

The value of design: an issue of vision, creativity and interpretation

Mariana Fonseca Braga

Politecnico di Milano

mariana.fonseca@polimi.it

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Abstract: What is the value of design? Why should firms invest in design? The paper aims at clarifying the value of design, its dimensions and its variables (qualitative and quantitative) throughout a literature review and analysis. The premise is that firms invest in design to create value. Design has evolved, becoming closely related to innovation, and the need to clarify its dimensions and relationships to value within firms and society rises. Despite the global growing interest in design, it is not fully understood how it brings benefits to the company. The concept of value is found in a fragmented literature including economics, marketing, business, management, value engineering, design domains, social and environmental sustainability. In conclusion, the value of design still is under-researched and new dimensions emerge. It is shaped by designers and companies visions, creativity and interpretations. Better cross-fertilization is required to identify the mechanisms of value creation by design.

Keywords: value of design, vision, creativity, cross-fertilization



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1. Introduction

The paper is organized in four sections in order to provide a framework to develop the analysis that draws the answers for the questions and the conclusion. It starts pointing out design definitions, and the evolution of the term and activity is provided in order to contribute to the understanding of the relationships between value and design, as well as its enlargement.

The value of the design section lies in clarifying the concepts of value reported in several domains and their limitations referring to the design perspective. Topic 4. Why should companies invest in design? elaborates on the motives to adopt design, describing some reported studies that have approached the economic benefits generated by design in the companies and highlighting qualitative dimensions related to competitive advantage.

The discussion and conclusion topics are presented in two parts. The first part summarises the value of design dimensions and variables according to the different perspectives reported that can be related to design.

The second part emphasizes the need to grasp design's nature and practices to better achieve cross-fertilization. In this sense, the paper extends the Cross (2001), D'Ippolito (2014) and Heskett (2009) concerns about the importance of understanding design practices and theories. Design and its value are perceived as a question of vision (Borja de Mozota 2006, Danish Design Centre 2003, Heskett 2009, Trueman and Jobber 1998, Walsh 1996), creativity and interpretation.

2. Design: definitions, approaches and potential

"Design is all around you, everything man-made has been designed, whether consciously or not" (Hunter 2014)

The word design has its origin in the Latin term *designare* which means "mark out, devise, choose, designate, appoint," where *de-* means "out" and *signare* means "to mark," from *signum* "a mark, sign" (Online Etymology Dictionary).

Leonardo Da Vinci is considered the first designer, but his legacy refers more to invention (Bürdek 2006). The beginning of the industrial era (XVII-XVIII) separates design and manufacturing in the company (Bürdek 2006, Forty 2007). Design starts taking on a mediator role between producers and users to convey social aspirations to products' designs in a European perspective (Forty 2007).

Two main streams of Design can be identified: (1) the inclusive one, that considers the multiplicity of design regarding arts and craftwork and (2) the polytechnic culture, where design is a branch of architecture and interacts with engineering, being called industrial design (Trocchianesi and Guglielmetti 2012, p. 39).

The polytechnic culture is related to approaches that are close to product development and product engineering involving product design at the project level (e.g. Baxter 1998, Pugh

1991, Ulrich and Eppinger 1995). Baxter (1998) defines product-design as the set of project activities, which can be overlapped, systematically planned and managed to approach each project context.

The inclusive perspective can be observed in the Italian *cultura del progetto*¹ (Munari 2008, Paris 2014), where the immersion in design is part of the culture and history and emerges from diverse relationships framed in the company throughout its experience and its relationships to diverse stakeholders, generating meanings that are conveyed to and valued by people.

The idea of design culture conceptualizes design as a mediator between the production and consumption worlds (Deserti and Rizzo 2014, Forty 2007). The designer is seen as an interpreter of social aspirations and serves as a means to convey values through products, services, experiences and so on.

