeing universal access to healthy and nutritious food and reducing food waste, has played a crucial role in providing the necessary guidelines to direct local players in the plan-

ning and implementation of Food Aid Hubs in various municipal areas within the city.



3. The Food Aid Hub Network

Hub Gallaratese



Hub Cuccagna



Hub Loreto



Hub Selinunte



Hub Lambrate



Hub Isola



Hub Centro



Hub Foody



3.1 Hub Isola

Year of opening: 2019

Area served: Isola district, Municipality 9

Managing entity: Banco Alimentare della Lombardia

Purpose: Food aid

Operating model: Mediated food banking model for surplus recovery and redistribution

Brief description: the Isola Hub, inaugurated in 2019 in Via Borsieri 2, was the first center in Milan to adopt a neighborhood-scale model of surplus food recovery and redistribution. Created as a pilot project, it represented a concrete experiment of sustainable urban micro-logistics designed to specifically address the food needs of the most vulnerable segments of the population and, at the same time, reduce food waste in the urban context. Managed by the Banco Alimentare of Lombardy and with the support of Fondazione Cariplo, the Hub collects unsold food surpluses, both fresh and shelf-stable food from large-scale retail outlets on a daily basis. Recovery takes place through an organized network of volunteers and operators who are also responsible for storage and preparation for redistribution. Recovered food is redistributed to a network of local non-profit organizations active in the area, which in turn provide various food assistance services (e.g., social soup kitchens, social markets, food parcel distribution) for vulnerable families and individuals.



3.2 Hub Lambrate

Year of opening: 2020

Area served: Lambrate district, Municipality 3

Managing entity: Banco Alimentare della Lombardia

Purpose: Food aid

Operating model: Mediated Food banking model for surplus recovery and redistribution

Brief description: the Lambrate Hub was inaugurated in 2020 in Via Bassini 26, housed within a space provided by AVIS Milano and with the support of Banca di Credito Cooperativo di Milano.

This Hub was created as an extension and consolidation of the experience begun with the Isola Hub, adopting its operating model for the recovery and redistribution of surpluses on a district scale.

Under the management of Banco Alimentare of Lombardy, in this case too, the Hub collects unsold products on a daily basis from the many large-scale retail outlets participating in the project. Recovered food surpluses are stored, sorted, and redistributed to a network of *frontline non-profit organizations* active in the Lambrate neighborhood and surrounding areas to provide food assistance services such as social soup kitchens, *social markets*, and the preparation and distribution of food parcels to individuals and families in socio-economic vulnerability conditions.



3.3 Hub Gallarate

Year of opening: 2021

Area served: Gallarate district, Municipality 8

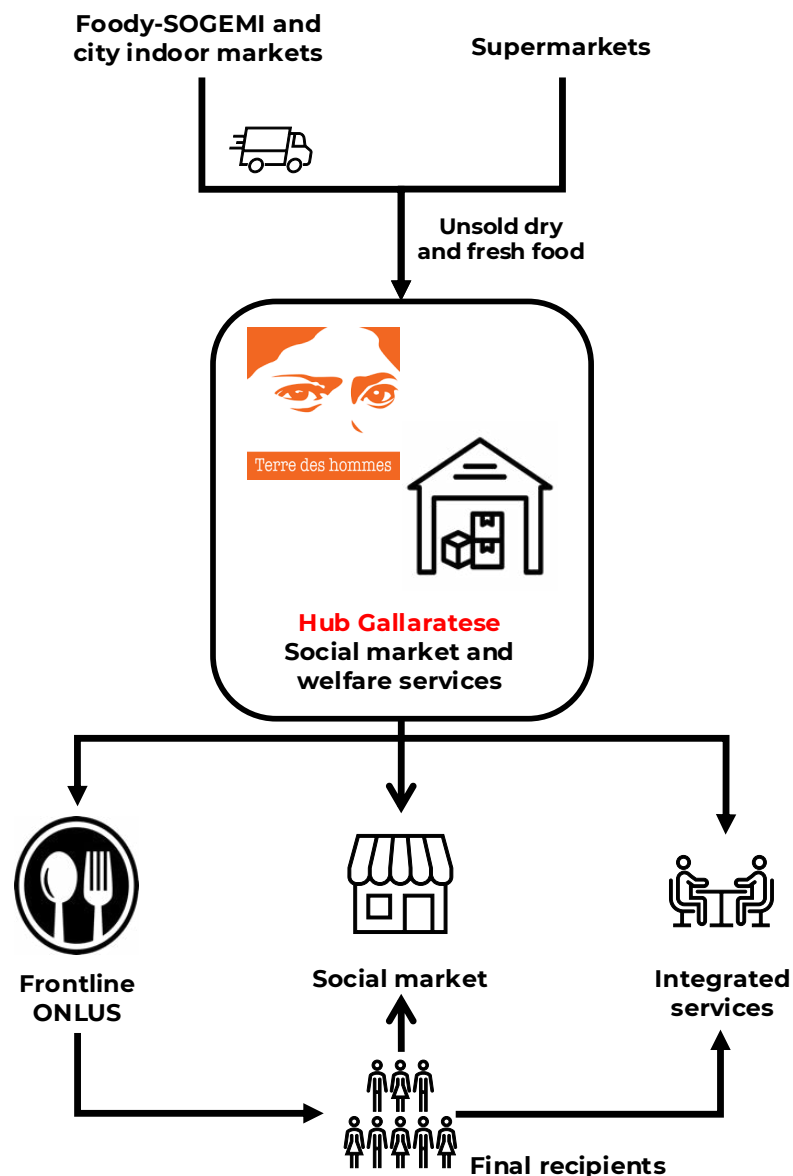
Managing entity: Terre des Hommes

Purpose: Food aid, training, and social services

Operating model: *Social market*

Brief description: the Gallarate Hub was opened in 2021 within the Spazio Indifesa, a multipurpose facility located in Via Appennini 50. The space, made available by the City of Milan, was requalified with support from Milan Foundation. Managed by Terre des Hommes in collaboration with the Italian Red Cross-Milan Committee and IBVA, the Hub fits in the city network by drawing inspiration from the surplus redistribution models already tested in the Isola and Lambrate districts and enhancing them with the social market Solidando formula.

Managed by IBVA, it provides people in economic distress with free access to food and essentials, selected from surpluses recovered from supermarkets, the SOGEMI fruit and vegetable wholesale market and other donors. It is a model that aims to promote the self-reliance and active participation of recipients. In addition, the Hub integrates the “suspended purchase” mechanism, service orientation activities, educational initiatives for minors, and empowerment programs addressed to women in vulnerable situations, thus strengthening its role as a proximity shelter and social inclusion center within the neighborhood.



3.4 Hub Foody – Zero Waste

Year of opening: 2021

Area served: Foody Fruit and Vegetable Market, City of Milan

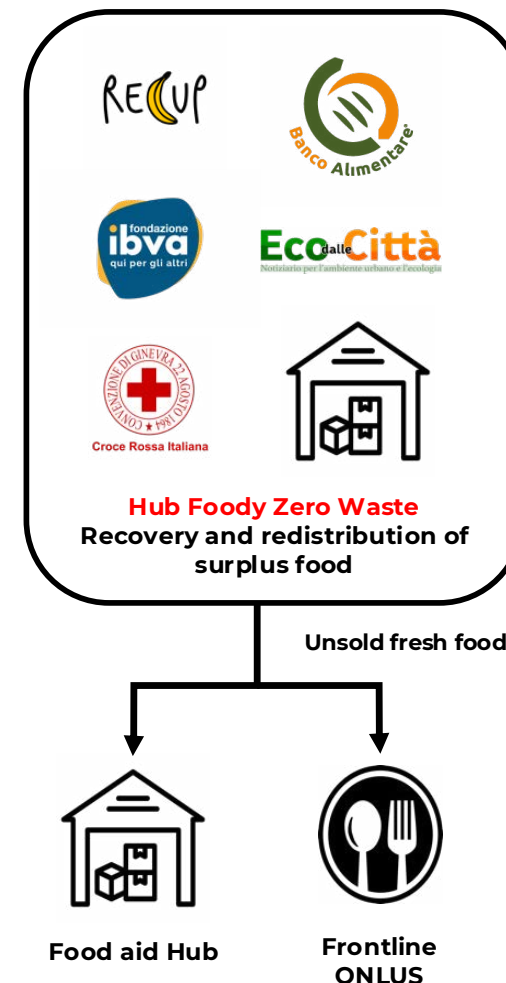
Managing entity: Partnership project (Recup, Banco Alimentare della Lombardia, Croce Rossa Italiana, Eco dalle Città, IBVA)

Purpose: Food aid

Operating model: Hybrid model for recovery and redistribution of fresh fruit and vegetable surplus, with innovative technology solutions

Brief description: the Foody Zero Waste Hub was created in 2021 at the Foody Fruit and Vegetable Market in Milan as an evolution of the experience acquired during the 2020 lockdown, when a temporary hub enabled the distribution of 138 tons of fresh fruit and vegetables in just eight weeks. The Foody Zero Waste Hub stood out within the city network for its high efficiency in the recovery and redistribution of surplus food, being the highest performing in terms of volumes processed. Between 2021 and 2023, the Hub recovered 389, 378, and 355.5 tons of unsold produce, while in 2024 the volume increased to 449 tons, equivalent to about 898,286 meals. This increase reflects both organizational and logistics development, based on the joint work of five operating managers and the active engagement of 134 wholesalers. The collected products are redistributed to a network currently consisting of 92 nonprofit organizations operating throughout Milan and some of the active Food Aid Hubs in the network.

The impact generated is measured not only in quantitative terms, but also in social terms: in 2024, the recovered food was provided to a total of 9242 households, with an estimated total of 105,547 individual recipients. At the infrastructural level, a decisive enabling factor for the project's continuity is the availability of space at the SoGeMi complex, the running costs of which are borne by the City of Milan. This institutional support configures a structural condition that is necessary for the maintenance of activities as it ensures the basic logistics for the operation of the Hub.



3.5 Hub Centro

Year of opening: 2022

Area served: Ticinese district, Municipality 1

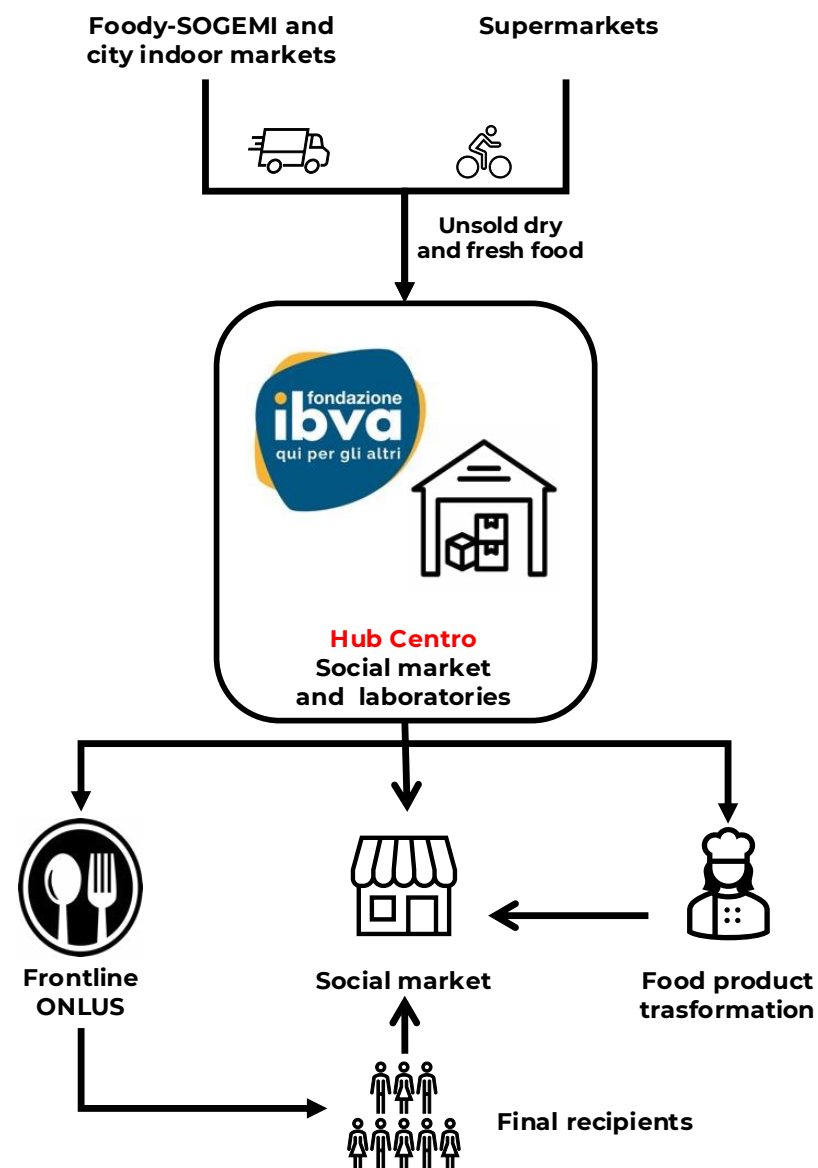
Managing entity: IBVA

Purpose: Food aid, training, and food production/processing

Operating model: *Social market* and mediated model of surplus food recovery and redistribution

Brief description: the Hub Centro, located at Via Santa Croce 15, opened in 2022 within the IBVA association spaces, alongside the activities of the Solidando social market, active since 2017.

The Hub recovers food surpluses, including through the use of cargo-bikes, donated mainly by large-scale retailers, and redistributes them, not directly to individuals, but to Third Sector entities that request them (e.g., foster homes, shelters, public housing). Further supplementing the recovery and redistribution practices, the Panificando and Panificando Kitchen projects are also active. The first is a social bakery run by volunteers who produce bread daily distributed across the network's social markets, including at Hub Gallaratese. The second is a social kitchen where, using food products close to their expiration date, warm meals are prepared for distribution also through social markets. With the integration of different services, the Hub Centro represents a strategic node in the Milan network promoting an integrated model of solidarity and socio-economic inclusion.



3.6 Hub Selinunte

Year of opening: 2024

Area served: San Siro district, Municipality 7

Ente gestore: COOPI – Cooperazione Internazionale

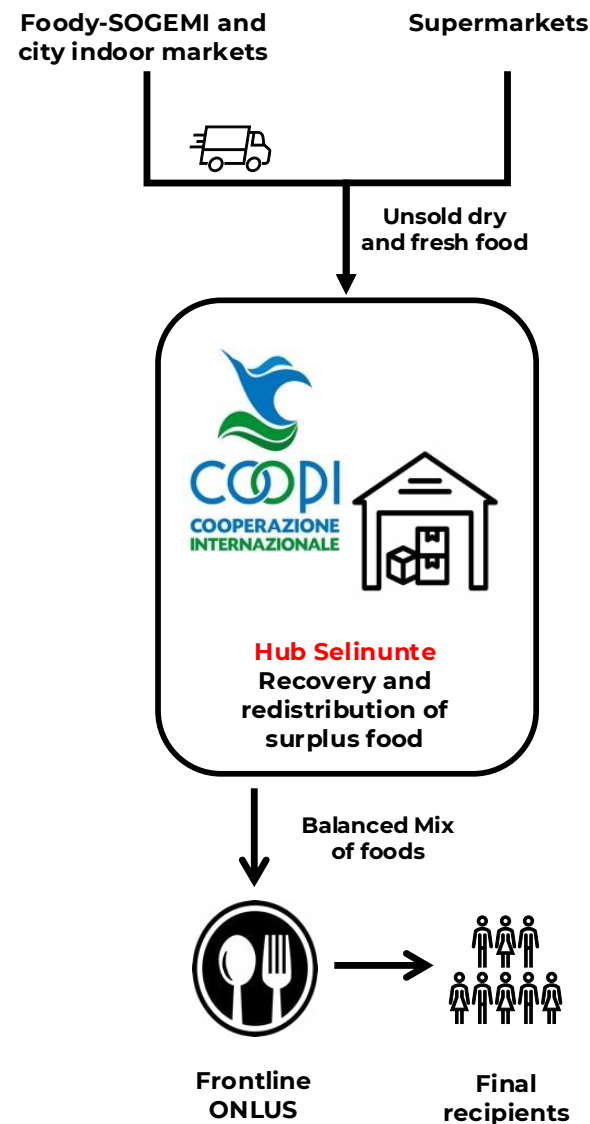
Purpose: Food aid

Operating model: Mediated model of surplus food recovery and redistribution

Brief description: the Hub Selinunte was created as a continuation of a food aid and empathetic listening center operating since 2021 in Piazzale Selinunte, in the San Siro district. It is the first hub launched as part of the co-design process promoted by the City of Milan starting in 2023, made possible by the use of resources provided by the *Earthshot Prize*, aiming to strengthen and innovate the network of city hubs.

