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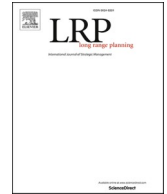
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Framing the multifaceted nature of design thinking in addressing different innovation purposes

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ABSTRACT

Scholars and practitioners acknowledge the role of design, and specifically design thinking, as a driver of innovation and change. Design thinking is gaining attention in the business community beyond the traditional product innovation realm and is increasingly promoted as an engine for the creation of novel user experiences, new businesses, strategic transformation, organizational and cultural change. Is it reasonable to assume that the same set of practices fits such a broad range of applications equally well? This study addresses how design thinking applications are differently framed when addressing diverse innovation purposes. Specifically, we compare two purposes: innovation of *solutions*, encompassing traditional product and service development projects, and innovation of *direction*, encompassing strategic and organizational renewal projects. Based on data collected from 146 design thinking projects conducted by European consulting firms we investigate the relationships between the design thinking practices adopted and the value generated by the projects. We then analyze how these relationships vary depending on the purpose of the innovation project, namely whether focused on innovating solutions or direction. The results show that different purposes indeed call for different practices. In projects aimed at innovating solutions, market value is positively related to capturing current user needs and envisioning future society. Conversely, in projects aimed at innovating direction, market value is positively related to challenging current assumptions.

1. Introduction

Design as a source of value creation has been the subject of numerous studies since the mid-1980s (Peterson et al., 1986; Hirschman, 1986; Fournier, 1991) and positive relationships with performance have been found (Gemser and Leenders, 2001; Candi,

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2010; Candi and Saemundsson, 2011). Scholars and practitioners acknowledge the central role of design as a driver of innovation and change (Brown, 2008; Martin, 2009; Kolko, 2015; Liedtka, 2015, 2018). An upsurge of interest in *design thinking* stems from the business community's increasing attention to design. Rather than being concerned with the *form* of products, design thinking is conceived as a formal creative problem-solving method intended to foster innovation (Brown, 2009; Liedtka et al., 2013). Although interpretations differ, design thinking is usually characterized by three traits: a human-centered perspective (Buchanan, 2001; Brown, 2008; Follett, 2016); leveraging creativity to originally frame problems (Dorst and Cross, 2001; Beckman and Barry, 2007; Kolko, 2010; Dorst, 2011; Leavy, 2011; Beckman, 2020); and the intense use of prototyping (Brown, 2008; Fraser, 2009; Holloway, 2009).

Design thinking looks beyond aesthetics and product form toward a creative problem-solving method that nurtures innovation (Brown, 2009; Martin, 2009; Liedtka et al., 2013), and a sense-making approach to envision new strategies (Simon, 1969; Stigliani and Ravasi, 2012; Verganti, 2017; Knight et al., 2020). Recent studies advocate for evolving and emerging interpretations of design thinking that can expand its application beyond the product and service innovation realm. According to Luchs and Swan (2011), and as reflected in the Danish Design Ladder model, design has progressed from "form-giving", to "design as process", "design as strategy", and even "design as transformational agent". As Gruber et al. (2015) highlight, the design discipline has gone beyond product appearance, and design thinking has helped create compelling consumer and user experiences with a strategic impact on business. Knight et al. (2020) introduced the term "design-led strategy" as the integration of design thinking into strategic management practice, arguing that design thinking has begun to influence how corporate managers bring customer data into their day-to-day strategic planning. Liedtka (2015) affirms that although originally focused on product development, design thinking is expanding its application domain to services, strategies, and even education. Micheli et al. (2018) discuss the opportunity to elevate design to a strategic level. They define *strategic design* as "designers' ability to influence decisions and set direction over issues that affect the long-term sustainability and competitiveness of an organization, such as development and communication of a brand's core values, positioning, and creation of new markets" (p. 2). The growing attention to design thinking is evident especially among large consultancy firms and digital agencies. The relentless dissemination of design thinking among new players facing a wide range of challenges has broadened its multifaceted nature. In fact, the entry of new players is leading to the adoption of design thinking in completely new contexts. Thus, design thinking has proven relevant not only for technological innovation (Liedtka, 2020), but also in fostering innovation in large organizations (Wrigley et al., 2020), with peculiarities emerging in the design thinking practices adopted. Thus, we raise the question of whether the same set of design thinking practices fits a broad range of applications equally well.

Given this intriguing background, the aim of our study is to explore the multifaceted nature of design thinking in addressing different innovation purposes. Several researchers have analyzed and described a rich set of design thinking practices. Studying firms adopting design thinking in innovation projects, Carlgren et al. (2016) identify six groups of practices. In a systematic review of design thinking, Micheli et al. (2019) propose ten attributes and eight methods and tools. Magistretti et al. (2021) consider the micro-foundations of design thinking as a set of dynamic capabilities for innovation. However, despite these efforts to identify design thinking practices, few scholars examine whether and how their adoption relates to certain contingent factors. Verganti (2017) highlights the dichotomy between innovation of solutions and innovation of direction, asserting that they require entirely different design thinking practices. While innovation of solutions is largely aimed at coming up with ideas to solve current problems, innovation of direction aims to identify new strategies that redefine what will be meaningful in the future. Put differently, a creative solution might lead to incremental or even radical improvements, but typically without a change in direction. Conversely, an innovative direction might lead to a novel purpose, not only a new 'how', but a new 'why', a new interpretation of what is meaningful. While innovation of solutions refers to new products and services intended to be sold to the market, innovation of direction deals with strategic choices aimed at discovering new markets, renewing organizational culture, and envisioning forward-looking transformations. Innovation of solutions is the domain in which design thinking is usually adopted, while innovation of direction is a new and emerging realm. Given this dichotomous view of the purpose of design thinking, more knowledge is needed on the practices that might support or hinder design thinking in addressing either type of innovation projects. As stated, past research (e.g., Carlgren et al., 2016; Micheli et al., 2018; Magistretti et al., 2021) has identified a number of design thinking practices, but without addressing how these are suited to projects involving innovation of solution or innovation of direction.

Thus, we explore the value of design thinking in both domains. Specifically, this research investigates (i) the relationships between design thinking practices and value generation, and (ii) how these relationships are moderated depending on whether the purpose is innovation of solutions or innovation of direction. The present study is one of the first to empirically investigate such relationships. We use survey data of design thinking projects conducted by European consulting firms using design thinking to address their clients' innovation challenges. The findings of this research indicate that practices aimed at capturing current user needs and envisioning the future are positively related to generating market value in projects aimed at innovating solutions. Concerning innovation of direction projects, the findings show that practices aimed at challenging existing assumptions are positively related to generating market value. Interestingly, we find that the practice of creating new ideas is not related with market value in any kind of project. We speculate that this practice has become so common and widespread that it no longer constitutes a driver of differential performance. Thus, in some sense, our findings suggest that design thinking has pervaded common practice so extensively that creating new ideas has become a baseline requirement.

Our research makes important contributions to both design thinking theory and practice. First, the results show that different purposes call for different practices. Second, in projects aimed at innovating solutions, the market value of consulting projects is positively related to capturing current user needs and to the practice of envisioning future society. Third, in projects aimed at innovating direction, the market value of consulting projects is instead positively related to practices based on challenging current assumptions. This is the case regardless of the scope of the initial analysis (users vs society) and the time horizon of insights (current vs future), implying that when looking for a new direction, critical reflection and challenging existing assumptions are more important

than the source and nature of the insights. Fourth, we enhance current understanding of the distinction between innovation of solutions and innovation of direction, and how design thinking can contribute to each, albeit using different sets of design thinking practices.

The remainder of the paper is organized as follows. The next section summarizes the main design thinking contributions in relation to the innovation of solutions and innovation of direction dichotomy, and introduces our research hypotheses. Then we present an overview of the research methodology and describe the empirical results. The final section offers conclusions and future research avenues.