Verganti (2008) introduces the concept of design driven innovation, a top-down approach to design. Instead of a user-centered design approach, the strategy of design driven innovation is used by design intensive firms based on their visions about possible new product meanings and languages that could spread in society (Verganti 2008). The design intensive company uses external interpreters to understand, anticipate and influence the emergence of new product meanings (Verganti 2008). According to Verganti (2008, p. 450), “this process is more knowledge based than creativity based”.

Bottom-up (or user-centered) approaches such as design thinking (Brown 2008) and emotional design (Norman 2008) are emergent in North-America, especially in the USA, where the focus on market and consumer-related needs are perceived throughout their industrial design history and culture (Paris 2014).

Norman (2008) describes the design expertise as the one responsible for discovering the users’ needs that they cannot express by themselves. Several ethnographic methods and the use of inter-disciplinary teams have been suggested to achieve users’ needs through design thinking (Brown 2009). Norman (2008) develops the argument that emotion plays a fundamental role in better products use; people feel more motivated to solve problems or to grasp products’ use as a consequence of the emotional relationship established through product's aesthetics.

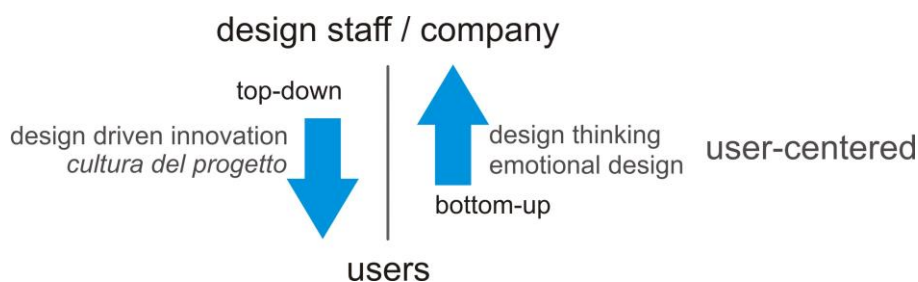


Figure 1 Top-down and bottom-up approaches to design. The inspiration flow.

¹ The term is not considered synonymous of design culture.

Top-down approaches emphasize designers as interpreters who bring the disruption, which could not be imagined by users who are used to behave according to a referable context, presenting difficulty to create breakthrough concepts. In this sense, top-down approaches have been considered more useful to achieve disruptive (or radical) innovations and bottom-up approaches to incremental innovations or improvements (Norman and Verganti 2014).

Design creates more than a tangible world composed of goods, driving the development of new ideas, strategies, services, brands and users' experiences. The emphasis on innovation changes from technology, R&D (e.g. Clark and Wheelwright 1993) to design principles: inspiration, ideation and implementation (Brown 2009).

The International Council of Societies of Industrial Design (ICSID 2015) acknowledges design as a fundamental means of innovation:

“Industrial Design is a strategic problem-solving process that drives innovation, builds business success and leads to a better quality of life through innovative products, systems, services and experiences.”

The Design Council (2015) broadly defines design as:

“a way of thinking that helps large organisations, small and medium-sized enterprises, social enterprises and charities change the way they work”.

Design Council (2015) definition assumes that design plays a fundamental organizational role related to the human-resources involvement and its ability to change. Heskett (2009, p. 82) highlights the design activity as a source of innovation, stressing the role of design to envision change.

Design potential has enlarged as well as its definition, being studied in several domains and being considered as an important competence to achieve innovation in enterprises (Brown 2009, Design Council 2007a, 2007b, ICSID 2015, Maeda, et al 2015, Verganti 2008) with its own ways, practices, knowledge and language (Cross 2001, Deserti and Rizzo 2014, Zurlo and Cautela 2014).

The complexity of evidencing design roles, “modes of use” and benefits for organizations becomes visible. Design management, business, design and competition are examples of fields that try to accomplish this clarification.

Exploring the design role in business success, Walsh (1996) interpreted design as an activity which overlaps with R&D and technological innovation, and can also contribute to the business of the company. She provides the insight that the way design is led by the company is a crucial issue along with resources invested (Walsh 1996).