Managed by COOPI-International Cooperation, in close synergy with the QuBì Program network that has been active in the district for some time, the hub adopts a model based on the recovery and redistribution of surplus food from large retailers and city markets, including the Foody-Zero Waste Hub within SOGEMI fruit and vegetable wholesale market.

Selinunte extends redistribution of surpluses beyond neighborhood boundaries to reach vulnerable people on a citywide scale to provide a comprehensive and coordinated response to local food needs.



3.7 Hub Loreto

Year of opening: 2024

Area served: Loreto district, Municipality 3

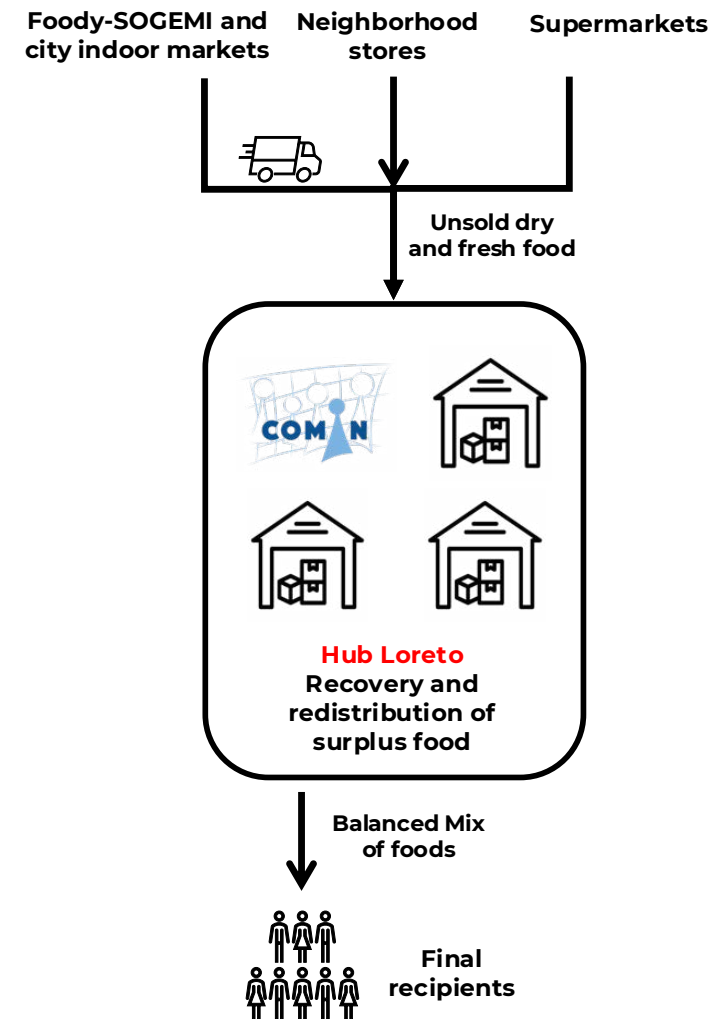
Managing entity: Comin Cooperativa Sociale (head entity); Parish Santa Maria Assunta in Turro; Terza Settimana; T12 Lab; Pronto Soccorso; Milano Positiva

Purpose: Food aid, training, surplus processing

Operating model: Mediated model of food surplus recovery and redistribution

Brief description: the Loreto Hub, inaugurated in 2024, is the second Hub activated as part of the co-design process promoted by the City of Milan with funding from the Earthshot Prize. Unlike the other Hubs in the network, this one is characterized by a widespread model, consisting of three distinct food aid locations: (i) Politecnico di Milano Off-Campus Nolo, originally located in viale Monza inside Crespi municipal market and recently moved temporarily to Cascina Turro; (ii) the Santa Maria Assunta Parish in Piazza Anelli, in the Turro neighborhood; (iii) and the Terza Settimana center in Via Leoncavallo. This configuration is designed to promote more effective coordination among the various entities involved in food aid, reinforcing territorial proximity and encouraging a collaborative approach.

In operating terms, the Hub adopts the well-established model of recovery and redistribution of food surpluses, adopted not only from large retailers and urban markets, but also by small neighborhood businesses. A further element of innovation is the integration of activities transforming surpluses that are no longer edible into compost, and the delivery of social-employment inclusion services. In addition, the active participation of the university in Hub management and field research-action is further intensified, coordinated by the POLIMI Desis Lab research group within the Off-Campus Nolo facility of Politecnico di Milano.



3.8 Hub Cuccagna

Year of opening: 2024

Area served: Porta Romana district, Municipality 4

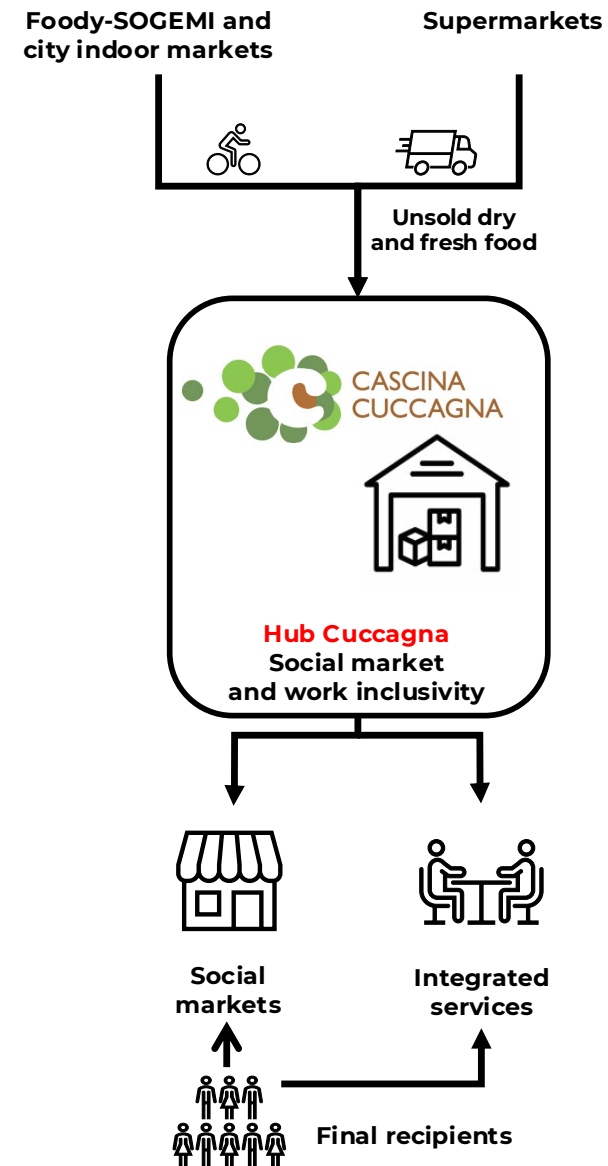
Managing entity: Cantiere Cuccagna Consortium Association (head entity); Està; Emergency; ACRA Foundation; The Seagull; RECUP

Purpose: Food aid, socio-economic integration, education

Operating model: *Social market*

Brief description: The Hub Cuccagna, established in 2024 at Cascina Cuccagna, represents the third and final project resulting from the co-design process promoted by the City of Milan and with resources from the *Earthshot Prize*. Ideated as a social market, the hub adopts a distribution model that combines self-service and assisted modes, enabling vulnerable people to independently choose the products they need. This formula, designed to restore dignity and decision-making capacity to recipients, is coupled with a social coaching process that includes orientation, training, and support in accessing services.

The project is based on recovering surplus food from local markets, supermarkets, and business operations, actively contributing to the reduction of waste along the supply chain. The implementation and management of the Hub involves a network of organizations, including EMERGENCY-taking care of access through the “Nessuno Escluso – *No one Excluded*” program, together with the Cantiere Cuccagna Consortium, ACRA, Il Gabbiano Community, Recup, and Està.



3.9 Other network best practices

3.9.1 CARE (Cargobike Action for Rescuing Edibles)

Year of opening: 2025

Area served: Milan Municipalities 4 and 5

Managing entity: MAGMA (So.De); ACRA

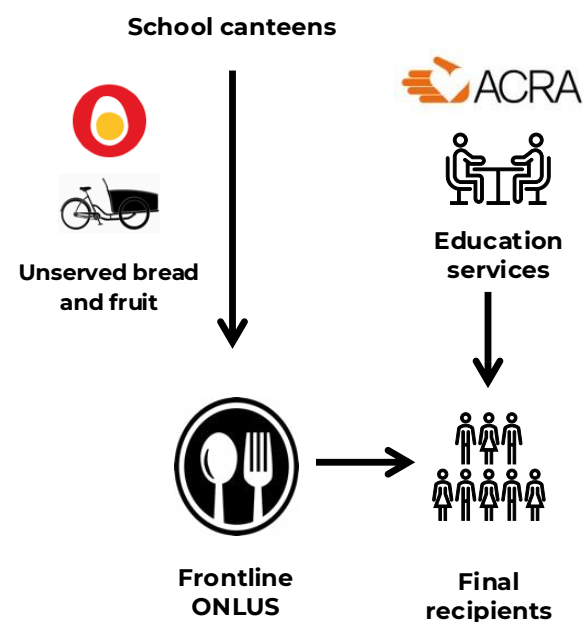
Purpose: Countering waste; training, food aid

Operating model: Non mediated (food delivery) model to recover and redistribute surpluses

Brief description: CARE Cargobike Action for Rescuing Edibles is the promoted pilot project under CULTIVATE by the City of Milan, Milano Ristorazione (food service), and Snam Foundation to test a system to recover food from school canteens with cargo bikes.

The trial phase, running between January and December 2025, aims to activate ongoing recovery of bread and fruit from 18 schools in Municipalities 4 and 5 in the City of Milan, while supplying selected charities in the same areas. The system is based on a logistics model that matches quality, quantity and type of food donations with the specific needs in terms of schedules, calendars and mobility. Operating development is managed by the social enterprise Magma through the So.De-Social Delivery service, also responsible for activities of capacity building targeting partners and other potentially interested entities to replicate the process in other settings.

In parallel, the project develops training and awareness-raising activities in schools, in addition to a youth engagement and community activation plan by ACRA. The project involves the co-creation of feasibility studies for the replicability of the effort in several city areas to which Banco Alimentare della Lombardia, Coopì, Recup, and IBVA contribute.



3.9.2 Recovery of surplus food from company canteens

Anno di svolgimento: 2019 – 2025

Enti coinvolti: Assolombarda; Banco Alimentare della Lombardia (Programma Siticibo)

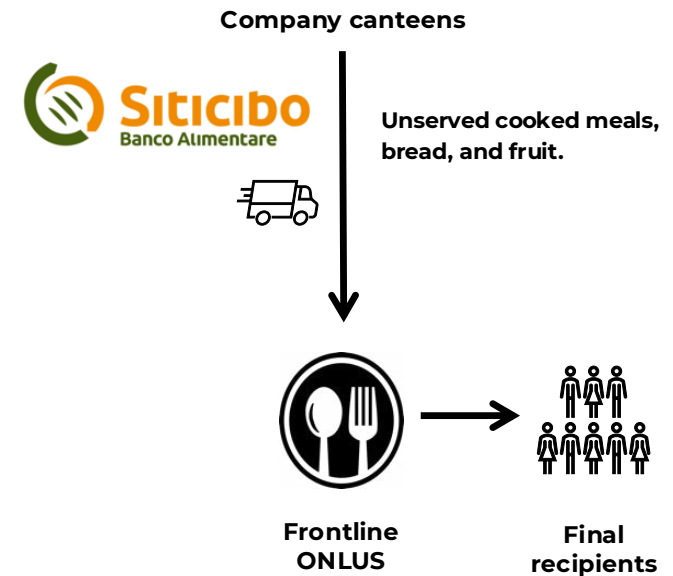
Funzione: Countering waste; education and food aid

Brief description: promoted by Assolombarda with the involvement of its business network, the project involves the recovery of cooked meals, fruit, bread, and other baked goods not served in company canteens.

Through the Lombardy Food Bank Siticibo program, these food surpluses are collected in compliance with the necessary sanitary and hygienic requirements through a structured logistics network and delivered directly to nonprofit organizations – frontline onlus – equipped with canteen service and engaged in providing meals to vulnerable people.

The activity is conducted according to protocols that ensure product traceability, maintaining the cold chain, and full compliance with current food safety standards. When possible, pickup occurs at the same time as the recovery of surplus food donated by supermarkets to Food Aid Hubs, streamlining logistics and reducing the environmental impact of operations.

Paused during the Covid-19 pandemic, the project was reactivated in 2024 and is currently operative.





4. Cross-sector collaboration: stakeholders, resources, and partnership stages

The recovery and redistribution of surplus food for social purposes is a potential means to alleviate the food insecurity problem in cities while reducing food waste. Due to the complexity and multidimensionality of the challenges faced, it therefore requires collaborative models that include public, private “for profit,” and Third Sector stakeholders, pooling complementary resources, skills, and expertise. Precisely because these collaborative models are characterized by the presence of different players, they are consequently complex to design and manage to be able to achieve ambitious goals in the medium to long term. In this regard, it is crucial to understand how the Food Aid Hub network has effectively managed the various phases of the initiative and maintained a complex collaborative structure, synergically systemizing resources and skills and dealing with shocks and internal as well as external changes.