2. Theoretical background and research hypotheses

While numerous scholars have examined design as a driver of value creation (Peterson et al., 1986; Hirschman, 1986; Fournier, 1991; Ravasi and Lojcono, 2005), design thinking is a more recent concept. Design thinking builds on some key tenets of the *design science movement* that emerged in the 1960s as a scientific method aimed at creating new forms, new artifacts, or more generally, new knowledge (e.g., Alexander, 1964; Gregory, 1966; Simon, 1969). According to these scholars, and in contrast to the natural sciences focused on analyzing existing reality, the science of design concerned “the transformation of existing conditions into preferred ones” (Simon, 1969, p. 4). Two decades later, the design science movement was enriched by a more constructivist stance toward design as a practice. In particular, Schön (1983) challenged Simon’s ‘science of design’ view as based on approaches to solving well-formed problems, while recognizing that professional designers face and deal with messy and problematic situations, what Churchman (1967) calls ‘wicked problems’ (see also Simon, 1969; Rittel and Webber, 1973) characterized by high uncertainty, ambiguity, and instability. Leveraging Schön’s work, other scholars further articulated the specifics of so-called ‘designerly ways of knowing’ (e.g., Cross, 1982, 1999, 2011) in terms of the nature of design problems and designers’ attitude to solving these (e.g., Lawson, 1994; Romme, 2003; Boland and Collopy, 2004). Therefore, the designer’s task has been conceptualized as creating a plausible solution by “organizing complexity [and] finding clarity in chaos” (Kolko, 2010, p. 15) through a pattern of synthesis of aesthetic, cultural, and technological trends, and consumer and business needs.

In recent years, a growing literature on design thinking has attempted to better understand and contextualize the role of design and the designerly way of working within a business context, albeit still offering largely ambiguous or incomplete definitions (Carlgren et al., 2016). Johansson-Sköldberg et al. (2013) differentiate between the development of design thinking in the academic domain and the more practical development in the business domain. More specifically, two distinct discourses on design thinking can be identified. On the one hand, “designerly thinking refers to the academic construction of the professional designer’s practice (practical skills and competence) and theoretical reflections around how to interpret and characterize this non-verbal competence of the designers”. On the other hand, “design thinking is about design practices and competences used beyond the design context (including art and architecture), for and with people without a scholarly background in design, particularly in management” (Johansson-Sköldberg et al., 2013, p. 123). Design scholars have written extensively on designerly thinking (Buchanan, 2001), but design thinking has only recently become a recognized term, predominantly framed as an approach to innovation and creative problem-solving based on designers’ processes and practices (Martin, 2009). We focus on design-as-practice, or as Kimbell (2011, p. 135) argues, “a situated and distributed unfolding in which a number of people, and their knowing, doing, and saying, and a number of things, are implicated”, seeking to understand design thinking based on its practice in the context of firms and applications therein.

In the following, we first discuss the innovation of solutions and innovation of direction dichotomy as proposed by Verganti (2017) to introduce the main differences among the consolidated and emerging interpretations of design thinking. Then, we introduce our research hypotheses on the relationship between design thinking practices and market value.

2.1. Innovation of solution and innovation of direction

Design thinking is typically viewed as a formal creative problem-solving method intended to foster innovation (Brown, 2009; Liedtka et al., 2013). It enables solving wicked and ill-defined problems by expanding problem and solution boundaries (Dorst and Cross, 2001; Dorst, 2011; Foss and Saebi, 2018) and igniting creativity in problem-solvers (Tripp, 2013). Traditionally, problem-solving approaches have favored deduction (from the general to the more specific), and induction (from the specific to the general). However, proponents of design thinking have called such reasoning into question, deeming it incomplete. Along these lines, Martin (2009) proposes that new knowledge and insights are better created through abductive reasoning, i.e., imagining what ‘might be’, instead of analyzing ‘what is’ (Nonaka et al., 2000; Dew, 2007; Lockwood, 2009). Design thinking implies looking at problems in innovative and novel ways, developing solutions creatively (Magistretti et al., 2021). As Boland and Collopy (2004, p. 4) highlight, “It portrays the manager as facing a set of alternatives from which a choice must be made. This decision attitude assumes it is easy to come up with alternatives to consider, but difficult to choose among them. The design attitude toward problem-solving, in contrast, assumes that it is difficult to design a good alternative, but once you have developed a truly good one, the decision about which alternative to select is trivial”. The problem-solving attitude embedded in design thinking is intrinsically creative because it implies imagining the new rather than finding a solution within a set (Verganti et al., 2020). “Innovation of solutions concerns better ideas to solve established problems. It’s a new *how*; a novel way to address the challenges that are considered to be relevant in a marketplace” (Verganti, 2017, p. 4).

The diffusion of design thinking among actors such as strategic consultants and digital agencies has led to the evolution of the paradigm to address innovation challenges in new domains. Discerning new markets, reshaping organizational culture, facilitating radical transformations, and envisioning plausible future scenarios are some of the reasons behind the growing adoption of design

thinking (Gloppen, 2009; Sato et al., 2010; Kelley and Kelley, 2013; Norman and Verganti, 2013; Liedtka, 2020). Knight et al. (2020) underline that design thinking can support managers in strategic planning activities, describing a progressive integration between design thinking and strategic management. Micheli et al. (2018) discuss the opportunity to elevate design to a strategic level to identify innovative directions for brand positioning and potential new markets. Mansoori and Lackeus (2020) compare design thinking to effectuation, discovery driven approaches, prescriptive entrepreneurship, lean startup, and business planning to shed light on the entrepreneurial aspect of this method. Proposing a link between design thinking and its role in entrepreneurial endeavors and vision creation resonates with the notions of causation and effectuation (Klenner et al., 2021), the latter presenting similarities with innovation of direction in envisioning new markets and opportunities by exploiting contingencies and leveraging assumption-driven dynamics (Sarvasathy, 2001). Dell'Era et al. (2020) affirm that aside from innovating products and services, the design thinking approach is also increasingly adopted to define new strategic directions, propose radically new customer experiences, enter new markets, and reposition brands. According to Verganti (2017, p. 5), "Innovation of direction concerns a novel vision that redefines the problems worth addressing. Not only a new *how*, but especially a new *why*: it proposes a new reason why people use things. A new value proposition, i.e., a novel interpretation of what is relevant and meaningful in a market".

2.2. Design thinking practices of capturing current user needs and envisioning future society

Numerous scholars have demonstrated the advantages of adopting a user-centered design approach (e.g., Vredenburg et al., 2002; Veryzer and Borja de Mozota, 2005; Von Hippel, 1988, 2005), citing the attainments of major design firms, such as IDEO (Kelley, 2001) and Continuum (Lojacono and Zaccai, 2004). This conception implies that organizations first need to profoundly understand the needs and desires of users and then create solutions to better solve these problems (Patnaik and Becker, 1999; Sutton, 2001). The rapid dissemination of this approach has ensued from the growing complexity and dynamism of user behaviors and the increasing demand for more sophisticated and tailored solutions. In several design thinking projects, individuals are the starting point of the process that culminates in a solution tailored to their needs (Norman, 2005; Brown, 2008; Holloway, 2009; Ward et al., 2009). The methods traditionally used to identify customer needs presuppose that they know better than anyone else what characteristics they want in a product. The tools used in this context therefore include questionnaires and interviews aimed at inducing customers to communicate their needs (Dahan and Hauser, 2001). As Beckman and Barry (2007) underline, observation and ethnographic research are fundamental techniques to empathize with users. Empathy refers to the willingness and ability to adopt the perspective of another person and recognize the perspective as their truth, be open to various inputs, suspend judgment, sense other people's emotions, and communicate by mirroring back. Empathy is fundamental to figuring out what people really want and need (Brown, 2009; Giacomin, 2014; Carlgren et al., 2016). Relying on observation and ethnographic research, design thinkers can build deep empathy with the purpose of solving user issues (Brown, 2008; Holloway, 2009).

Verganti (2017) argues that developing a new meaningful direction requires codifying the multitude of weak signals emerging in society, implying the need for interpretation. The socio-cultural context in which users are immersed inclines them toward interpretations in line with what is occurring at the time. Meanwhile, a new direction requires radically new interpretations of what a product is intended for, which might only be understood by looking at things from a broader perspective. Therefore, a firm's vision of possible breakthrough meanings that people will become enamored with fosters innovation of direction (Verganti and Dell'Era, 2014). The value of things, what society is looking for, evolves over time. If in the past these changes occurred more slowly and more rarely to the point that organizations had time to reactively observe changes in customer behaviors, today they happen more quickly and along unpredictable trajectories (Verganti, 2017). Knowledge of the subtle and unexpressed dynamics of socio-cultural models is distributed and tacit. In contrast to the analysis of user needs that mainly captures individuals' current interpretations, innovation of direction calls for the proposal of future interpretations about the values that will be meaningful in society (Verganti, 2006). Innovation of direction often requires a redefinition of socio-cultural paradigms and the accepted interpretations of what a product is and what it is meant for (Geels, 2004). According to Verganti and Oberg (2013, p. 89), innovation of direction is the result of an interpretative process: "Interpretation does not merely follow a linear process in which opportunities and ideas are assessed in the light of the existing context. It is not only a process of interpretation of an existing reality. The exploration of new directions instead implies to envision a new scenario that does not exist yet. It implies to picture an idea into a context to be designed. It is therefore a process of generative interpretation".