The growing interest in design benefits for firms leads to the development of models and tools, such as the Design Management Staircase model from the Design Management Europe survey (Kootstra 2009) and the design ladder tool shown in Figure 2 (Danish Design Centre 2007), in order to grasp the design phenomena in companies, according to the ways companies see and use design.

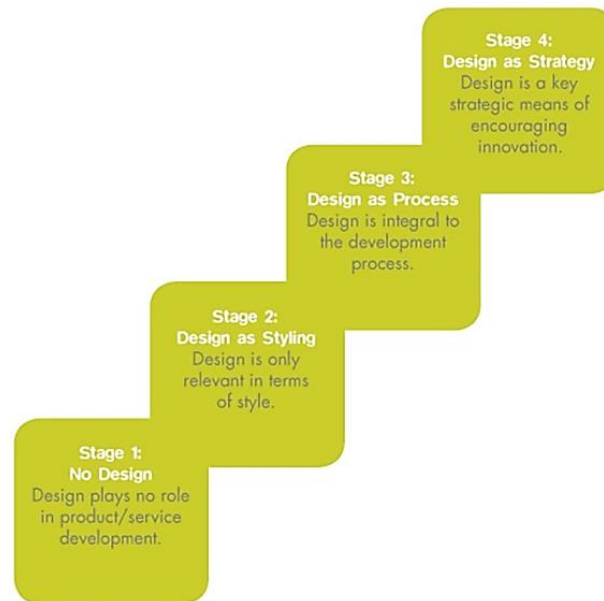


Figure 2 The design ladder (Danish Design Centre 2007). Retrieved from: <http://www.seeplatform.eu/casestudies/Design%20Ladder>

Zurlo and Cautela (2014, p. 35) assume that design can contribute to the company in several ways and levels of innovation, from styling to the change of ecosystems of product-services and business models.

From the argument of design and competition, D'Ippolito (2014, p. 721) underpins that "design has the potential of bringing into the picture some non-technological dimensions of new products that firms had not considered before," emphasizing design as a creative activity and a social phenomenon that has been studied across various domains.

In the context of management and business, design is considered a strategic resource (Bruce and Bessant 2002, Celaschi, et al 2012, Dell'Era and Verganti 2007). Design adoption and its "mode of use" are a question of enterprises' behavior, ethos or vision (Borja de Mozota 2006, Calabretta, et al 2008, Danish Design Centre 2003, Verganti 2008, Walsh 1996).

Borja de Mozota (2006) introduces the concept of the four powers of design in the management science. Two powers suggested by Borja de Mozota (2006) are of special interest in this paper's discussion: design as an integrator, which undertakes design as a core competence, and design as a transformer, which brings the design contribution to the learning processes and to the ability to deal with change in organizations, creating new business opportunities.

Design potential depends on the individual creativity, talent, experience of the designer (D'Ippolito 2014, Gemser and Leenders 2001). Besides the designers' skills, the development of competencies and ability to deal with change (Borja de Mozota 2006) are important potentials which can be fostered by design in the organization. On the other hand, the company's vision about design (Borja de Mozota 2006), its cultural imperatives (Heskett 2009), and the adopted design strategy (Gemser and Leenders 2001, Roy and Riedel 1997) or

stage (Danish Design Centre 2003) define the limitations of design potential exploration by the firm.

Another stream that design has strongly embraced refers to social and environmental issues (e.g. Bonsiepe 2011, Manzini 2007, Manzini and Vezzoli 2005). The interest in the social dimension comes from the Bauhaus and Ulm schools, which started working on design and its social contributions. Papanek (1971) introduced the idea of design responsibility in his book *Design for the real world*. Design starts exploring the ways towards social responsibility throughout ecodesign, Design for Sustainability and social innovation.

3. Value of design

3.1 The evolution and fragmentation of value concepts

Several domains have studied the value concept (Ulaga and Chacour 2001). Among them, marketing (Kotler 1972, Ravald and Grönroos 1996) and economic (Heskett 2009, Smith 1776) disciplines have stressed the importance of value and presented a range of definitions.

