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## TEAM MEMBERS



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**Alice Zorzan,**  
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**Marta Lamanna,**  
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## Executive summary

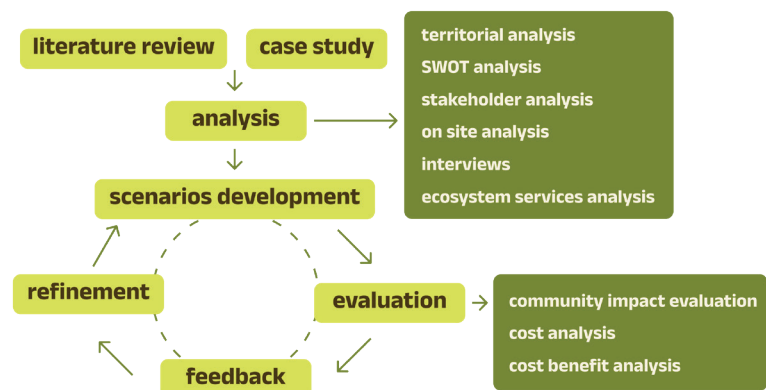
In the contemporary urban context, where cities face mounting pressures from rapid population growth and climate change, food security emerges as a critical challenge requiring innovative solutions. By 2030, nearly 60% of the global population will live in cities, placing new pressures on already vulnerable food systems. In this context, vertical farming emerges as a highly promising solution. However, it still requires deeper investigation, particularly with respect to effective implementation strategies. FARMER was established in response to this metropolitan imperative. Its mission is to develop a research-driven project focused on analyzing urban food security challenges and formulating effective methodologies to address them through vertical farming technologies.

Our project advanced through three distinct stages:

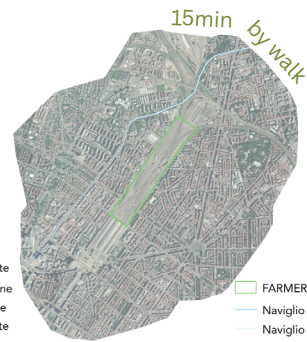
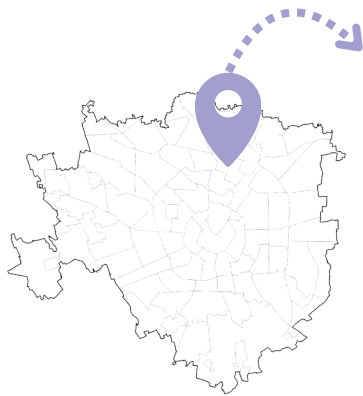
- **Strategic and multidimensional assessment.** Before selecting Magazzini Raccordati, we examined Milan's agricultural landscape and identified strategic intervention sites through SWOT analysis, stakeholder mapping, and ecosystem services evaluation.
- **Scenario development and solution design.** We developed multiple intervention scenarios for the selected site, exploring different approaches to vertical farming integration, spatial organization, and community engagement. This stage defined alternatives and selected the optimal 'Vertical Farming Hub' model blending production, education, and civic engagement.
- **Scenario evaluation and implementation phasing proposal.** We conducted comprehensive evaluation using Community Impact Evaluation (CIE) methodology and cost-benefit analysis to assess economic viability and neighborhood benefits. We then designed a phased implementation strategy, creating a replicable model for resilient urban regeneration.

## Key Words

Urban Vertical Farming, Community Impact, Urban Voids Regeneration, Food Security, Strategic Evaluation



# TERRITORIAL AND NEIGHBOURHOOD ANALYSIS



- Park
- Greenspace
- Milano Centrale

- Bike route
- Metro Line
- Tram Line
- Bus Route

- FARMER project site
- Naviglio Martesana (Surface)
- Naviglio Martesana (Underground)



