

CRAFT-DRIVEN INNOVATION – THE “KNOW-HOW” AT THE BASE OF INDUSTRIAL INNOVATION.

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ABSTRACT | This industrial PhD. research, co-funded by industry, aims to highlight the potential arising from the integration between innovative technological processes and traditional manual techniques, transmitting know-how within the new product development of the upholstered furniture sector high-end, with a focus on small and medium-sized enterprises (SMEs) of the “Made in Italy.”

Simultaneously, the value of Open Innovation is underlined, hence the collaboration between the research world and the enterprise and the role of design as a mediator between this bidirectional flow of knowledge. Today, Italian manufacturing SMEs face complex and interconnected challenges exacerbated by environmental, economic, and social crises. In this context, synergies such as those described above are strategic tools for achieving sustainable innovation and enhancing the “Made in Italy” value.

The scientific literature supporting the contribution includes various research areas, such as the role of design in innovation, the craft-driven innovation approach, and the concept of innovation through tradition. Moreover, different ways of adopting technological innovations are explored, both in production phases and in dissemination within new product development.

In this phase, the research is based on User Research, exploring the co-financing company and its surrounding context to define specific business needs. Subsequent adoption of additional methodologies is planned to define the proposed research trajectories and achieve a pilot project to be tested in the host company. This study contributes to the scientific landscape by enriching the surrounding industrial field, validating the hypothesis that collaboration between digital and artisanal skills and between the research and business worlds represents a significant potential for the future of the sector.

1. Introduction

Today, industrial realities face global challenges where issues are increasingly complex and interconnected. Design, as a discipline, has always sought new ways to tackle these complexities and is now more involved in these major transformations than ever before. (Dorst, 2019; Fondazione Symbola, 2023)

These challenges, resulting from market developments, mass production, and environmental, economic, and social crises, severely test manufacturing companies, specifically the small and medium-sized enterprises (SMEs) of the "Made in Italy." (Assolombarda, 2021)

For instance, one of the models that many countries around the world are leaning towards today is driven by a market economy and a mass consumption society. (Brocchi, 2022)

In the above context, to maintain competitiveness and add value, the "Made in Italy," although associated with prestige, quality, artisanal innovation, and "know-how," must also be synonymous with circularity and sustainability. (Barbaritano, Bravi & Savelli, 2019)

Regarding these strategies, and specifically a reconsideration of production paradigms, SMEs, being aware that they cannot solely rely on their internal Research and Development expertise, are expanding their vision to allow external actors such as Universities to permeate their boundaries, adopting the Open Innovation (OI) approach. (Chesbrough, 2003; de las Heras-Rosas & Herrera, 2021)

These exchanges of bidirectional knowledge flows require an intermediary, namely the figure of the designer, who, as a mediator of complexity, allows for the construction of a simplified model of reality, observing and utilizing other disciplines as project inputs. (Germak, 2008)

This highlights a fundamental approach for the current research based on interdisciplinarity and cooperation, where design is defined as a tool to connect different actors in innovation (Magistretti et al., 2020)

The general objective of the research is to identify points of contact between the development of advanced technologies and the world of artisanal experience, exploring how this traditional and ancient knowledge contributes to new product development (NPD) to bring innovation within manufacturing enterprises.

The project was funded by EDRA S.p.A, an Italian family-owned company based in the province of Pisa, specializing in the creation of high-end upholstered furniture. EDRA employs both industrial machinery and manual techniques. This adoption constitutes specific know-how that is both passed down internally and developed together with external collaborators. The company's supply chain is mainly confined to the Tuscan territory and consists of long-standing relationships. Thanks to these relationships, EDRA develops innovative technologies and methodologies often subject to patents and thus represents a potential case study of innovation in the "Made in Italy" and the context of Italian family businesses. Being a family business, it is even more interesting, based on the existing literature, to investigate how know-how is strategic in innovation. (De Massis, et al., 2016).

Therefore, such innovation must not be an end in itself but must be meaningful with social and environmental repercussions. The present research thus focuses on re-evaluating the importance of the hand industry, with its risk workmanship (Pye, 1968) and the concept of "Craft Driven Innovation" (CDI) (Veliz Reyes et al., 2019), which combines craft skills and learning through learning by making, implementing the most up-to-date technological components. These approaches are reflected today in the figure of a contemporary craftsman who adopts technology to support traditional practices. (Micelli, 2011) According to De Massis et al. (2016), the main area of "Innovation Through Tradition," based on the "Know-How" and historical-cultural tradition, is considered a useful strategy to bring quality and innovation.

