



**Politecnico  
di Torino**

# **Support industrial conversion and product diversification strategies through Design-driven processes**

Implementation of Design culture as a strategic innovation in  
manufacturing companies

Doctoral Dissertation  
Doctoral Program in Management, Production and Design (36th Cycle)

By Eva Vanessa Bruno





**Politecnico  
di Torino**

**ScuDo**

Scuola di Dottorato - Doctoral School  
WHAT YOU ARE, TAKES YOU FAR

Doctoral Dissertation

Doctoral Program in Management, Production and Design (36th Cycle)

# Support industrial conversion and product diversification strategies through Design-driven processes

Implementation of Design culture as a strategic innovation in manufacturing companies

By

Eva Vanessa Bruno

—

Supervisors

Prof. Beatrice Lerma, Supervisor

Prof. Claudia De Giorgi, Co-Supervisor

—

Doctoral Examination Committee

Prof. Claudio Germak, Politecnico di Torino

Prof. Giulia Calabretta, Delft University of Technology

Prof. Flaviano Celaschi, Università di Bologna

Prof. Luca Casarotto, Università luav di Venezia

Prof. Annalisa Di Roma, Politecnico di Bari

Politecnico di Torino

2024

## ABSTRACT

For more than a decade, Italian manufacturing companies, particularly **SMEs**, have been going through a phase of great economic uncertainty characterised by **rapid and unpredictable changes** in consumption and demand, where **flexibility** becomes a key factor for competitive success. Within this landscape, the discipline and the practice of Design can play an essential role in meeting the challenge of **perceiving unexpected changes** and emerging trends by identifying in advance different market niches where companies can enter with new products or services.

The doctoral research fits into this context, using *Research through Design* as a qualitative-quantitative methodological approach to propose to manufacturing SMEs of components or semi-finished products the **adoption of design-driven and design-oriented strategies** of industrial conversion (referred to as IC in the text) or product diversification (referred to as PD in the text). The pathway aims to achieve a new positioning in B2C markets concordant with current trends by updating and expanding the company's product portfolio. Therefore, **the doctoral research aims to provide theoretical and practical tools that help designers, manufacturing companies, and local bodies integrate Design as a discipline and practice** within business strategies. In addition, the research wants to be part of the debate in the scientific communities in the area of Design and Innovation Management about **new words and locutions** that can connect the two disciplines through design culture.

4 Studying the research context by reviewing the relevant international literature and structuring a dataset visualisation to catalogue national case studies of successful conversions/diversifications where Design played a crucial role in business growth, the research identified preliminary strategic axes and Design-driven guidelines to be used in the subsequent phases, to create added value in the business reality.

Given the collaboration with the **Torino Chamber of Commerce**, the action-research scenario is limited to the **manufacturing sector in Piedmont**; its analysis allowed the selection of sectors in which to operate in the experimental phase, set up with a specific methodology validated at Delft University of Technology. In fact, the research included a practice-based design exploration (called *Design in Progress*, which involved two "case-study" companies from the province of Turin), which is configured as a path of support to product diversification or Design-oriented industrial conversion through Design-driven processes. In this experience, which can be defined as a pilot project, the typical Design culture and Design methods, enriched by those of Innovation Management, allowed an interdisciplinary reading of the local and corporate production context. The design of a vision-driven strategy, which takes the form of a **Strategy Roadmap** branched into **three time horizons**, is the result of experimentation. The Strategy Roadmap is broken down for each horizon into characterising strategic levers: values (of the company and users), technologies (in-house, external, and to be acquired), trends (market and generational), partners (established and new), and deployment (visibility channels). Last, the strategy

proposes concepts for new products or services to materialise the vision. The positive feedback from the practice-based design exploration that emerged from the participating companies demonstrated the valuable contribution that Design offers in response to the challenges faced by Italian manufacturing companies and lays the foundation for the implementation of the research on a larger scale. The final result of the doctoral research is a **theoretical-practical framework** that systematises tools for the selection and analysis of production systems and manufacturing realities, processes of corporate strategy design, as well as possible stakeholders involved and their relationships in order to encourage companies in the conscious introduction of Design as a tool for productive re-characterisation. In particular, the research yielded three final outcomes: 14 Design-driven strategy guidelines at the **knowledge** level, one Operational Framework at **practice** level and one Theoretical Framework for the **theory** level. These results can be applied in different territories and different industrial sectors as widespread support for creating a new competitive advantage through industrial conversion or product diversification. The designer, with a strategic designer role, here becomes a promoter of the new corporate vision and facilitator of the processes that enable its achievement. In the landscape of business support tools through the culture and practices of Design by universities and local authorities, research provides results using Design both as a means and as a tangible result.