In the modern economics, the value in exchange comes from the concept of money, which arises because of the need to have a common element and measure to exchange things among different producers. It started as a question of a commodity becoming “the universal instrument of commerce” (Smith 1776).

Smith (1776) suggests two different meanings for value: value in exchange and value in use. Scant things have a higher value in exchange and a lower value in use (e.g. diamond). Goods which have a greater value in use (e.g. water) usually have no value or have a lower value in exchange (Smith 1776). Both concepts are restricted to the monetary value, to the idea of price defined by productive dimensions (labour and capital), in the neoclassical theory.

The concepts of value generated throughout economic theory do not fit the design dimensions regarding the context of use, the role of products, communications, environments, services and systems in the lives of people (Heskett 2009). Heskett (2009) argues that the economic theory generally stops at the point-of-sale and the new economic concepts such as value should be elaborated from the design perspective. The Austrian School explores value concept closer to the marketing ideas in which the users’ behaviour plays an important role in purchasing (Heskett 2009, p. 75).

Marketing concepts are related mainly to the idea of “customer-perceived quality” and “customer satisfaction,” where the customer perceives benefits relative to perceived sacrifice, taking into consideration suppliers’ offers and price (Ulaga and Chacour 2001). In business-to-business, value has also been related to psychological benefits such as risk reduction and reputation (Hinterhuber 2008). Hinterhuber (2008) highlights that the concept of value still is ill-defined and an under-researched subject, despite the importance of providing value to customers to foster their loyalty. Ravald and Grönroos (1996) emphasize that marketing perspective carries on the idea of value, adding that it can lead to adding

technical products improvements or increment of services that are not perceived by the customers anymore.

The value engineering (Csillag 1991) and the product-design (Baxter 1998) approaches to value are similar, stressing value in terms of money as an outcome of a combination of different types of value or functions, representing how much money the consumer is willing to pay for functions in the market by comparison. Baxter (1998) considers two product-design functions: utility and esteem².

Krucken (2009) relates value to the perceived product quality, suggesting different value dimensions such as functional or practical value referred to the mode of use; emotional value related to subjective factors as feelings, user's experience, memories; environmental value represented by nature preservation; and symbolic and cultural value expressed by the social identity.

Borja de Mozota (2006) says that value in management science is achieved when a result superior to that of the competition has been achieved, when a greater ratio between the profits and the capital invested is realized.

The Economic Value Added (EVA) comes from two types of value: substantial value based on customer value, performance value and strategic value; and financial value that is gotten through finance, investment or mergers (Borja de Mozota 2006). The substantial value includes the value perceived by the market (competitive rationality), and the value created and shared by human resources (process improvement, individual creativity, knowledge management, the performance of projects) that is referred as organizational rationality by Borja de Mozota (2006).

The perspective of value engineering and of product development narrows the design strategic values related to the corporate image, language and meanings, innovation, human resources and possible social contributions. Marketing perspective bounds the issue to a profit, focusing on the customers' viewpoint (Kotler 1972, Ravald and Grönroos 1996, Ulaga and Chacour 2001), presenting the shortcoming of an innovative logic to achieve disruptive ideas or to deal with change.

3.2 The scenario of design value within companies: the management of design complexity

Design has been emphasized as an important factor for economic growth by several governments and institutions throughout Europe and North America (Aalto University, et al 2012, Barcelona Design Center 2014, Borja de Mozota 2006, Danish Design Centre 2003, Design Council 2007b, European Commission 2012). The need to demonstrate design benefits for business has generated reports, website platforms (e.g. SEE Platform) to share design experiences and policies. Governments have focused attention on design as policy for national economic growth and to foster innovation.

² Esteem function represents social, cultural and commercial effects throughout beauty, shape, appearance.