2. Literature Review

The literature on the distinctive role of the design discipline in stimulating innovation is extensive, and different ways of innovating through design are addressed based on the drive adopted, such as Design Thinking or Design Driven Innovation. A further perspective on the role of design in knowledge acquisition emerges from an analysis of the literature on Open Innovation. (Lambert, & Flood, 2017)

Indeed, it has been emphasized how the involvement of design and researchers within companies can help

imagine future scenarios to meet current challenges. (Magistretti, et al., 2020) In this context, for example, the European Commission (policy no. 3, 2021, Industry 5.0 A Transformative Vision For Europe) suggests shifting from a scenario based on overproduction (Industry 4.0) to an environmentally and socially sustainable one defined as Industry 5.0. (European Commission, 2021) Furthermore, the 2030 Agenda promotes technological development, research, and innovation, recognizing culture and creativity as drivers of sustainable development. (European Commission, 2022) To foster the relationship between enterprises and research entities, there are actions guided by research projects with objectives like those outlined in the National Recovery and Resilience Plan (PNRR), particularly within Mission 4: Education and Research "M4C2" - from research to enterprises - "Strengthening research and the dissemination of innovative models for basic applied research conducted in synergy between universities and companies." (Italian Government, 2021)

Beyond the main contributions concerning design, it is relevant to explore the literature on traditional knowledge and its relationship to innovation. Regarding this phenomenon, numerous studies have revealed the role of the so-called innovation strategy through tradition, through the "Innovation Through Tradition" approach (De Massis et al., 2016), where the influence of knowledge maturity on the value of innovation is analyzed, (Petruzzelli, Ardito & Savino, 2018) and tradition is considered as an accumulation of know-how, contributing to the identity formation of individuals, organisations, and territories. (Magistretti, et al., 2020)

The "Computing Craft" study (3D printing for architectural, structural elements in clay, robotically supported) is a project that explores the CDI approach and shows how craftsmanship allows the identification of innovative approaches to robotic manufacturing in architecture, thanks to its ability to understand and experiment with materials. (Veliz Reyes et al., 2019)

Similarly, the DefeXtiles research project (3D printing quasi-woven textiles via underextrusion) exemplifies the proposed CDI approach, where underextrusion, a technological gap, can be exploited to quickly print thin and flexible textiles. This approach reflects how, within NPD, a craftsperson's attitude and mindset towards technology can lead to significant and radical innovation. (Forman, et al., 2020)

Considering manual techniques as an element of inspiration is not the only aspect addressed in this research. Indeed, biology-inspired design uses analogies with biological systems to achieve solutions for sustainable development. (Helms, Vattam & Goel, 2009)

The literature on design sciences from a project perspective indeed presents numerous bio-inspired design case studies, such as the "Biomimicry Chair" project - 3D Printed Soft Seat, Lilian van Daal, 2014. In response to traditional upholstered furniture, impactful in production and disposal, this mono-material product in nylon, inspired by the structure of plant cells, utilizes additive manufacturing as the sole production technique, where varying local structures achieve different properties to meet the requirements of different elements, such as legs or seating. (Sauerwein, et al., 2019)

This approach is reflected in Hybrid Design, which allows the creation of hybrid artifacts halfway between nature and artifice, where the design is inspired not only by nature but by its conception of logic, and thus interdisciplinarity is fundamental. (Langella, 2021)

As diverse skills are required, communication challenges arise, highlighting once again the importance of the designer's role as a mediator of knowledge. (Germak, 2008)

Craftsmanship is primarily about tools as well as materials, and digital tools are transforming the way things are made, where they are made, and how they are communicated.

Adopting such tools must, therefore, result in an enhancement of certain knowledge on a multitude of levels, both for the design and production process by acting on the generation change and also for the dissemination of know-how by enhancing certain intangible values.

In this section, the research emphasizes how technologies such as eXtended Reality (XR) are increasingly applied as they benefit from the phenomenon of Immersive Experience Design. (Elmezeny, Edenhofer, & Wimmer, 2018)

In the context of XR, the DISTANCE project (Digital Immersive Technologies and Craft Engagement) allows artisans to apply their tactile skills and material knowledge in a digital immersive space, with the opportunity to collaborate and share experiences. In this case, it is emphasized how crucial it is for creative professionals to acquire digital skills, both for creative production and collaboration. (Panneels, et al., 2023)

3. Methodology

This research is based on the general objective of evaluating the potential of integrating innovative technological processes with traditional manual techniques, preserving and transmitting intangible knowledge and values within the entire NPD process in the upholstered furniture sector.