4.1 The original configuration of the cross-sector network for food assistance: players and roles

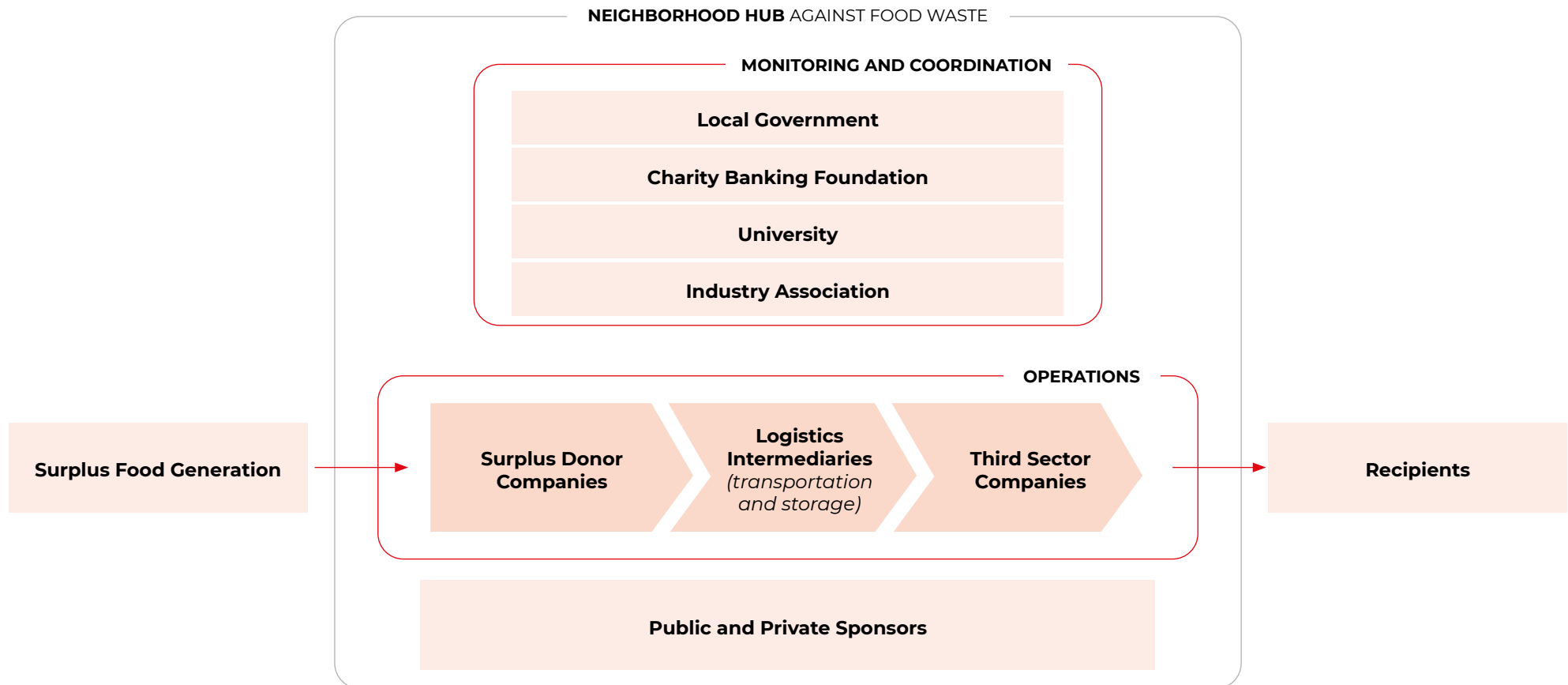
The need to foster synergies and the integration of complementary resources and expertise to address the major challenges of sustainability have led to the development and increasingly wide spread of cross-sector collaborations, intended as initiatives involving the col-

laboration of public, private “for profit,” and Third Sector entities. SDG 17 (“Partnerships for the Goals”), and in particular Target 17.17 on cross-sector models, well represent the strategic importance accorded to collaboration to achieve the goals of the United Nations 2030 Agenda. Practices aimed at solving complex problems, such as food insecurity and food waste, transcend the areas of action of individual stakeholders and sectors and thus require a coordinated effort among different sections of society, each with specific resources and expertise. In this logic, the Food Aid Hubs are based on a collaborative model that brings together specific resources, skills and strengths of different public and private players. Figure 3 shows the main entities involved in the Hub collaborative network, which collectively plays the role of intermediary at the local scale between generating food surpluses and final recipients. As we will see in the following sections of this chapter in addition to food aid, the network has integrated other care services (including educational and recreational services for families with children, psychological help desk) by leveraging the resources and expertise brought by the partners that are gradually involved in the network.

In the original configuration of the network aimed at food relief, the *operating activities* of the network are performed by a number of players who ensure that food surpluses are physically collected, transport-

ed, stored, and redistributed to end recipients. These players are either *for-profit* companies that donate their surpluses to the network, or private entities from the Third Sector that act as logistics intermediaries (collecting food surpluses from donors, storage, Hub management) and as a point of contact to end recipients (performing the final redistribution activity).

Figure 3. Stakeholders involved and their roles in the Food Aid Hub project (Bartezzaghi et al., 2022)



The Food Aid Hub network also comprises a monitoring and coordination layer, performing the role of network design, coordination, monitoring, and performance measurement. This level is populated by players from the public sector and the Third Sector. In particular, the City of Milan with the Food Policy office is in charge of defining policy measures that can encourage the redistribution of food surpluses (including tax incentives and the simplification of administrative procedures, within the national framework of the Gadda Law) and making available unused public spaces in which to place Food Aid Hubs. The City of Milan, in synergy with Fondazione Cariplo, also facilitates the creation of the

network, analyzing and monitoring the state and spread of poverty in the city and interacting with organizations engaged in delivering food aid in the area, providing them with financial support. Politecnico di Milano supports the development of the logistics model and measurement and monitoring system as an independent third party, monitoring performance and surplus flows within the network and managing relationships with donor companies and the Third Sector. Trade association Assolombarda facilitates the engagement and awareness of businesses and coordinates the “Zero Waste” brand recognition process, upon businesses’ active participation in the project as donors of food surpluses and/or other forms of sponsorship.

Lastly, a large network of public and private stakeholders supports the network through financial as well as operational resource funding and donations.

Figure 4. **The collaborative governance of Food Aid Hubs (adapted from Ansell & Gash, 2008)**

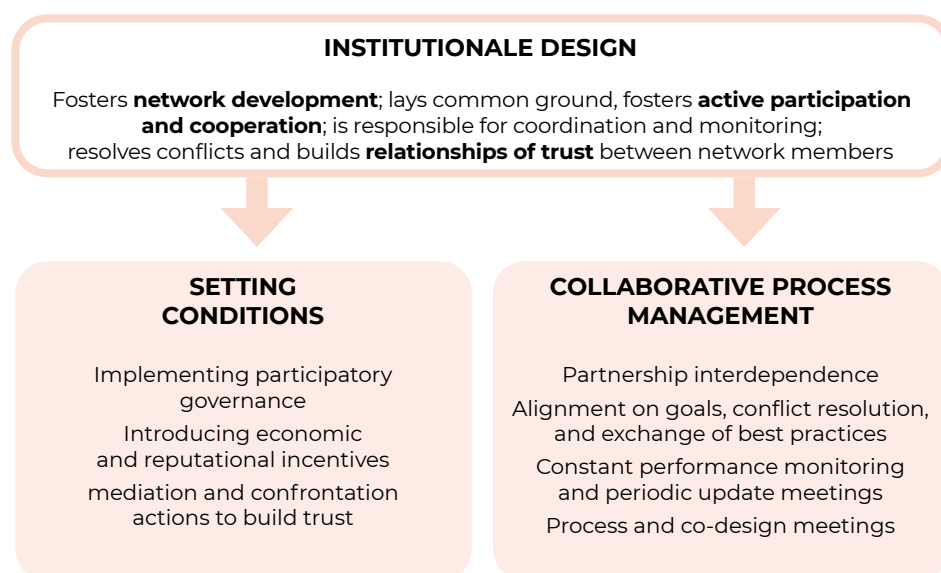


Figure 4 illustrates the role of monitoring and coordination levels in managing the Food Aid Hub network.

The core element of the model is its *institutional design*, meaning the set of strategic actions aimed at fostering network creation and cooperation, ensuring alignment on shared goals, and managing or resolving potential conflicts. Institutional design primarily enables the initial conditions required for the Network to function, by defining a participatory governance model, economic and reputational incentives, and by setting up mechanisms for mediation and communication among partners. A key activity to create the starting conditions of the collaborative network is the analysis of the existing practices and relationships of (or among) individual partners, and their integration with the operational and collaborative activities within the Network. Furthermore, institutional design ensures proper management of the collaborative process. In practice, this

happens through both co-programming and co-design meetings coordinated by the City of Milan to involve stakeholders, coordinate activities, and develop new projects, and through regular update meetings coordinated by the Politecnico di Milano to monitor performance and share results with partners. These meetings also serve to keep partners aligned on strategic objectives, facilitate the resolution of tensions or issues, and encourage the exchange of best practices.

4.2 The development of Food Aid Hubs: mobilized resources

Table 2 shows the specific resources contributed to the Network by different stakeholders, categorizing them by type – physical, financial, human, relational, intellectual, and reputational. The summary figure highlights the heterogeneity of the partners, and the complementarity of the resources made available, which enabled the launch of the Hub system, and subsequently to enhance and diversify managed network services, going beyond the function of food assistance.

The City of Milan, Food Policy Area, together with other institutional partners – Politecnico di Milano, Assolombarda, Fondazione Cariplo, and Fondazione Snam – contributes with resources such as legitimacy and reputation, which are essential to give credibility to the initiative and engage new partners. It also provides unused spaces for the storage and management of surplus food. The knowledge of the City of Milan of the local context enables the project to be tailored to the specific needs of the area and the adaptation of public policies to encourage and streamline donation and redistribution activities. This local knowledge is supported by the role of other partner stakeholders who facilitate access to local networks of businesses, Third Sector organizations, and recipients.

Politecnico di Milano – School of Management, with the contribution of the Università degli Studi di Milano, brings scientific and technical expertise by supporting the design of the logistics network, monitoring and measuring the flows of food surplus within the network, and acting as mediator in relationships with businesses and the Third Sector, through the university's ability to credibly certify as an independent third party. Politecnico di Milano also promotes awareness among the student community, young researchers, and citizens on issues related to the initiative, namely food waste, food security, and more broadly the sustainability of urban food systems through training and dissemination activities. Fondazione Cariplo provides financial resources and contributes a deep understanding of the local context and strong connections with Third Sector networks, particularly those focused on combating food poverty among youth. Assolombarda contributes not only through direct funding, but also by leveraging its network of local businesses, which can be engaged either as donors of surplus food or as financial and technical sponsors.

Third Sector organizations that serve as Managers of the Food Aid Hubs provide specialized expertise in the recovery and redistribution of surplus food, along with a well-established network of relationships and staff – both employees and volunteers – essential to the project's operational functioning. In some Hubs, these Managers also oversee and coordinate the work of other Third Sector organizations delivering family and social support services, thus expanding the Hubs' activities beyond food assistance alone. Businesses in the food supply chain that donate to the Network – mainly large-scale retail chains, markets, and canteens – provide surplus food, equipment, and trained staff, all of which are critical resources for the recovery phase. They also bear part of the operational costs associated with donations. Food aid associations that benefit from

Table 2. Stakeholders and conferred resources

Stakeholder	Category	Contributed resources	Type
City of Milan – Food Policy Area	Local government	Legitimacy Unused space Knowledge of the local context Support in public policy	Reputational Physical Intellectual, humane Financial, reputational
Politecnico di Milano Università degli Studi di Milano	University	Legitimacy and certification Specialist skills Access to local business networks	Reputational Intellectual, humane Relational
Cariplo Foundation	Banking foundation	For funding Legitimacy Knowledge of the local context Access to local Third Sector networks	Financial Reputational Intellectual, humane Relational
Assolombarda	Association of enterprises	Funding Legitimacy Knowledge of local context Access to local business networks	Financial Reputational Intellectual, humane Relational
Managers and Organizations active in Food Aid Hubs	Third sector nonprofit entities	Specialized skills Trained volunteer and employed staff Operational reliability and established relationships with businesses Access to local Third Sector networks	Intellectual, humane Intellectual, humane Reputational, intellectual Relational
Surplus food donors	Food distribution enterprises (large-scale retailers, urban markets, food companies, corporate canteens, and others)	Trained employed staff Surplus food Equipment Operational cost burden for some stages of recovery	Intellectual, humane Physical Physical Financial
Beneficiary food aid organizations	Third sector nonprofit entities	Trained employed and volunteer staff Space and equipment Access to local beneficiary networks	Intellectual, humane Physical Relational
Financial and technical sponsors	Businesses, private foundations, social enterprises, nonprofit organizations and other entities	Equipment, transportation, vehicles, space, measuring instruments Project logo Funding	Physical Intellectual Financial

these donations, also non-profit entities, contribute trained staff, spaces, and equipment – resources needed for the final stages of redistribution to end users. Their access to and close ties with local beneficiary networks represent a valuable relational resource, enabling the Network to reach the final recipients of surplus food and other assistance services. Foundations and banking institutions, logistics operators, and other private entities act as sponsors by contributing funding, donating vehicles for food recovery and redistribution, and providing other physical equipment essential for the economic stability and sustainability of the activities. The project also benefited from a logo designed and donated by a company within the Assolombarda network.

The Table illustrates how each player contributes synergistic resources, creating a collaborative ecosystem that supports the entire process of surplus food recovery and redistribution.

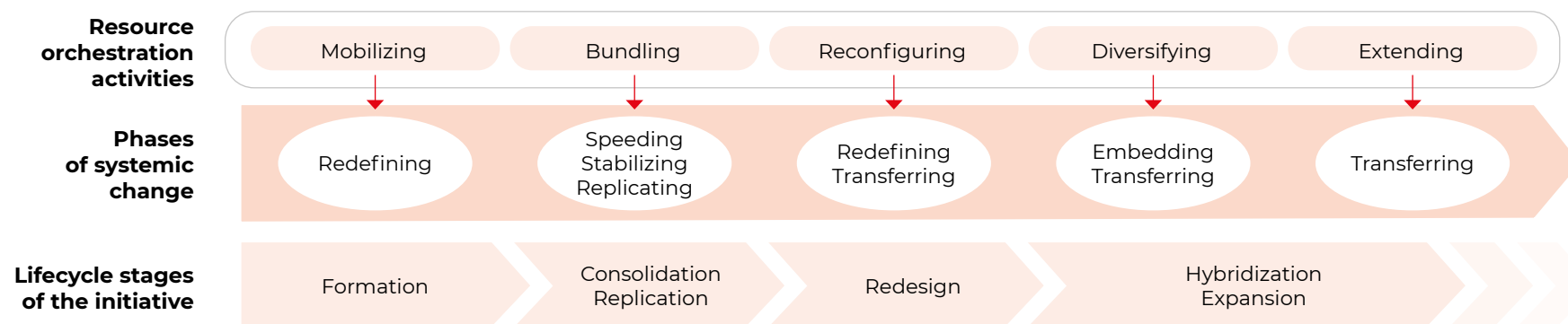
4.3 Project evolution: resource management and process stages

Figure 5 provides a detailed description of the evolutionary process of Food Aid Hubs based on the aggregation and strategic management of resources provided by the partners. This process aims to drive deeper systemic change in the urban food landscape, with the goal of effectively addressing food poverty and reducing food waste at the city level. It also highlights how each stage in the initiative's evolution is marked by strategic actions to manage and enhance resources, which are entwined with the system transformation phases driven by the Hubs. The process described encapsulates the Milanese experience and offers general guidance to launch and develop collaborative initiatives with similar goals in other urban contexts.

The first phase focuses on gathering and mobilizing the resources necessary to launch the project. This involves the identification and strategic acquisition of financial resources (such as funds from sponsors and donations), material resources (e.g., vehicles for food transport and unused public spaces), and human resources (including technical skills to manage surplus food, analyzing food poverty in the city, and studying the logistics network). An example is the launch of the first Hub, which was made possible by the involvement of Third Sector organizations that brought valuable operational expertise and strong connections with recipient organizations. Equally important was the reputational capital of the founding institutions – such as the municipality, the university, and the business association – which played a critical role in attracting new partners. This initial phase laid the groundwork to redefine roles and responsibilities, moving away from the traditional model where redistribution activities were delegated to individual private players, establishing a framework based on multiactor collaborative governance instead.

Subsequently, the project entered a phase of resource consolidation and integration, where the focus shifted to optimizing and coordinating activities. In this stage, operational efficiency became a key objective: it was crucial to ensure that recovered food was redistributed quickly, minimizing waste and improving the quality of food delivered to recipients. A symbolic example is the organization of an efficient and prompt logistics system, enabling food to be recovered and distributed within a few hours or within a very short time. This approach made it possible to include fresh and protein-rich items in the food mix – an essential factor in enhancing the nutritional quality of donations. The stabilization of the project impact involves the gradual structuring of management and

Figure 5. Stages of systemic change and resource orchestration activities (Bartezzaghi et al., 2025)



operational processes into established routines, ensuring increased effectiveness and efficiency, continuity of service, and securing long-term commitment from partners. Furthermore, the model's scalability was confirmed with the launch of a second Hub, which relied on the same types of resources, skills, and collaborative network established during the pilot phase, thereby expanding its reach to additional districts.

