Design Contribution to the Competitive Performance of SMEs: The Role of Design Innovation Capabilities

Please cite this article as:

Landoni P, Dell'Era C, Ferraloro G, Karlsson H, Peradotto M and Verganti R (2016).
Design contribution to the competitive performances of SMEs: The role of design innovation capabilities.
Creativity and Innovation Management, Vol. 25, No. 4, Pp. 484-499.
(DOI: 10.1111/caim.12165)

Design contribution to the competitive performances of SMEs: The role of design innovation capabilities

Paolo **LANDONI** (corresponding author)
Department of Management, Economics and Industrial Engineering,
Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy
Tel: +39 02 2399 3973; Fax: +39 02 2399 2720
paolo.landoni@polimi.it

Claudio DELL'ERA
Department of Management, Economics and Industrial Engineering,
Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy
Tel: +39 02 2399 2798, Fax: +39 02 2399 2720
claudio.dellera@polimi.it

Gregorio **FERRALORO**
Department of Management, Economics and Industrial Engineering,
Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy

Mattia **PERADOTTO**
Department of Management, Economics and Industrial Engineering,
Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy

Helena **KARLSSON**
School of Innovation, Design and Engineering
Mälardalen University –P.O. Box 325, 631 05 Eskilstuna Sweden

Roberto VERGANTI
Department of Management, Economics and Industrial Engineering,
Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy
Tel: +39 02 2399 2770, Fax: +39 02 2399 2720
roberto.verganti@polimi.it

Keywords: Design Innovation Capabilities, Design Innovation, Small and Medium Enterprises

Acknowledgements
As stated in the paper, the research was conducted within the framework of the 'DeEP' EU Project (Design for European Policy) and thus benefited from the input, the suggestions, and the contributions of all participants in the project. We acknowledge this crucial contribution, but the opinions expressed in this article are those of the authors and we assume full responsibility for them and for any errors. Financial support from the Lombardy Region fund 'Dote Ricercatori e della Dote Ricerca Applicata per lo sviluppo del capitale umano nel sistema universitario lombardo' is also gratefully acknowledged.

Design contribution to the competitive performances of SMEs: The role of design innovation capabilities

Abstract

The strategic role of design-driven innovation is being increasingly recognized. Many studies show that investments in design positively influence the innovative capacity of firms and consequently their competitive performances. However, few researchers have explored how this relationship comes about. The studies that over the years have contributed to the understanding of design have identified two main barriers: the lack of a common language on design, and poor analysis of the dynamics that characterize the relationship between investment in design and competitive performances. In this paper, we investigate six SMEs located in the Lombardy region (Italy) that have received funding from a policy aimed to develop design innovation capabilities. We identify and discuss five different design innovation capabilities and we analyse their role in mediating the relationship between investment in design and competitive performances.

Keywords: Design Innovation Capabilities, Design Innovation, Small and Medium Enterprises

1. Introduction

The importance of innovation for enterprises' competitiveness is today widely acknowledged, and the strategic role of design-driven innovation is being increasingly recognized (Dumas and Mintzberg, 1989 and 1991; Hargadon and Sutton, 1997; Boland and Collopy, 2004; Rindova and Petkova, 2007; Verganti, 2006, 2009 and 2011; Michlewski, 2008). Many researchers have cited empirical evidence to support the thesis that design, and more specifically investments in design, positively influence the innovative capacity of firms (Gemser and Leenders, 2001; Hertenstein et al., 2005; Veryzer, 2005). The main studies that over the years have contributed to the understanding of design have identified two main barriers: the lack of a common language on design, and the scarce significance of the results obtained when seeking to identify the factors, related to investments in design, that are central to improving the business results of firms (Swink, 2000; Wallace, 2001; Chiva and Alegre, 2009; Candi, 2010).

There is general political agreement in Europe that all forms of innovation need to be supported to ensure competitiveness, prosperity and well-being. Design is increasingly recognised as a key discipline and activity to bring ideas to the market, transforming them into user-friendly and

appealing products or services[1]. The European Commission asked the European Design Leadership Board (EDLB), a group of 15 experts from industry, SMEs, national and regional innovation agencies and the academic world, to make proposals on how to improve the integration of design, user-driven innovation and other non-technological drivers into innovation policy and support; they define design, as an 'activity of people-centred innovation by which desirable and usable products and services are defined and delivered'[2]. The European Design Innovation Initiative was launched in 2011 to exploit the full potential of design-driven innovation and to reinforce the links between design, innovation and competitiveness[3]. To accelerate the take-up of design in innovation policy, particular importance is given to three strategic areas for action: (i) Promoting understanding of design's impact on innovation; (ii) Promoting design-driven innovation in industries to strengthen Europe's competitiveness; (iii) Promoting the adoption of design to drive renewal in the public sector. In fact few studies focus on the capabilities able to impact positively on competitive performances (Jevnaker, 1998; Swan et al., 2005; Moultrie and Livesey, 2009). While several studies focus on innovation capabilities (e.g. Teece and Pisano (1994), Lawson and Samson (2001), Marsh and Stock (2003), O'Connor (2008), Börjesson et al. (2014)), only few researches focus on design innovation capabilities (e.g. Hatchuel et al. (2002), Hatchuel et al. (2006), Le Masson et al. (2011)). In this paper we try to open the enterprise's 'black box' and determine how the relationship between investments in design and competitive performances is mediated by design innovation capabilities and influenced by the environment (see Figure 1).

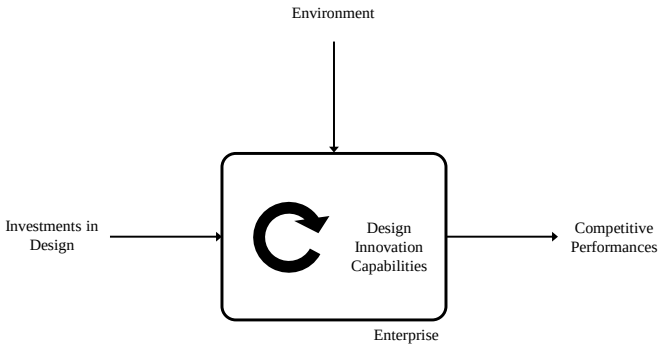

Figure 1: Research Framework

[1] Innovation Union Flagship Initiative of the Europe 2020 strategy for growth and jobs, commitment 19, SEC(2010) 1161.
[2] Definition by the EDLB in Design for Growth & Prosperity Report, 2012, http://ec.europa.eu/enterprise/policies/innovation/policy/design-creativity/index_en.htm
[3] More on the European Design Innovation Initiative: http://ec.europa.eu/enterprise/policies/innovation/policy/design-creativity/index_en.htm#h2-3.

We based our research on the analysis of six case studies on SMEs located in the Lombardy region (Italy) that have received funding from the design-supporting policy entitled "Un designer per le Imprese" (A Designer for Each Company). The research was conducted in the context of a wider European funded project on the evaluation of design policies called DeEP project (Design for European Policy project - http://www.deepinitiative.eu/ -). The focus on firms of similar size operating in a similar context, and with comparable investments in design provided by the policy enabled us to observe the effects of these investments with less 'noise' from other factors.

The paper is organized as follows. In the next section we highlight the most recent literature on the relationship between design and performance. In the third section we introduce the conceptual framework that guided the research, and in the fourth section we illustrate methodological aspects and the case studies analysed. The fifth section presents the empirical results, while the sixth section concludes the paper, suggesting some managerial and policy implications of the findings.