Being a Ph.D. co-financed by a company, eighteen months at the company, EDRA S.p.A. is planned, where alternative investigative strategies aimed at qualitative research, such as ethnographic research (Creswell, 2017) and the collection of case studies (YIN, 2009), will delve deeper into the company's needs to act more efficiently and targeted. The first investigative tool applied is ethnographic research, in which the company is studied as a whole, actors, and context for an extended period, collecting observational and interview data (Creswell, 2017). To these participatory observations, which involve a high level of involvement, other documentary sources such as books and publications are integrated.

This exploratory and qualitative approach will be added to the activity of collecting and analyzing information on how people experience User Research (UR). (Rohrer, 2014)

Tools such as interviews and surveys will first be submitted to the top management of the main corporate areas, followed by more targeted surveys of the employees of each area and then to the end customers.

This first phase will make it possible to bring to light specific problems connected to the company, both those directly expressed and, above all, those unexpressed, and thus identify which of the potential research trajectories listed below to undertake to realize a pilot project aimed at the development of the expected outputs, which can be adopted within the company and thus 'tested' within the company (Fig.1).

3.1 Research Trajectories:

- Innovative production based on the interpretation of existing technologies through a vision inspired by manual techniques, developing new design and production methods identified in the terminology of "Craft Driven Design";
- Development of an innovative approach to design that combines craftsmen and artists with the designers of the future through a methodology identified in the terminology "Craft Inspired Design";
- Definition of new ways of conceiving upholstery through the adoption of interdisciplinarity and an experimental approach, with a focus on sustainable materials/structures, bio-inspired and/or technologically advanced;
- Transferring and enhancing the company's know-how on various levels, design, production, and communication, to raise awareness among future designers and end-users towards the firm's identity.