## ABSTRACT

Da più di un decennio le imprese manifatturiere italiane, in particolare le PMI, attraversano una fase di grande incertezza economica caratterizzata da cambiamenti rapidi e imprevedibili dei consumi e della domanda, dove la flessibilità diventa un fattore chiave per il successo competitivo. All'interno di tale panorama, la disciplina del Design può svolgere un ruolo essenziale nell'affrontare la sfida di percepire i cambiamenti inattesi e le tendenze emergenti individuando con anticipo differenti nicchie di mercato in cui le aziende possono inserirsi con nuovi prodotti o servizi.

La ricerca dottorale si inserisce in questo contesto, utilizzando il *Research through Design* come approccio metodologico quali-quantitativo, per proporre alle PMI manifatturiere di componenti o semilavorati l'adozione di strategie di riconversione industriale o diversificazione produttiva guidate dal design (*Design-driven*) e orientate al design (*Design-oriented*). Il percorso mira a raggiungere un nuovo posizionamento in mercati B2C concorde con gli attuali trend, aggiornando e ampliando il portafoglio prodotti aziendale. Dunque, la ricerca dottorale si propone di fornire strumenti teorici e pratici che supportino designer, aziende manifatturiere ed enti locali a integrare il Design come disciplina e pratica all'interno delle strategie aziendali. Oltre a questo, la ricerca vuole inserirsi nel dibattito delle comunità scientifiche dell'area del Design e dell'*Innovation Management* rispetto a nuove parole e locuzioni in grado di collegare le due discipline tramite la cultura del progetto.

6

Studiando il contesto di ricerca con la revisione della letteratura internazionale di riferimento e con la strutturazione di un *dataset visualisation* per catalogare casi studio nazionali di riconversioni/diversificazioni di successo, dove il Design ha avuto un ruolo chiave nella crescita del business, la ricerca ha individuato dei preliminari assi strategici e linee guida *Design-driven*, da utilizzare nelle successive fasi, per creare valore aggiunto nella realtà aziendale.

Data la collaborazione con la Camera di commercio di Torino lo scenario di ricerca-azione è circoscritto al settore manifatturiero piemontese; la sua analisi ha permesso la selezione dei settori merceologici in cui operare nella fase di sperimentazione, impostata con una metodologia specifica validata presso l'università di Delft University of Technology. La ricerca infatti ha incluso una *practice based design exploration* (denominata *Design in Progress*, che ha coinvolto due aziende "caso-studio" provenienti dalla provincia di Torino), che si configura come un percorso di accompagnamento alla diversificazione produttiva o alla riconversione industriale *Design-oriented* attraverso processi *Design-driven*. In tale esperienza, definibile come un progetto pilota, la cultura e i metodi tipici del Design, arricchiti da quelli dell'*Innovation Management*, hanno permesso una lettura interdisciplinare del contesto produttivo locale e aziendale. La progettazione di una strategia guidata da un *vision*, che prende la forma di una **Strategy Roadmap** ramificata in tre orizzonti temporali (*horizons*), è il risultato finale della sperimentazione. La *Roadmap* è suddivisa per ogni

*horizon* in leve strategiche caratterizzanti: i valori (dell'azienda e degli utenti), le tecnologie (*in-house*, esterne e da acquisire), i trend (di mercato e generazionali), i partner (consolidati e i nuovi), la diffusione (canali di visibilità). Per ultimo, la strategia propone *concept* di nuovi prodotti o servizi per concretizzare la *vision*. I riscontri positivi della *practice based design exploration* emersi dalle aziende partecipanti hanno dimostrato il prezioso apporto che il Design offre in risposta alle sfide che le imprese manifatturiere italiane devono affrontare, e pongono le basi per l'implementazione della ricerca su scala più ampia.