As Verganti and Dell'Era (2014) argue, the role of users significantly differs depending on whether innovation targets solutions or direction. The latter requires new interpretations of what is 'good' or worthwhile, and what is 'bad' and therefore not worth doing. While capturing current user needs is particularly effective for innovating solutions, innovating direction requires the ability to envision emerging and future lifestyles (Verganti, 2009, 2016). We therefore hypothesize:

- H1.** The positive relationship between the practice of *capturing current user needs and the value generated through design thinking* is stronger for projects aimed at *innovation of solution* than projects aimed at innovation of direction.
- H2.** The positive relationship between the practice of *envisioning future society and the value generated through design thinking* is stronger for projects aimed at *innovation of direction* than projects aimed at innovation of solution.

2.3. Design thinking practices of creating new ideas and challenging existing assumptions

As Micheli et al. (2019) highlight in their recent literature review, creativity and idea generation are core attributes of design thinking. Ideation describes designers' tendency to perceive situations from a lateral and novel perspective, investigating

ground-breaking alternatives (Casakin, 2007). Creative ideation enables transcending conventional knowledge domains, simultaneously exploring and generating ideas and concepts that could lead to innovative solutions. Ideation refers to the ability to identify connections not necessarily based on rational considerations, but more on intuitive criteria (Karpen et al., 2017). Structuring and intuitively connecting information and knowledge enables recognizing patterns, associations, and ultimately innovative ideas (Karpen et al., 2017). The capability to understand and consider the different perspectives and interests of internal and external stakeholders gives rise to the possibility of conceiving innovative ideas (Beverland et al., 2015). The combination of divergent and convergent activities aims to foster creativity. While the goal of divergent activities is to generate several alternative ideas and glimpse possible paths toward a solution, the goal of convergent activities is to narrow down the alternatives and develop the most promising ones (Boland and Collopy, 2004; Drews, 2009; Sato et al., 2010). To generate innovative ideas, designers experiment with new paths, helping them select the most promising ideas (Brown, 2008; Fraser, 2009; Holloway, 2009). As Nakata and Hwang (2020) argue, abductive reasoning may spur the action of ideation, whereby fresh concepts are generated even with limited resources (Bicen and Johnson, 2015; Dong et al., 2016). Abduction enables overcoming mental puzzles, contradictions, and competency traps (Dunne and Dougherty, 2016).

While the creation of new ideas is a core practice in innovation of solutions supporting divergent and outside-the-box thinking (Carlgen et al., 2016), innovation of direction builds on challenging existing assumptions (Verganti, 2016). The practices of challenging current cognitive frames and questioning how people make sense of the environment are based on criticism (Verganti and Norman, 2019; Beckman, 2020; Curhan et al., 2021). Criticism leads to a journey, seeking a new and more powerful direction, searching deeper for fundamental connections, and offering a renewed understanding of reality (Dell’Era and Verganti, 2010; Verganti, 2017). The ability to challenge the status quo stimulates curiosity and new interpretations (Drews, 2009). Challenging current assumptions is based on a deep comprehension of current mental models and the generation of alternative ones (Senge, 1991). Inquiry stimulates individuals to discuss assumptions and recognize the limitations of their perspectives (Schein, 1999). According to Beckman and Barry (2009), sensemaking and framing activities help generate a set of collective and emotionally connecting narratives or stories that can be readily articulated and then used heuristically to guide decision-making. Often, projects aimed at defining a new strategic direction imply changing the organizational culture and mindset, hence challenging established and shared beliefs, creating a common sense of purpose that inspires new actions (Kelley and Kelley, 2013; Beltagui et al., 2017; Elsbach and Stigliani, 2018; Wrigley et al., 2020).

In contrast to innovation of solutions based on the practice of creating new ideas, innovation of direction mainly relies on the practice of challenging existing assumptions, going deeper into interpreting things, striving to unveil what lies beneath the surface by considering different perspectives (Verganti, 2017). Whereas the creation of new ideas is aimed at producing a large number of ideas, challenging existing assumptions is aimed at reframing how we see the context, hence developing a richer and more robust interpretation. Therefore, we posit:

H3. The positive relationship between the practice of *creating new ideas* and the *value generated through design thinking* is stronger for projects aimed at *innovation of solution* than projects aimed at innovation of direction.

H4. The positive relationship between the practice of *challenging existing assumptions* and the *value generated through design thinking* is stronger for projects aimed at *innovation of direction* than projects aimed at innovation of solution.

3. Research methodology

To test our research hypotheses, we collected data from consulting firms that use design thinking in their work for clients. This empirical context is appropriate for two reasons. First, the consulting industry has embraced design thinking practices in the last years,

Table 1

Descriptions used to distinguish between consulting projects focused on innovation of solutions and innovation of direction.

Project focus	Archetypical descriptions	No. of projects in sample
<i>Innovation of solution</i>	The client was looking for creative inspiration to revitalize a product line that was dramatically losing market share. Even if the client knew the market, they did not understand the changes in user behaviors and expectations. For this reason, the client needed new inspiration, a better picture of emerging user needs, and to conceive original solutions. Therefore, the client asked you to conduct a deep analysis of the market to map explicit and latent needs, and conceptualize new creative solutions that could address the market changes. OR The client needed to significantly reduce the time-to-market of new products/services. The opportunities provided by digital technologies are disruptively changing the market dynamics. Therefore, the client faced a double challenge: on the one hand, the need to accelerate the development process, on the other hand, to manage higher uncertainty. The client struggled to determine the value and feasibility of innovative ideas. For this reason, they needed to explore new ways to reduce the time-to-market, test innovative ideas in a fast and effective way, and move forward with those solutions that fit the signals from the market.	99
<i>Innovation of direction</i>	The client needed to identify and formulate a new vision to pursue. The competitive arena was showing disruptive changes to the point that the client perceived the need to radically rethink the direction to follow. The client was aware that improvements in the current offering were not enough to create competitive advantage. Therefore, they asked you to contribute to defining emerging scenarios and designing new experiences that could be valuable for the market and might require significant changes in the client’s vision.	47

Table 2
Illustrative vignettes of consulting projects based on design thinking.

Client Organization	Project Brief	Design Thinking Practices	Client Market Value
Company M has operated in the cruise industry since 1987, has over 15,000 employees and a fleet of 17 vessels operating worldwide.	<i>Innovation of direction:</i> The aim of the project was to craft a new direction to envision new digital experiences for cruise travelers.	<i>Envisioning future society:</i> The project started when Company M planned to introduce 11 new vessels to the market by 2026 to satisfy the growing interest of users in cruise travel. The project started in 2014 with the involvement of a consulting firm that helped Company M envision how to bring onboard technologies and imagine new ways of experiencing the entertainment. Smart city concepts were booming, but how to bring technologies onboard with all the constraints imposed by offshore connectivity, maintenance, and obsolescence of these vessels? Thus, the need to envision how to bring digital solutions onboard was pursued. By interacting with the consulting firm and many colleagues within the organization, the project team could envision a new direction that combined many digital initiatives to pursue a future of cruise travel based on the value of pampering. The idea was not to substitute humans with digital touchpoints, the current adoption of digital solutions in society, but to enable different and future interactions based on letting users feel pampered with the constant support of an immersive digital experience onboard. <i>Challenging existing assumptions:</i> The new interpretation of the technology was designed with the strong collaboration between the consulting firm and Company M during creative workshops. This new interpretation resulted from a new view of the technology, not as support for efficiently booking experiences or managing the bookings, but as a sort of virtual concierge that pampers travelers onboard by anticipating their needs and allowing them to feel unique. In these workshops, people debated and discussed the pros and cons of digital solutions, moving from the potentiality offered by technology, such as artificial intelligence or big data, to try to go deeper into the value offered and untangle their true potentialities. This was achieved not by focusing on traditional adoptions of technological solutions to substitute and automatize processes, but by discussing the potentiality of such technologies and proposing an individual vision to introduce these technologies in the cruise industry in a counterintuitive way. By delving more deeply into the continuous engagement of people and challenging standard views, the new vision of pampering emerged as an excellent lever to interpret the value offered by digital technologies.	The project delivered to the market provides a new interpretation of digital solutions. Users appreciate the value generated by the pampering direction. The end solution surprised them on interacting with the new mobile application. Indeed, the app proposes insights and suggestions for a better experience rather than solving direct user needs.
Company V has operated in the telecommunication sector since 1994, has over 6,000 employees and more than 20,000,000 active users.	<i>Innovation of solution:</i> The aim of the project was to solve the problem of the advent of a low-cost competitor in the telco segment that could have reduced	<i>Capturing current user needs:</i> The project started when Company V realized that a low-cost solution was about to enter the Italian telecommunications market and that they had to react in only 8 months.	The project introduced a second brand for Company V that provides new solutions to ongoing problems in the telco sector. First, the possibility of low-cost solutions with