Despite all the emphasis that design has recently received (Borja de Mozota 2006, Brown 2009, Bruce and Bessant 2002, Danish Design Centre 2003, Design Council 2007a, 2007b, D'Ippolito 2014, Gemser and Leenders 2001, Hunter 2014, Maeda, et al 2015, Norman 2008, Roy and Riedel 1997, Verganti 2008, Walsh 1996), it is still considered an uncertain activity, where we cannot be sure of the results (Bessant 2002, Trueman and Jobber 1998). On the other hand, design management makes an effort to explain how we can achieve better performance by design in the firms throughout skills, organizational and managerial practices, to attain an effective design (Chiva and Alegre 2009).

The value creation by design can be regarded as a complex phenomenon. The intangible values have strongly emerged and impacted firms in several ways. Brands have become more valuable than the physical and tangible aspects of business. Creativity, knowledge and ideas related to design are highlighted as sources of value creation in organizations, improving competencies and skills to deal with a change towards innovation.

In this scenario, design expertise contributes to the company's challenge, but it is still considered an uncertain practice and it is not grasped at all in enterprises that use design according to their own visions. The nature of design activity is tacit-based, relying on creativity to achieve unique solutions. Design is not a science, design is a reflective practice in a constructivist paradigm where we do not expect something repeatable, despite the fact that it can be seen as a discipline and can be studied as a phenomenon (Cross 2001).

The design practice is related to subjective factors such as empathy and intuition, presenting an experimental character of "trial and error" practice (Brown 2009) despite methods and tools that can be systematically employed. To source a designer, for instance, companies consider personal recommendations (Bruce, Cooper and Vazquez 1999). In addition, looking at the identity of design at the organizational level, design still is undefined in terms of responsibility, budget source, guidelines and power, presenting a non-clear form to manage compared to R&D or technology developments (D'Ippolito 2014).

All the subjective and tacit dimensions make design difficult to grasp, and the risk of disruptive ideas is higher than improvements proposals enabled by market research³. Design is future-oriented and the future is uncertain, which leads to the representation of customer value as a range of expected values, rather than a single (certain) number (Hinterhuber 2008, p. 390). It seems more comfortable for the company to invest in things that are the "right things," that are possible to forecast in terms of return on investment and profits in short run strategies. On the other hand, companies that acknowledge design as a source of innovation challenge forecasts and market research (which can be observed in the history of Apple and Sony – e.g. Ipad and the Sony walkman).

³ It is important to emphasize the difference between market research and design research. Market research is statistically valid and shows opportunities for improvements considering similar behaviour among groups. Design research tends to more innovative solutions starting from users and establishing relationships with cultural anthropology and sociology (as cited in Zurlo 1999, p.35).

4. Why should companies invest in design?

Gemser and Leenders (2001) and Roy and Riedel (1997) show that more innovative design strategy leads to better results (e.g. turnover growth and exports) from design at the product development level. However, first-to-market innovation strategy does not always lead to more success than using a follower strategy (see for instance Teece (1986) who also describes ways in which some enterprises profit from others' innovations).

Gemser and Leenders (2001) suggest that other qualitative aspects influence competitive performance such as the designers' reputation, experience, skills, and talent, and the market segments a company tries to serve.

The Danish survey: The Economic Effects of Design (Danish Design Centre 2003) was a pioneer in studying the effects of design on national and business economics. The study shows that companies that work systematically with design, using professionals internally or as consultants, have higher earnings and exports than companies that do not use design. Gross revenue performances and exports are higher the higher on the design ladder those companies rank (Danish Design Centre 2003). However, the research does not identify the precise share of the economic growth that can be directly related to design.

After that, United Kingdom has strived to measure design impacts on companies. The public policy has approached design as a fundamental factor for economic growth. The Design Council (2007b) report contributes to show the design impact on business performance. The report states design advantages in business such as (Design Council 2007b) turnover growth and shares outperformance.

The recent Design Council (2015) publication, The Design Economy, demonstrates the design contribution to the financial performance of the business in the United Kingdom. The publication widened the scope of design activities approaching a wide variety of industries, compared to their previous report. It identifies a concentration of design workers and design intensive firms in London, evidencing the fact that design is underused and its benefits can be broadened in other locations.