2. Literature review

Studies on innovation management have often focused on two domains: technologies and markets. Technological innovation has attracted the most attention, especially as far as radical technological change is concerned. More recently, the perspective on innovation has become more systemic (Xu et al., 2007; Ortt and van der Duin, 2008). Design has recently received close attention from practitioners and scholars as a source of innovation. In today's business and academic arenas, design is increasingly viewed as an important strategic asset. Design is no longer identified as a mere aesthetic and stylistic concept; rather, it is seen as a strategic tool given the sustainable competitive advantage that it can give to the firm (Dumas and Mintzberg, 1989 and 1991; Pesendorfer, 1995; Schmitt and Simonson, 1997; Verganti, 2003; Bloch et al., 2003; Cappetta et al., 2006). As said, few studies focus on the capabilities able to impact positively on competitive performances (Jevnaker, 1998; Swan et al., 2005; Moultrie and Livesey, 2009). For this reason, the literature review is organized into two main streams: first we survey the research studies exploring the relationships between design and competitive performances; then we focus on studies in the literature on design innovation capabilities.

2.1. Design and competitive performances

Many scholars and researchers have explored how design has become a fundamental asset for firms and entrepreneurs. Having grown significantly together with the level of awareness on the subject, design's importance derives from the role that it plays as an enabler of sustainable competitive

advantages in the long run. In fact, many studies have shown the existence of a positive link between investments in design and performance improvements (Borja de Mozota, 2003; Swan et al., 2005; Bedford et al., 2006; Utterback, 2008; Chiva and Alegre, 2009; Zec and Jacob, 2010; Gemser et al., 2011). Despite a lack of systematic theories on design and the great ambiguity surrounding its definition, many scholars of management and innovation have attempted to quantify the contribution of design to business processes and practices (Borja de Mozota, 2003; Boland and Collopy, 2004; Creusen and Schoormans, 2005; Hertenstein et al., 2005; Veryzer, 2005).

Several scholars approximate the capacity to launch design-driven innovations by considering the number of design awards or by asking design professionals to rate the skills and achievements of companies (Hertenstein et al, 2005; Dell'Era and Verganti, 2007; Dell'Era and Verganti, 2010; Gemser et al., 2011) Companies characterized by a systematic approach to design record substantially better financial performances than their competitors (Roy, 1994; Swan et al., 2005; Bedford et al., 2006; Gemser et al., 2011). Best practices based on design show a long-term, persistent, and stable effect on performances (Roy, 1994; Hertenstein et al., 2005). While the effect on sales of technical innovation decreases as soon as the product in which it has been embedded reaches maturity, design shows a positive impact on sales across the entire product life-cycle (Talke et al., 2009). Several researchers have analyzed the relationship between competitive performances and investments in design, the purpose being to identify a sort of Return on Investment (ROI) for design (Wallace, 2001; Johansson, 2006; Zec and Jacob, 2010). Firms with more investment opportunities and with bigger budgets usually have financial positions better than those of their competitors (Gemser and Leenders, 2001; Swedish Industrial Design Foundation, 2004; Candi, 2010). Nevertheless, the results arising from investments in design are decisively mediated by the design practices adopted by the company (Danish Design Centre, 2003; Chiva and Alegre, 2009). Some researchers show that financial indicators alone are unable to capture and evaluate the overall value of design; the impact of design on the performances and results of organizations, in fact, is mediated by factors that make it difficult to provide an accurate measurement based only on financial data (Borja de Mozota, 2006; Johansson, 2006; Gabrielsen et al., 2007). The effects of design practices can be tangible when they create a direct economic return. But they may also be intangible when they contribute to the future performance of firms by impacting on non-quantifiable factors, such as the culture and business philosophy, strategic knowledge assets, and business approach specific to each firm (Inns, 2002).

2.2 Design innovation capabilities

The relationship between investment in design and competitive performances can be significantly influenced by design capabilities (Danish Design Centre, 2003; Chiva and Alegre, 2009), similarly to the way in which innovation capabilities are seen to mediate the relationship between investment in innovation and competitive performances (Teece and Pisano, 1994; Helfat et al, 2007; Teece, 2011; Moultrie et al, 2012). The notion of innovation capabilities has its roots in organizational capability theory and resource based view of the firm (e.g. Penrose, 1959; Grant, 1996). Christensen (1997) describes organizational capabilities along the dimensions of: (i) resources, which includes people, equipment, technology, product designs, brands, information, cash, and relationships with external partners; (ii) processes or the methods/activities used to transform inputs into higher value outputs and include the organization's patterns of interaction, coordination, communication, and decision-making; and (iii) values such as decision making criteria and the mindsets of decision-makers. Francis and Bessant (2005) describe the innovation capability or the capability to innovate as the aptitude to exploit new ideas successfully, while Assink (2006: p. 219) defines it as ''the internal driving energy to generate and explore radical, new ideas and concepts, to experiment with solutions for potential opportunity patterns detected in the market's white space and to develop them into marketable and effective innovations''. Innovation capability is also described as the ability to generate and create new knowledge in the collective recreation of value (LeMasson et al., 2010). These capabilities are built upon combinations of firm-specific assets and competences (Xu et al., 2007) that often contain tacit knowledge (Teece and Pisano, 1994). The tacit content of such firm-specific design and innovation capabilities makes them difficult to acquire, imitate and transfer between firms (Teece and Pisano, 1994; Colarelli O´Connor, 2008; Ho et al, 2011). Transfer barriers rise to a level where transaction costs potentially create a sustainable competitive advantage (Barney, 1991; Teece and Pisano, 1994). According to Barney (1991), "these resources are valuable, rare, imperfectly imitable and non-substitutable". Dynamic capabilities are defined as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Leonard-Barton, 1992; Teece et al., 1997). "Dynamic capabilities reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions" (Leonard-Barton, 1992). Since innovation is by definition change and deviation from what has been (OECD, 2005; Ortt and van de Duin, 2008; Tidd and Bessant, 2009), capabilities to innovate must be sufficiently dynamic to meet new requirements and drive innovation in changing environments. If the firm is unable to meet changing requirements and environments, it risks decreasing its relative innovativeness, and its innovative capability is lost over time (Hamel and Pralahad, 1996; Christensen, 1997; Markides, 2001; Sniukas, 2010). Dynamic capabilities are not only considered prerequisites for the enhancement of

existing resources in order to maintain competitiveness over time; they also enable a firm to reconfigure in a way that takes advantage of rapidly changing environments (Xu, 2007; Teece). Since dynamic capabilities are considered to be the very source of a sustained competitive advantage (Teece, 1997; Xu et al., 2007), they should be the focus of innovation management (Teece et al., 1997; Helfat et al., 2007; Sniukas, 2010). As the concept of innovation and design has expanded far beyond technical products and aesthetics, so the management of innovation has moved beyond the management of single processes. It is necessary today to take a more holistic approach to innovation, incorporating it into the framework of the firm's strategy and treating it as a function of 'all processes' that generates synergies within the innovation system between technological and non-technological innovation. (Xu et al., 2007) Only by approaching innovation as an interlinked part of all processes can the firm address the overall process and better meet and adapt to the 'real demands' of today's customer-centered economy.