The emergence of new challenges – most notably the Covid-19 pandemic – made reconfiguration of available resources a necessity. The health crisis disrupted traditional operations and called for a rapid adaptation to meet the growing demand for food aid. In this situation, the City of Milan took on a central role by coordinating a temporary system of Hubs distributed across the city. This example illustrates how flexible governance and a well-established network of partners can respond quickly and effectively to external shocks, even of significant magnitude. Additionally, centralizing operations strengthened

the role of the public sector as the leading force behind the initiative. Lastly, the project further evolved into a phase of hybridization and expansion, marked by the diversification of activities and the integration of new services. The Hubs have no longer been limited to food redistribution but now offer psychological support services, foreign language lessons, and vocational training. A key development in this phase was acknowledging food aid as part of a broader system of welfare services aimed at helping marginalized members of the community overcome socio-economic hardship. Even activities closely connected with surplus recovery have diversified, as shown by the integration of social markets and surplus transformation processes within Hubs. The social market model is particularly interesting, as it replicates the grocery shopping experience for recipients, who can “purchase” products using a points-based card. Points are allocated based on socio-economic status and composition of the family unit.

In parallel, the geographic expansion of the project led to the opening of new Hubs in various parts of the city, engaging partners with complementary skills drawn by the growing success of the model. This process established the initiative as a key component of local public policy, demonstrating that public-private collaboration can systematically address complex challenges and position food aid within more comprehensive welfare support programs.

Figure 5 illustrates that the management and optimization of resources is a dynamic and evolving process. It demands strategic foresight to respond resiliently to changing environments and to amplify social impact. Each phase of the project delivers not only immediate advantages but also builds the foundation for more significant, long-term transformations. In doing so, it redefines the role of public policy and supports the creation of a more equitable, inclusive, and sustainable urban landscape.



5. The co-planning and co-design process

5.1 The importance of the network

The Food Aid Hub system finds the foundation of its effectiveness in the activation, maintenance, and enhancement of a robust stakeholder engagement process. Over the years, this process has involved a wide range of public and private stakeholders, including third-sector organizations, social enterprises, private sector players, large-scale retail chains, regional institutions, international partners, universities, and research centers.

In this context, the public sector plays a key role in fostering and coordinating collaborative innovation processes that bring together a wide array of stakeholders. The City of Milan, in particular, has taken on a dual role: not only coordinating these efforts but also acting as a facilitator and advocate of a participatory model. This model has effectively engaged third-sector organizations, scientific institutions, and other actors. When this role is strategically developed and implemented, it becomes a vital enabler for initiatives that aim to create both social and economic value, characterized by principles of sustainability and inclusion.

This collaborative framework has enabled the integration of various resources and expertise. The process unfolds across two complementary and interconnected phases: co-planning and co-design. Each phase is characterized by specific goals, tailored methodologies, and well-defined results.

5.2 Introduction to co-planning and co-design procedures

The legal foundation for co-planning and co-design procedures is established by Legislative Decree No. 117 of July 3, 2017, known as the Third Sector Code. Under Title VII, "Relations with Public Entities," Article 55 of the decree mandates that public sector bodies, in line with the principles of subsidiarity, cooperation, effectiveness, efficiency, cost-effectiveness, consistency, financial and asset responsibility, accountability, and administrative uniqueness, must ensure the active participation of Third Sector entities. This engagement must take place through co-planning, co-design, and accreditation initiatives, all conducted in accordance with the principles of transparency and sound performance outlined in Law No. 241 of August 7, 1990, as well as other relevant procedural regulations. Co-planning refers to the joint identification of needs, the necessary interventions, implementation methods, and available resources. Co-design, by contrast, focuses on the collaborative development and implementation of specific projects to meet the identified needs, building on the previously defined programming framework.

This collaborative approach represents a significant shift in the governance model of Milan's Food Policy. It moves away from a solely administrative management style toward a participatory model in which public institutions and social private actors work together to co-create solutions. Within this legal and strategic framework, the City of Milan's initiative to

strengthen the Food Aid Hub system stands as a concrete example of how the principles enshrined in the Third Sector Code can be translated into effective and inclusive action.

5.2.1 Co-planning stage

The starting point to launch the co-planning procedure – and the subsequent co-design phase – has been the adoption of a resolution by the City of Milan¹⁰. In this case, the resolution outlined the guidelines to use the financial resources awarded in 2021 under the “*Built Free Waste World*” category of the prestigious environmental award, “The Earthshot Prize,” launched by Prince William of Wales. This resolution has laid the groundwork to initiate the participatory process, identifying the target recipients and available resources, while delegating the implementation of the procedure to subsequent and separate executive acts.

The co-planning phase has been initiated through the publication of a public notice¹¹ to invite expressions of interest from Third Sector entities wishing to participate in co-planning activities. These activities have been aimed at the emergence of needs and potential, as well as to define innovative proposals to strengthen the citywide Food Aid Hub system. The

10) City Council Resolution No. 84 dated 28/01/2022, concerning the approval of the guidelines for accepting a contribution of £1,000,000, equivalent to €1,150,000.00 (calculated at the current exchange rate), from the Royal Foundation, following the selection of the City of Milan as the winner of the Earthshot Prize 2021. The aim is to implement new initiatives to strengthen and expand the network of Food Aid Hubs in Milan and promote the international dissemination of the model, in line with Milan's Food Policy.

11) Executive Determination of the Food Policy Area No. 1597 dated 01/03/2023, concerning the approval of the public notice for collecting expressions of interest from Third Sector entities interested in participating in the co-programming process (pursuant to Article 55 of the Third Sector Code). The objective is to identify needs and opportunities and to define innovative proposals for enhancing Milan's citywide Food Aid Hub system, in accordance with Milan's Food Policy.

co-programming process has focused on the following specific objectives:

- identify existing best practices across the five active Food Aid Hubs – Isola, Lambrate, Gallaratese, Centro, and Foody – and to assess any critical issues or areas for improvement;
- co-define shared strategies to scale up this model within the city, identifying new opportunities for collaboration and synergy across different levels (e.g., managing organizations and large-scale retailers) in order to develop new proposals and/or integrate existing networks working on food waste reduction and food aid;
- connect existing data collection tools and databases to promote shared processes of research and analysis;
- align the technical-operational approaches to manage surplus food, with the goal of evaluating the potential for centralized logistics and improving delivery methods to the recipient organizations.

The co-programming phase was launched with an in-person workshop held on March 30, 2023. All 36 Third Sector organizations that expressed interest were invited to participate. In addition, the City of Milan involved a range of strategic partners – such as universities, research institutes, private companies, and other public entities – who actively work on the topics at the core of this initiative. Their participation has been seen as essential for enriching the discussion with diverse insights and expertise, helping to frame priorities more effectively and identify additional opportunities and resources to meet community needs.

Twelve additional partner organizations have been selected, bringing the total number of workshop participants to 89, representatives from Third Sector entities and partners.

The workshop adopted a *participatory design*¹² approach, organizing participants into three parallel work groups, each focused on a specific theme:

- Group A: Enhancing existing Food Aid Hubs.
- Group B: Opening new Food Aid Hubs.
- Group C: Innovative propositions to incorporate in the Food Aid Hub system.

Participants were assigned to groups based on their specific expertise and stated interests, ensuring a balanced distribution of knowledge and resources. In line with other initiatives under the *Food Policy*, a community of practice approach was adopted. Each work group operated as a thematic community, united by shared challenges and the collective pursuit of practical solutions.

To support participation and facilitate the structured and consistent collection of inputs – enabling comparative analysis across groups – the sessions were guided by standardized project templates. These templates included predefined fields such as identified needs, proposed solutions, required resources, and assigned priority levels.

At the end of the group sessions moderators from the *Food Policy Area* of the City of Milan led a plenary feedback session, where group representatives presented their results. A visual *brainstorming* technique using sticky notes was employed to summarize and make the identified needs immediately visible (Figure 6). In total, 210 individual needs were reported and condensed into 78 sticky notes, thematically grouped and shared

¹² Participatory design (once known as cooperative design, cooperative design, or co-design) is a design approach that attempts to actively involve all stakeholders (employees, partners, customers, citizens, end users) in the design process with the aim of helping to ensure that the product meets their needs and is usable.

with all participants. The City of Milan then organized the key takeaways into 18 shared priority needs (cfr. Figure 6).

The final phase involved prioritizing the needs identified during the workshop using the *Analytic Hierarchy Process* (AHP, Vaidya and Kumar, 2006), a *decision analysis* technique commonly applied to support multi-criteria decision-making in complex projects. The AHP method was implemented through an online questionnaire, where Third Sector organizations and partners were invited to rank the priorities that had emerged during the work group sessions.

This method enabled the conversion of qualitative assessments from participants into a quantitative format, based on a hierarchical weighting process. Finally, the City of Milan compiled the outcomes of the workshop into a final report¹³.

5.2.2 Co-design stage

The co-planning phase has laid the groundwork to move forward with participatory planning through the next step of co-design. In this context, an Executive Decision¹⁴ resulted in the launch of a public notice in August 2023 to select Third Sector organizations interested in collaborating on initiatives to enhance the Food Aid Hub system. The report resulting from the co-programming activities, attached to the public notice as a core

¹³ cfr. <https://www.comune.milano.it/documents/20126/481928442/Report-Coprogrammazione.pdf/64d2319b-30ec-6f67-3f6e-ff3f08c9e85c?t=1712132338646>

¹⁴ Executive Determination of the Food Policy Area No. 6773 dated 04/08/2023 launched a call for expressions of interest to identify Third Sector organizations willing to co-design initiatives to strengthen the Food Aid Hub system and combat food waste. The initiative involves investing the resources from the Earthshot Prize, in alignment with the objectives of the Milan Food Policy;

Figure 6. Activities conducted in the co-programming workshop



reference document, has been used as a strategic tool to shape project proposals. These proposals aim to address the priorities identified and explore the practical implementation of the solutions proposed during the co-design process.

Reflecting the structure of the three thematic work groups formed during the co-programming phase, the notice called for project proposals aligned with three cross action areas (cfr. Figure 7):

- Action A: strengthening existing Food Aid Hubs.
- Action B: launching new Food Aid Hubs.
- Action C: integrating municipal markets into the Food Aid Hub network.

To promote synergy among potential applicants, the notice included an incentive in its evaluation criteria¹⁵ for proposals submitted by multiple Third Sector organizations acting in partnership and presenting multidimensional initiatives.

To ensure broad participation, the notice also established that all proposals scoring above a minimum threshold (set at 60 points) would be admitted to the co-design roundtables. These roundtables would bring together the selected proposals to jointly develop a unified project.

Reinforcing the role of co-design as a tool to build systemic actions, the notice also outlined the *governance* mechanisms for the network, which would remain in effect throughout the implementation phase of the initiatives. In particular:

- **Steering Committee:** a panel consisting of representatives from the Food Policy Area, the designated contacts for each project, and representatives of the organizations identified in City Council Resolution No. 609/2023 as signatories of the “Food Aid Hub” Memorandum of

¹⁵) Evaluation to be conducted by a technical evaluation committee appointed by specific and subsequent act.

Understanding (Assolombarda, Politecnico di Milano, and Fondazione Cariplo). Additional partners and stakeholders – such as municipal companies, international partners, research institutes, and other municipal departments – may also be invited to participate. The committee is scheduled to meet quarterly throughout the implementation period to ensure effective coordination;

- **Scientific Partner:** throughout the duration of the co-designed initiatives, and any potential extensions of the agreements, the City of Milan will collaborate with the Politecnico di Milano – School of Management. This partner will be responsible for data collection and analysis, activity monitoring, and support in the implementation and management of the initiatives.

Once the evaluation process was completed and the results published, the co-design roundtables convened in October 2023 over the course of three sessions – each dedicated to one of the three main action areas.

Throughout the meetings, participating organizations were encouraged to explore potential synergies and expand their partnerships, also involving entities that had met the minimum evaluation criteria and actively contributed to the co-design process.

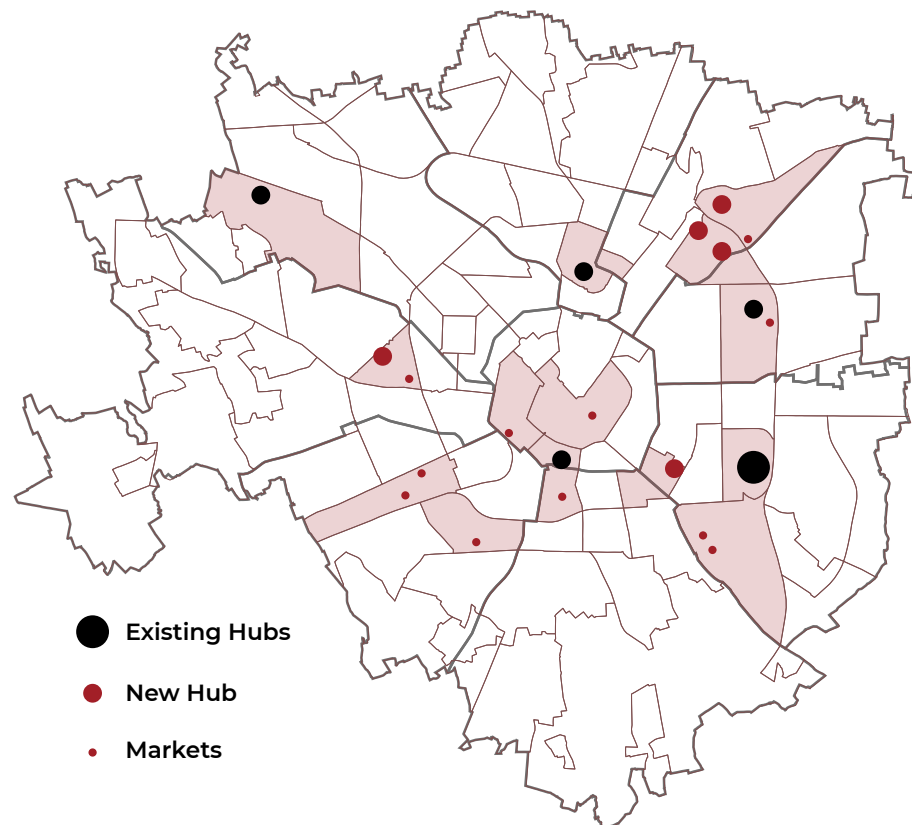
The mediation conducted within the roundtables led to the inclusion of additional organizations in the partnership network, reinforcing collaboration and formalizing shared project frameworks.

The process concluded with the development of a unified project¹⁶, structured into five sub-projects aligned with the three macro-areas addressed in the co-design sessions. Each sub-project has been assigned to a lead co-designing organization, either individually or as part of a group, with a total of 20 Third Sector entities involved. The unified project has been adopted

¹⁶ cfr. https://www.comune.milano.it/documents/20126/481928442/All-1-Progetto-Unitario-HUB-TEP_signed+%281%29.pdf/09b2b112-38e1-eab7-dd16-4a0f0934c328?t=1712132426982

through a formal agreement between the City of Milan and the managing organizations, set to run during the 2024 and 2025 calendar years.