Borja de Mozota (2006, p.46) relates design to the competitive advantage, presenting multiple interpretations to design by the firm, from design as differentiator when the company sees design in the context of reputation or brand to design as a core competence, or a resource-based view difficult to imitate in terms of organizational competencies.

Chiva and Alegre (2007) emphasize that the relationship between design investment and company performance is not unconditional. The authors describe the importance of design management and its skills to achieve design effectiveness and good results to the firm (Chiva and Alegre 2007). The way the company uses design investment to obtain or improve design management skills affects performance (Chiva and Alegre 2007).

Most studies focus on the relationship between commercial success, competitive advantage, economic performance, and design to demonstrate benefits that design can generate for

companies. However, the reasons to invest in design are not reduced to commercial success in firms. The development of unique organizational competencies (Borja de Mozota 2006) and of learning skills (Roy and Riedel 1997) are qualitative aspects that can drive the economic value creation to strengthening the ability to deal with change and innovation, generating competitive advantages (Borja de Mozota 2006, Chiva and Alegre 2009, Roy and Riedel 1997). Other limitations are that design economic performance is more evident throughout time (Rae 2013, 2014) and that disruptive ideas are not always immediately successful in the market.

5. Discussion and conclusion

5.1. Dimensions and variables of the value of design

The value of design dimensions and variables can be distinguished from the domains and approaches studied. This is just an initial effort considering the complexity of the subject and that it is an ill-defined, under-researched, multifaceted and complicated topic (Hinterhuber 2008, Ravald and Grönroos 1996) where visions, interpretations and new dimensions emerge as well as new research domains.

The figure below demonstrates the dimensions and variables of the value which can be related to design according to the reported studies:

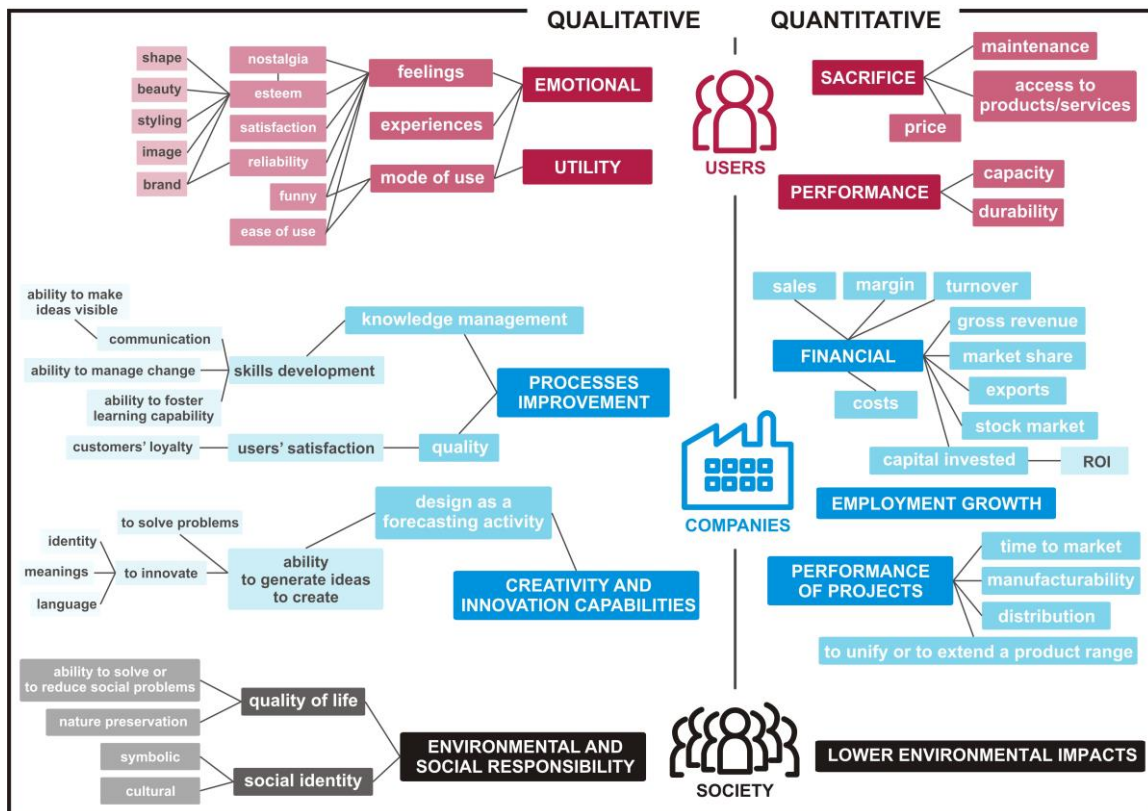


Figure 3 Qualitative and quantitative dimensions and variables of the value of design according to the perspective of different stakeholders (users, companies and society) and domains reported (economics, marketing, business, management, design).

5.2 The value of design: an issue of vision, creativity, and interpretation

The reasons that lead companies to explore design potential have been related to the interest in getting a competitive advantage at a profit, increasing the focus on design relationships to competition, business, and management. The will to demonstrate that design is a rewarding activity for companies triggers several efforts to translate in numbers design outcomes. Then again, Gemser and Leenders (2001) suggested that good financial performance is not a precondition for design investment in firms. Furthermore, this approach presents the limitation of binding design to an outcome, disregarding its qualitative roles and benefits that lead to the results. In this sense, Borja de Mozota (2006) draws a compelling perspective contributing to the establishment of a connection between the qualitative aspects (e.g. design as a core competence and as an agent that fosters the firm's ability to deal with change and creates new business opportunities), which are considered the source of economic added value.

Another constraint is the difficulty in isolating design from other variables that impact the firms' performance, because the company's performance is not just a result of design adoption (Chiva and Alegre 2009, Gemser and Leenders 2001, Roy and Riedel 1997) and design is very "integrated into the fabric" of design-led organizations (Westcott, et al 2013). Moreover, the measurable results of design are more evident throughout time (Rae 2013, 2014).

Design expertise and practice are still not fully understood by people in the company (D'Ippolito 2014, Trueman and Jobber 1998, Walsh 1996), despite the existence of systematic processes and tools. This misunderstanding can be related to the idea that design is not a science and has its own logic (Cross 2001), and that design is future-oriented; it deals with uncertain change. In addition, the individual creative component and the tacit nature in which it operates to build expertise through practice-based know-how can also contribute to this (Cross 2001, D'Ippolito 2014, p.722).

Assuring measurable results for innovative design is an incoherent approach, and so is market behaviour forecast, which is inappropriate to disruptive innovations that are unfamiliar to users.

Design as a process relies on creativity. From the semiotics point of view, we are always interpreters regardless of our functions or positions. When a message is sent (an image, a text, a product and so on) the relevance is the meaning that the "reader" builds on it, the interpretation. Designers interpret society and users employing technical information to create. The knowledge used to achieve solutions passes through a creative process where the designer is also a "filter" and interpreter, who turns diverse subjective (e. g. social desires, aspirations, unknown users' needs, individual know-how) and objective (e. g. manufacturing requirements, technologies, materials) information into design (products, services, experiences, communications, systems). In this sense, creativity is the main power to innovation by design.

Verganti (2008, p. 450) claims that the design driven innovation process “is more knowledge-based than creativity-based”. Knowledge and creativity appear inherent to each other (Cohen and Levinthal 1990, p. 130), and weighing which of them is more relevant to design seems incoherent considering that design knowledge has its own form of relying on engagement and reflection on design activity (Cross 2001, p. 54) that is creative-based. To think of new languages and visions in an explorative manner requires creativity to establish new linkages that embodies sociocultural models making sense of new meanings.