Building on the seminal study by Teece and Pisano (1994), some authors have introduced the concept of 'design capabilities' (Jevnaker, 1998; Swan et al., 2005; Moultrie and Livesey, 2009). Scholars of design management have attempted to identify the distinctive features of design capabilities: some of them derive these specific capabilities from the product development process literature (Perks et al., 2005), other scholars identify these specific capabilities by analyzing functions and/or business-units dedicated to the practice of design (Chiva and Alegre 2009). Design capabilities consist of "diverse and mutually-interconnected" assets (Ho et al, 2011) that contribute to a firm's ability to innovate. Hatchuel and Weil (1999) term "design-oriented organizations" the kinds of organization favorable to collective learning cycles, which are themselves conducive to this simultaneous regeneration of objects, skills and occupations. Investments in design capabilities also include investments in intangibles, which have historically been treated as expenses, rather than as investments (Moultrie and Livensey, 2014). In this paper we concentrate on *Design Innovation Capabilities* defined as those capabilities that enable companies to innovate their product's functional (performance, functionality), social (how am I perceived by others) and emotional (how does it make me feel) utilities.[4]

3. Conceptual Framework

As previously mentioned, and as underlined by the literature analyzed, the relationship between investments in design (independent variable) and competitive performances (dependent variable)

[4] The definition of design innovation capabilities derives from the definition of design as " the set of activities that focus on the integration of functional, emotional and social utilities" introduced in €Design (2013).

can be mediated by several factors. Firstly, investments in design can be of two different kinds: they can be *internal* if they are defined and allocated according to the enterprise's design strategy (*Internal Investments in Design*) or *external* if they are supported by external organizations such as policy-makers, governmental institutions, etc. (*External Investments in Design*). Furthermore, investments in design contribute to the stock of design innovation resources and capabilities (*Design Innovation Resources* and *Capabilities*): the former are the tangible assets that enterprises can exploit in order to support the development of design innovations (economic resources, technologies, tools, etc.); the latter are the intangible assets that enterprises can adopt in order to enable the development of design innovations (people, knowledge, methodologies, etc.). By drawing on the literature about the resource based-view, we can interpret design innovation resources as physical resources (Barney, 1986), while design innovation capabilities represent human and organizational resources (Starbuck, 1992). The interaction between resources and capabilities allows the development of design innovations like the registration of design patents (*Design Innovation Performance*), which, as demonstrated by the literature described in the previous section, influence competitive performances. Obviously, other enterprise performances – such as those of the supply chain or of sales and marketing – can influence competitive performances such as market share, sales volume, etc. (*Other Enterprise Performances* and *Competitive Performances*). In this perspective the variable "Other Enterprise performances" is another variables that mediates the relationship between investments in design and competitive performances. Finally the enterprise system can be significantly influenced by the environment in which the company operates (*Environment*): the presence and the quality of design schools, design centers, etc. can significantly influence the behaviors of companies located in specific environments (see Figure 2).

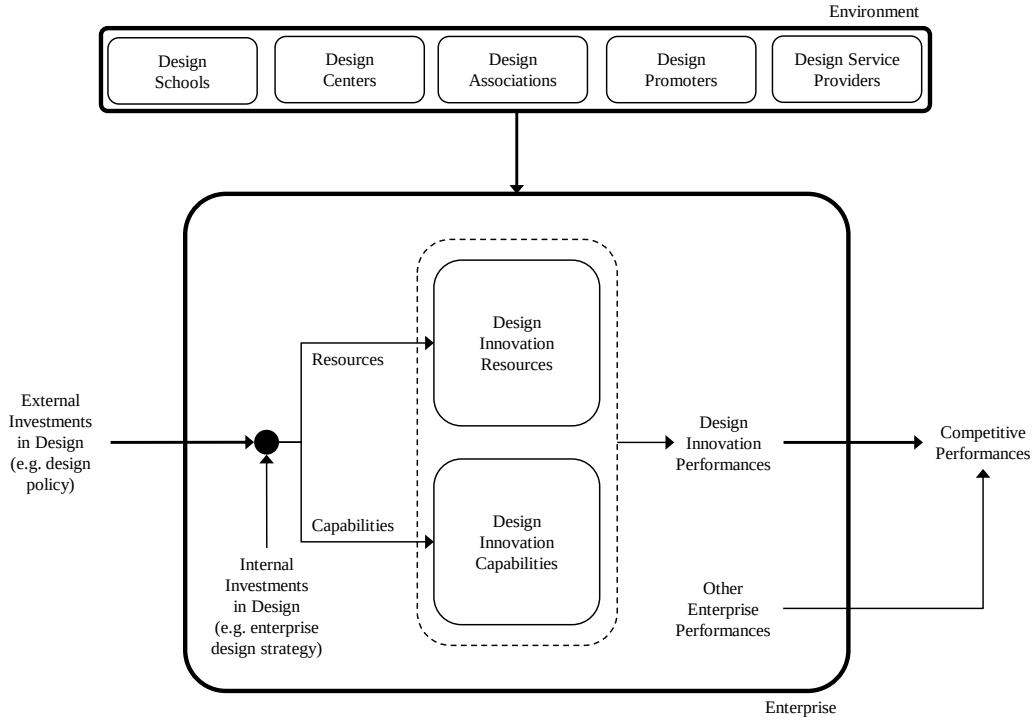

Figure 2: Conceptual Framework

Having reviewed the main literature streams and introduced the conceptual framework, we now present the research questions. As we pointed out in the literature review section, the relationship between investment in design and competitive performances has already been explored. The aim of our research is to verify the role played by *Design Innovation Capabilities* in mediating this relationship. More precisely, accordingly to the literature, we operationalize the *Design Innovation Capabilities* in five main capabilities:

1. Holistic view;
2. How people give meaning to things;
3. Applying new technology;
4. Visualizing and Materializing;
5. Managing the design process.

The *holistic view* concerns the ability to manage design as an overall process strongly linked with the business strategy and medium to long-term planning. On this view, design assumes a crosscutting role within the company and is no longer considered as the ability to make a product more aesthetically appealing and marketable, but rather as a strategic tool available to management (Xu et al. 2007). Exploring this dimension may mean, for example, verifying that there are clear interactions and connections between the design activities and the company's strategy. Similarly to what mentioned by Lawson et al. (2001) about innovation capabilities, the link between vision,

strategy and innovation is important to effective innovation management. Leveraging this capability requires understanding the value of design in the broadest sense and perceiving its value for competitive advantage in the global scenario. Indeed, we can refer to the *holistic view* design capability as the firm's ability to manage design as a process strongly linked with the medium-long term business strategy.

How people give meaning to things concerns the ability to perceive and interpret the process that consumers adopt when giving meanings to products. In this regard, we refer to studies on design-driven innovation by looking at the market, not to understand the functional needs of consumers, but to design new experiences by assigning new meanings to existing products or new products (Verganti, 2009).

Applying new technology concerns the ability to implement processes, tools, machinery and technologies to improve the management and development of new products. This capability is one of the most simple to explore because it is incremented when new procedures or machines are used within the enterprise. It is possible to monitor this increase by checking whether there have been investments in new infrastructure such as research labs, or if highly skilled profiles have been hired, as in the case of the Italian policy. According to Lawson et al. (2001), innovative companies are able to link their core technology strategies, with innovation strategy and business strategy. Each technology embeds many potential applications: the most immediate ones are generally those endorsed and boosted by who managed the technological development; others are more hidden and quiescent and do not fit with the current context. "Technologies offer opportunities", as the semiologist Giampaolo Proni (2007) says, "which are of course not infinite, but are greater in number than those imagined by early developers". Consequently technological breakthroughs can enable the development of completely different applications that address different needs in comparison to the previous generation.

Visualizing and Materializing concerns the ability to conceptualize and give physical concreteness to the ideas produced through better visualization. This capability is closely linked with the third one. As when use is made of new technologies, such as digital prototyping systems and 3D printers, so the increase of this capability is 'pulled' by the use of the new technologies (Verganti, 2009).

Managing the design process concerns the ability to manage the design process effectively and efficiently as a set of intertwined activities (Xu et al., 2007), integrating these activities with those already present within the new product development process. Managing the design process means improving design activities if they are already present, or defining new activities to be integrated with the processes currently present in the firm.

The paper aims at answering the following research questions (see Figure 3):

RQ1: How do investments in design impact on *design innovation capabilities*?

RQ2: How do *design innovation capabilities* impact on competitive performances?