Figure 7. Map of projects pertaining to the three horizontal actions



5.2.3 Permanent co-design

During the first year of the co-design process, the Steering Committee met on a quarterly basis, serving as a central body for both project governance and progress monitoring. It also acted as a platform

to test innovative approaches and pursue system-level objectives. Key outcomes included the adoption of a unified IT management platform for the coordination of the Food Aid Hubs, and the launch of pilot initiatives that strengthened ties with other strategic pillars of the *Food Policy* and the municipal bodies, including European collaborations and international partnerships. Specifically:

- After identifying the digital transformation of the donation supply chain as a shared priority among Third Sector organizations and the public sector, the co-design process initiated efforts to find a concrete solution to address this need and enhance the network. The Politecnico di Milano, acting as the scientific coordinator of the co-design initiative and a signatory of the Memorandum of Understanding with the City, played a pivotal role. Its involvement supported a structured analysis of the barriers and enablers to adopting new monitoring and evaluation systems, ensuring a rigorous and evidence-based methodology.
- Building on the theme of digital infrastructure and traceability, the co-design work also explored the feasibility of adopting an innovative financing tool (sustainability-linked bond). This instrument is designed to fund and secure the long-term viability of surplus food recovery and redistribution through a financial model tied to achieving specific performance indicators (KPIs) across social, environmental, economic, and

governance dimensions, with rewarding mechanisms linked to results.

- The co-design process further served as a launchpad for a pilot initiative under the European project Cultivate¹⁷. This pilot involves collecting edible food surpluses from school canteens using cargo bikes and fast, eco-friendly logistics solutions. It also integrates a comprehensive awareness program targeting school communities in Milan Municipalities 4 and 5, with the goal of promoting informed and sustainable behaviors.
- Snam Foundation also joined the co-programming and co-design efforts as a corporate foundation committed to building partnerships that generate social impact and enable systemic transformation. Through its engagement, Snam Foundation has contributed financial resources, volunteer participation, and the skills of Snam and foundation staff to help define priority actions and respond to identified needs.

The experience of the Food Aid Hubs illustrates the effectiveness of co-design as a means to address complex social issues, providing a model that other urban areas may adapt and replicate.

¹⁷ The project CULTIVATE – Co-designing food sharing innovation for resilience, active until 31/12/2026, the project aims to recalibrate the way Europeans value food, placing resilience and sustainability at the core. It seeks to create an enabling food environment that supports citizens in adopting healthy and sustainable practices – from production to final consumption and disposal. The City of Milan, together with Barcelona (ES) and Utrecht (NL), is one of the Hub cities where research is conducted and solutions are tested.



6. The logistics model

The logistics model of the Food Aid Hub network represents a central element of the project, as it enables the efficient recovery and redistribution of food surpluses while ensuring access to services for final recipients. The design of the ideal logistics model is shaped by the characteristics of both source and destination points, the type of products handled, and the level of service expected by end users. This model must strike a balance between service efficiency and cost optimization in managing Hubs.

Table 3 outlines the variables used to detail these characteristics and analyze the surplus food recovery and redistribution system. From this perspective, to better understand the impact of the “distribution challenge” on recovery and redistribution practices, the current setup in Milan is presented, along with considerations on conditions for effective operation and areas for improvement. These insights are intended to provide practical guidance for future developments and to support the potential replication of the model in other urban contexts.

6.1 The recovery and redistribution system

6.1.1 Products

The products managed by the Hubs fall into two main categories: fresh (e.g. fruit and vegetables, meat, fish, cheese, baked goods) and dry (e.g. pasta, canned goods). Donations of surplus food are highly variable in

Table 3. **Distribution problem analysis framework**

	DESCRIPTION
Products	
Product range	Type of products available
Transport requirements	Transport requirements (e.g., controlled temperature)
Perishability (average shelf life)	Perishability of available product
Density	Product density [kg/m ³]
Value density	Product value [€/m ³]
Points of origin (PoO)	
Number	Number of points of origin
Location	Location of points of origin
Capacity	Storage capacity of point of origin
Focus	Level of PO focus (type of products handled)
Points of destination (PoD)	
Number	Number of destination points
Location	Location of destination points
Capacity	Average order size issued by the PoD [meals/order]
Focus	Level of PoD focus (type of products handled)
Level of service	
Order Cycle Time	PoD needs in terms of the time between when the destination point need emerges and when the product is delivered
DTTE (Desired Time to Expire)	PoD needs in terms of the time until the product expires (at the time of receipt)
Mix (Desired Product Mix)	PoD needs in terms of the variety of product ranges

terms of both volume and type, especially for fresh products. This variability is influenced by external factors such as seasonality and weather conditions. Fresh products account for the main share of surpluses managed by Hubs and require storage and transport under controlled temperature. The main issue is high perishability, with an average shelf life of about 1–2 days from the time of donation. Dry products, on the other hand, do not require special storage or transport conditions. However, since they are typically donated close to their expiration date, they have an average shelf life of around 7 days.

6.1.2 Points of origin

The points of origin (PoO) fall into two main categories: wholesalers from the SOGEMI fruit and vegetable wholesale market and retail outlets from Large-scale retail trade. In addition, there are marginal donations from private individuals or small businesses located near the Food Aid Hubs¹⁸. Wholesalers at the Produce market provide surplus fruit and vegetable donations. Although these operators are independent, their shared location within the fruit and vegetable wholesale market makes them, from a logistical standpoint, a single supply source.

More than 30 retail stores involved in the project across different areas of the city mainly supply fresh products and, to a lesser extent, dry goods. Since the volume of dry products donated by retailers to the Food Aid Hubs is not always enough to ensure a complete product range on the shelf, it is sometimes necessary to supplement it through targeted pur-

chases at discounted prices – the result of agreements in place with retail chains – or through alternative sources such as food stocks provided by the Fund for European Aid to the Most Deprived (FEAD).

Both types of origin points (Produce wholesalers and large retailers) supply Hubs equipped with Social Markets as well as other Hubs relied upon by local food aid associations.

6.1.3 Destination points

The points of destination (PoD) are divided into two types: *Social Markets*, operated by Third Sector organizations and serving end users directly, and *front-line* non-profit associations, which depend on the Food Aid Hub network to access surplus food, later distributed as food parcels or prepared meals.

The two active Social Markets operate similarly to conventional supermarkets. Recipients can choose from a variety of fresh and dry goods displayed on shelves and check out using a points-based card instead of cash. The number of points available is determined by specific criteria, such as household size, age of children, and income level. The second type of destination points include over 90 non-profit associations. These organizations typically manage their own logistics, collecting surplus goods from the Hubs and delivering them directly to those in need. However, they generally have limited storage space and are not equipped for sorting or additional handling. To streamline operations, Hubs provide them with pre-packed boxes that are ready for distribution. *Social Markets* are few in number and strategically located, whereas the associations are spread more broadly across the area. Logistically, it's important to highlight that each association collects around 3 tons of surplus food per year, typically on a weekly or bi-weekly schedule. In contrast, *Social*

¹⁸ The surplus generated by company canteens, i.e., cooked and unserved food, are redistributed directly from the canteens to local associations without transiting through the Food Aid Hubs, to ensure it is consumed very rapidly. Therefore, this food flow is handled separately and is not covered in this chapter.

Markets handle an average of 30 tons and are restocked with varying frequency, from daily to three times a week.

6.1.4 Service levels

The final aspect that defines the logistics system of the Food Aid Hubs is the expected level of service. A distinctive feature of this system is the absence of formal “orders” from end recipients. To reflect this characteristic and to evaluate service performance in a way that is relevant to the context, a set of tailored indicators has been developed:

- **The Order Cycle Time (OCT)** refers to the time elapsed between when a food requirement arises at the destination point and when the products are actually delivered to the association or Social Market. OCT tends to be medium – long for Social Markets, as their storage capacity allows greater flexibility – unlike associations, which typically operate without warehousing.
- **Delivery Time to End-user (DTTE)** measures the number of days between when the destination point receives a product and when it is delivered to the end user (and/or expiration date). Social Markets require a medium-to-long shelf life (medium being 2–7 days, long being more than 7 days), given their need to display items on shelves for a minimum period. Associations, on the other hand, are assigned a short-to-medium DTTE (short being 1 day), as they distribute goods directly to recipients and are less concerned with shelf life.
- **The desired product mix** defines the level of variety expected in the assortment received by the destination point. Social Markets require a broader product range to ensure a consistent, minimum assortment on display. For associations, product variety has less impact on perceived service levels, as any imbalance is generally quite marginal within food parcels and less noticeable to end recipients.

6.1.5 Identified distribution problems

By analyzing the four elements of the logistics system (points of origin, points of destination, products, and service level), six “distribution issues” have been identified. The main distinction lies in the point of destination – numerous and dispersed in the case of associations, and few and well-defined in the case of *Social Markets* – and in the characteristics of the products.

Table 4. Summary of identified distribution problems

SOCIAL MARKET	ASSOCIATIONS
Fresh	
Origin: Supermarkets	Origin: Supermarkets
Shelf life remaining: 1-2 days	Shelf life remaining: 1-2 days
Order size: large	Order size: small
OCT: medium	OCT: medium
DTTE: medium/short	DTTE: medium/short
Desired product mix: high	Desired product mix: low
Produce	
Origin: Ortomercato wholesalers	Origin: Ortomercato wholesalers
Shelf life remaining: 1-2 days	Shelf life remaining: 1-2 days
Order size: large	Order size: small
OCT: medium	OCT: short
DTTE: medium/short	DTTE: short
Desired product mix: high	Desired product mix: low
Dry	
Origin: Supermarkets	Origin: Supermarkets
Shelf life remaining: 7 days	Shelf life remaining: 7 days
Order size: large	Order size: large
OCT: long	OCT: long
DTTE: long	DTTE: long
Desired product mix: high	Desired product mix: high

6.2 Current network

To address distribution requirements, three types of networks are considered:

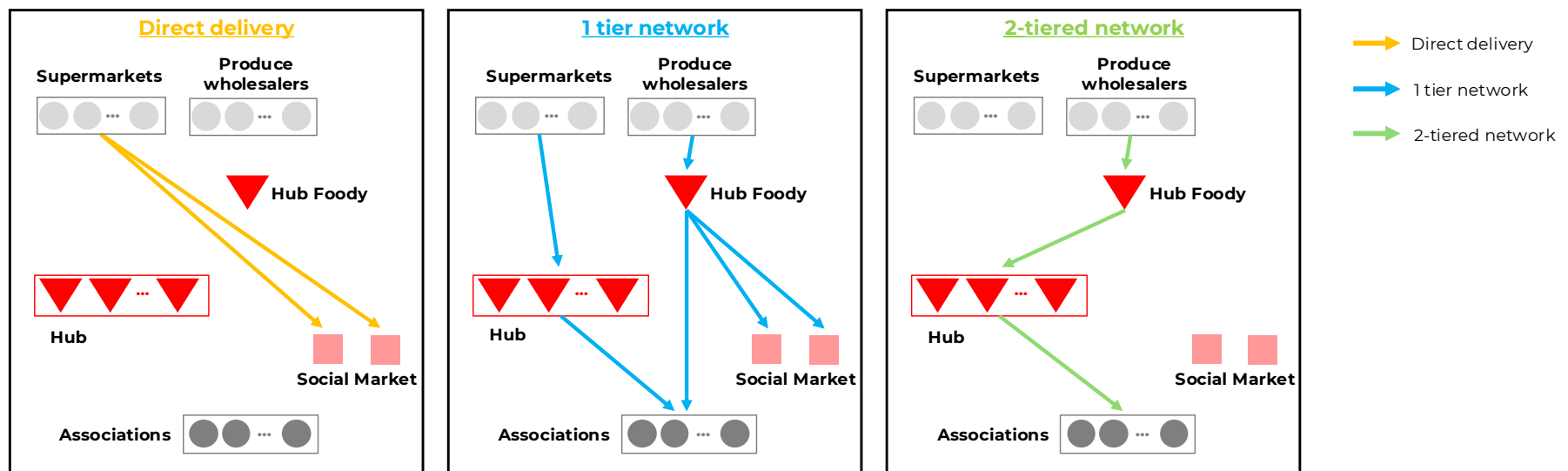
- 1. Direct delivery:** Products are donated by supermarkets and transported directly to the Social Market, where activities such as inspection, sorting, and shelving take place. This method ensures high transport efficiency when large volumes are involved.
- 2. Single-tier network:** Fresh produce from SOGEMI fruit and vegetable wholesale market is routed through Foody Hubs (first tier) before being delivered to Social Markets or front-line associations. Similarly, products from large-size retailers arrive at Food Aid Hubs (first tier)

and are then delivered to local associations. The first-tier hub helps reduce transport costs between origin and destination points, increases the variety of available products, and shortens delivery time compared to direct delivery in cases involving multiple connections.

- 3. Two-tiered network:** Fresh produce SOGEMI fruit and vegetable wholesale market goes through Foody Hubs (first tier) and then through Food Aid Hubs (second tier) before reaching the final recipients. In this case, the second-tier hub brings distribution closer to the end users and reduces delivery costs.

Figure 8 summarizes the three distribution networks described above.

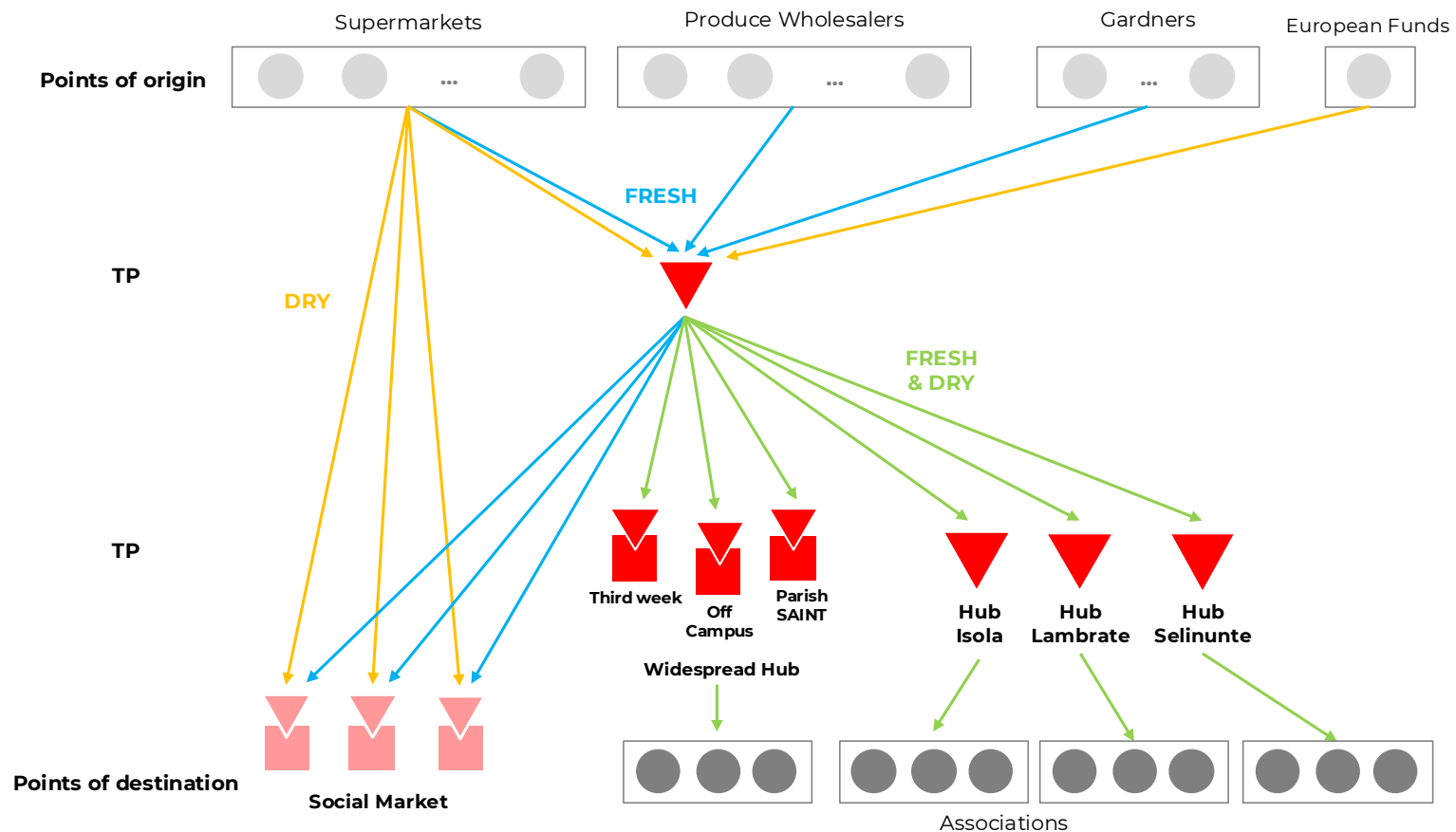
Figure 8. The Distribution Network of the Food Aid Hub System



It is important to highlight that transportation activities are currently managed independently by each Hub operator. This ensures flexibility (depending on available resources and urgency) in managing the collection and delivery of surplus food, but it also requires time and additional resources that could be used in other ways. Furthermore, it is worth noting that

the current network configuration is strongly shaped by a dense web of long-standing, neighborhood-level relationships connecting individual Hub managers with local associations and various points of origin. This network guarantees continuity in the supply and redistribution of surplus food, while also representing a key element of social capital within the project.