(continued on next page)

Table 2 (continued)

Client Organization	Project Brief	Design Thinking Practices	Client Market Value
	the customer base. Thus, Company V looked for an innovative solution to cope with this challenge.	<p>Thus, in 2016, the client and the consulting firm started investigating the needs of different users through a series of focus groups around the country. They contacted different users, existing and potential customers, to understand their needs in terms of tariffs and services needed. The focus groups were run both in large and small cities and in the countryside (e.g., small towns and villages) to capture different needs emerging from different areas. During the meetings, interviews, and open-ended discussions were conducted with the purpose of ascertaining the reaction of actual and potential users to new competitors and brands competing on price.</p> <p><i>Creating new ideas:</i> These interviews generated a vast source of data for ideation workshops. The final solution for Company V's second brand was crafted starting from the insights gathered from the live interviews and focus groups, then tested directly with market segments to fine-tune a prototype and be ready to launch the brand in the required timeframe. The creation of a series of wireframes of the application, the design of the branding and communication campaign, the crafting of several customer journeys allowed Company V, with the support of the consultants, to create a tangible and sharable solution with their customers. This triggered the possibility to obtain feedback and reactions to the new idea conceived.</p>	the service level guaranteed by a big player. Second, creating a fully digital telco provider that cut operational costs and offered cheaper rates.
Company R has been a bicycle manufacturer since 1892, has around 500 employees, and is among the top players in the European market.	<i>Innovation of direction:</i> The goal of the project was to develop a future vision for mobility as a starting point for thinking of new digital services to enrich the biking experience.	<p><i>Envisioning future society:</i> The consultancy used its trademark methodology to develop a future vision for mobility. This methodology combines expert interviews with the experience and knowledge archive to derive a list of factors that might influence the future attitudes, behaviors, and lifestyles of people in relation to mobility. Through a process of clustering, the consultancy arrived at a vision for mobility centered on multifunctionality, personalization, and connectedness.</p> <p><i>Challenging existing assumptions:</i> To help the client understand and embrace the vision, the consultancy translated it into a set of bold and future-oriented concepts aimed at making the vision tangible, and at the same time, provoking discussions among the different stakeholders on what is feasible. These discussions helped the client become more aware of their weaknesses but also unexploited potential. This process resulted in an adjusted version of the vision (more aligned with Company R's way of thinking) and in a concept for a connected bike that helps users reach their personal goals.</p>	While the connected bike project is still running, the vision was used to adjust the current digital touchpoints of Company R. This resulted in a more coherent digital experience, which strengthened the brand perception and increased the number and frequency of interactions (and related data exchanges) between the brand and the users.

thus offering a large enough population where the phenomenon under study can be observed with a certain variance in its occurrence, i.e. different types of consulting firms, varying client goals, and diverse project team compositions (Seidel, 2000; Rylander, 2009; Dell'Era et al., 2020). Second, the adoption of design thinking by consulting firms enlightens pioneering interpretations of the paradigm due to the variety of challenges embedded in clients' innovation assignments (Seidel, 2000; Rylander, 2009; Dell'Era et al., 2020). The firms are all based in Europe, namely Italy, the Netherlands, Sweden, and the UK. Using an online survey, respondents were asked to answer questions about one particular consulting project completed in the last year in which design thinking had been used. The respondents were project or design managers operating in the unit (e.g., business unit, service line, or department) specialized in the adoption of design thinking, and very familiar with the projects. Presenting them with descriptions of the two types of innovation of solutions and innovation of direction (see Table 1), respondents were asked to indicate which their chosen project was closest to. However, respondents were also offered the option of selecting neither type of innovation, and the data for these were excluded from hypothesis testing.

Table 2 reports three illustrative vignettes with the aim of providing examples of the consulting projects. Specifically, they describe the client organization, the project brief given to the consulting firm (distinguishing between innovation of solutions and innovation of direction), the design thinking practices adopted, and finally, the value generated by the consulting project.

The survey items to measure the practices previously described (capturing current user needs, envisioning future society, creating new ideas, challenging existing assumptions) are based on the work of Carlgren et al. (2016), Verganti (2017), Micheli et al. (2019), and Dell'Era et al. (2020). The items to measure the dependent variable (market value of design thinking projects for clients) are based on Gatignon et al. (2002), and Gattiker and Goodhue (2005). The items included in the model are listed in Table 3. We used Stata version 15.1 to conduct exploratory factor analysis with varimax rotation followed by confirmatory factor analysis to test the measurement model. The measurement model fit statistics were good (Shah and Goldstein, 2006) with a χ^2 of 149 (94 degrees of freedom), a root mean square error of approximation (RMSEA) of 0.052, and a comparative fit index (CFI) of 0.95. All composite reliabilities were over the generally accepted cut-off of 0.7, thus indicating convergent validity (Hair et al., 2010).

Since the data were collected from single respondents at one point in time, we needed to address the possibility of common method bias (Podsakoff et al., 2003). Before administering the survey, we had it carefully reviewed by several academics and practitioners. Their input was used to refine item wording to ensure readability and comprehensibility. Respondents were promised anonymity to decrease the likelihood of selecting responses viewed as more socially acceptable. To enable testing for common method bias after data collection, we included items measuring a variable unrelated to our research topic (Bagozzi, 2011; Lindell and Whitney, 2001), namely technological turbulence (Jaworski and Kohli, 1993) in the factor analysis. These items loaded on one variable and did not have any substantial cross-loadings with other variables, thus reducing common method bias concerns.

We included consulting firm size (number of employees), project length (in months), and team size (considering both the consulting firm and client) as control variables, since these are likely related to the practices employed in the design thinking projects and the related outcomes.

Table 3

Model variables and survey items (response options for all survey items range from 1 = disagree to 7 = agree).

Variables	Survey items	References (adapted from)
Capturing current user needs	Among the practices used extensively during [name of project]: - Interviewing users about their needs - Directly observing what happens in real-use environments - Tuning into user feelings	Carlgren et al. (2016), Micheli et al. (2019)
Envisioning future society	Among the practices used extensively during [name of project]: - Predicting relevant future market trends - Predicting relevant future technology trends - Investigating emerging lifestyles in society - Developing future scenarios for society	Verganti (2017), Dell'Era et al. (2020)
Creating new ideas	Among the practices used extensively during [name of project]: - Asking questions that prompt people to think outside the box - Thinking in a divergent way - Always looking for original solutions to the problem	Carlgren et al. (2016), Micheli et al. (2019)
Challenging existing assumptions	Among the practices used extensively during [name of project]: - Asking questions that challenge the status quo - Stimulating people to rethink the way they solve problems - Repeatedly asking questions to unearth and challenge inherent assumptions	Verganti (2017), Dell'Era et al. (2020)
Project market value for client	- The project has been a success in terms of the client's business impact - The project has seriously improved the client's overall business performance - The project has significantly improved the client's brand positioning	Gatignon et al. (2002), Gattiker and Goodhue (2005)

4. Results

The summary statistics and pairwise correlations between variables are shown in Table 4a (innovation of solutions) and 4b (innovation of direction). The results of the multi-group path analysis (conducted in Stata version 15.1) to test our hypotheses are shown in Table 5. We checked variance inflation factors and the highest was found to be 2.19, which is well below the conservative threshold of 5 (Marquardt, 1970), thus indicating that multicollinearity was not likely an issue.