Individual creative reactions and the construction of an organizational culture that fosters innovation seem to be crucial factors to innovate by design. The design process is *creative-oriented* and its most powerful feature is to innovate. Nevertheless, the design strategy supported by the firm (Gemser and Leenders 2001, Roy and Riedel 1997), its vision about design or its cultural imperatives (Borja de Mozota 2006, Heskett 2009) along with adopted approach to design and design skills embraced by the organization binds the exploration of the value of design in organizations.

Design requires a diversity of competencies and each project is unique (Project Management Institute 2012). The difficulty in demonstrating a “recipe for design” relies on the creative nature of the activity and its diversity compared to activities that you can repeat and obtain the same result (e.g. manufacturing activities). To overlook the nature of design, its practice and knowledge can lead to a superficial approach to the role of creativity to innovate by design.

The way in which the firm leads design concerns design management that searches for patterns or indications for “good” design (e.g. Hertenstein, Platt and Veryzer 2012). The limitation on a recipe for “good” design is also related to the *unique* competences, visions, change, innovation, breakthrough concepts and design context. In this sense, *the value of design is not just related to the results but to the capacity to create, interpret and visualize worthy ideas in each context, forecasting novelty throughout time.*

Some enterprises are future- and design-oriented at the beginning of their foundations, which means that the stages in the design ladder are useful references but the reality and the dynamism of the companies to compete and to innovate by design are not reduced to this general scale.

Furthermore, some studies have explored organizational culture in design-centric firms (Calabretta, et al 2008, Design Council 2007a), and the cultural change of perspective in climbing the design ladder (Doherty, et al 2014). However, it is not clear when and how a non-design-oriented company presents capacity to absorb design (or features that favours design embodiment) to create value fostering innovation.

The analogy to absorptive capacity⁴ (Cohen and Levinthal 1990) suggested by Verganti (2008, p. 447) regarding the company's immersion in design is a valuable insight, considering that design performs a mediator role between companies and users or society (outside knowledge), and that design can foster the evolvement of the companies' human resources and their learning skills (Borja de Mozota 2006, Roy and Riedel 1997) depending on its management. But it is necessary to clarify the particularities of design knowledge and practice (Cross 2001, D'Ippolito 2014, Heskett 2009) to better accomplish this cross-fertilization. For instance, what are the preconditions or the prior knowledge in the design context to recognize the value of new information, assimilate it, and apply it to commercial ends? Another consideration discussed in this paper is that the value of design is not restricted to commercial ends, but is built throughout the evolvement of unique competencies, visions, and interpretations that can lead to the creation of economic value.

The implication of this discussion for research in design innovation management is the need to develop new ways of dealing with the innovation by design issue besides the measurable and visible assets, first focusing on the creative process and tacit knowledge in organizations in order to get insights related to the design core competencies and their roles in the companies changing processes, understanding what the preconditions to better develop innovation and create value by design are. This paper tries to shed light on this issue emphasizing design as a creative-oriented activity in which its value is shaped by companies' visions and interpretations.

6. Limitations and future research

This study focuses on the value of design at the organizational level. It is important to notice that this issue does not rely just on designers' activities as it can be observed in the phenomenon of silent design (Gorb and Dumas 1997). Moreover, a set of activities inside and outside the company is accomplished in order to make the design system work, supporting and communicating the value of design. Future research aims at exploring the value creation by design at the design system level, considering the diverse stakeholders and their actions through a strategic design perspective.

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⁴ Cohen and Levinthal (1990, p. 128) notice that the ability to exploit external knowledge is a critical component of innovative capabilities: "We argue that the ability to evaluate and utilize outside knowledge is largely a function of the level of prior related knowledge.[...] prior related knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends. These abilities collectively constitute what we call a firm's "absorptive capacity"."

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About the Author:

Mariana Fonseca Braga is PhD candidate at Politecnico di Milano with a B.Sc. in industrial design and a M.Sc. in industrial engineering. Her research interests include design and innovation management. She has experience developing products, teaching and researching design domains and ergonomics.