Figure 9. Distribution Network Scenario with Centralized Hub



However, when taking a “critical” view of the Food Aid Hub ecosystem focused on process optimization, several areas for improvement in the current logistics model should be noted, including:

- Fragmented transport from points of origin to Hubs: Origin points deliver directly to the Hubs, generating a high number of individual connections. Due to the perishable nature of the products, the high delivery frequency and limited volumes lead to low vehicle load rates and transportation inefficiencies.
- Fragmented transport between Hubs and associations: Associations independently travel to the Food Aid Hubs to collect food surpluses. The large number of associations served by the Hub system results in many individual connections, causing transport inefficiencies.
- Product mix: surplus varies in type and quantity. To compensate for the scarcity of fresh produce, Hubs currently conduct a limited and non-systematic redistribution of surpluses.

The current network configuration is the result of a deliberate choice to leverage neighborhood-level geographic proximity and historical relationships between local actors. The aim is to integrate rather than completely overhaul existing practices and logistics processes managed by each partner. This model offers a certain degree of flexibility, but at the cost of reduced efficiency, as previously noted.

Based on the identified distribution needs and challenges, alternative network configurations may be explored – for instance, introducing an intermediate warehouse between points of origin and the Hubs to consolidate incoming logistics flows. This solution, illustrated in Figure 9, could reduce transportation costs and provide a more complete assortment of food to redistribute across the various Hubs. However, designing and implementing such a solution would require a revision of logistics processes

and existing agreements between donors and non-profit organizations, which may prove difficult to pursue.

Therefore, when configuring the Food Aid Hub network, it is essential to consider multiple decision-making variables, starting from the specific characteristics of the urban environment in which the system will operate.

6.3 Operating directives

Based on the evidence gathered from the Milan case, it is possible to provide some practical recommendations to configure the logistics network that could potentially be applied also to other urban contexts.

This chapter focuses on:

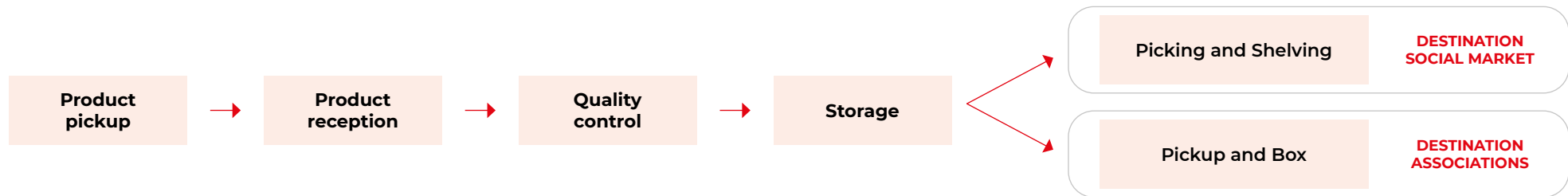
- Operational management of the network, which describes the logistics processes
- Management of the network’s information flow, which describes the information exchange.

6.3.1 Network operations management

Today, although each Food Aid Hub manages the logistics process independently from the others, the operative activities conducted are largely the same across all of them and can be outlined as shown in Figure 8.

The logistics process begins with the collection of goods from wholesale suppliers at the produce market and from retail stores. To maximize operational efficiency, collections can be organized within a specific

Figure 10. The logistics process that characterizes Food Aid Hubs



morning time slot, for example, between 8:00 and 10:00 – by scheduling coordinated pick-ups with surplus donors. This approach helps streamline transport routes by consolidating collections based on points of origin, thereby minimizing redundant trips by individual Hub operators. The next phase involves receiving products. Each Hub should be equipped with a designated intake area to facilitate this step, followed by a sorting and quality control process. Due to the perishable nature of fresh goods, it's critical to inspect donations promptly to determine which items are suitable for distribution and which should be discarded.

Beyond intake and sorting, Hubs must also maintain a dedicated storage area for items not distributed immediately. This space should have appropriate infrastructure such as shelves for dry goods and refrigeration units to ensure proper cold chain management for fresh products. Outbound logistics vary depending on whether the Hub operates as a *Social Market* or as a distribution center for local associations.

In *Social Market* configurations, products are transferred from storage to the retail area, where they are placed on shelves according to current

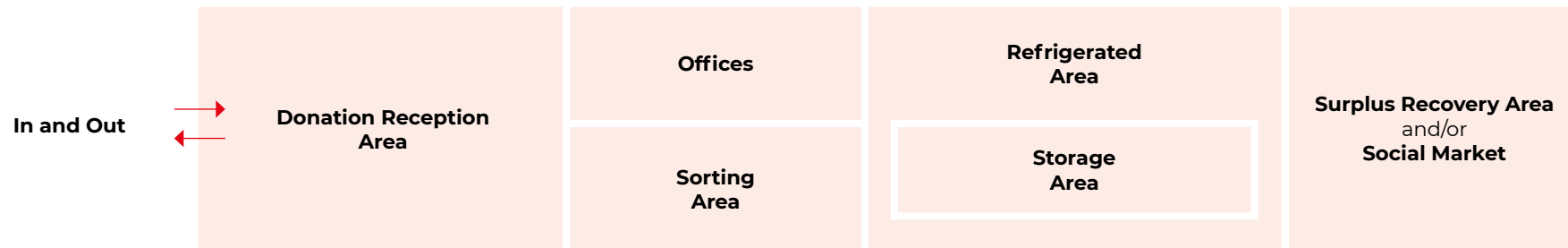
demand and available stock levels.

For Hubs acting as supply centers for local associations, outbound logistics typically follow a two-step process: dry goods are first selected and packed into boxes, followed by the addition of fresh products just prior to distribution to limit their exposure to non-refrigerated conditions. These Hubs require a specific area to manage pre-packed boxes and facilitate outbound distribution. This area effectively replaces the retail space found in *Social Market* models and tends to be more compact in scale. Figure 11 presents a potential layout of these functional areas within Hubs.

Lastly, the adoption of standardized *packaging* for association-bound boxes is strongly recommended. This would enable centralized procurement and management of packaging materials, improving efficiency by lowering both total and per-Hub costs. Additionally, it would reduce waste by reallocating excess packaging to Hubs with greater need.

In the current network operating in Milan, product transportation to the associations is handled by the associations themselves, which trav-

Figure 11. Food Aid Hub functional areas hypothesis



el to Hubs for collection. An alternative approach – subject to evaluation based on the specific characteristics of the implementation context – could be to implement a shared transport service. This would enable to optimize delivery routes and consequently lower transportation costs.

6.3.2 Network information flow management

To effectively organize the operations of Food Aid Hubs, it is essential to properly manage the flow of information regarding available surpluses and the specific needs of each Hub. This enables not only to learn more about the recipients (families reached through associations and/or the *Social Market*) but also facilitates communication between points of origin and Hubs regarding the quantities and types of available products. Sharing this information facilitates the alignment between demand, that is, the recipients – and supply – that is, the food surpluses managed by the Hubs.

Currently, visibility over redistributed surpluses is often limited to individual Hub managers and remains partial. For example, Hub Foody collects

fresh produce from the SOGEMI fruit and vegetable wholesale market and subsequently communicates data on redistributed surpluses. Information exchanges between retailers and Food Aid Hubs depend on existing agreements between them that do not include other Hub operators. Therefore, it is crucial that managers work proactively to establish agreements with the various retail brands, defining the procedures for deliveries and communication regarding available surpluses (product quantities and types).

Through the facilitation of the Politecnico di Milano, data on collected and redistributed surpluses is gathered monthly from individual Hub managers and donors, analyzed in aggregate form, and then shared across the network. This process of measurement and monitoring enhances information exchange across the network and improves visibility into the surplus flows managed by different Hubs (see Chapter 7 for further details). In an effort to improve logistics processes, expand the network, and reduce waste, the Hubs are working toward adopting a shared and accessible information system. As mentioned in Chapter 5 and explored further in Chapter 7, developing an IT infrastructure is essential to map incoming

and outgoing flows throughout the week and accurately track product expiration dates to enable better inventory management.

Within this framework, it is important to ensure comprehensive tracking, including even non-donatable surplus that must be discarded. This ensures consistent stock management within Hubs. With such visibility, Hub managers would be able to prepare aid packages for association beneficiaries based on detailed household profile information and available surpluses, thereby creating balanced and diversified boxes. They would then communicate the number of prepared boxes to the relevant associations to arrange collection.

Social Markets, by contrast, manage surpluses differently. The store manager regularly identifies which shelf products need restocking, and these items are replenished based on availability. It is important to note that fresh products naturally have a much shorter shelf life than dry goods.

To ensure a steady supply, the Food Aid Hub must constantly monitor inventory levels and maintain active communication with all partner associations, updating them on the availability of aid packages prepared for individual families and notifying them when these are ready for pickup.



7. The system for measuring and monitoring performance and evaluating project impact

Tracking how the network evolves helps define actions that strengthen operations and correct inefficiencies. Universities involved in the project coordinate a consistent data collection process that gathers input from all partners using multiple sources. This approach focuses on monitoring the volumes of food recovered and distributed across the network and, more broadly, on assessing the project's sustainability outcomes using targeted tools, methodologies, and impact metrics. This data foundation supports decisions that shape how the network operates and grows. It helps manage day-to-day operations and assess the project's economic, social, and environmental impact while also making the model easier to scale or replicate.

For example, to review and renew agreements that place the management of Food Aid Hubs in the hands of nonprofit organizations, the City of Milan relies on technical reports showing the results achieved by each Hub involved. Performance tracking also plays a central role in reporting outcomes to supporters – whether they donate food or provide technical or financial backing. These insights help attract new stakeholders and secure additional resources across the Network.

Businesses can include the outcomes of the Hubs they support in their sustainability reports. Data also powers outreach efforts: organizers use it

in public awareness campaigns, events, publications, university lectures, and other communication formats to address food insecurity and reduce waste in urban environments.

On the administrative side, data monitoring supports tax reporting related to donations made by companies and received by associations. It also contributes to expand urban food policy communications, including policy briefs published on the City of Milan website.

The next sections describe the methodology used to measure surplus food flows and offer examples of key social impact indicators.

7.1 Measuring and monitoring surplus food

Measurement systems for food surplus help pinpoint where waste occurs along the agri-food chain. They increase accountability among stakeholders, streamline operations, and support strategic decisions grounded in real data (Corrado et al., 2019; FAO, 2019; WRAP, 2021).

Measuring and tracking surplus involves complexity. Data collection and processing methods often vary depending on how donor companies and nonprofit organizations operate and structure their surplus recovery ac-

tivities. Experience from the Food Aid Hub network in Milan highlights the value of a shared monitoring system. This approach enables Hubs to work more closely together through standardized incoming and outgoing documentation and greater visibility on flows and surplus volumes and availability across the network.

As mentioned earlier, digital technologies can play a major role here. Platforms that register surplus food flows in real time, including volume, product category, recovery and redistribution time, and coverage area help build detailed operation maps. These tools improve system supervision, reveal inefficiencies, and enable continuous impact assessment. In Milan, Politecnico di Milano – School of Management is in charge of coordinating performance monitoring and impact evaluation efforts, working alongside Università degli Studi di Milano and Università Cattolica del Sacro Cuore.

7.1.1 The methodology and process of measuring surplus food

In alignment with standardized monitoring practices, surplus data is systematically recorded at two key levels: individual large-scale retail brands and associated collection hubs. This dual-level reporting structure enables a consistent comparison between the surplus volumes donated by individual retail locations and the intake volumes reported by the corresponding hubs. The analysis also includes surplus flows recovered from the SOGEMI fruit and vegetable wholesale market and local *urban markets*.

In addition to volume tracking, the system gathers detailed network information. Each hub reports on the specific points used to recover surplus food and on the nonprofit organizations involved in the redistribution process. Operational models adopted by Hub managers

covering logistics, coordination, and resource allocation are also documented.

Data collection takes place on a monthly basis through direct contact with the store managers of the large-scale retail chains, with whom Non-Disclosure Agreements are signed to ensure the confidential and anonymous treatment of data, and with the contact persons of the Third Sector associations that manage individual Hubs. In accordance with the defined measurement protocol, large-scale retailers are asked to share data regarding the quantity and economic value of donated and disposed food products, as well as monthly turnover. The information is requested in disaggregated form by month and for the following product categories:

- Dry goods
- Bread
- Bakery
- Fruit and vegetables
- Meat
- Fish
- Deli and cured meats
- Dairy products
- Prepared foods (in-store)
- Frozen food

Hence, this method makes it possible to assess not only the quantity but also the variety and variability of food redistributed to recipients. Against common guidelines for data collection and sharing at the network level, in order not to make the process challenging for donors, the required information is extracted consistently with the setup of their internal data storage infrastructure. As a result, the collected data re-

quires a preliminary clean-up and filtering phase before it is aggregated, reprocessed, and interpreted by the Politecnico di Milano research team. For example, it may be necessary to disaggregate the data by point of sale or month, filter the information based on the recipient association of the donated products to trace the donation back to a specific Hub, or associate each donated product with the corresponding product category.

Third Sector entities responsible for managing the Hubs must submit data on the volume of food flows handled and the structure of the donor and recipient networks. Specifically, food flow data should detail the quantities of surplus food recovered, disaggregated by month and by product category. With respect to the network, the required information includes the names of the retail brands donating products, the specific store locations from which each Hub collects surplus food, the organization in charge of logistics and surplus collection, the number of non-profit associations receiving the redistributed food, and the number of final

recipients, including, where available, the number of family units and minors. Further details must be provided regarding any additional sources of food products that cannot be systematically monitored due to irregular donation patterns or limited volumes. Once compiled, the data can be uploaded to the designated collection system that stores the extracted datasets. For the Hubs located in Milan, this system currently consists of an Excel file. The structure and organization of this file are briefly outlined below.