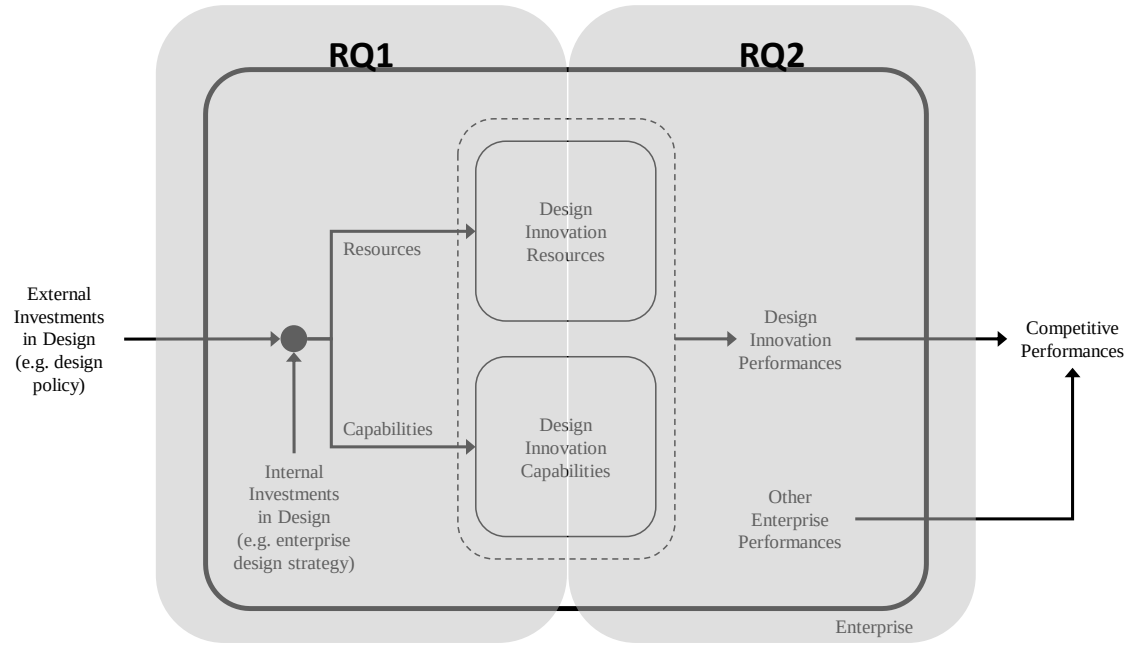

Figure 3: Conceptual Framework and Research Questions

4. Methodology

To answer the research questions we adopted the case study methodology, which is consistent with a theory building approach (Yin, 2009). In particular, we applied a multiple-case study design (Eisenhardt, 1989; Yin, 2009) to analyze the role and impact of Design Innovation Capabilities. We studied six SMEs located in the Lombardy region (Italy) that had invested in design by accessing the public design-support policy named "A Designer for Each Company". By focusing on similar firms operating in the same region and receiving similar support in terms of design investment, we were able to reduce the number of mediating factors, as shown in Figure 4. In particular, we reduced the disturbance due to the *Environment* (all the companies surveyed belonged to the same environment) and the one due to *Resources* (all the companies surveyed had received the same resources). In this way we were able to more easily understand the mediating role of the variable

"Design Innovation Capability" in the relationship between the "Investment in Design" variable (independent variable) and the "Competitive Performance" variable (dependent variable).

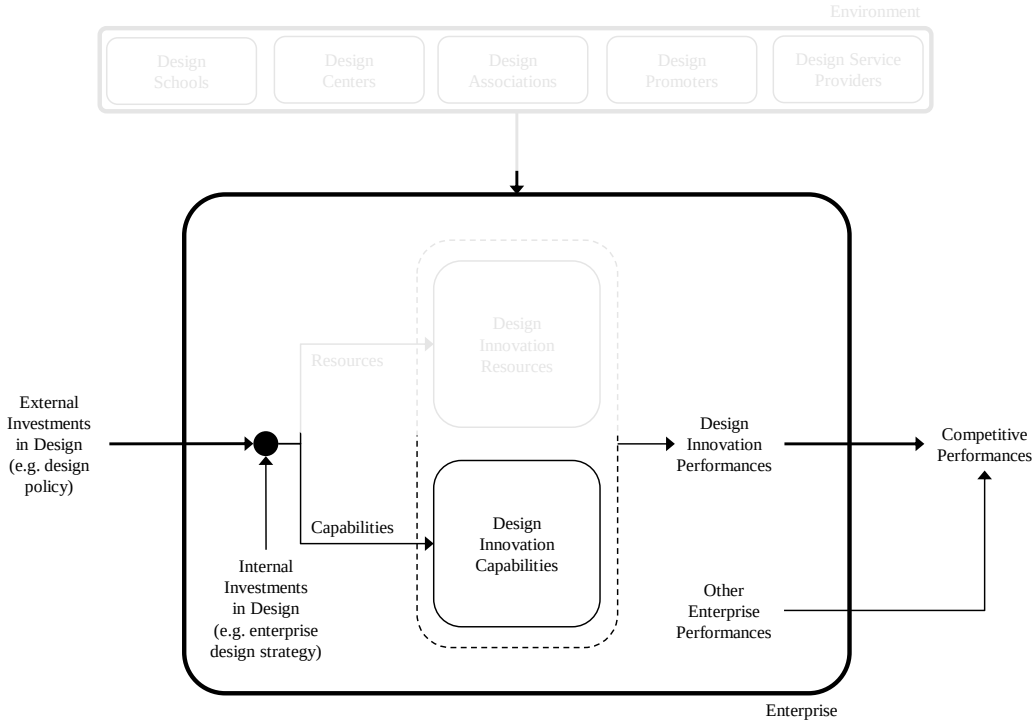

Figure 4: Empirical setting

The "A Designer for Each Company" policy is promoted by the Chamber of Commerce of Milan and the Province of Milan with the purpose of creating a broader perception of the value of design and new materials among SMEs and to facilitate encounter and collaboration between companies and young designers so as to produce product prototypes. The policy, in fact, foresaw the possibility for the companies selected to involve designers from one of the four design schools and universities in Milan (Domus Academy, Istituto Europeo di Design (IED), NuovaAccademia di Belle Arti (NABA), Faculty of Design of Politecnico di Milano). The policy was launched in 2010, and because of its success it was replicated in the following years, when it involved new institutional funders. The beneficiary firms are selected among SMEs with a first-come, first-served approach, that do not introduce a bias in the analyzed sample.

Edition	**Budget [k€]**	**# of SMEs supported**	**# of projects developed**	**# of prototypes developed**	**# of products launched on the market**
2010	200	15	60	15	6
2011	120	15	60	15	5
2012	155	25	90	26	4

Table 1: Data on the "A Designer for Each Company" policy

Our research focused on companies participating in the 2011 Edition, in particular on the six companies listed in Table 2. The choice of companies that received funding in 2011 allowed us to verify the impacts of investment in design after a few years because the empirical part of the research was carried out in 2013. We selected companies from different sectors, producing different products (furniture, apparel, marble design, accessories, medicine) and that experienced different overall performances in terms of turnover. In other words we designed the cases to cover different conditions as suggested by Yin (2009) in order to identify patterns of difference or similarities (theoretical replication).

