

P / REFERENCES OF DESIGN

THE DESIGN APPROACH FOR INTEGRATING CROSS- SECTOR PROCESSES. APPLICATION OF TANGIBLE/ INTANGIBLE RESOURCES FROM THE TERRITORY TO A CO-PARTICIPATED SUPPLY CHAIN MODEL.

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ABSTRACT | The intervention priorities of the Recovery and Resilience Plan (PNRR), introduced by the European Union following the pandemic, represent an opportunity for economic recovery for Made in Italy and the country's production chains. Key sectors such as agri-food, automotive, furniture, and clothing constitute the manufacturing sectors primarily interested in implementing sustainable, economic, and social development initiatives. In this context, the Green & Digital Transitions guide and shape the future of societies, highlighting the need to overturn the linear economic paradigm in favor of restructuring value chains that integrate the principles of sustainable development, innovation in business models, sector-specific skills, and production processes, with their re-centralization in the territories. The Italian manufacturing system, characterized by micro-small enterprises, sometimes organized in districts and production chains, aligned to the concept of the soft economy, constitutes fertile ground for initiating design-oriented systemic strategies capable of combining local resources and productions while maintaining the integrity of natural ecosystems.

In this scenario, the research project aims to develop a strategic model of co-participated production chains, aiming to establish productive symbiosis relationships and integrate tangible and intangible resources of the territories in a systemic and circular perspective across different manufacturing sectors of Made in Italy concerning agri-food chains and the cosmetic sector. The research intends to explore various implementation scales of the co-participated model, involving local manufacturing through business audit activities, incorporating already ongoing sustainable production processes, and utilizing Industry 4.0 technologies through collaboration between enterprises, research centers, and Innovation hubs present in the territory. Through field research, the bottom-up detection methodology identifies initiatives, needs, and emerging issues from territorial production contexts, evaluating possible collaborative match-making strategies. The project's results are directed towards enhancing the excellence of Made in Italy, engaging and strengthening links between productive communities (micro-small enterprises), and experimenting with innovative products that synergize local know-how and design-oriented strategies. The co-participated model's experimentation aims to test collaborative production between companies in the agri-food and cosmetic sectors present in the Campania region. The outcomes of the experimentation will determine the verification of the co-participated chain model, the identification of replicability requirements, and the development of a disciplinary tool for creating new synergies between different production sectors. The paper describes the theoretical background, project objectives, methodology, and initial outcomes of the doctoral research conducted during the 1st year of the National Interest Ph.D. in Design for Made in Italy (XXXVIII cycle) at the University of Campania "Luigi Vanvitelli."

1. Background and Objectives of the Research Project

The field of the research project investigates design-oriented strategies for sustainable development in territories, aiming to enhance Made in Italy supply chains through co-participation among various manufacturing sectors. In the Italian production landscape, Industry 4.0 is guiding regional economic systems toward adopting new approaches to promote territories and excellence. To preserve the identity linked to specific geographical contexts, manufacturing, and local know-how, micro and small enterprises are identifying new opportunities for valorization through collaboration with other production entities and community relationships. A collaborative society, promoting dialogue and confrontation, follows an alternative economic model with positive impacts on territories and communities (Bistagnino, 2016). This model, incorporating the concept of a soft economy based on community cohesion, aligns with the programmatic strategies of the 2030 Agenda for sustainable development, directing societies towards integration between the production-economic system and the socio-institutional system.