We find that H1 about the positive moderating effect of projects aimed at innovation of solutions on the relationship between capturing current user needs and the value generated by design thinking projects is supported. The coefficient for innovation of solution projects is 0.51 ($p = 0.00$), and for innovation of direction projects 0.09 ($p = 0.53$). The Wald test for difference indicates that the difference is statistically significant. Contrary to H2, the data indicate that the relationship between envisioning future society and value generated by design thinking projects is stronger for innovation of solution projects (coef. = 0.27, $p = 0.01$) than for innovation of direction projects (coef. = -0.15, $p = 0.32$). H3 is not supported as there is no statistically significant difference in the relationship between creating new ideas and the value generated by design thinking projects between innovation of solution and innovation of direction projects. We also note that the relationship is not statistically significant across both project purposes. H4 is supported by a statistically significant difference between the coefficients for challenging existing assumptions, with a coefficient of 0.01 ($p = 0.88$) for projects aimed at innovation of solutions, and 0.44 ($p = 0.01$) for projects aimed at innovation of direction.

5. Discussion

The empirical results in Table 5 suggest that, consistently with H1, capturing current user needs appears particularly effective in generating market value in projects aimed at innovating solutions. The success enjoyed by major design firms, such as IDEO (Kelley, 2001) and Continuum (Lojacono and Zaccai, 2004), have demonstrated that through its human-centered nature, design thinking can support innovation projects. Interpreting users as sources of innovation, innovators compete by discovering hidden and unexpressed user needs, transforming them into unique insights. Mapping current user needs via interviews and questionnaires is one of the most diffused practices. Observing users when they experience products and services is fundamental to tracking their attitudes and discovering unconscious behaviors. Several scholars have identified tools and models that support the application of the human-centered approach (Sutton, 2001; Kumar and Whitney, 2003; Rosenthal and Capper, 2006), providing guidelines on the appropriateness of various techniques to uncover user needs. The basic classification of needs as explicit or latent depends on the degree to which needs are clear and evident to the subject. Generally, more explicit needs are easier to meet, while understanding and satisfying sometimes irrational feelings that are not explicit may be more difficult (Candi et al., 2016). The category of needs that a company wants to analyze has an obvious effect on choosing the appropriate method among questionnaires, surveys, focus groups, contextual inquiry, applied ethnography, lead user analysis, living labs, and so forth (Dell'Era and Landoni, 2014). As posited in H1, capturing current user needs is particularly effective in innovation projects dealing with solutions, while it is not as valuable in projects dealing with innovation of direction. This can be explained by the notion that innovative directions aim at interpreting and picturing future meaningful scenarios, and for this reason, can hardly be informed by users. Humans get naturally used to things around them and gradually take them for granted, becoming indifferent. Being immersed in the reality characterized by currently available products and services, humans become accustomed to interacting with them and expect progressive improvements. To some extent, the current reality in which humans live significantly influences their needs, both explicit and observable. For this reason, capturing current user needs creates value in projects aimed at innovating solutions, but is not as effective in supporting the development of a new direction.

As discussed above, our data do not support H2. Instead, they indicate that the relationship between envisioning future society and the value generated by design thinking projects is stronger for projects that aim to innovate solutions rather than direction. The unexpected effectiveness of envisioning future society practices for innovation of solutions might be related to several factors. First, companies are increasingly expected to consider the direct and indirect impacts generated by their innovative solutions, with widespread calls to be more responsible in innovation (Bansal et al., 2021; Candi et al., 2019). If human-centered approaches prevalently focus on serving the individual to make the products and services that people want, society-centered design considers people in relation to their communities or wider society. Second, envisioning future societies entails practices such as back-casting. This starts with defining a desirable future and then working backwards to identify solutions that will connect the future to the present, and exploring the preconditions that could lead to the desirable future (Rotmans et al., 2000). As De Smedt et al. (2013) argue, when the drivers of change are not only multiple but also mutable, it is not sensible to extrapolate the future from past data and relationships.

Table 4a

Innovation of solution projects: Summary statistics and pairwise correlations between variables.

N	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7
1	Client market value	5.33	1.13							
2	Capturing current user needs	5.41	1.43	0.49						
3	Envisioning future society	4.23	1.74	0.23	0.21					
4	Creating new ideas	5.28	1.22	0.12	0.32	0.56				
5	Challenging existing assumptions	5.48	1.22	0.12	0.26	0.40	0.49			
6	Consulting firm size	620	432	0.04	0.01	-0.31	-0.22	-0.13		
7	Project length	6.98	6.10	0.14	0.04	-0.12	-0.01	-0.06	0.05	
8	Team size	6.06	7.78	0.20	0.16	0.03	0.05	0.11	0.09	0.43

Table 4b

Innovation of direction projects: Summary statistics and pairwise correlations between variables.

N	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7
1	Client market value	5.41	1.24							
2	Capturing current user needs	5.18	1.25	0.07						
3	Envisioning future society	4.58	1.47	-0.04	0.45					
4	Creating new ideas	5.65	0.91	0.09	0.12	0.43				
5	Challenging existing assumptions	5.53	1.15	0.29	0.21	0.34	0.67			
6	Consulting firm size	642	411	-0.23	0.06	0.15	0.09	0.25		
7	Project length	8.96	7.03	0.31	-0.06	-0.11	-0.30	-0.26	-0.04	
8	Team size	5.43	4.05	0.03	0.24	0.28	0.13	0.06	0.03	0.27

Table 5

Results of the multi-group path analysis used to test the research model.

	Innovation of solutions projects N = 99				Innovation of directions projects N = 47				Wald tests for differences between groups				
	Coef.	Std. Err.	Z	p > z	Coef.	Std. Err.	z	p > z	X ²	p > X ²			
Client market value <													
Capturing current user needs	0.51	0.07	7.25	0.00	**	0.09	0.14	0.63	0.53	4.19	0.04	*	
Envisioning future society	0.27	0.10	2.82	0.01	**	-0.15	0.15	-1.00	0.32	4.36	0.04	*	
Creating new ideas	-0.18	0.10	-1.68	0.09		-0.01	0.18	-0.07	0.94	0.30	0.58		
Challenging existing assumptions	0.01	0.10	0.15	0.88		0.44	0.16	2.73	0.01	**	4.98	0.03	*
Consulting firm size	0.27	0.08	3.27	0.00	**	0.02	0.15	0.13	0.90	1.86	0.17		
Project length	0.22	0.09	2.34	0.02	*	0.45	0.13	3.44	0.00	**	1.56	0.21	
Team size	0.05	0.09	0.54	0.59		-0.10	0.15	-0.66	0.51	0.61	0.44		

*p < 0.05, **p < 0.01.

Visionary thinking aims at designing preferable futures, and more specifically, envisioning how society can be designed in a better way (Jørgensen, 2013).

Contrary to what we posit in H3, the empirical results do not show a statistically significant difference in the relationship between creating new ideas and the value generated by design thinking projects when comparing projects aimed at innovation of solutions and innovation of direction. Furthermore, this relationship is not statistically significant for either type of innovation project. One possible explanation might be the widespread and key role that creating new ideas plays in design thinking in general. Creating new ideas is so prevalent in design thinking projects that its adoption no longer constitutes a differentiating factor, but is instead a baseline expectation. Micheli et al. (2019) describe creativity and idea creation as the primary attribute connoting design thinking, and for this reason, may not constitute a differentiating factor, but a baseline practice in any design thinking project. A possible alternative explanation may be the drawback of divergent thinking. Even though the discussion on creative ideating as problem finding/solving practices started several decades ago (Simon, 1985, 1988; Csikszentmihalyi, 1988), many scholars have identified the role of creative ideating in supporting divergent thinking as a fundamental feature of design thinking (Brown, 2009; Martin, 2009; Lafley et al., 2013). Design problems are typically wicked because they are often ill-defined, involve stakeholders with different perspectives, and have no right or optimal solutions (Churchman, 1967; Simon, 1969; Rittel and Webber, 1973). Therefore, design problems cannot be solved by the application of analytical methods; they demand creative ideating. If creative ideating enables looking for original solutions and analyzing problems from different angles, it usually also implies the generation of numerous alternatives. They do not only create possible solutions, but also a lot of 'noise' that requires significant effort to properly understand, screen, and select the best solution (Levitt, 2002; Burkus, 2013). Thus, the benefits and drawbacks of creative ideating may cancel each other out in contributing to client market value.