Beneficiary Firms	Industry	Foundation year	Employees (2011)	Markets	Turnover 2010 [k€]	Turnover 2011[k€]	Turnover 2012 [k€]
A4ADesign	Furniture design	2002	6	Europe	290	300	300
Leone1947	Boxing apparel	1947	14	Worldwide	3.955	4.350	5.000
Merli Marmi	Marble design products	1982	5	Italy	370	390	470
MomoDesign	Accessories and clothing	1981	12	Europe	1.430	1.627	1.585
Sonnomedica	Sleep disorder medicine	2006	6	Italy	180	200	217
Tucano Urbano	Biker clothing	1999	30	Europe	15.800	13.600	11.400

Table 2: Case Studies

To collect the data necessary for our analysis we prepared two questionnaires to submit to the two main actors of the design policy: the policy-makers and the related institutions on one hand and the beneficiaries on the other. We interviewed two policy makers involved in the design of the policy and in the (political) process of approval. We also interviewed two managers of the intermediaries that were involved in the design and the day-by-day management of the policy. These interviews lasted between half an hour and forty-five minutes each and allowed us to understand on one hand the mechanisms and the resources involved in the policy and on the other its expected benefit. We then interviewed managers of the beneficiary firms focusing only on how they have used the resources provided. We focused on determining the impacts of the investments in design and the relationships between these investments and the increase in Design Innovation Capabilities. For

each firm we interviewed a top-manager (President, CEO or General Director) and one or two managers involved in the execution of the project related to the policy. The first interview was focused on the strategic reasons behind the choice to apply and on the overall results. The second interview was focused on the use of the resources, the development of the Design Innovation Capabilities and their impact. The interviews were conducted by one senior researcher and there were always present at least two other researchers (senior o junior). The interviews with the top-managers lasted approximately half-an-hour while the other interviews lasted approximately two hours. The interviews were registered and then transcribed. Finally, the interviews were complemented with secondary sources data such as company reports, company financial information and documents on the projects and the products discussed. The data of each firm were analyzed by two senior researchers and two junior researchers separately and then in a series of research meetings and discussions. The theoretical development process was favored by subsequent involvement of two other senior researchers. One of these researchers has analyzed similar cases in her country (cases of firms that received support from a similar Design Policy). These cases were not included in this paper because of the differences in terms of context (environment) and policy (resources), but they helped to further confirm the results of the analyses.

5. Empirical results and Discussion

This section presents the findings of our research, following the model and the questions presented in the previous section.

5.1. RQ1: How do investments in design impact on *design innovation capabilities*?

Having dealt with the first research question, we now analyse how investment in design impacts on design innovation capabilities (see Figure 6).

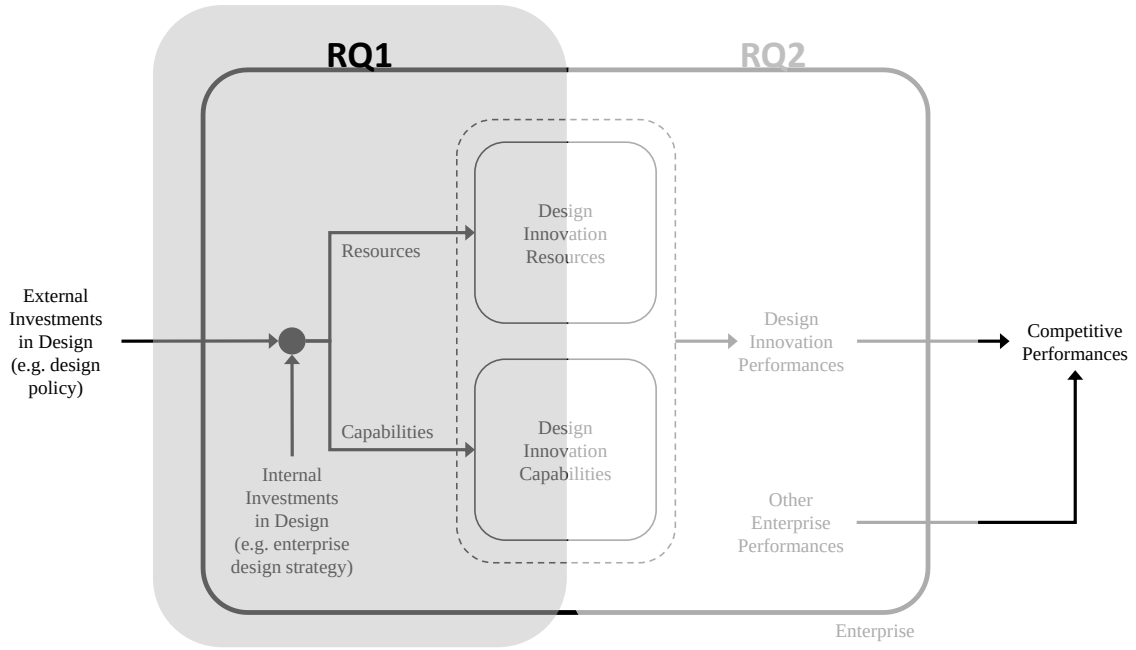

Figure 6: Research Question 1

Measuring the impacts of investments means assessing target policies regarded as 'injections' of design into firms. All of the companies interviewed had experienced more or less explicit changes in their business, their processes, and their approach to the market. We have seen that these capabilities are increased by investments in design through a *design innovation capabilities absorption* process based on the Design Management Absorption Model (DMAM) proposed by Acklin (2011, 2013; see also Zahra and George, 2002) (see Figure 7).

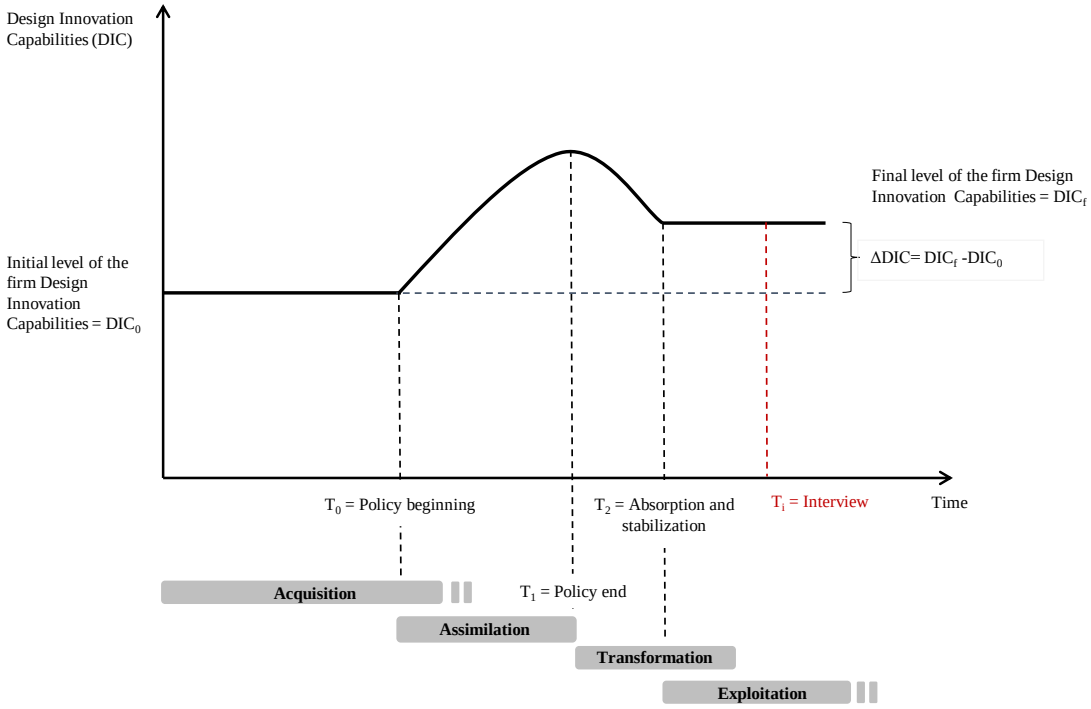

Figure 7: Absorption model of design innovation capabilities

The model depicted in Figure 7 shows the trend of design innovation capabilities (DIC) over time, and its increase as a result of investments in design and participation in supporting policies. As a result of participation in a design policy, the growth of design innovation capabilities must be achieved in part by the company, with its own investments aimed at strengthening its skills, and in part enabled by the collaboration with designers. In this simple model, we have assumed a correspondence between the beginning of the investment in design or the participation in a policy and the beginning of impacts on capabilities within the firm. Along the 'y' axis we have located the initial level of design innovation capabilities (DIC_0), or in other words, prior knowledge in terms of design accumulated over time. Precisely for this reason, different firms will be represented with different initial levels of design expertise up to a limit of $DIC_0 = 0$ in the case of a complete absence of capabilities. During the investment period, emphasis is placed on the presence of a number of external variables that may impact on the absorption process, and that tend to vary the amplitude of the curves between the companies. The increase is measured at T_i, the moment in time when the results were collected, through the differential obtained by enterprises, ΔDIC. As the basis for the retention of *design knowledge*, we have considered the four phases of skill retention used by Acklin (2011) in the DMAM model: Acquire, Assimilate, Transform and Exploit. To understand the relationships between these four stages and the growth of design innovation capabilities, we report the definition provided by Acklin (2011):

1. *Acquire*: Identification of specific design contribution to a company that consists of recognizing the potential of design as a strategic resource;
2. *Assimilate*: Combination of new design knowledge to goals and processes, which entails a deeper understanding of the new design knowledge by connecting it to company goals;
3. *Transform*: Deployment of design knowledge and improvement through building design management capabilities and using design tools to improve all customer touch points: such as products, brands, services, or communication processes: such as NPD or innovation processes;
4. *Exploit*: Companywide implementation of new knowledge will involve the implementation of the design resources through integrating design into processes, co-ordinating functions, aligning core values and training the staff. It becomes evident that design is not a one-off activity but needs further top investments.