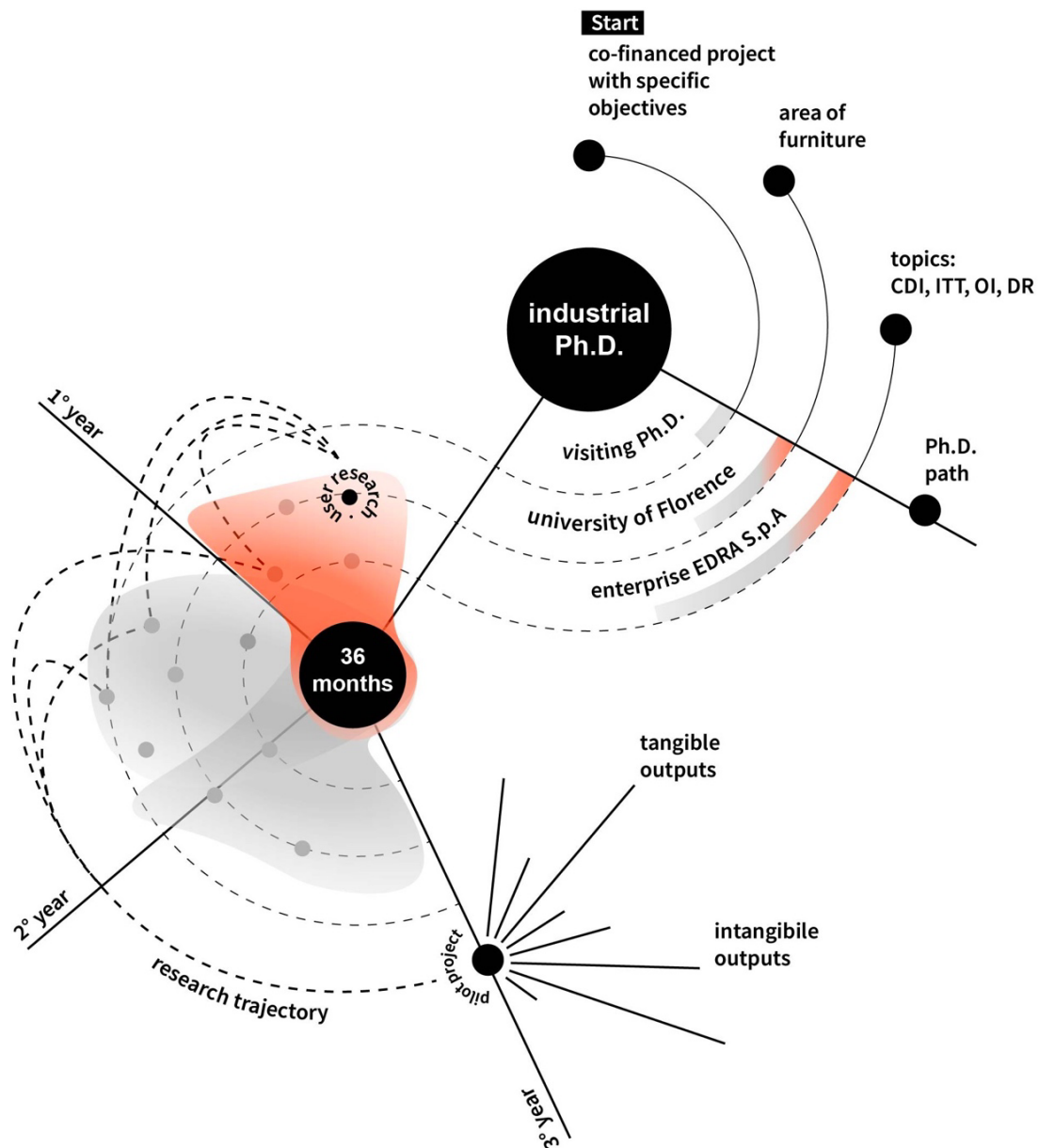


Figure 1. The graph shows the path of the industrial Ph.D. Starting from a co-funded project with pre-established objectives and an established context of intervention, to which topics are added (CDI: Craft Driven Innovation; ITT: Innovation Through Tradition; OI: Open Innovation; DR: Design Research) The development of the course extends over 36 months of which: 6 Visiting Ph.D., 12 University of Florence and 18 within Edra S.p.A. The highlighted area describes the current state, while a pilot project is envisaged that will extend through tangible and intangible outputs.

4. Expected Results

Based on the pre-set objectives in this research project, the valorization of know-how through the CDI methodology is anticipated. As analyzed in Section 2, this methodology, which combines craft skills and learning through practice with the latest technological tools, will be applicable in the corporate context and will branch into the research trajectories mentioned above.

Furthermore, an increased awareness among future designers and end-users towards the company's identity and the issues emerging from the research problem is expected. Indeed, within these scenarios, sustainability will be achieved in multiple areas, including social, environmental, and cultural, for example, through respect for materials, resources, and intangible values.

Through qualitative and quantitative analysis using User Research (Rohrer, 2014), a vision of the company's issues will be obtained both macroscopically and microscopically, directly confined to the reference

company and also extended to broader contexts. This will then allow for the implementation of such context by identifying the most critical practices to act upon.

Subsequently, additional methodologies will be adopted capable of directing the research trajectories toward a pilot project "tested" within the enterprise, aiming to confirm the research question by introducing new practices or solutions for improvement or innovation.

5. Conclusions

The research is currently in an initial testing phase with the project 'Craft Driven Innovation. The 'Know-How' at the basis of industrial innovation,' in the context of the doctoral fellowship 'Innovative Methods of Industrialization with Manual Techniques,' aims to meet the research question based on the innovation of production techniques by emphasizing the role of manual skills through scientific interpretation. From the initial investigative approaches described in Section 3, within the company and the surrounding reference context, the need to demonstrate how the capabilities of the design discipline can bring innovation, intertwining the know-how belonging to the "Made in Italy" and technological advancement, is evident.

The project will be the starting point for other company activities aimed at practical experimentation by adopting advanced technologies. This will lead to an expansion of academic awareness of the industrial context with the possibility of materializing the added value of the research. Thus, the contribution enriches the scientific and industrial landscape, validating that the collaboration between digital and craft skills and between the research world and the business world represents a significant potential for the future of the sector.

References

- Assolombarda. (2021). Produttività in Italia: Quadro generale e ruolo di Lombardia e PMI. Centro Studi, Ricerca n°11/2021. Retrieved from <https://www.assolombarda.it/centro-studi/1121-produttivita-in-italia>
- Barbaritano, M., Bravi, L., & Savelli, E. (2019). Sustainability and quality management in the Italian luxury furniture sector: A circular economy perspective. *Sustainability*, 11(11), 3089. <https://doi.org/10.3390/su11113089>
- Brocchi, D. (2022). *By disaster or by design?: Dalla crisi multipla alla grande trasformazione sostenibile*. Mimesis.
- Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.
- Commissione Europea, Directorate-General for Research and Innovation, Renda, A., Schwaag Serger, S., & Tataj, D. (2021). *Industry 5.0, a transformative vision for Europe: Governing systemic transformations towards a sustainable industry*. Publications Office of the European Union.
- Commissione Europea. (2022). *Relazione della commissione al parlamento europeo, al consiglio, al comitato economico e sociale europeo e al comitato delle regioni, sulla dimensione culturale dello sviluppo sostenibile nelle azioni dell'UE*. Bruxelles. <https://doi.org/10.3280/diri2014-001020>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- De las Heras-Rosas, C., & Herrera, J. (2021). Research trends in open innovation and the role of the university. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 29. <https://doi.org/10.3390/joitmc7010029>