Finally, the empirical results support H4 with a statistically significant difference between the coefficients for challenging existing assumptions in projects aimed at innovation of solutions and projects aimed at innovation of direction. Specifically, challenging existing assumptions has a positive and statistically significant relationship with market value in projects dealing with innovation of direction, while not related with market value in projects that aim at innovating solutions. As Verganti (2016) argues, challenging existing assumptions is a fundamental practice in innovation of direction where objective judgements are not available and criticism is needed. As many scholars point out, reframing is an activity that applies creativity not only in developing new solutions, but also in interpreting and defining the addressed problem, enabling moving from the initial (usually ill-defined) problem to the true problem (Dorst and Cross, 2001; Dorst, 2011). The aim of reframing is not finding the real problem, but identifying a better one to solve, searching for a better problem space to find the right solution. Criticism is an advanced interpretation of reframing to apply in the case of innovation of direction. According to Verganti and Norman (2019), "when conducted with curiosity and respect, criticism becomes the most advanced form of creativity". Indeed, criticism helps challenge existing assumptions and question current paradigms. It supports the development of robust and innovative directions because they imply new interpretations of potential futures. There is no scale of judgment, since the aim of a new direction is innovating precisely the judgement scale itself. To some extent, proposing new directions can be a relatively easy task, but identifying which one really makes sense can be more challenging (Verganti, 2008, 2017).

This finding, combined with the lack of a significant relationship between envisioning future society and market value in innovation of direction projects highlights even more the importance of challenging existing assumptions for finding a new direction. If we comprehensively look at all four sets of practices within the scope of projects aimed at developing a new direction, we observe that the approach an organization uses to build insights (capturing current user needs or envisioning future society) does not make a significant difference. Whatever the scope of the initial analysis (users vs society) and the time horizon of insights (current vs future), what matters is critical reflection to challenge existing assumptions in interpreting these insights. In finding a new direction, the quality of the reframing process matters more than the sources and nature of the insights.

6. Conclusions

The objective of this research is to increase our understanding of design thinking and its growing role in innovation. By studying how consulting firms implement design thinking in innovation projects, our research sheds light on the relationships between design thinking practices and the value generated by adopting this methodology. The evidence from the analysis of 146 design thinking projects demonstrates that as design thinking is broadening its scope, we cannot frame it as one single approach to deal with any challenge. We show that the different purposes (innovation of solutions or direction) for adopting design thinking may call for different practices to generate market value for clients.

Our evidence highlights the kaleidoscopic nature of design thinking and the emergence of new design thinking practices by opening up the black box of this methodology. Indeed, the growing debate around design thinking reflects how the interpretation of this phenomenon is broadening and new interpretations and characteristics are being unveiled. Our study demonstrates that the purposes of design thinking projects differ, with some aiming for innovation of solutions, some for innovation of direction, and others falling into neither category. Indeed, each category of projects appears to call for a different set of design thinking practices. This research also contributes to a broader conceptualization of design thinking by highlighting the currently less-discussed practice of criticism, thus enriching our knowledge by highlighting the diverse set of practices underpinning design thinking that is becoming increasingly pervasive in today's society.

Besides the contribution to theory, our study also offers implications for practitioners. The research highlights that design thinking adopters need to be aware of the distinction between innovation that aims to create new solutions (new products/services) and innovation that aims to identify a new direction (strategic and organizational transformation). While innovation of solution projects are likely to benefit from capturing current user needs and envisioning future society, innovation of direction projects are likely to benefit from challenging existing assumptions. Finally, the findings indicate that creating new ideas does not appear to contribute to market value for clients, which may be due to the pervasiveness of creative ideating, giving them the status of hygiene factors.

Our study has some limitations that point to potential avenues for future research. The data we used to test the research hypotheses derive from a few European countries, and the findings might hence be skewed by cultural idiosyncrasies. Thus, future research should test the research model in a broader range of countries. Moreover, the analysis of a single project in each consulting firm might be a limitation, and future research could investigate portfolios of projects within firms. Since our data were drawn from a self-report survey, the possibility of self-report bias should be acknowledged; this is a perennial issue when respondents are asked to describe their thoughts, recollections, or behaviors, rather than measuring these directly and objectively (Podsakoff and Organ, 1986). While we applied procedural remedies and a marker variable test to minimize the risk of common method variance, we call for future studies that involve multiple respondents to reduce the risk of self-report bias, as well as longitudinal studies, which could enable causal inference.

Author statement

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References

- Alexander, C., 1964. *Notes on the Synthesis of Form*, vol. 5. Harvard University Press.
- Bagozzi, R.P., 2011. Measurement and meaning in information systems and organizational research: methodological and philosophical foundations. *MIS Q.* 35 (2), 261–292.
- Bansal, P., Grewatsch, S., Sharma, G., 2021. How COVID-19 informs business sustainability research: it's time for a systems perspective. *J. Manag. Stud.* 58 (2), 602–606.
- Beckman, S.L., 2020. To frame or reframe: where might design thinking research go next? *Calif. Manag. Rev.* 62 (2), 144–162.
- Beckman, S.L., Barry, M., 2007. Innovation as a learning process: embedding design thinking. *Calif. Manag. Rev.* 50 (1), 25–57.
- Beckman, S.L., Barry, M., 2009. Design and innovation through storytelling. *Int. J. Innovat. Sci.* 1 (4), 151–160.
- Beltagui, A., Sigurdsson, K., Candi, M., Riedel, J.C., 2017. Articulating the service concept in professional service firms. *Journal of service management* 28 (3), 593–616. <https://doi.org/10.1108/JOSM-10-2015-0299>.