The first sheet offers an overview of the major retail brands and the Hubs. For each retail brand, the following information is registered:

- The Hub served
- General information (store addresses and size in square meters, reference contact)
- The type of data provided and the method of data sharing and aggregation (if aggregated by category or not, and if referring to individual store locations or the entire retail brand)

Table 5. **Points of sale that donate to Hub Lambrate**

BRAND	POINT OF SALE	ADDRESS	SQUARE METERS	CONTACT PERSON	DONATION DATA	DISPOSAL DATA	MASS UNIT OF MEASURE	VALUE UNIT OF MEASURE	AGGREGATION LEVEL
Hub served: Hub Lambrate									
Brand 1	Pos 1	Address 1	6,000	Contact Brand 1	Yes	No	kg	No	Point of sale category
	Pos 2	Address 2	4,400		Yes	Yes	kg	€	
Brand 2	Pos 1	Address 3	1,600	Contact Brand 2	Yes	Yes	kg	€	Products
Brand 3	Pos 1	Address 4	1,000	Contact Brand 3	Yes	Yes	kg	€	Brand category
	Pos 2	Address 5	1,450						
	Pos 3	Address 6	1,450						

As an example, Table 5 provides an overview of the large-scale retail brands that donate surplus food to the Lambrate Hub.

Regarding individual Food Aid Hubs, information pertaining to:

- General information (town hall, neighborhood, and address).
- Managing entity and contact person.
- Other sources of food goods not monitored by the Politecnico di Milano.
- The number of recipients reached (total, the number of minors, and the number of households).
- The management model.
- The entity in charge of logistics and transportation of food goods.

Also in this case, the example of the overview for the Lambrate Hub is provided below Table 6.

The following sheets contain data for each of the seven active Hubs: Lambrate, Isola, Gallaratese, Centro, Cuccagna, Loreto, and Selinunte. The only exception is the Foody Zero Waste Hub, whose data – due to specific features of its management – are collected and stored differently, for reasons described in further detail later. Each Hub corresponds to an Excel sheet, which includes five tables:

- Table of the quantity of food items donated by companies to the Hub, split by store.
- Table of the quantity of food items received by the Hubs.
- Table of the quantity of food items discarded by companies, split by store.
- Table of the economic value of food items donated by companies to the Hub, split by store.
- Table of the economic value of food items discarded by companies, split by store.

Table 6. Information on Hub Lambrate (2024)

Hub served: Hub Lambrate	
MUNICIPALITY	III
DISTRICT	Lambrate
ADDRESS	Via Edoardo Bassini 26, Milano, MI
MANAGING ENTITY	Banco Alimentare della Lombardia
OTHER SOURCES	1 delivery service + 6 PoS (Points of Sale) from a large-scale retail brand (2 on-call)
RECIPIENTS REACHED	2,200 recipients reached, including 979 households; 380 individuals aged 0–15; 1,820 individuals aged 16–65+
MANAGEMENT MODEL	Recovery and redistribution of surplus food to Third Sector associations in partnership with the managing entity
LOGISTICS	The managing entity handles logistics (with a refrigerated van for the collection and transport of surplus food)
CHARITY ASSOCIATIONS SERVED	9

Table 7. Amount of surplus food donated (kg) by supermarkets to the Hub Gallaratese

PRODUCT TYPE	BRAND 1		BRAND 2		BRAND 3	BRAND 4	TOTAL
	POS 1	POS 2	POS 1	POS 2	POS 1	POS 1	
April 2024							
Dry goods	162.2	23	125	-	43.2	-	353.4
Bread	-	-	1	-	19.5	538	558.5
Bakery	-	-	-	-	2.4	-	2.4
Fruit and vegetables	-	59.9	1	2060	-	1313	3434
Meat	121.4	33	-	-	-	-	154.3
Fish	-	-	-	-	-	-	-
Deli and cured meats	0.43	6.5	-	-	0.30	-	7.21
Dairy products	288.7	81.6	-	-	7.70	-	378
Prepared foods (in-store)	-	-	-	-	0.96	-	0.9
Frozen food	-	-	-	-	-	-	-
Total	572.7	203.9	127	2060	74.1	1851	4889

Table 8. Amount of food goods received (kg) by the Hub Gallaratese

PRODUCT TYPE	AMOUNTS RECEIVED
April 2024	
Dry goods	515.6
Bread	554.6
Bakery	-
Fruit and vegetables	2986.1
Meat	383.9
Fish	-
Deli and cured meats	128
Dairy products	213.3
Prepared foods (in-store)	-
Frozen food	-
Total	4781.4

The tables show disaggregated data by product category, by month, and by year. As a result, each of these sheets provides a historical record of the data collected for each Food Aid Hub, making it easy to extract information for further data analysis.

As an example, two summary tables are provided here from the Gallaratese Hub data collection sheet for April 2024: one showing the volume of food products donated by the monitored retail chains, and the other showing the flow of surplus actually recovered by the Hub.

The Foody Zero Waste Hub plays a key role in recovering surplus food from the SOGEMI fruit and vegetable wholesale market and indoor markets. The available data focuses on the quantities of fruit and vegetable products collected by the Hub. Each year, the Hub operator also shares figures with the various nonprofit organizations involved in recovery activities at these locations. However, this data is only available on an annual basis and is not disaggregated by month. As a result, each Third Sector entity is represented by a single annual value, which is stored in

the “aggregated data” sheet, discussed in the following sections. The final Excel sheet of the database contains consolidated data taken from the individual sheets of each Food Aid Hub. This information is used to generate summary tables, including annual quantities donated and collected per Hub, and detailed insights by product category. These datasets support cross-Hub comparisons, enable the creation of visual dashboards, and provide input for calculating *Key Performance Indicators* (KPIs) used to assess the overall performance of the food redistribution system. It is important to acknowledge that discrepancies may arise between the figures reported by supermarket chains and those provided by Hub managers. Not all donation sources can be easily traced. For instance, some supermarket brands have opted not to disclose sensitive data, even in case of a *Non-Disclosure Agreement* (NDA) signed with the university to ensure confidentiality and anonymity. Others have chosen to end their collaboration due to an inability to guarantee consistent food supply. In some cases, deliveries are made by third-party logistics services with small, poorly documented volumes, making tracking difficult. Additionally, certain Hubs receive donations from the Foody Zero Waste Hub within the SOGEMI fruit and vegetable wholesale market, which reports total volumes without specifying which recipient organizations were involved. This information is later clarified and recorded by the receiving Hub managers, who ensure it is integrated into the data collection tables.

7.1.2 The assessment of the impact of food recovery and redistribution activities

Data collection for each Food Aid Hub enables to create historical records and compare donated quantities over different timeframes, both annually and monthly. From these food donation volumes, it is also possible to estimate the number of equivalent meals distributed to final recipients. According to the Italian *Reference Intake Levels for Nutrients* (LARN)¹⁹, one meal corresponds to a mix of 500 grams of food. As such, the number of meals can be directly computed from the quantity of food recovered by the Hubs.

By way of example, Tables 9 and 10 present data on surplus food recovered and redistributed by the Hubs, along with the corresponding number of equivalent meals for the years 2023 and 2024. The Hubs covered in 2023 include Lambrate, Isola, Gallaratese, and Centro. In 2024, the network expanded to include Selinunte, Cuccagna, and Loreto, which became operational in the course of the year.

Table 9. Results achieved by Food Aid Hubs in 2023

FOOD AID HUB	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS
Hub Lambrate	80,090	160,180
Hub Isola	53,124	106,248
Hub Gallaratese	19,478	38,956
Hub Centro	20,251	40,502
Total	172,943	345,886

¹⁹) cfr. <http://sinu.it/tabelle-larn-2014/>

Table 10. Results achieved by Food Aid Hubs in 2024

FOOD AID HUB	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS
Hub Lambrate	63,248	126,496
Hub Isola	64,904	129,808
Hub Gallaratese	57,728 (10,598 of which from Foody)	115,456
Hub Centro	42,645	85,289
Hub Selinunte	7,617	15,234
Hub Loreto	9,266 (1,200 of which from Foody)	18,531
Hub Cuccagna	5,275 (3,600 of which from Foody)	10,550
Total	250,683 (15,398 of which from Foody)	501,366 overall

In 2023, the Food Aid Hubs collectively recovered and redistributed approximately 173 tons of surplus food. The established Hubs of Lambrate and Isola reported the largest volumes, each handling over 130 tons. The newer Hubs, Gallaratese and Centro, still in the ramp-up phase, managed smaller quantities, averaging around 20 tons each. In addition, 352 tons of produce were recovered by the Foody Zero Waste Hub and redistributed through the wider Hub network.

In 2024, differences among the Hubs narrowed due to the full implementation of food recovery and redistribution processes, with Lambrate and Isola showing similar recovery rates, as between Gallaratese and Centro. That same year, data from the newly launched Hubs – Selinunte, Cuccagna, and Loreto – were also included. However, these Hubs only

provided partial data, limited to the months they were in operation. Specifically, Selinunte began reporting in June, Cuccagna in July, and Loreto in September. Variations in recovered volumes across Hubs continued to reflect area-specific factors, such as the number and size of local supermarkets and the agreements in place with retail chains.

Starting in 2024, Hub managers also began reporting surpluses received directly from the Foody Zero Waste Hub, primarily consisting of fruit and vegetable surpluses collected from the SOGEMI fruit and vegetable wholesale market. Up to 2023, monitoring of flows from the Foody Zero Waste Hub and indoor markets was handled by the research team at the Università degli Studi di Milano in collaboration with the non-profit organizations managing collection and distribution activities, to adopt a more standardized and consistent methodology. To avoid double counting, the volumes of fruit and vegetable products received directly by Gallaratese, Loreto, and Cuccagna from the Foody Zero Waste Hub were recorded separately from the overall totals. These figures, along with data from other urban indoor markets, are presented in Table 11 and refer to 2023 and 2024. Overall, the volume of food recovered and redistributed has continued to grow, highlighting an increasingly significant social impact over time.

In conclusion, Figure 12 shows data from the various Hubs, broken down by month, highlights a clear increase in total donations throughout 2024. This growth is largely driven by the significant rise in volumes handled by the Centro and Gallaratese Hubs, as well as the contribution of new Hubs launched during the year. Overall, the Hubs experience seasonal fluctuations in donation volumes, influenced both by retail sales trends and by a general slowdown in recovery and redistribution activities during August.

Table 11. Results achieved by Foody Zero waste Hub in 2023-2024

THIRD SECTOR ENTITIES ACTIVE IN THE FOODY HUB	2023		2024	
	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS
Eco dalle città	53,657	107,314	59,452	118,904
Recup	205,000	410,000	217,573	435,146
Banco Alimentare	43,000	86,000	98,061	196,122
Caritas	50,405	100,809	74,057	148,114
Total	352,062	704,123	449,143	898,286
ASSOCIATIONS RECOVERING FROM INDOOR MARKETS	2023		2024	
	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS	RECOVERED AND REDISTRIBUTED SURPLUS FOOD AMOUNTS (kg)	EQUIVALENT IN MEALS
Eco dalle città	11,000	22,000	14,639	29,278
Recup	30,000	60,000	57,929	115,858
Comunità Nuova	-	-	23,577	47,154
Fondazione Archè	-	-	2,855	5,710
Total	41,000	82,000	99,000	198,000

The data used to create the sample chart does not include flows from the Foody Zero Waste Hub or the indoor markets, as the manager shares this information in an annual, non-disaggregated format. As a result, it is not possible to track monthly trends or directly compare these flows with those of other Hubs.

The Milan Hubs have made it possible to recover large quantities of food that would otherwise have gone to waste and to redistribute it to vulnera-

ble individuals through the efforts of various charity organizations. In this regard, the Hubs of Lambrate, Isola, Gallaratese, Centro, Selinunte, Cucagna, and Loreto alone have provided food assistance to approximately 4,731 households, totaling around 16,416 individuals, including nearly 3,900 minors. Table 12 below summarizes the social impact of these Hubs over the past year.

Figure 12. Amount of surplus food recovered (kg) from the Food Aid Hubs in 2023 and 2024

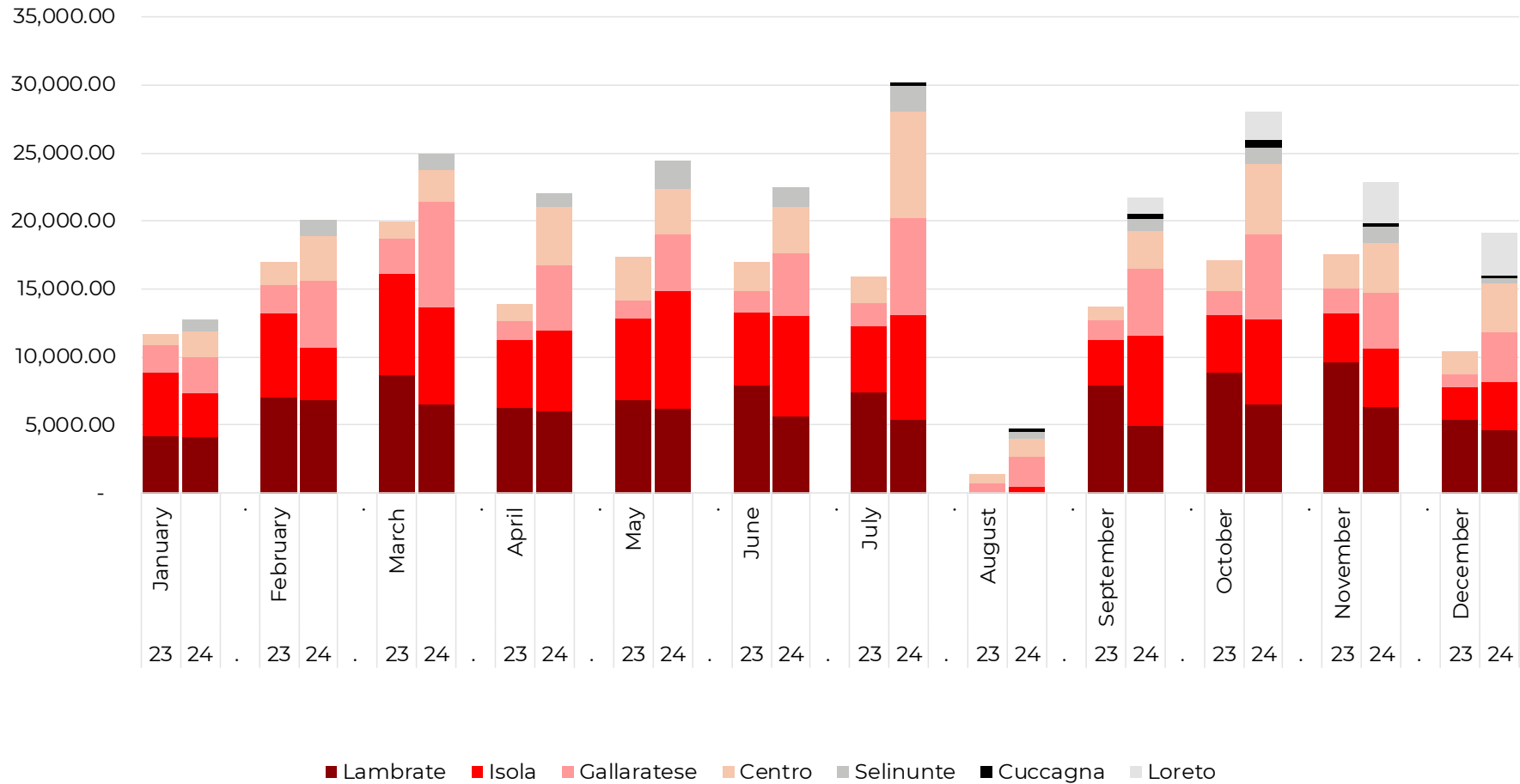


Table 12. Individual recipients and charities served in 2024

FOOD AID HUBS	TOTAL BENEFICIARIES REACHED	HOUSEHOLDS REACHED	BENEFICIARIES UNDER THE AGE OF 16	CHARITABLE ASSOCIATIONS SERVED
Hub Lambrate	5,637	1,178	1,879	18
Hub Isola	2,200	979	380	9
Hub Gallarate	4,263	1,272	1,574	7
Hub Centro	4,729	1,298	-	24
Hub Selinunte	2,028	701	805	6
Hub Loreto	3,500	1000	-	19
Hub Cuccagna	311	115	-	1

In 2023, the Foody Zero Waste Hub recovered surplus food that were distributed to approximately 480 households and around 5,400 vulnerable individuals. Additionally, part of the recovered goods was redistributed by Caritas, reaching more than 15,000 end recipients. Surpluses recovered from indoor markets were distributed by local associations to over 200 households and an additional 80 individual recipients. In 2024, the food surpluses collected by the Foody Zero Waste Hub supported 9,242 households, considering that Caritas alone helped around 8,732 vulnerable families and 105,547 individual recipients. Furthermore, the surplus recovery from markets in Milan provided support to an additional 811 vulnerable individuals. These results confirm the increasing effectiveness of the Food Aid Hub model in reducing food insecurity among Milan residents.