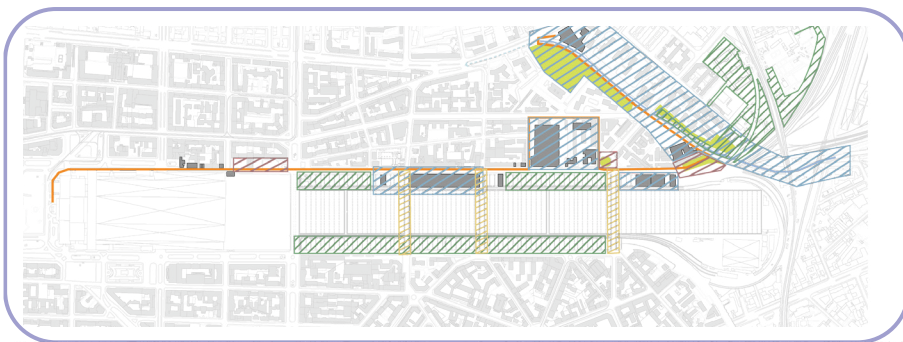
- Publicly owned land

- Food Services

- Population of census block
- 11-50
  - 51-150
  - 151-300
  - 301-400
  - 401-550

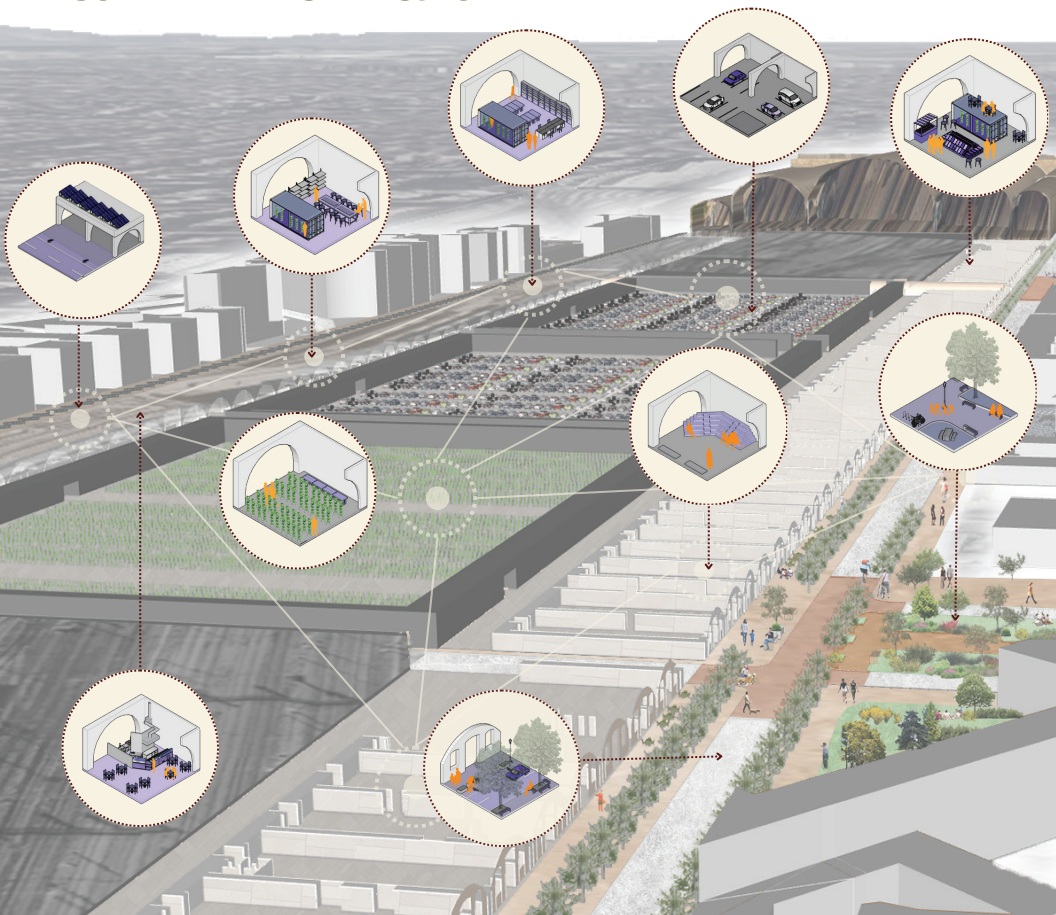
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## ONSITE ANALYSIS



- Strengths
- Weaknesses
- Threats
- Opportunities

## SCALABLE PILOT PROJECT



The FARMER project aims to provide a replicable scalable model and explore how cities can address food insecurity, urban abandonment and social marginalization by mixing vertical farming providing “Kilometro Zero” food supported by energy produced on site. At the same time, the project will create inclusive public spaces that foster social cohesion and offer opportunities for marginalized communities.