The main feature of the model concerns the retention capacity of the investing companies, which extends beyond individual participation in the policy support. Through the four phases mentioned above, firms will have to retain and transform the acquired skills, integrating them into their internal processes through a process of exploitation.

In the model, we have assumed that the final value achieved by the design innovation capabilities will not be equal, in absolute value, among different companies. Rather, it will have the same trend, reaching the maximum value at the end of the Assimilation phase, and then declining and stabilizing in the next phases through the integration of new skills in the innovation processes. The initial boost to growth is imparted by participation in policies and/or by investments within the company. In this phase, the company is focused on the development of the design capabilities; it receives or invests funds; and it commits resources. For instance, in many cases there are collaborations with design agencies or designers, the development of research projects and marketing studies, etc. In the subsequent phase, the design innovation capabilities decline because the collaborations, the project, etc., end together with the funds and the commitment. But the design innovation capabilities do not return to the previous level thanks to the investments and the experiences developed, and thanks to a *transformation* phase in which these capabilities are diffused inside the organization. During the study, we found that firms with less experience in design, and therefore a lower initial level of skills (DIC_0), reached a final level (DIC_f) greater in terms of absorption, and consequently achieved better results in terms of performance compared with those of companies with greater design maturity. In this regard, we report a significant insight of Giovanni Rivolta, founder of A4Adesign:

"*(...) we are a design-centred enterprise; we work in daily contact with design. We are all designers, and of course we understand the importance of the theme from a strategic point of view. Precisely for this reason we have not found changes in our processes or activities, we still work as before*" [Giovanni Rivolta - A4Adesign]

The growth of design innovation capabilities therefore depends not only on the level of investment but also on the individual company's knowledge and previous experience of design. The substantial impact of investments in design on design innovation capabilities differs among firms. Also different is the importance perceived by companies and assigned to design innovation capabilities. In those firms with high design maturity, like MomoDesign and A4Adesign, the increase in the holistic view following participation in the policy was almost undetectable. This result also emerges from the interviews in which these firms declared they had not perceived significant changes because they were used to working with design on a daily basis. In contrast to what was found in firms like LEONE1947, which thanks to collaboration with designers had introduced a new line of products. For the majority of firms with low design maturity, we found significant increases in individual design innovation capabilities. This is the case of firms such as LEONE1947, MerliMarmi, and Sonnomedica, whose statements, in the section devoted to the increases in internal resources, are self-explanatory in regard to the increases obtained.

To summarise, investments in design by those companies that have already involved, within their business, activities or collaborations with designers, will have less impact in relative terms compared to companies which have never invested in design. This consideration entails that the capabilities do not grow linearly; rather, the percentage increase will become less and less with increasing investments over time. That is what happened at A4Adesign, a Milan company run by two architects, where one of the two founders Giovanni Rivolta stated:

"We decided to try and apply for the project but our expectations were quite low. We thought that no useful ideas or innovative products could come from other designers, so we looked at the policy with a bit of skepticism. This is because we are a design firm, so the last thing we could think about was looking for help with a design project" [Giovanni Rivolta - A4Adesign].

This non-linearity is related to the definition of Design Innovation Capabilities. Indeed having a "design perspective", a design approach based on holistic view, experimentation etc. is a big step forward in terms of product and service development. And it is a big development for the whole company. The whole company is exposed to a new way of thinking, new processes, etc. in a form of collective learning. After this big "jump" further investments have a more limited impact.

5.2. RQ2: How do *design innovation capabilities* impact on competitive performances?

The second research question concerned the impact of design innovation capabilities on competitive performances (see Figure 8).

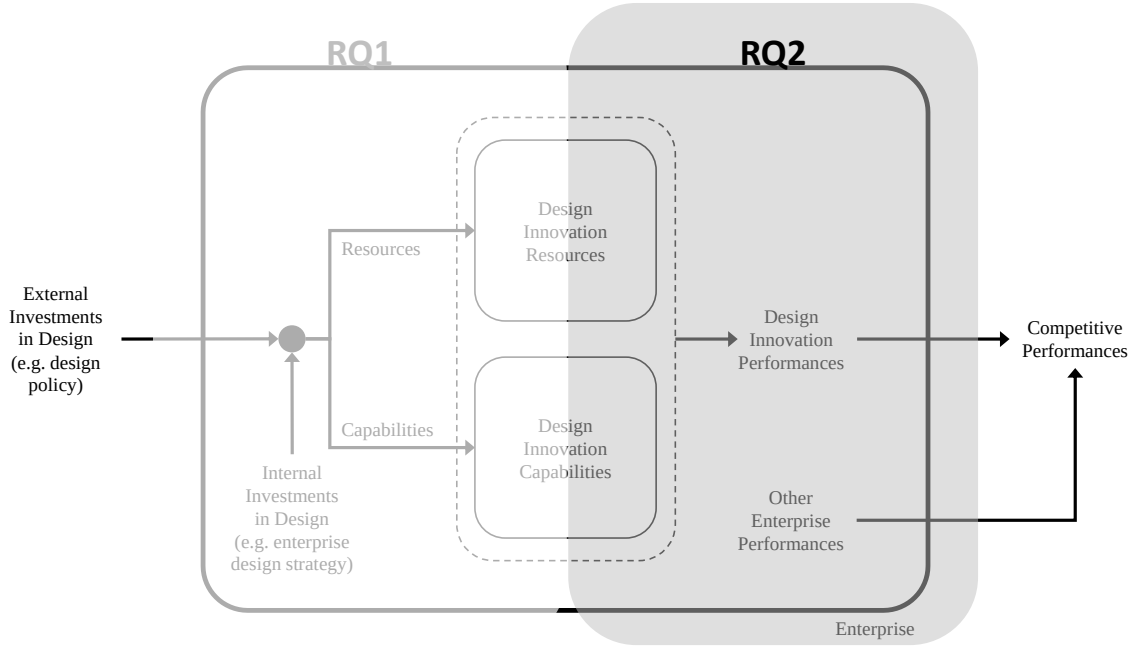

Figure 8: Research Question 2

Instead of focusing only on the traditional indicators (revenues, profits, etc.) we have considered also the impact of the policy on recruitment strategies. Indeed, many companies have hired or continued to collaborate with designers since the policy ended. This finding shows that the design resources were perceived as strategic, fundamental, and hard to imitate, confirming that design enables firms to obtain sustainable competitive advantages even in the short term. This is a relevant result in itself. Design Innovation Capabilities have been easily identified as strategic and they have quickly became a relevant component of the firms: once exposed to their value the companies didn't want to go back to their previous status.

We have verified how the firms observed a relationship between improvement in the design innovation capabilities and their performance, experiencing positive impacts especially in the definition and visualization phases of their strategy. This finding is consistent with that of past research studies, which suggest that there is some overlap between design management studies and

strategic management studies, where design is seen as a strategic resource for firms (Utterback et al., 2008). Paolo Merli, Chief Executive of Merli Marmi, has underlined this evidence:

"*This experience helped us to have new ideas, the ideas of designers and people external to the company; they did not know the material, so they imagined it in a completely original and innovative way with respect to those already present in the marble industry*" [Paolo Merli – Merli Marmi].