Il risultato finale della ricerca dottorale è un **quadro teorico-pratico** che mette a sistema strumenti di selezione e analisi di sistemi produttivi e realtà manifatturiere, processi di progettazione della strategia aziendale, nonché possibili *stakeholder* coinvolti e le loro relazioni al fine di incoraggiare le imprese nell'introduzione consapevole del Design quale strumento di ri-caratterizzazione produttiva. In particolare, la ricerca ha prodotto tre risultati finali: 14 linee guida di strategia guidata dal design a livello di *knowledge*, un quadro operativo a livello di *practice* e un quadro teorico per il livello di *theory*. Tali risultati possono essere applicati in diversi territori e in differenti settori industriali, quale supporto diffuso per creare un nuovo vantaggio competitivo attraverso la riconversione industriale o la diversificazione produttiva. Il designer, con un ruolo di *strategic designer*, diventa qui promotore della nuova *vision* aziendale e facilitatore dei processi che ne permettono il raggiungimento. Nel panorama degli strumenti di supporto alle imprese attraverso la cultura e le pratiche del Design da parte di Università ed enti locali, la ricerca fornisce risultati utilizzando il Design sia come mezzo che come risultato finale tangibile.

*Support industrial conversion and product diversification  
strategies through Design-driven processes*



## Research domain and Keywords

### Design

### Innovation Management



### Research gap

Literature review points out that:

Industrial conversion and product diversification are not identified as strategies to integrate Design into manufacturing companies

### Research problem

Field and desk research points out that:

Manufacturing companies overlook Design practices as an added value to diversify the product portfolio to move to different markets or industries.



### Research questions

#### Main RQ:

What is the influence of the Design discipline and Design activity in corporate strategies for managing product portfolios in manufacturing companies?

**RQ1:** What design-driven guidelines can designers adopt for integrating the Design culture in manufacturing companies?

**RQ2:** What design-driven tools and approaches do designers need to boost design-oriented Industrial Conversion or Product Diversification?

**RQ3:** How can designers play a role in the strategic decision-making processes of businesses?

### Methodology and methods

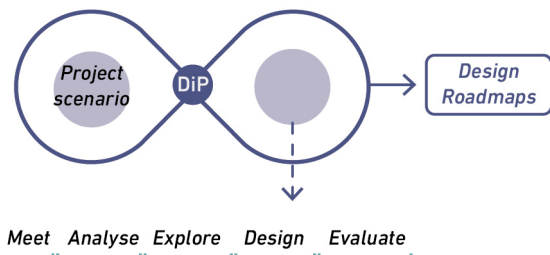
#### Research through Design

Qualitative/quantitative methods

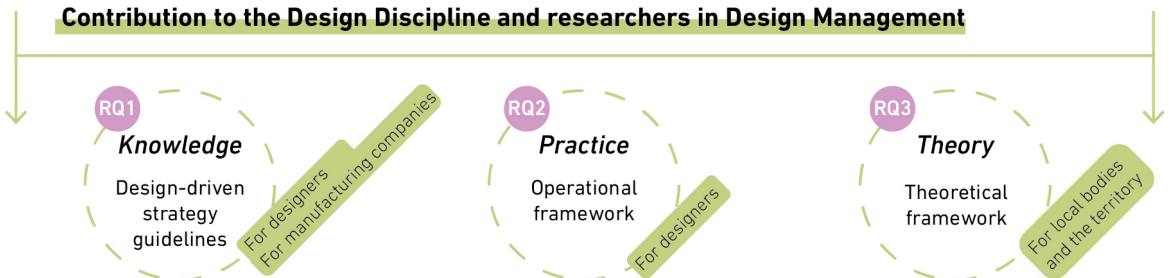
1. Research background
2. Interpreting
3. Designing
4. Validating and implementing

### Practice-based design explorations

Design in Progress



### Contribution to the Design Discipline and researchers in Design Management



## SELECTED BIBLIOGRAPHY

Best, K. (2015). *Design Management: Managing Design Strategy, Process and Implementation*. Bloomsbury Publishing.