- Beverland, M.B., Wilner, S.J.S., Micheli, P., 2015. Reconciling the tension between consistency and relevance: design thinking as a mechanism for brand ambidexterity. *J. Acad. Market. Sci.* 43 (5), 589–609.
- Bicen, P., Johnson, W.H.A., 2015. Radical innovation with limited resources in high turbulent markets: the role of lean innovation capability. *Creativ. Innovat. Manag.* 24, 278–298.
- Boland, R.J., Collopy, F., 2004. *Design Matters for Management. Managing as Designing*. Stanford University Press, Stanford, CA.
- Brown, T., 2008. *Design Thinking*. <https://hbr.org/2008/06/design-thinking>.
- Brown, T., 2009. *Change by Design. How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins Publishers, New York.
- Buchanan, R., 2001. Human dignity and human rights: thoughts on the principles of human-centered design. *Des. Issues* 17, 35–39.
- Burkus, D., 2013. *Innovation Isn't an Idea Problem*. <https://hbr.org/2013/07/innovation-isnt-an-idea-proble>.
- Candi, M., 2010. Benefits of aesthetic design as an element of new service development. *J. Prod. Innovat. Manag.* 27 (7), 1047–1064.
- Candi, M., Saemundsson, R.J., 2011. Exploring the relationship between aesthetic design as an element of new service development and performance. *J. Prod. Innovat. Manag.* 28 (4), 536–557.
- Candi, M., Van Den Ende, J., Gemser, G., 2016. Benefits of customer codevelopment of new products: the moderating effects of utilitarian and hedonic radicalness. *J. Prod. Innovat. Manag.* 33 (4), 418–434.
- Candi, M., Melia, M., Colurcio, M., 2019. Two birds with one stone: the quest for addressing both business goals and social needs with innovation. *J. Bus. Ethics* 160 (4), 1019–1033.
- Carlgrén, L., Rauth, I., Elmquist, M., 2016. Framing design thinking: the concept in idea and enactment. *Creativ. Innovat. Manag.* 25, 38–57.
- Casakin, H.P., 2007. Factors of metaphors in design problem-solving: implications for design creativity. *Int. J. Des. I.* 1, 21–33.
- Churchman, C.W., 1967. Guest editorial: wicked problems. *Manag. Sci.* 14, 141–146.
- Cross, N., 1982. Designerly ways of knowing. *Des. Stud.* 3 (4), 221–227.
- Cross, N., 1999. Natural intelligence in design. *Des. Stud.* 20 (1), 25–39.
- Cross, N., 2011. *Design Thinking: Understanding How Designers Think and Work*. Berg.
- Csikszentmihalyi, M., 1988. Motivation and creativity: toward a synthesis of structural and energetic approaches to cognition. *New Ideas Psychol.* 6 (2), 159–176.
- Curhan, J.R., Labuzova, T., Mehta, A., 2021. Cooperative criticism: when criticism enhances creativity in brainstorming and negotiation. *Organ. Sci.* 32 (5), 1256–1272. <https://doi.org/10.1287/orsc.2020.1420>.
- Dahan, E., Hauser, J.R., 2001. Product development – managing a dispersed process. In: Barton, A.W., Wensley, R. (Eds.), *Handbook of Marketing*. Sage Publishing, pp. 179–222.
- Dell'Era, C., Landoni, P., 2014. Living lab: a methodology between user-centred design and participatory design. *Creativ. Innovat. Manag.* 23 (2), 137–154.
- Dell'Era, C., Magistretti, S., Cautela, C., Verganti, R., Zurlo, F., 2020. Four kinds of design thinking: from ideating to making, engaging, and criticizing. *Creativ. Innovat. Manag.* 29 (2), 324–344.
- Dell'Era, C., Verganti, R., 2010. Collaborative strategies in design-intensive industries: knowledge diversity and innovation. *Long. Range Plan.* 43, 123–141.
- De Smedt, P., Borch, K., Fuller, T., 2013. Future scenarios to inspire innovation. *Technol. Forecast. Soc. Change* 80, 432–443.
- Dew, N., 2007. Abduction: a pre-condition for the intelligent design of strategy. *J. Bus. Strat.* 28, 38–45.
- Dong, A., Garbuio, M., Lovallo, D., 2016. Generative sensing: a design perspective on the microfoundations of sensing capabilities. *Calif. Manag. Rev.* 58 (4), 97–117.
- Dorst, K., 2011. The core of 'design thinking' and its application. *Des. Stud.* 32, 521–532.
- Dorst, K., Cross, N., 2001. Creativity in the design process: Co-evolution of problem-solution. *Des. Stud.* 22, 425–437.
- Drews, C., 2009. Unleashing the full potential of design thinking as a business method. *Des. Manag. Rev.* 20, 39–44.
- Dunne, D.D., Dougherty, D., 2016. Abductive reasoning: how innovators navigate in the labyrinth of complex product innovation. *Organ. Stud.* 37 (2), 131–159.
- Elsbach, K.D., Stigliani, I., 2018. Design thinking and organizational culture: a review and framework for future research. *J. Manag.* 44, 2274–2306.
- Follett, J., 2016. *What Is Design Thinking? Human-Centered Design and the Challenges of Complex Problem-Solving*. <https://www.oreilly.com/ideas/what-is-design-thinking>.
- Foss, N.J., Saebi, T., 2018. Business models and business model innovation: between wicked and paradigmatic problems. *Long. Range Plan.* 51 (1), 9–21.
- Fournier, S., 1991. A meaning-based framework for the study of consumer/object relations. *Adv. Consum. Res.* 18, 736–742.
- Fraser, H.M., 2009. Designing business: new models for success. *Des. Manag. Rev.* 20, 56–65.
- Gatignon, H., Tushman, M.L., Smith, W., Anderson, P., 2002. A structural approach to assessing innovation: construct development of innovation locus, type, and characteristics. *Manag. Sci.* 48 (9), 1103–1122.
- Gattiker, T.F., Goodhue, D.L., 2005. What happens after ERP implementation: understanding the impact of inter-dependence and differentiation on plant-level outcomes. *MIS Q.* 29 (3), 559–585.
- Geels, F.W., 2004. From sectoral systems of innovation to socio-technical systems. Insights about dynamics and change from sociology and institutional theory. *Res. Pol.* 33, 897–920.
- Gemser, G., Leenders, M., 2001. How integrating industrial design in the product development process impacts on company performance. *J. Prod. Innovat. Manag.* 18 (1), 28–38.
- Giacomin, J., 2014. What is human centred design? *Des. J.* 17 (4), 606–623.
- Gloppen, J., 2009. Perspectives on design leadership and design thinking and how they relate to European service industries. *Des. Manag. J.* 4, 33–47.
- Gregory, S.A., 1966. *Design science*. In: *The Design Method*. Springer, Boston, MA, pp. 323–330.
- Gruber, M., Leon, N. de, George, G., Thompson, P., 2015. *Managing by design*. *Acad. Manag. J.* 58 (1), 1–7.
- Hair, J.F., Anderson, R.E., Babin, B.J., Black, W.C., 2010. *Multivariate Data Analysis: A Global Perspective*. Pearson Upper, Saddle River.
- Hirschman, E.C., 1986. The creation of product symbolism. *Adv. Consum. Res.* 13, 327–331.
- Holloway, M., 2009. How tangible is your strategy? How design thinking can turn your strategy into reality. *J. Bus. Strat.* 30, 50–56.
- Jaworski, B.J., Kohli, A.K., 1993. Market orientation: antecedents and consequences. *J. Market.* 57 (3), 53–70.
- Johansson-Sköldberg, U., Woodilla, J., Çetinkaya, M., 2013. Design thinking: past, present and possible futures. *Creativ. Innovat. Manag.* 22, 121–146.
- Jørgensen, M.S., 2013. Visions and visioning in foresight activities. In: Borch, K., Dingli, S.M., Jørgensen, M.S. (Eds.), *Participation and Interaction in Foresight: Dialogue, Dissemination and Visions*. Edward Elgar Publishing.
- Karpen, I.O., Gemser, G., Calabretta, G., 2017. A multilevel consideration of service design conditions: towards a portfolio of organisational capabilities, interactive practices and individual abilities. *J. Serv. Theory Pract.* 27, 384–407.
- Kelley, T., 2001. *The Art of Innovation*. Currency, New York.
- Kelley, T., Kelley, D., 2013. *Creative Confidence. Unleashing the Creative Potential within Us All*. Crown Business, New York.
- Kimbell, L., 2011. Rethinking design thinking: Part II. *Des. Cult.* 4 (2), 129–148.
- Klener, N.F., Gemser, G., Karpen, I.O., 2021. Entrepreneurial ways of designing and designerly ways of entrepreneurship: exploring the relationship between design thinking and effectuation theory. *J. Prod. Innovat. Manag.* <https://doi.org/10.1111/jpim.12587>. In press.
- Knight, E., Daymond, J., Paroutis, S., 2020. Design-led strategy: how to bring design thinking into the art of strategic management. *Calif. Manag. Rev.* 62 (2), 30–52.
- Kolko, J., 2010. Abductive thinking and sensemaking: the drivers of design synthesis. *Des. Issues* 26, 1.
- Kolko, J., 2015. *Design Thinking Comes of Age*. <https://hbr.org/2015/09/design-thinking-comes-of-age>.
- Kumar, V., Whitney, P., 2003. Faster, deeper user research. *Des. Manag. J.* 14 (2), 50–55.
- Lafley, A.G., Norman, D., Brown, T., Martin, R., 2013. *Q&A. Des. Manag. Rev.* 24 (2), 4–11.
- Lawson, B., 1994. *Design in Mind*. Architectural Press.
- Leavy, B., 2011. Roger Martin explores three big ideas: customer capitalism, integrative thinking and design thinking. *Strat. Leader.* 39, 19–26.
- Levitt, T., 2002. *Creativity Is Not Enough*. <https://hbr.org/2002/08/creativity-is-not-enough>.
- Liedtka, J., 2015. Perspective: linking design thinking with innovation outcomes through cognitive bias reduction. *J. Prod. Innovat. Manag.* 32, 925–938.