The interviewee highlighted that the higher level of design innovation capabilities impacted on design innovation performances (design awards, collaborations with external designers, etc.) and also on overall innovation performances (time to market, number of new products). Finally as previously seen, in the majority of firms there was an increase in turnover despite the economic crisis affecting Italy's economy in the years observed. As noted when introducing the conceptual framework, these overall performance cannot be related only to the new products and the development of the Design Innovation Capabilities. But at the same time overall performance (turnover) are an important indicator of the overall impact of these capabilities and the interviewee explicitly indicated this impact.

Participation in the policy and the changes introduced can be evaluated by analysing the pre-policy or pre-investment situation and the post-policy situation. Comparison of turnover in 2012 with the turnover of the companies in 2010 and 2011 shows that many of these firms had experienced a significant increase[5]. LEONE1947 recorded a turnover growth of 26.6%, similar to Merli Marmi, which in two years increased its turnover by 27.7% and Sonnomedica, which achieved a 20% increase in turnover. The lowest growth was that of MomoDesign (10.8%).

More in general, the main impact of the higher level of design innovation capabilities can be seen in the sales of new products. Thanks to their design investments, the firms analysed have introduced new products that are obtaining significant success in the markets. The statement by LEONE1947 exemplifies the design innovations in these new products:

"We have made a new pair of boxing gloves in different colours; it would seem an irrelevant detail, except that this way they are not allowed in official competitions. It was a great innovation for LEONE, not only for us, but also for the boxing market in general. We turned to a new target consumer, developing an entire line which has now become our core business, the amateur fitness market" [Veronica Masiero - Leone1947].

[5] Only Tucano Urbano saw a reduction of its turnover in the years examined despite the participation to the policy. However i) the company is bigger than the others and so less influenced by the policy ii) the company was already well acquainted with designer and the design approach (see RQ2) and iii) its products and its sector in general (Biker clothing) were more affected by the economic crisis.

This evaluation of the results obtained was confirmed by the promoter of the policy, the Chamber of Commerce of Milan, through the statement by Roberto Calugi, Area Manager for Competitiveness of Companies:

"In every edition of the policy, more and more companies participate and more and more prototypes arrive at the final design stage ready for the market. Evaluation of the policy, from my point of view, can be made in terms of the increasing number of new products placed on the market" [Roberto Calugi - Chamber of Commerce of Milan]

During the research we tried to define a hierarchy among the five capabilities proposed, but it was not possible to isolate individual contributions to performances. We can conclude that these design innovation capabilities are closely related to each other, and for this reason it is not possible to disentangle the impact that each one individually has on performances. From this it follows that, in order to experience an improvement in performances and to ensure a long-term competitive advantage for their company, managers should handle all the five design innovation capabilities at the same time, choosing the right indicators and the correct evaluation system to monitor them.

6 Conclusions

The paper has analyzed how the relationship between investments in design and competitive performances is mediated by internal capabilities. The analysis conducted on the literature and beneficiary companies that had received funding from the design-supporting policy entitled "Un designer per le Imprese" (A Designer for Each Company) showed that investments in design had an impact on the skills of the companies and more precisely on five Design Innovation Capabilities: the *Holistic view* concerns the company's ability to manage design as an overall process strongly linked with the business strategy and medium-to-long term planning; *How people give meaning to things* concerns the company's ability to perceive and interpret the process that consumers follow when giving meaning to products; *Applying new technology* concerns the company's ability to implement processes, tools, machinery and technologies to improve the management and development of new products; *Visualizing and Materializing* concerns the company's ability to conceptualize and give physical concreteness to the ideas produced through better visualization; *Managing the design process* concerns the company's ability to manage the design process effectively and efficiently as a set of intertwined activities, integrating these activities with those already present within the new product development process.

The empirical results show that the growth of design innovation capabilities depends not only on the level of investment, but also on the individual company's knowledge and previous experience of design. The substantial impact on design innovation capabilities due to investments in design differs among firms. Many companies have hired or continued to collaborate with designers since the policy ended. This finding shows that the design resources were perceived as strategic, fundamental, and difficult to imitate, confirming that design allows firms to obtain sustainable competitive advantages even in the short term.

Managers must be aware of the importance of design innovation capabilities and of the processes that integrate design into innovation processes. Managers aware of the existence and potential of these five design innovation capabilities should adopt measurement and assessment systems of capabilities levels so that they can monitor and take actions to increase them and to diversify their creative and technical resources. This is fundamental especially for firms that have already integrated design and design approaches in their firms because, as shown, the impact of adding more designers is not linear (the impact of the first designers is higher).

To conclude, we acknowledge some limitations of our work. First, we have tried to highlight how investment in design translates into design capabilities and performance, but some aspects of these dynamics remain unexplored. For instance, the role of professional designers and of other professionals (e.g. engineers) inside the company should be further analysed. Similar analysis could be interesting in regard to the role of managers and the impact of the firm's development phase (start-up, growth, etc.).

Second, future research could enrich the analysis by investigating how the initial stock of design innovation capabilities can influence the various relationships. Similarly, it would be interesting to analyze the enabling role of design innovation resources and investigate how they influence the relationships among design innovation capabilities, design innovation performances, and competitive performances. Finally, it would be interesting to quantitatively examine the non-linearity result (higher impact for firms that were not exposed to Design Innovation Capabilities before) and the irreversibility hypothesis (once exposed to Design Innovation Capabilities the firms continue to collaborate with designers or hire them).

7. References

- Acklin C. (2011) Design-Driven Innovation Process Model Design. Management Journal Volume 5, Issue 1, pages 50-60
- Acklin C (2013), Design Management Absorption Model - A Framework to Describe the Absorption Process of Design Knowledge by SMEs with Little or No Prior Design Experience. Creativity and Innovation Management. Volume 22, Issue 2, pages 147–160, June 2013
- Assink, M., 2006. Inhibitors of disruptive innovation capability: a conceptual model. *European Journal of Innovation Management* 9 (2) 215–233.
- Barney J (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, Vol. 17, No. 1, Pp. 99-120.
- Bedford C, Hertenstein JH, Plat MB and Desbarats G. (2006). Profiting by Design. *Design Management Review*, Vol. 17, No. 2, Pp. 54-59
- Boland RJ and Collopy F (2004), *Managing as Designing*, Stanford CA: Stanford University Press
- Borja De Mozota B. (2003), *Design Management - Using Design to Build Brand Value and Corporate Innovation*. Allworth Press
- Borja De Mozota B. (2006) The Four Powers of Design: A Value Model in Design Management. *Design Management Review*, Vol. 17, No. 2, Pp. 44-53
- Börjesson S, Elmquist M, Hooge S (2014). The challenges of innovation capability building: learning from longirudinal studies of innovation efforts at Renault and Volvo Cars. *Journal of Engineering and Technology Management*, Vol. 31, Pp. 120-140.
- Candi (2010), Benefits of Aesthetic Design as an Element of New Service Development. *Journal of Product Innovation Management*
- Colarelli O'Connor, G. 2008. Major Innovation as a Dynamic Capability: A Systems Approach. Journal of Product Innovation Management, 313–33
- Chiva R. and Alegre J. (2009), Investment in Design and Firm Performance: The Mediating Role of Design Management. *Journal of Product Innovation Management*
- Christensen, C. M. 1997. *The innovatiors dilemma*, Boston, Harvard Business Review Press.
- Creusen MEH and Schoormans JPL (2005), The Different Roles of Product Appearance in Consumer Choice. *Journal of Product Innovation Management*, Vol. 22, Pp. 63-81
- Danish Design Centre, National Agency for Enterprise and Housing. The Economic Effects of Design, Copenhagen: 2003 in Bitard & Basset 2008