Bianco, F., & Rampino, L. (2017). *Il designer in azienda: Il viaggio d'esplorazione di un giovane designer in una PMI no-design*. Franco Angeli Edizioni.

Björklund, T., Maula, H., Soule, S. A., & Maula, J. (2020). Integrating Design into Organizations: The Coevolution of Design Capabilities. *California Management Review*, 62(2), 100–124. <https://doi.org/10.1177/0008125619898245>

Blessing, L. T. M., & Chakrabarti, A. (2009). *DRM, a Design Research Methodology*. Springer London. <https://doi.org/10.1007/978-1-84882-587-1>

Borja de Mozota, B., & Wolff, F. (2019). Forty Years of Research in Design Management: A Review of Literature and Directions for the Future. *Strategic Design Research Journal*, 12(1), 4–26. <https://doi.org/10.4013/sdrj.2019.121.02>

Brown, T. (2008). *Design Thinking*. Harvard Business Review.

10

Buchanan, R. (2004). Management and Design. Interaction Pathways in Organizational Life. In R. Boland & F. Collopy (Eds.), *Managing as designing*. Stanford Business Books.

Calabretta, G., Gemser, G., & Hekkert, P. (2014). Extending design leadership to innovation strategy: Roles and tools. In E. Bohemia, A. Rieple, J. Liedtka, R. Cooper, & L. Santamaria (Eds.), *Proceedings of the 19th DMI: Academic design management conference*. The Design Management Institute.

Calabretta, G., Gemser, G., & Karpen, I. (2016). *Strategic design: Eight essential practices every strategic designer must master*. Bis Publishers.

Casarotto, L. (2018). Design e ricerca su misura delle imprese [Bespoke design and research]. In M. B. Spadolini (Ed.), *Design su misura: Atti dell'Assemblea annuale della Società Italiana di Design* (pp. 219–227). Società Italiana di Design. <http://www.societaitalianadesign.it/2022/06/28/design-su-misura/>

Cautela, C. (2019). *Design e Management: Alla ricerca di un comune terreno epistemologico [Design and Management: Searching for common epistemological ground]*. Self published.

Celaschi, F., Celi, M., & García, L. M. (2011). The Extended Value of Design: An Advanced Design Perspective. *Design Management Journal*, 6(1), 6–15. <https://doi.org/10.1111/j.1948-7177.2011.00024.x>

Celi, M. (Ed.). (2015). *Advanced Design Cultures*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-08602-6>

Cross, N. (1993). Science and design methodology: A review. *Research in Engineering Design*, 5(2), 63–69. <https://doi.org/10.1007/BF02032575>

Design Council. (2014). *Innovation by design. How design enables science and technology research to achieve greater impact*. Retrieved June 2022, from <https://www.idi-design.ie/content/files/innovation-by-design.pdf>

Dong, A., Kleinsmann, M., & Snelders, D. (2021). The Design of Firms: Part 1 – Theory of the Firm. *Design Issues*, 37(2), 60–76. [https://doi.org/10.1162/desi\\_a\\_00636](https://doi.org/10.1162/desi_a_00636)

Dong, A., Kleinsmann, M., & Snelders, D. (2021). The Design of Firms: Part 2 - Competitive Advantage. *Design Issues*, 37(3), 59–77. [https://doi.org/10.1162/desi\\_a\\_00648](https://doi.org/10.1162/desi_a_00648)

Dorst, K. (2015). *Frame innovation: Create new thinking by design*. The MIT Press.

Findeli, A., Brouillet, D., Martin, S., Moineau, C., & Tarrago, R. (2008, May 30). Research Through Design and Transdisciplinarity: A Tentative Contribution to the Methodology of Design Research. Swiss Design Network Symposium.

Garvey, B., & Childs, P. (2016). Design as an Unstructured Problem: New Methods to Help Reduce Uncertainty - A Practitioner Perspective. In A. Chakrabarti & U. Lindemann (Eds.), *Impact of Design Research on Industrial Practice* (pp. 333–352). Springer International Publishing. [https://doi.org/10.1007/978-3-319-19449-3\\_22](https://doi.org/10.1007/978-3-319-19449-3_22)

Germak, C. (Ed.). (2008). *Uomo al centro del progetto. Design per un nuovo umanesimo [Man at the centre of the project. Design for a new humanism]*. Allemandi.

Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86(12), 50–59.

Le, H. (2019). Literature Review on Diversification Strategy, Enterprise Core Competence and Enterprise Performance. *American Journal of Industrial and Business Management*, 09(01), 91–108. <https://doi.org/10.4236/ajibm.2019.91008>

Manzini, E. (2016). Design Culture and Dialogic Design. *Design Issues*, 32(1), 52–59. [https://doi.org/10.1162/DESI\\_a\\_00364](https://doi.org/10.1162/DESI_a_00364)

Lerma, B., Palù, D. D., & Giorgi, C. D. (2015). Advanced Design issues: A strategic and investigating research approach to design without a market. *Strategic Design Research Journal*, 7, 144–151. <https://doi.org/10.4013/SDRJ.2014.73.05>

Lerma, B., Dal Palù, D., Actis Grande, M., & De Giorgi, C. (2018). Could Black Be the New Gold? Design-Driven Challenges in New Sustainable Luxury Materials for Jewelry. *Sustainability*, 10(1). <https://doi.org/10.3390/su10010002>

Montagna, F., & Cantamessa, M. (2019). Unpacking the innovation toolbox for design research and practice. *Design Science*, 5, e8. <https://doi.org/10.1017/dsj.2019.3>

Morrison, A. (Ed.). (2023). *Anticipatory design literacies (Vols 1 and 2)*. Oslo School of Architecture and Design (AHO)-FUEL4DESIGN project. [http://design-friction.com/dfi/DesignFuturesLiteracies\\_Vol1\\_PracticesProspects.pdf](http://design-friction.com/dfi/DesignFuturesLiteracies_Vol1_PracticesProspects.pdf)

12

Muratovski, G. (2015). Paradigm Shift: Report on the New Role of Design in Business and Society. *She Ji: The Journal of Design, Economics, and Innovation*, 1(2), 118–139. <https://doi.org/10.1016/j.sheji.2015.11.002>

Parente, M., & Sadini, C. (2018). *D4T–Design Per I Territori. Approcci, metodi, esperienze [D4T–Design For Territories. Approaches, methods, experiences]*. List Lab.

Poli, R. (2019). *Lavorare con il futuro: Idee e strumenti per governare l'incertezza [Working with the future: Ideas and tools for dealing with uncertainty]*. Egea.

Quint, E., Gemser, G., & Calabretta, G. (2022). *Design leadership ignited: Elevating design at scale*. Stanford Business Books, an Imprint of Stanford University Press.

Rae, J. (2013). What is the real value of design? *Design Management Review*, 24(4), 30–37. <https://doi.org/10.1111/drev.10261>

Rampino, L. (2012). *Dare forma e senso ai prodotti. Il contributo del design ai processi d'innovazione: Il contributo del design ai processi d'innovazione [Giving shape and meaning to products. The contribution of design to innovation processes: The contribution of design*

to innovation processes]. Franco Angeli Edizioni.

Rampino, L. (2011). The Innovation Pyramid: A Categorization of the Innovation Phenomenon in the Product-design Field. *International Journal of Design*, 5, 3–16.

Simonse, L. W. L. (2017). *Design roadmapping*. Bis Publishers.

Stappers, P. J., & Giaccardi, E. (2017). Research through design. In M. Soegaard & R. Friis-Dam (Eds.), *The encyclopedia of human-computer interaction (2nd ed., pp. 1–94)*. The Interaction Design Foundation.

Telalbasic, I. (2021). The Value of Design-driven Entrepreneurship. *The Design Journal*, 24(5), 675–682. <https://doi.org/10.1080/14606925.2021.1960700>

Taleb, N. N. (2016). *The black swan: The impact of the highly improbable (Second Edition)*. Penguin Books.

Valencia, A., Lievesley, M., & Vaugh, T. (2021). Four Mindsets of Designer-Entrepreneurs. *The Design Journal*, 24(5), 705–726. <https://doi.org/10.1080/14606925.2021.1958601>

Verganti, R. (2008). Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda. *Journal of Product Innovation Management*, 25(5), 436–456. <https://doi.org/10.1111/j.1540-5885.2008.00313.x>