**Project description  
written by  
the Principal Academic  
Tutor**

The UN forecasts predict that the population living in urban areas in 2050 will be 66%, implying a growing demand for food in cities. Currently, almost all food consumed in cities is produced elsewhere, generating an impactful food flow on the environment and depleting arable. Instead, cities are currently neglected with empty spaces and buildings which require redevelopment and new use. This project aims to implement urban farming in Milan as an urban adaptive strategy, moving food production directly into the city. It supports the reduction of food flows, ensures affordable and fresh food for citizens, and provides social empowerment and environmental benefits, while also renovating urban voids and empty buildings. This project aims at strategically planning the implementation of urban farming by regenerating open spaces and buildings located in the city of Milan within a multidisciplinary approach which combines different expertise in urban planning, built and natural environments, agri-food supply chain, Ecosystem Services (ES) mapping and evaluation, service design, engineering, and strategic evaluation of multidimensional externalities. The challenge is proposing an innovative urban and socio-economic network for local food production, also supported by a web platform for citizens of Milan.

**Team description by  
skill**

The FARMER team was able to break down the complexity of the challenges described above into different project items belonging to different aspects of real urban concerns, through the integration of the interdisciplinary skills of the project teams itself.

The composition of the team is as follows:

Sofia Bonini was responsible for enhancing and supporting the urban intervention strategy for the identification of functional spatial layout, Territorial representation of the analyses and qualitative evaluation. In representation of the entire team, she joined the ICCSA conference in Istanbul to present the project development and attend conferences regarding innovative approaches to evaluation methodology in urban planning.

Alberto Cozzi was designated as team controller, responsible for budget management, communicating with the ASP board and stakeholders interviews. He carried out studies on territorial wealth distribution, evaluation methodologies implementation and phases, food distribution system in Milan and food waste management.

Marco De Luca was responsible for the collection and organization of population data, design of a user centered software programme to make accessible and cohesive the intervention and development of quantitative evaluation.

Marta Lamanna was responsible for the studies on UVF modular system and application, case studies selection and analyses, communication strategy of the project and qualitative evaluation. In representation of the entire team, she joined the ICCSA conference in Istanbul to present the project development and attend conferences regarding innovative approaches to evaluation methodology in urban planning.

Shizuka Sasaki (Landscape Architecture, Politecnico di Milano) was responsible for analysing the broader regional context across Milan and for representation during the project phase. She strengthened and supported the urban intervention strategy through research into transport connections, existing stakeholder networks, project phasing design for implementation, the relationship between the project and the surrounding landscape, and quantitative analysis.

Alice Zorzan was responsible for UVF production studies and calculation, Ecosystem Services individuation, energy production and consumption estimation, qualitative and quantitative analyses. In representation of the entire team, she joined the ICCSA conference in Istanbul to present the project development and attend conferences regarding innovative approaches to evaluation methodology in urban planning.

## Goal

The final goal of the FARMER project is to transform city challenges like food insecurity and spatial abandonment into regenerative opportunities for the broader metropolitan area. However, it extends beyond local impact: it aims to provide a replicable method and framework to face contemporary urban challenges complexity, proving that long-term viable food production is achievable through interconnected technology, neighborhood partnership, and strategic planning.

The thorough process of research, analysis, solution development, testing, and implementation must necessarily follow a rigorous methodology for the project to succeed in creating measurable city-wide impact. By Advocating a multi-faceted approach centered on our proposed model combined with strategic civic engagement it was possible to identify what needed to be undertaken in the selected area:

- **Revitalize neighborhood spaces. According to the emerging evidence from preliminary analysis and stakeholders perspectives**, the intention is to prioritize the restoration of abandoned industrial facilities to create vibrant public markets, educational facilities, workshops, research hubs, and local restaurants. These spaces embrace the core function of the vertical farming production by actively involving the community and by fostering social interaction among residents.
- **Develop eco-friendly energy systems.** The project should achieve energy self-sufficiency through unified solar panel installation across 24,364 m<sup>2</sup>, generating 4.6 GWh annually and covering 50% of operational energy needs while reducing environmental impact. In addition, the rooms that host the vertical farming technology will include monitoring systems for controlling the environmental conditions and regulating the lightning needed for the plants growth.
- **Establish coordinated infrastructure.** This involves installing 800 vertical farming units across 4,800 m<sup>2</sup> of covered space, producing 19,000 kg of fresh produce monthly while creating employment opportunities and supporting local food security.
- **Employ digital innovation for system optimization.** Digital platforms will enable real-time production management and stakeholder coordination. This will improve the community engagement and ensure a better operational efficiency.
- **Educate and involve all stakeholders.** It is necessary to proactively involve residents, investors, and institutions through extensive educational programs, training initiatives, and activities with schools and kindergartens, to promote sustainable food education and awareness.



Fostering stronger stakeholder supporting networks

## **Understanding of the problem**

By 2030, almost 60% of the global population will live in cities (Oppio et al., 2022), causing severe implications for food security, social cohesion, and environmental sustainability (United Nations Department of Economic and Social Affairs, 2019). This demographic shift will lead to the transformation of traditional food systems into long and complex supply chains, increasingly vulnerable to climate change, geopolitical instability, and economic disruptions (De Pee et al., 2017).

These predictions have led to a reassessment of how we conceive of the very concept of the city and the methods used to design urban networks. In particular, one of the issues that this increase makes more urgent is access to basic necessities such as food.

The need to address food security in urban contexts is underscored by global frameworks such as the United Nations' Sustainable Development Goal 2 (SDG 2), which aims to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture (Food Security and Nutrition and Sustainable Agriculture | Department of Economic and Social Affairs, n.d.-b). To ensure equitable access to nutritious food, it is essential to pursue a systemic transformation of urban food systems, integrating sustainability at every stage: from production to distribution to consumption (Food Security and Nutrition and Sustainable Agriculture | Department of Economic and Social Affairs, n.d.). The issue of food accessibility therefore arises in a decidedly complex and broad context that incorporates other equally important factors such as social cohesion, civic engagement, and broader objectives of urban sustainability (Bottero et al., 2020).

The complexity of this scenario requests a more integrated and thoughtful method for project development that should be kept under control by different methodology of evaluation. Being able to analyse and evaluate the different phases of this integrated process is a fundamental step towards a more comprehensive understanding of best practices for the new frontiers of integrated urban planning and design.

## **Exploring the opportunities**

The preliminary research conducted on Milan urban infrastructure as on the existing literature underlined an extensive problematic context in which some patterns are repeating. In particular the proposed project areas for the implementation of the UVF production were in all cases connected with important infrastructural nodes and existing community service related to needing population. These two shared characteristics drove the development and the choices of urban social focused analyses methods. Both of them represent important opportunity as well:

Recent literature shows how positive interpretation of urban voids is increasing as vacant primarily means empty, but also full of opportunity open to a constantly reshaping action, redefined as users reinterpret them (Cupers & Miessen, 2002).

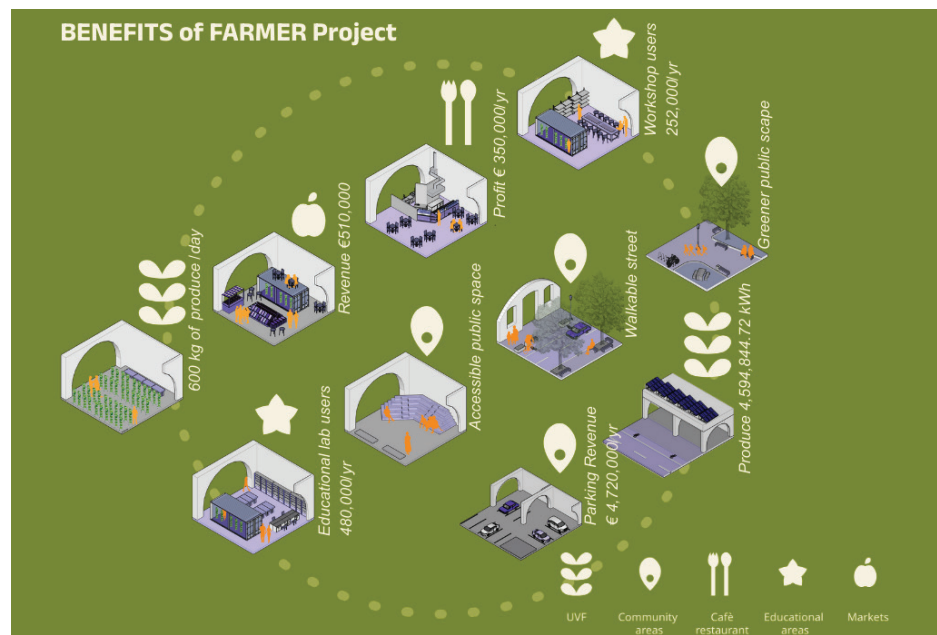
The presence of an existing community network, even if weak and inefficient in proximity to lost spaces, represents an important point for connecting to vulnerable groups and involving them spatially and logically in the decision making process. This crucial connection point brings to the reconsideration not only of the considered data, but of the analyses application and considered methods such as on person interview, historical studies on the development of the community, Community Impact Evaluation with a focus on social groups, development of tailored multidimensional indicators based on social needs and wishes.