- Dell'Era C and Verganti R (2007). Strategies of Innovation and Imitation of Product Languages. *Journal of Product Innovation Management*, Vol. 24, Pp. 580-599.
- Dell'Era C and Verganti R (2010). Collaborative Strategies in Design-intensive Industries: Knowledge Diversity and Innovation. *Long Range Planning*, Vol. 43, Pp. 123-141.
- €Design (2013) ANALYTICAL FRAMEWORK PAPER, Contributors: Nomen E., Moultrie, J., Roig I. http://www.measuringdesignvalue.eu
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. Academy of Management Review, 14, 532–550.
- Francis, D., Bessant, J., 2005. Targeting innovation and implications for capability development. *Technovation* 25 (3) 171–183.
- Gabrielsen G, Gronhaug K, Kahle L, Kristensen T, Plenborg T and Wilke R (2007), Is Good Design Good Business? In *Industrial Design, Competition and Globalization*: Palgrave Macmillan
- Gemser G and Leenders M. (2001), How integrating industrial design in the product development process impacts on company performance. *Journal of Product Innovation Management*, Vol. 18, Pp.28-38
- Gemser G Candi M and van den Ende J. (2011), How Design Can Improve Firm Performance. *Design Management Review*, Vol. 22, No. 2, Pp. 72-77
- Grant, R., 1996. Towards a knowledge based theory of the firm. *Strategic Management Journal* 17 (Winter Special Issue) 109–122.
- Hamel, G. & Prahalad, C. K. 1996. Competing for the future, Boston, Massachusetts, Harvard Business School Press.
- Hatchuel A, Le Masson P, Weil B (2002). From Knowledge Management to Design Oriented Organizations. International Social Science Journal, Blackwell Publishing / UNESCO 171 (March 2002):25-37.
- Hatchuel A, Le Masson P, Weil B (2006). Building Innovation Capabilities. The Development of Design-Oriented Organizations. In: Hage J, Meeus M (eds) *Innovation, Science and Industrial Change*, the Handbook of Research. Oxford University Press, New-York, pp 294-312.
- Helfat CE, Finkelstein S, Mitchell W, Peteraf MA, Singh H, Teece D and Winter SG. (2007) Dynamic Capabilities Understanding Strategic Change In Organizations, Blackwell Publishing, MA, USA

- Hertenstein JH, Platt MB, Veryzer RW. (2005), The Impact of Industrial Design Effectiveness on Corporate Financial Performance. *Journal of Product Innovation Management*, Vol. 22, Pp. 3-21
- Inns T (2002), *The Tangible and Intangible Impact of Design Activity*. Dundee: Duncan of Jordanstone College of Art & Design, 2002
- Jevnaker, B.H. (1998) Building Up Organizational Capabilities in Design. In Bruce, M. and Jevnaker, B.H. (eds.) *Management of Design Alliances: Sustaining Competitive Advantage*. JohnWiley & Sons, Chichester.
- Johansson, U. 2006. Design som utvecklingskraft. En utvärdering av regeringens designsatsning 2003 2005. Växjö University Press, Göteborg.
- Lawson B, Samson D (2001). Developing Innovation Capability in Organisations: a Dynamic Capabilities Approach. *Intenational Journal of Innovation Management*, Vol. 5, No. 3, Pp. 377-400.
- Le Masson P, Hatchuel A, Weil B (2011). The Interplay Between Creativity issues and Design Theories: a new perspective for Design Management Studies? *Creativity and Innovation Management*, Vol. 20, No. 4, Pp. 217-237.
- Le Masson P, Weil B, Hatchuel A (2010). Strategic Management of Innovation and Design. Cambridge University Press, Cambridge Marsh SJ, Stock GN (2003) Building Dynamic Capabilities in New Product Development through Intertemporal Integration. *Journal of Product Innovation Management*, Vol. 20, Pp. 136-148.
- Leonard-Barton, (1992) Core capabilities and core rigidities: A paradox in managing new product development
- Markides, C. 2001. Strategy as balance: From "either-or" to "and". *Business strategy review*, 12**,** 1.
- Moultrie J. and Livesey M. (2009) *International Design Scoreboard: Initial indicators of international design capabilities*. Cambridge: Institute for Manufacturing.
- Moultrie, J. and Livesey, F. (2014) Measuring design investment in firms: Conseptual foundations and exploratory UK survey. *Research Policy,* Vol. 43, Pp. 570-587
- O'Connor GC (2008). Major Innovation as a Dynamic Capability: A Systems Approach. *Journal of Product Innovation Management*, Vol. 25, Pp. 4, Pp. 313-330.
- OECD 2005. Oslo Manual - Guidelines for Collecting and Interpreting Innovation Data 3rd edition ed. Paris.
- Ortt, j. R. & van der duin, p. A. 2008. The evolution of innovation management towards contextual innovation. *European Journal of Innovation Management*

- Penrose, E.T., 1959. *The Theory of the Growth of the Firm*. Wiley, New York.
- Perks, H., Cooper, R. and Jones, C. (2005) Characterizing the Role of Design in the New Product Development: An Empirically Derived Taxonomy. Journal of Product Innovation Management
- Proni (2007). Interview by author, Bologna, November 15.
- Roy R. (1994), Can the Benefits of Good Design Be Quantified? *Design Management Journal*, Vol. 5, No. 2, Pp. 9-17
- Sniukas, M. 2010. *Reshaping Strategy - Exploring the Content, Process and Context of Strategic Innovation,* Saarbrücken, VDM Verlag Dr. Müller Aktiengesellschaft & CO. KG.
- Starbuck S (1992). Learning by Knowledge-Intensive Firms. *Journal of Management Studies*, Vol. 29, No. 6
- Swan KS., Kotabe M and Allred BB (2005), Exploring robust design capabilities: Their role in creating global products, and their relationship to firm performance. *Journal of Product Innovation Management*, Vol. 22, No. 2, Pp. 144-164
- Swedish Industrial Design Foundation, Swedish Agency for Economic and Regional Growth (2004)
- Swink M (2000). Technological Innovativeness as a Moderator of New Product Design Integration and Top Management Support. *Journal of Product Innovation Management*.
- Talke K, Salomo S, Wieringa JE and Lutz A. (2009), *What about Design Newness? Investigating the Relevance of a Neglected Dimension of Product Innovativeness. Journal of Product Innovation Management, Vol. 26,* Pp. 601-615
- Teece D.J. and Pisano G. (1994). The Dynamic Capabilities of Firms
- Teece D.J. (2011). *Dynamic Capabilities & strategic management*. New York, USA, Oxford University Press Inc
- Tidd, J. & Bessant, J. 2009. *Managing Innovation,* West Sussex, England, John Wiley & Sons Ltd.
- Utterback J. (2008) Design-Inspired Innovations
- Van de Ven, A. H., Polley, D. E., Garud, R. & Venkataraman, S. 2008. *The Innovation Journey,* New York, Oxford University Press.
- Verganti R. (2009), Design-Driven Innovation, Changing the rules of competition by radically innovating what things mean
- Veryzer R.W. (2005), The Roles of Marketing and Industrial Design in Discontinuous New Product Development. *Journal of Product Innovation Management*, Vol. 22, No. 1, Pp. 22–41

- Wallace R. (2001), Proving Our Value: Measuring Package Design's Return on Investment. *Design Management Review*, 12, vol. 3
- Xu, Q., Chen, J., Xie, Z., Liu, J., Zheng, G., & Wang, Y. 2007. Total Innovation Management: a novel paradigm of innovation management in the 21st century. *Journal of Technol Transfer*, 32**,** 9-25.
- Yin R.K. (2009). Case study research: Design and methods. Thousand Oaks (CA): Sage.
- Zec and Jacob B. (2010), *Design Value*: Red Dot Edition
- Zollo, M. & Winter, S. G. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* 13**,** 339-351.