Based on the available data, it is possible to identify a few key performance indicators (KPIs) that provide an overview of the impact of Food Aid Hubs over time. The data collection protocol described in previous sections provides access to the variables required to deter-

mine these indicators: production – defined as the revenue of a retail chain in a given month; donations – the amount of food surplus donated to the Hubs in that month; and waste – the volume of food that cannot be donated for various reasons and must be discarded. Using these variables, the following performance indicators are suggested:

Effect of surplus on production: this measures the amount of surplus generated in relation to the total volume managed. This KPI reflects the efficiency of internal food product management processes. The indicator can be calculated based on either individual donors or the project as a whole:

$$\frac{(\text{donated} + \text{discarded})}{\text{production}}$$

Effect of donations on surplus: this measures the recovery rate of surplus food for human consumption through donations, relative to the total surplus generated before it becomes food waste. This indicator reflects the efficiency of internal surplus management processes and is calculated as follows:

$$\frac{\text{donated}}{(\text{donated}+\text{discarded})}$$

The calculation and interpretation of these indicators make it possible to assess the behavior of large-scale retail companies in relation to SDG target 12.3, which aims to reduce by 50% global per person food waste at the retail and consumer levels by 2030 compared to 2015 levels.

The optimal way to share data should therefore include information on donated products, total surplus, and overall production, allowing the proposed KPIs to be calculated. However, this is not always possible, as not all retailers are able to provide the required data. This limits the visibility of donors' performance in terms of efficiency in preventing and managing surplus food, and restricts comparability between various retail chains. This limitation is partly addressed through continuous communication between the researchers and managers and store representatives to better understand internal surplus management processes.

Finally, to enhance data interpretation and more thoroughly assess the impact of the system, it is key for project partners to actively contribute by continuously sharing the data available to them.

The data collection and processing methodology used for the surpluses recovered from retail chains has also been tested with company can-

teens involved in the initiative. Necessary adjustments were made to reflect the specific nature of these settings, including the type of food handled (cooked meals), the surplus management methods adopted by the canteens, and the specific processes for donating cooked meals, which are distributed directly to recipient organizations rather than through the Food Aid Hubs. In the future, these flows – though not explored in this document – could also be integrated into the project's monitoring system.

7.2 Other social impact indicators

In addition to quantifying and profiling beneficiaries by age – both for each individual Hub and the network as a whole – it is also possible to measure other indicators of the effectiveness of food assistance from a social perspective. Based on a study conducted by the Università Cattolica del Sacro Cuore in Milan in collaboration with Caritas Ambrosiana, it is possible to estimate the present value of food donations, calculated in terms of the savings that final recipients would gain if they had to purchase the same quantity of food using their own resources. The underlying assumption is that, although donations have no commercial value, they acquire social value through the process of recovery and redistribution. This value is even greater when the recipients are experiencing a higher level of food insecurity.

Finally, it is essential to measure the impact of the other functions conducted by Food Aid Hubs that go beyond food assistance. In this regard, the Gallaratese Hub is a representative example due to the variety of personal support services it offers together with food aid (including employment services, women's support activities, and a legal helpdesk for fam-

ily and immigration rights). Therefore, for these types of multifunctional Hubs, it is necessary to continuously monitor the number, profiles, and vulnerability conditions of the individuals who access one or more of the support services, evaluating changes over time.

7.3 Final considerations

The adoption of a shared measurement and monitoring system among the Food Aid Hubs is a key factor in improving process efficiency and enhancing the overall effectiveness of the project. With this in mind, measurement methodologies and the types of data collected should be as standardized and consistent as possible across the various network nodes. To this end, digitization of the data collection and analysis system is key to enhance the measurement and monitoring system from a network-wide perspective.

The benefits of adopting an integrated system for measuring and monitoring the project's performance are numerous and are outlined below for clarity:

- **Traceability and transparency:** Enables monitoring of every stage of the process, from surplus collection to redistribution, ensuring more transparent and accountable management by providing all project partners with real-time visibility of flows.
- **Operational fine-tuning:** Helps identify critical issues related to the management of the Food Aid Hubs, offering opportunities to improve logistics and reduce operational costs, particularly those related to warehouse management.
- **Decision-making support:** Facilitates the use of predictive models to optimize activity planning based on volume and demand, enabling re-

source sharing among the various Food Aid Hubs.

- **Impact assessment:** Enables to measure and communicate social impact (in terms of the number of individuals reached, user profiles where available, and the social value of donations). Social indicators can be integrated with environmental impact indicators (e.g., the equivalent volume of waste avoided, and CO2 emissions saved through the recovery and donation of food products), enabling the development of sustainability reports to communicate project results to stakeholders.
- **Scalability and replicability:** Standardize processes, facilitating the adoption of the model in other geographical contexts.

However, it should be noted that the widespread heterogeneity of tools and monitoring processes used by a network consisting of numerous players can lead to mixed outcomes. On one hand, it highlights the importance of finding common solutions that can enhance visibility and process optimization by leveraging the collaborative nature of the network. On the other hand, it complicates the transition to a shared tool, as this requires consensus on the digital platform to be adopted and careful implementation that accounts for the diverse technical and operational needs across the network.

With a view to adopting a system capable of integrating and systematizing the collection of data and information within the Food Aid Hub project, the City of Milan together with the Politecnico di Milano and all involved partners, initiated a selection process for a single digital tool aimed at improving operating efficiency and enhancing integration and synergy among the various Food Aid Hubs. This selection process served as a best practice in collaboration, with all project stakeholders actively participating in decision-making through interviews, questionnaires, and plenary meetings. The final choice of the tool was made possible through

the shared willingness to balance different needs through communication and compromise, ultimately bringing benefits to the entire network.

The selection process involved several phases: an initial phase of needs assessment to map the requirements of all network stakeholders; a second phase of mapping available digital solutions to identify the most suitable technologies, evaluated based on technical, economic, and integration criteria; and finally, a comparative evaluation phase, in which identified platforms were assessed through supplier interviews and collaborative decision-making sessions with Third Sector organizations.

As analyzed by the Food Sustainability Lab of the Politecnico di Milano, the selection process highlighted several key features of the chosen solution that could balance the integration and flexibility requirements of all stakeholders involved:

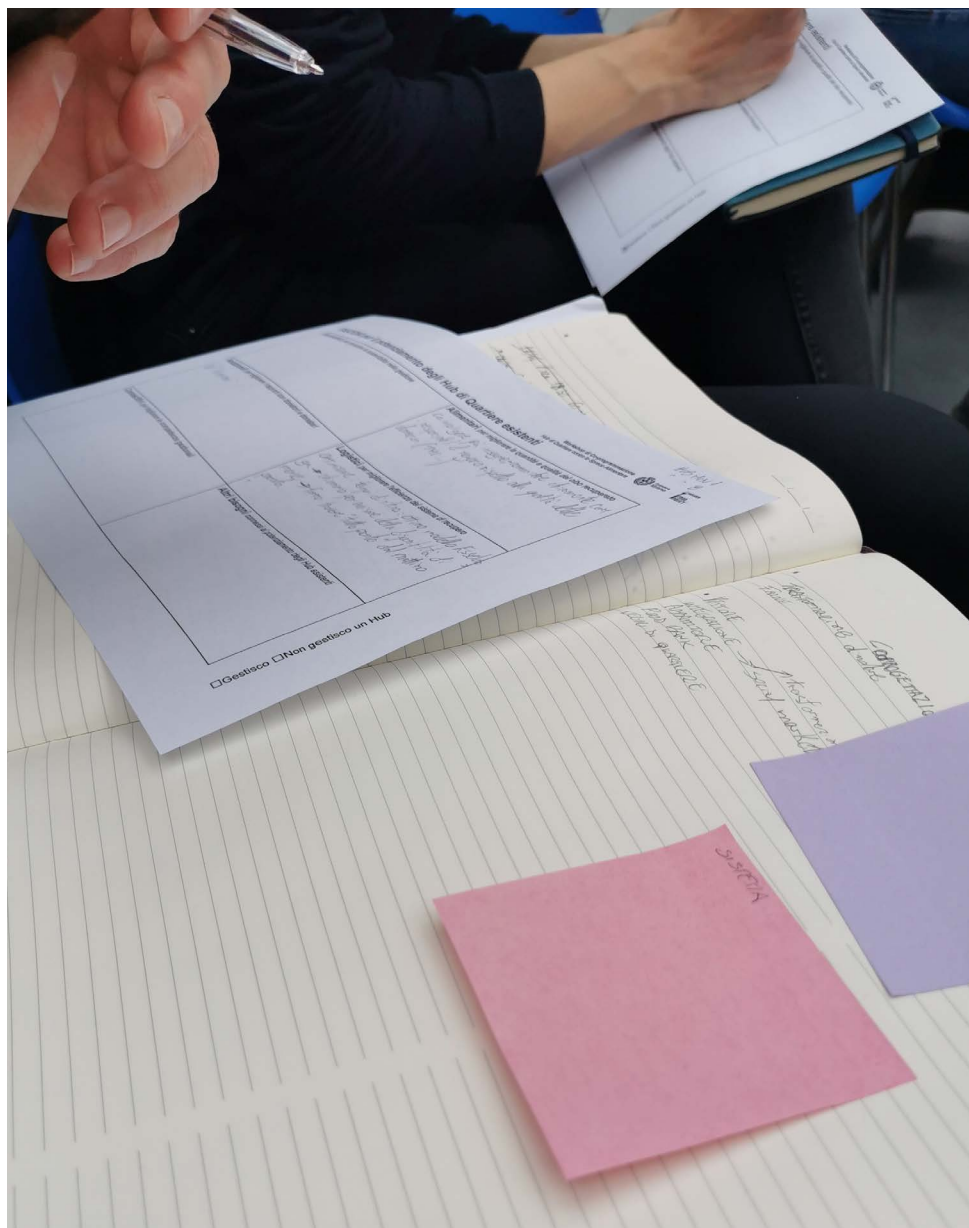
- **Standardizing product categories:** Implement a uniform categorization across all surplus food donors to facilitate data processing and reduce allocation errors.
- **Harmonizing units of measure:** Standardize units of measure across all products, allowing direct comparison of donor performance, facilitating project-level aggregation, and, where possible, providing automatic conversions from kilograms to economic value.
- **Technology integration:** Ensure compatibility (input reading) with the existing systems of various donors and enable integration across Hubs for smoother and more accurate data flows, supporting the introduction of new data and migration from legacy systems.
- **User-friendly interface:** Offer an intuitive interface for all users (donors, logistics operators, Hub managers), encouraging system adoption and ease of use.
- **Customizable, systemic dashboards:** Provide real-time overview of food quantities and types across different Food Aid Hubs, enabling

more efficient management. The tool should also provide access to data at different levels of detail based on each stakeholder's role within the Hub network.

Additional features aim to improve operational efficiency and information completeness:

- **Structured communication:** Implement a real-time notification system to facilitate communication between retailers and donors, replacing informal channels and optimizing logistics.
- **Digital document management:** Integrate a digital system to generate and manage Transport Documents (DDTs), simplifying record-keeping, archiving, and cross-checking.
- **Comprehensive tracking and advanced reporting:** Extend monitoring beyond the Hubs to gather complete data to evaluate the social and environmental impact of the initiative all the way to the final recipients. Generate detailed, customizable reports to analyze the overall efficiency of the project in terms of economic, environmental, and social impact, based on established KPIs.

Once these requirements are met, adopting the common solution becomes a much smoother process, enabling effective transition for all stakeholders involved. This contributes to enhancing the operational efficiency and effectiveness of the initiative, while supporting its scalability.



8. Learnings and recommendations

The planning and management of Food Aid Hubs must be based on close collaboration among institutions, nonprofit organizations, local businesses and communities. The Milan experience has shown that shared governance with the City Council as the central coordinator and Third Sector players and businesses responsible for day-to-day operations in collaboration with universities and others, is crucial to the success of the project. Each Hub must focus on and become integrated within a wide-ranging food policy, serving not only as a center for the recovery and redistribution of surplus food, but also offering itself as a center for meeting, sharing, and social integration and the provider of various services to accompany and support the most vulnerable people. The Hubs aim to contribute to sustainable management of food resources, reducing waste and promoting circular practices. They also become important vehicles for informing and raising public awareness about the challenges of food insecurity and food waste through educational activities and dissemination initiatives aimed at the local, national, and international community.

8.1 Strategic recommendations

To summarize previous chapters and lessons learned from the experience of the Milan Food Aid Hubs, recommendations that serve as a practical and strategic guide for the development and management of Food

Aid Hubs are shared, aiming to maximize their effectiveness and ensure their long-term sustainability.

- **Active collaboration between local stakeholders:** ensuring coordination between institutions, universities and research centers, associations, businesses and citizens, with clear roles for each stakeholder. The cross-sector governance model is the key element of success of a Food Aid Hub. The collaborative nature of the initiative and the gradual entry of new partners into the network make it possible to systematize different resources and skills that can ensure the smooth operation, resilience, and scalability of the initiative.
- **Integration with the broader urban food policy:** integrate Food Aid Hubs into the city's strategic vision and food sustainability policy, combining circular economy actions to counter food waste with actions to ensure access to food, foster social integration, and promote food education.
- **Ongoing institutional support:** the City can act as a facilitator of operational and administrative activities and can act as a mediator between parties, stimulating public-private collaboration and co-partnership. A crucial aspect for the successful operation of the Food Aid Hub system is the mobilization of publicly owned assets, such as unused public spaces designated as Hubs and the use of indoor markets as a platform for surplus recovery and redistribution, and social interconnection.

- **Measurement and monitoring:** adopt an ongoing performance measurement and monitoring system to assess project progress and formulate corrective and network enhancement actions. To this regard, establishing partnerships with universities and research centers at the local level to help develop shared methodologies and data collection and analysis is highly recommended.
- **Community outreach:** encourage education, dissemination and engagement initiatives so that the public actively participates in managing and promoting the project.

8.2 Operating Recommendations

- **Adaptive design:** customize the Hubs based on the characteristics of the economic and social structure and logistics system of each district, optimizing the use of space and resources.
- **Data monitoring and management:** employ digital systems to track and analyze food flows to efficiently manage food recovery, management, and distribution.
- **Diversifying supply sources:** ensure a stable and diverse supply network, including various types of surplus donors to ensure the continuity of food flows and provide the end recipients with the most nutritionally balanced basket of goods possible.
- **Education and training:** to invest in continuous training of all stakeholders to ensure food safety and improve operational efficiency.



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Comune di Milano – Food Policy Area: https://www.comune.milano.it/aree-tematiche/food_policy

Milan Urban Food Policy Pact (MUFPP): <https://www.milanurbanfoodpolicypact.org>

Politecnico di Milano – School of Management: <https://www.som.polimi.it/>

Food Sustainability Lab: <https://www.som.polimi.it/labs-e-centri/>

Food Sustainability Observatory: <https://www.osservatori.net/food-sustainability/>

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Guidelines for the development of Food Aid Hubs



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