- Liedtka, J., 2018. Why Design Thinking Works. <https://hbr.org/2018/09/why-design-thinking-works>.
- Liedtka, J., 2020. Putting technology in its place: design thinking's social technology at work. *Calif. Manag. Rev.* 62 (2), 53–83.
- Liedtka, J., King, A., Bennett, D., 2013. Solving Problems with Design Thinking: Ten Stories of what Works. Columbia University Press, New York.
- Lindell, M.K., Whitney, D.J., 2001. Accounting for common method variance in cross-sectional research designs. *J. Appl. Psychol.* 86 (1), 114–121.
- Lockwood, T., 2009. Transition: how to become a more design-minded organization. *Des. Manag. Rev.* 20, 29–37.
- Lojacono, G., Zaccai, G., 2004. The evolution of the design-inspired enterprise. *Sloan Manag. Rev.* 45 (3), 75–79.
- Luchs, M., Swan, K.S., 2011. The emergence of product design as a field of marketing inquiry. *J. Prod. Innovat. Manag.* 28 (3), 327–345.
- Magistretti, S., Ardito, L., Messeni Petruzzelli, A., 2021. Framing the microfoundations of design thinking as a dynamic capability for innovation: reconciling theory and practice. *J. Prod. Innovat. Manag.* <https://doi.org/10.1111/jpim.12586>.
- Mansoori, Y., Lackeus, M., 2020. Comparing effectuation to discovery-driven planning, prescriptive entrepreneurship, business planning, lean startup, and design thinking. *Small Bus. Econ.* 54 (3), 791–818.
- Marquardt, D.W., 1970. Generalized inverses, ridge regression, biased linear estimation, and nonlinear estimation. *Technometrics* 12 (3), 591–612.
- Martin, R.L., 2009. The Design of Business: Why Design Thinking Is the Next Competitive Advantage. Harvard Business Press, Boston.
- Micheli, P., Perks, H., Beverland, M.B., 2018. Elevating design in the organization. *J. Prod. Innovat. Manag.* 35 (4), 629–651.
- Micheli, P., Wilner, S.J., Bhatti, S., Mura, M., Beverland, M.B., 2019. Doing design thinking: conceptual review, synthesis and research agenda. *J. Prod. Innovat. Manag.* 36, 124–148.
- Nakata, C., Hwang, J., 2020. Design thinking for innovation: composition, consequence, and contingency. *J. Bus. Res.* 118, 117–128.
- Nonaka, I., Toyama, R., Konno, N., 2000. SECI, Ba and leadership: a unified model of dynamic knowledge creation. *Long. Range Plan.* 33 (1), 5–34.
- Norman, D., 2005. Human-centered design considered harmful. *Interactions* 12 (4), 14–19.
- Norman, D., Verganti, R., 2013. Incremental and radical innovation: design research vs technology and meaning change. *Des. Issues* 30, 78–96.
- Patnaik, D., Becker, R., 1999. Needfinding: the why and how of uncovering people's needs. *Des. Manag. J.* 10, 37–43.
- Peterson, R.A., Hoyer, W.D., Wilson, W.R., 1986. The Role of Affect in Consumer Behaviour: Emerging Theories and Applications. Lexington Books, Lexington MA.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88 (5), 879–903.
- Podsakoff, P.M., Organ, D.W., 1986. Self-reports in organizational research: problems and prospects. *J. Manag.* 12 (4), 531–544.
- Ravasi, D., Lojacono, G., 2005. Managing design and designers for strategic renewal. *Long. Range Plan.* 38 (1), 51–77.
- Rittel, H.W., Webber, M.M., 1973. Dilemmas in a general theory of planning. *Pol. Sci.* 4 (2), 155–169.
- Romme, A.G.L., 2003. Making a difference: organization as design. *Organ. Sci.* 14 (5), 558–573.
- Rosenthal, S.R., Capper, M., 2006. Ethnographies in the front end: designing for enhanced customer experiences. *J. Prod. Innovat. Manag.* 23 (3), 215–237.
- Rotmans, J., van Asselt, M.B.A., Anastasi, C., Greeuw, S., Mellors, J., Peters, S., Rothman, D., Rijkens, N., 2000. Visions for a sustainable Europe. *Futures* 32 (9–10), 809–831.
- Rylander, A., 2009. Design thinking as knowledge work: epistemological foundations and practical implications. *Des. Manag. J.* 4 (1), 7–19.
- Sarasvathy, S.D., 2001. Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Acad. Manag. Rev.* 26 (2), 243–263.
- Sato, S., Lucente, S., Meyer, D., Mrazek, D., 2010. Design thinking to make organization change and development more responsive. *Des. Manag. Rev.* 21, 44–52.
- Schein, E., 1999. How to set the stage for a change in organizational culture. In: Senge, P.M. (Ed.), *The Dance of Change: the Challenges of Sustaining Momentum in Learning Organizations*. Nicholas Brealey Publishing, London, England, pp. 334–344.
- Schön, D., 1983. *The Reflective Practitioner*. Temple Smith, London.
- Seidel, V., 2000. Moving from design to strategy the four roles of design-led strategy consulting. *Des. Manag. J.* 11 (2), 35–40.
- Senge, P.M., 1991. *The Fifth Discipline: the Art and Practice of the Learning Organization*. Random House Business Books.
- Shah, R., Goldstein, S.M., 2006. Use of structural equation modeling in operations management research: looking back and forward. *J. Oper. Manag.* 24 (2), 148–169.
- Simon, H.A., 1969. *The Sciences of the Artificial*. MIT Press.
- Simon, H.A., 1985. Psychology of Scientific Discovery. Paper Presented at the 93rd Annual Meeting of the American Psychology Association, Los Angeles, CA.
- Simon, H.A., 1988. Creativity and motivation: a response to Csikszentmihalyi. *New Ideas Psychol.* 6 (2), 177–181.
- Stigliani, I., Ravasi, D., 2012. Organizing thoughts and connecting brains: material practices and the transition from individual to group-level prospective sensemaking. *Acad. Manag. J.* 55 (5), 1232–1259.
- Sutton, R.I., 2001. *The Weird Rules of Creativity*. <https://hbr.org/2001/09/the-weird-rules-of-creativity>.
- Tripp, C., 2013. No empathy-No service. *Des. Manag. Rev.* 24, 58–64.
- Verganti, R., 2006. *Innovating through Design*. <https://hbr.org/2006/12/innovating-through-design>.
- Verganti, R., 2008. Design, meanings, and radical innovation: a meta-model and a research agenda. *J. Prod. Innovat. Manag.* 25, 436–456.
- Verganti, R., 2009. *Design-Driven Innovation: Changing the Rules of Competition by Radically Innovating what Things Mean*. Harvard Business Press, Boston, MA.
- Verganti, R., 2016. *The Innovative Power of Criticism*. <https://hbr.org/2016/01/the-innovative-power-of-criticism>.
- Verganti, R., 2017. *Overcrowded: Designing Meaningful Products in a World Awash with Ideas*. MIT Press, Boston.
- Verganti, R., Dell'Era, C., 2014. Design-driven innovation: meaning as a source of innovation. In: Dodgson, M., Gann, D., Philips, N. (Eds.), *The Oxford Handbook of Innovation Management*. Oxford University Press.
- Verganti, R., Norman, D., 2019. *Why Criticism Is Good for Creativity*. <https://hbr.org/2019/07/why-criticism-is-good-for-creativity>.
- Verganti, R., Oberg, A., 2013. Interpreting and envisioning – a hermeneutic framework to look at innovation of meanings. *Ind. Market. Manag.* 42 (1), 86–95.
- Verganti, R., Vendraminelli, L., Iansiti, M., 2020. Innovation and design in the age of artificial intelligence. *J. Prod. Innovat. Manag.* 37 (3), 212–227.
- Verzyer, R.W., Borja de Mozota, B., 2005. The impact of user-oriented design on new product development: an examination of fundamental relationships. *J. Prod. Innovat. Manag.* 22, 128–143.
- Von Hippel, E., 1988. *The Sources of Innovation*. Oxford University Press, New York.
- Von Hippel, E., 2005. *Democratizing Innovation*. MIT Press, Boston.
- Vredenburg, K., Scott, I., Righi, C., 2002. *User-Centered Design: an Integrated Approach*. Prentice Hall PTR, Upper Saddle River, NJ.
- Ward, A., Runcie, E., Morris, E., 2009. Embedding innovation: design thinking for small enterprises. *J. Bus. Strat.* 30, 78–84.
- Wrigley, C., Nusem, E., Straker, K., 2020. Implementing design thinking: understanding organizational conditions. *Calif. Manag. Rev.* 62 (2), 125–143.

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