## Generating a solution

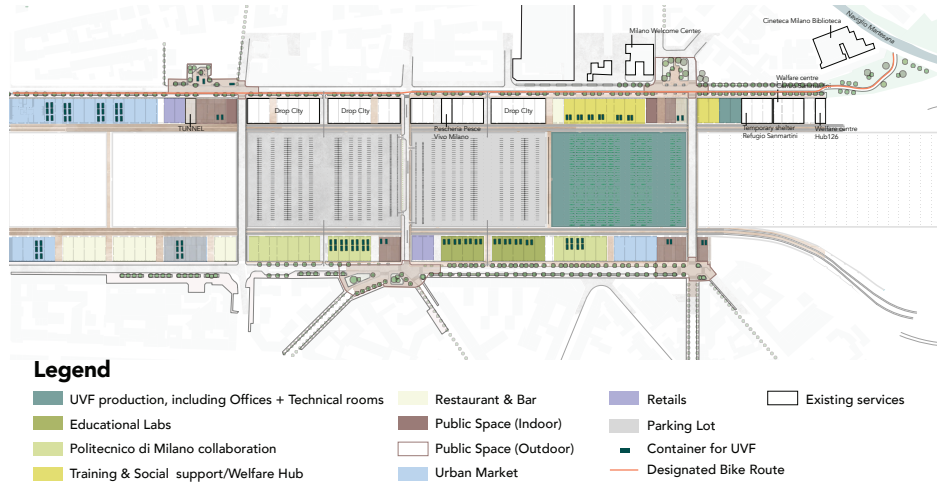
The structure that was implemented combines an integrated design strategy for a tailored local urban solution which focuses on the interconnection between different aspects of the urban network. The main aim of the team is developing a system that could help in understanding the needs of the territory and the impact of design choice by alternating between design phases and analysis or evaluation phases at various stages of strategy development. Using this structure allows choices to be adjusted and modified before they are implemented, making the process more iterative, dynamic, informed, and transparent.

The seven different phases that were identified and implemented are:

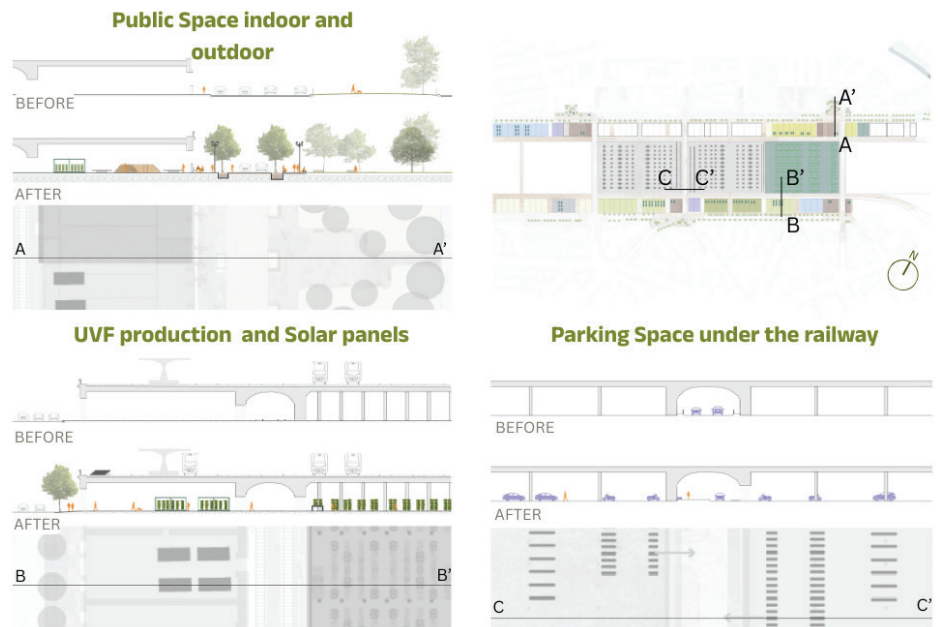
- Integration of SWOT analysis, Stakeholder Analysis, Ecosystem Services Analysis and site mapping for the adoption of a mixed-method approach to perform the analysis regarding the four potential locations in the urban area of Milan for the vertical farming initiatives, assessing their urban characteristics, social context and environmental conditions.
- Selection and in depth analyses of the selected area by the integration of stakeholders interview, multiple site visits, Ecosystem Services Evaluation
- Design of three different urban strategies mainly focused on functional development and distribution.
- Identification of evaluation criteria based on community interests, stakeholders involvement and network, qualitative evaluation of the three options and selection of a mixed solution which merges the options of different scenarios with the best output.
- Development of the final scenario considering urban strategies, energy supply, social engagement, marketing process and food chain management.
- Qualitative evaluation by applying Community Impact Evaluation (CIE): a stakeholder-sensitive methodology for assessing the multidimensional impacts of urban regeneration, integrating economic, social, cultural, environmental, and institutional dimensions through carefully calibrated qualitative and quantitative indicators (Bottero et al., 2020).
- Quantitative evaluation such as Cost-Benefit Analysis (CBA), an economic evaluation tool for assessing the utility of a public intervention for the community (Roscelli, 2014). This approach ensures that the analysis considers not only the financial aspect but also a broader category of impacts (e.g., social and environmental), providing thus a comprehensive evaluation of public projects.



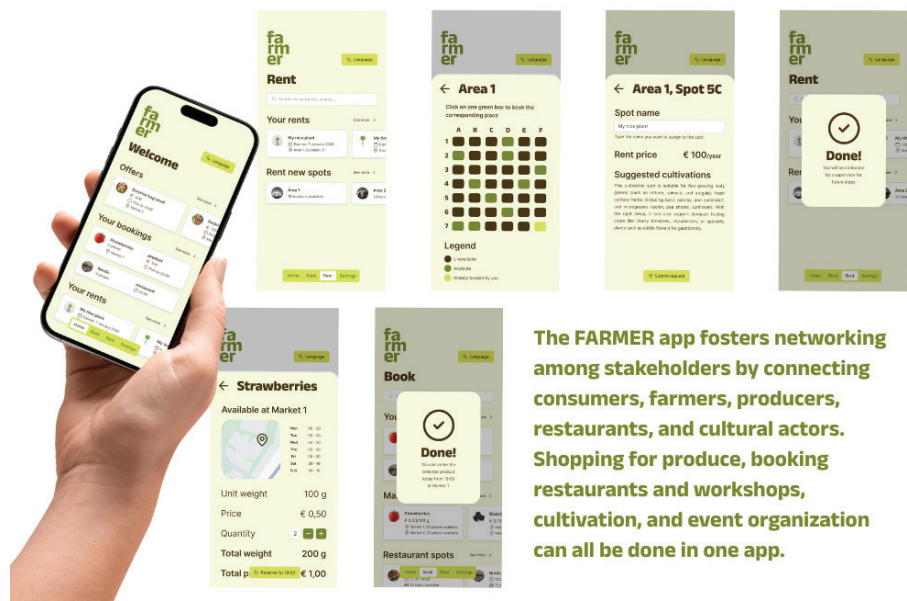
Result of Cost Benefit Analysis for Each Functional Area



**Final Scenario: Holistic Spatial Network of Food Production, Commerce, Social Spaces, Infrastructure, and Ecological Corridors**



Spatial Transformation of the Magazzini after Implementation of the Project



Mockup of FARMER App Linking Food, Farming, and Community making

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