From this scenario and the analysis of project experiences in symbiotic processes of closed-loop supply chains and based on the priorities identified in the National Recovery Plan (PNRR - investment 5.2: Competitiveness and Resilience of Production Chains), the research project aims to develop a strategic co-participatory supply chain model. This model aims to create productive and collaborative processes in a systemic and circular perspective, focusing on agri-food excellence and cosmetic companies in the Campania region. The model intends to activate synergistic actions between the two sectors, involving the know-how of supply chains in the selection of secondary raw materials and activating symbiotic processes among companies, local producers, research centers, and innovation hubs. The project results target the protection of Made in Italy excellences and the creation and enhancement of multi-sectoral, innovative, and sustainable aggregation processes. The outcomes of the experimentation in the Campania region (Italy) will determine the verification of the co-participatory model and the project requirements for defining replicability in other production sectors. Within the field of the research project, design considers the territory as an intermediate substrate on which to initiate processes of innovation, whether it is understood as an "object" or as a "context" (Parente et al., 2016) of design practices. From this scenario, the doctoral research project conducted during the 1st year of the National Interest Ph.D. in Design for Made in Italy (XXXVIII cycle) at the University of Campania "Luigi Vanvitelli," investigates the following macro-areas of research:

- Strategies and research projects in the field of design for territorial development and design-driven innovation through the analysis of systemic design approaches, circular design, and participatory design practices.
- Investment priorities of Mission 1, "Digitalization, Innovation, Competitiveness, Culture, and Tourism," and Mission 4, "Education and Research" of the National Recovery and Resilience Plan (PNRR).
- International and national funding programs for territorial development (LEADER, EUI, LDEI) and integrated supply chain projects (PIF).
- Opportunities, challenges, and emerging needs in Made in Italy production chains through consultation of reports and databases from Unionfiliera, Italian District Federations, Confcommercio, and Confindustria, monitoring the productivity and trends of the country's production sectors.
- Sustainable production processes and business models of Industry 4.0 through projects promoted by platforms such as Circularity, ENEA, Symbiosis, ECEP, and ICESP.

The analysis of existing literature on territorial sustainable development projects has revealed a gap in the systematization of symbiotic processes among productive sectors of different economic activities.

Two main aspects emerge from this analysis: firstly, the absence of a regulatory framework governing the aggregation between different production chains; secondly, the lack of a coherent procedural path aligned with regulatory aspects that facilitates the encounter and collaboration between different sectors. These premises have contributed to defining the research objectives through which the project intends to address the identified scientific problem.

- Construct a replicable co-participatory supply chain model, designing guidelines that instruct and facilitate the integration among companies for the development of co-participated production processes.
- Establish a multisectoral network that synergizes territorial resources, companies, and productive communities through co-design experiences.
- Iterate symbiotic productions and cross-fertilization processes involving productive communities, manufacturing, and local know-how.
- Activate systemic actions among territorial productions to optimize resources used and enhance the value of secondary raw materials.
- Reduce the ecological footprint of production processes by introducing or strengthening closed-loop product systems.
- Enable productive entities for Industry 4.0 technologies, integrating training programs within Innovation hubs and research centers to promote the development of new business models.

2. Research Framework

From the in-depth exploration of the research background, three main areas of investigation have emerged. The first focus involves the research and critical analysis of case studies in the field of systemic design concerning sustainable and socially responsible development of territories. The projects were selected and evaluated according to criteria relevant to the research project's objectives, such as collaboration between companies and the territory, support for the local economy, reduction of environmental impact, innovation in production processes, optimization of resources, valorization of waste, and the production of secondary products. The second focus of the research centers on the examination of experiences of productive symbiosis already experimented in the territory through the analysis of closed-loop production processes, both within the same sector and between sectors of different economic activities. The selected case studies were cataloged in synthesis tables to create a mapping based on the following analysis criteria: geographical area, type of promoting company, number of partner companies, involved productive sectors and economic activities, types of funding, collaboration results, limitations, challenges, and future replicability. The third focus of the research concerns the analysis of integrated supply chain projects, in which productive collaborations have been established among companies belonging to the same sector or different productive sectors. To examine the strategies, methodologies, and results of such collaborations, similarly, to focus 2, reference case studies were identified and subsequently cataloged in synthesis tables according to the following criteria: geographical location, number of partners, type of supply chain, sector of affiliation, involved economic activities, partner supply chains, type of funding, collaboration results, limitations, challenges, and possibilities of future replicability.