De Massis, A., Frattini, F., Kotlar, J., Petruzzelli, A. M., & Wright, M. (2016). Innovation through tradition: Lessons from innovative family businesses and directions for future research. *Academy of Management Perspectives*, 30(1), 93–116. <https://doi.org/10.5465/amp.2015.0017>

Dorst, K. (2019). Design beyond design. *She Ji: The Journal of Design, Economics, and Innovation*, 5(2), 117–127. <https://doi.org/10.1016/j.sheji.2019.05.001>

Elmezeny, A., Edenhofer, N., & Wimmer, J. (2018). Immersive storytelling in 360-degree videos: An analysis of interplay between narrative and technical immersion. *Journal For Virtual Worlds Research*, 11(1). <https://doi.org/10.4101/jvwr.v11i1.7298>

Fondazione Symbola. (2023). *Io sono Cultura - Rapporto 2023*. Unioncamere.

Forman, J., Dogan, M. D., Forsythe, H., & Ishii, H. (2020, October). DefeXtiles: 3D printing quasi-woven fabric via under-extrusion. In *Proceedings of the 33rd Annual ACM Symposium on User Interface Software and Technology* (pp. 1222–1233). <https://doi.org/10.1145/3379337.3415876>

Germak, C., Bistagnino, L., & Celaschi, F. (2008). *Uomo al centro del progetto–Design per un nuovo umanesimo* [Man at the Centre of the Project–Design for a New Humanism]. Umberto Allemandi & C.

Governo Italiano. (2021). *PNRR, Piano nazionale di ripresa e resilienza #nextgenerationitalia*. Retrieved from <https://www.governo.it/sites/governo.it/files/PNRR.pdf> <https://doi.org/10.24965/reala.i17.11055>

Helms, M., Vattam, S. S., & Goel, A. K. (2009). Biologically inspired design: Process and products. *Design Studies*, 30(5), 606–622. <https://doi.org/10.1016/j.destud.2009.04.003>

Lambert, R., & Flood, R. (2017). *Understanding design-intensive innovation: A literature review*. Design Consul.

Langella, C. (2021). *Hybrid design: Progettare tra tecnologia e natura*. FrancoAngeli.

Magistretti, S., Dell’Era, C., Frattini, F., & Messeni Petruzzelli, A. (2020). Innovation through tradition in design-intensive family firms. *Journal of Knowledge Management*, 24(4), 823–839. <https://doi.org/10.1108/jkm-07-2019-0399>

Micelli, S. (2011). *Futuro artigiano: L'innovazione nelle mani degli italiani*. Marsilio Editori Spa.

Panneels, I., Helgason, I., Smyth, M., Darzentas, D., Hocking, L., & Shillito, A. (2023). Distance: Digital immersive technologies and craft engagement. In *Connectivity and Creativity in Times of Conflict: Cumulus Conference Proceedings Antwerp 2023*. <https://doi.org/10.26530/9789401496476-043>

Petruzzelli, A. M., Ardito, L., & Savino, T. (2018). Maturity of knowledge inputs and innovation value: The moderating effect of firm age and size. *Journal of Business Research*, 86, 190–201. <https://doi.org/10.1016/j.jbusres.2018.02.009>

Pye, D. (1968). *The nature and art of workmanship*.

Rohrer, C. (2014). When to use which user-experience research methods. *Nielsen Norman Group*, 12, 21.

Sauerwein, M., Doubrovski, E., Balkenende, R., & Bakker, C. (2019). Exploring the potential of additive manufacturing for product design in a circular economy. *Journal of Cleaner Production*, 226, 1138–1149. <https://doi.org/10.1016/j.jclepro.2019.04.108>

Veliz Reyes, A., Jabi, W., Gomaa, M., Chatzivasileiadi, A., Ahmad, L., & Wardhana, N. M. (2019). Negotiated matter: A robotic exploration of craft-driven innovation. *Architectural Science Review*, 62(5), 398–408. <https://doi.org/10.1080/00038628.2019.1651688>

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage.

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