2.1 Methodology

The research adopts a bottom-up research-action methodology that, starting from the analysis of the territory, identifies the needs perceived by local communities to transfer them to the co-participated supply chain model. The four phases of the research, named Discover, Detect, Define, and Develop, consist of tasks for acquiring information and data, intending to provide concrete results. Each phase identifies a step towards achieving one or more research project objectives, for which different design methods and approaches will be used. The community-centered approach and co-design practices will be adopted to

identify emerging needs and challenges in the territory, as well as to identify collaborative processes between companies, communities, and stakeholders. Simultaneously, systemic design and circular design will be employed to facilitate the transfer of inputs and outputs between the productive realities of different sectors, adopting a "cradle to cradle" perspective.

- The first phase, called "Discover," conducted during the first semester of the doctoral research, focused on building the theoretical foundations of the project and the state of the art of design practices in the territorial context through literature review activities and the exploration of case studies. Subsequently, national and regional funding programs were examined, along with the current regulatory framework concerning productive chains.
- The second phase, called "Detect," involves field research to identify agri-food and cosmetic companies in the Campania region. These companies will be subsequently analyzed to identify matchmaking opportunities and experiment with the co-participated supply chain model. The selection will take place through the analysis of databases from the entities identified in the research background and will involve companies more inclined towards building a collaborative, productive network. The collection of qualitative and quantitative data from the companies will be conducted through questionnaires and one-to-one interviews to investigate the relationships between the companies, the territory, and the community; the skills involved in the company's production activities; the resources used and production waste; emerging challenges and perceived needs.
- The third phase, called "Define," involves organizing workshops that will engage the companies interviewed in the previous phase to identify collaboration opportunities through discussion and sharing activities. The results of the field data collection and the analysis of the workshop outcomes will form the basis for the project phase of the co-participated model and identify possible achievable matches.
- The fourth phase, called "Develop," concerns the project development and experimental application of the co-participated supply chain model in the Campania region. Sample companies operating in the agri-food and cosmetic sectors will be selected based on the interpretation of the collected data and the matching opportunities that emerged from the workshops. The outcomes of co-design meetings will constitute the requirements for defining a disciplinary tool that facilitates collaborative synergies and the creation of innovative and sustainable supply chain products.

3. Results and Conclusions

The first year of research concluded with the achievement of the objectives outlined in the initial phase, and its outcomes have brought forth considerations related to the investigated theme. Specifically, the results of the conducted activities have impacted various aspects of the project, including the in-depth exploration of research background topics and the identification of primary focus areas; the compilation of the reference bibliography and the creation of the state-of-the-art methodologies and approaches of design for the sustainable development of territories; the research and cataloging of case studies related to productive symbiosis and integrated supply chains, along with their interpretative parameters; the selection of international and national funding programs, followed by an analysis of their respective guidelines. Based on the insights derived from the theoretical background, the construction of the state-of-the-art, and the analysis of case studies, research questions have been formulated that the project aims to address.

RQ 1. What design-oriented strategies can be considered most effective in promoting sustainable development in territories from a collaborative perspective?

RQ 2. What approaches, methods, and design tools can be employed to facilitate multisectoral integration between productive supply chains and territories?

RQ 3. Which design practices can contribute to regulating organizational aspects of multisectoral collaborations within participatory production processes?

The activities planned for the current semester will involve the research and selection of companies operating in the agri-food and cosmetic supply chains in the Campania region. This will be followed by planning the field investigation phase, which will include conducting questionnaires and interviews for

Data collection. The results of these activities will subsequently be presented through the development of interpretative maps for effective visualization of the collected data. The paper aims to share the idea that the diversity of productive sectors present in the Italian territory constitutes a distinctive feature globally. This diversification and excellence specialization, combined with the high manufacturing specialization of the Made in Italy system, can represent a significant resource for the realization of design-oriented sustainable development strategies and new transition models. These strategies aim to combine economic competitiveness with social cohesion, drawing strength from local communities and surrounding territories (Cianciullo & Realacci, 2005).

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P/REFERENCES OF DESIGN

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