Design thinking for organizations: functional guidelines

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Abstract

The objective of this paper is to propose functional guidelines for the assertive practice of the design thinking approach in organizational environments, and therefore to promote innovation. Considering the statement that contextual conditions directly influence innovation, a literature review is conducted in both design thinking and organizational structures bodies of knowledge in order to discover possible relationships between one another. A brief explanation about how designers make sense of things is presented in order to exploit connections between design thinking, creativity, and innovation, and after three specific organizational structures – formalization, hierarchy and functional differentiation – are analyzed, relationships between them and design thinking are established. Accordingly, three functional guidelines for organizations to exercise design thinking assertively are proposed: in terms of formalization, employees must be provided with clearly specified rules and procedures that encourage creative, exploratory, and risk friendly work and learning in a design conductive ecosystem so engagement, motivation and productivity can be increased; in terms of hierarchy, managerial responsibilities and roles must be designated so strategic decisions can be made quickly and co-creation can work; in terms of functional differentiation, integrative, human-centered, and collaborative work has to be contemplated with the existence of interdisciplinary teams for a rich mix of expertise and points of view so opportunities can be better seized.

Keywords: design thinking, product design, service design, organizational structures, innovation

1   Introduction

The relationship between design and innovation has been proven effective. According to Brown (2009), as the center of economic activity in the developing world shifts from industrial manufacturing to knowledge creation and service delivery, innovation has become nothing less than a survival strategy. Additionally, Lockwood (2009) defends that there is no better time than now for out of the box thinking and new methods of problem solving, and that we need new, transformative corporate strategies that are based on human needs, not just financial analyses, stating that design is the key to achieving it all because it drives innovation.

Design's strategic influence in shaping the future is growing (Banerjee et al., 2013) and within the managerial realm, design thinking has been described as the best way to be creative and innovate (Johansson-Sköldberg et al., 2013). Along the first decade of the 21st-century, design thinking emerged as an approach that can promote radical and incremental innovation in companies that want to create innovative products and services (Fleury et al., 2016).

For many businesses, innovation has become a top priority, but, in order to practice, it corporate leaders need to learn how to adopt revolutionary thinking and practices required to stimulate and propel innovation (Leavy, 2012). Furthermore, definitions of innovation may vary in their wording, but they all stress the need to complete the development and exploitation aspects of new knowledge, not just its invention (Tidd et al., 2013) because innovation is not simply coming up with good ideas, but also putting them into practice (Hargadon, 2003).

If ideas are to be put into practice, the context has to be considered and the environment is recognized as one of the important contextual factors that influence innovation (Tornatzky et a., 1990). Organizational structures and their external linkages have an important bearing on the rate and direction of innovation (Teece, 1996), but the links between them and strategy itself are poorly understood (Dosi et al., 1988). Additionally, several publications discuss the importance and potential of design thinking to innovate, but scarce are the ones which offer guidelines on how to exercise it effectively by considering the characteristics and peculiarities of the surrounding environment (Correia et al., 2017). Accordingly, the objective of this paper is to propose functional guidelines for the assertive practice of design thinking in organizational environments, and therefore to promote innovation.

2   Innovation through design thinking

According to Lockwood (2009), design thinking is essentially a human-centered innovation process that emphasizes observation, collaboration, fast learning, visualization of ideas, rapid concept prototyping, and business strategy. The author states that the objective of the approach is to involve consumers, designers, and businesspeople in an integrative process, which can be applied to product, service, or even business design. Although the term itself is generally referred to as applying a designer's sensibility and methods to problem solving, it doesn't represent a substitute for professional design or the art and craft of designing, but rather a methodology for innovation and enablement. Brown (2009) believes that design thinking is a powerful approach to innovation, besides effective, broadly accessible, possible to be integrated into all aspects of business and society, and useful to generate breakthrough ideas that can be implemented and have impact. In this sense, according to Schumpeter (1912), discontinuous and revolutionary change happens through innovation and is the core of economic development because it breaks the economy out of its static mode through the discovery of valuable new combinations.

If design thinking is to be widely adopted, people with few or no experience in it will employ its methods (Seidel and Fixson, 2013). Considering that and with the main goal to promote

innovation through design, the specific objective of this article is to propose functional guidelines on how to practice design thinking effectively while taking under consideration the practicing environment and its characteristics. In order to do that, a literature review in both design thinking, and organizational structures bodies of knowledge is conducted to establish relationships between one another.

3   Abductive reasoning

According to Leavy (2010), most managers make decisions through either deductive or inductive reasoning modes. Deductive logic reasons from the general to the specific, while inductive logic reasons in the opposite direction. Deduction uses already accepted premises to arrive at *must be* guides to future action, while induction tries to arrive at guides to action through existing empirical evidence. Either way, both use existing data to draw conclusions as a guide to future action. However, new knowledge emerges through the logic of what it could be, not what it was. That is, by abduction (Martin, 2009).

Abductive reasoning is considered the logic of what might be. It represents a thought process that is a kind of informed conjecture that can only be verified through the generation of new data (Leavy, 2010). Additionally, it has the capacity of diverging and opening the perimeter of problems in order to explore other possibilities (Nitzsche, 2012).

Based on Dorst (2011), essentially, abduction comes in two forms where the outcome is conceived in terms of value. As showed in Table 1, the first one, which the author names Abduction 1, is often associated with conventional problem solving. In Abduction 1, both the 'value' wished to be created, and 'how' or 'Y', are known, but the 'what' or 'X' is missing (an object, a service, a system), which will give a definition to both the problem and the potential solution space within which an answer can be sought. According to the author, this is often what designers and engineers do, creating a design that operates with a known working principle, and within a set scenario of value creation. This is a form of 'closed' problem solving that organizations in many fields do on a daily basis.

The other abductive reasoning form proposed by Dorst, Abduction 2, is considered more complex because at the start of the problem-solving process only the wanted value is known. Therefore, the challenge in Abduction 2 is to understand 'what' or 'X' to create, while there is no known or chosen 'how' or 'Y', then both must be created in parallel.

Table 1. Forms of abduction, adapted from Dorst (2011).

Forms of abduction	
Abduction 1	X + how = value
Abduction 2	X + Y = value

Design is a problem-solving activity (Buchanan, 1992), and as a response to the challenge of working in problem situations that require abduction, designers have developed and professionalized specific ways of working (Dorst, 2011). Therefore, design thinking is abductive by nature, focused on the visualization of what a project might be in a desired future by creating models to materialize intentions. This essence is characteristic of the creative design practice (Nitzsche, 2012). Hence, design methods and principles can help managers to navigate

uncertainties and complexities and have been established as a tool with which to address a wide range of issues, from strategy to social change (Lockwood, 2009).

Despite the growing interest in design thinking concepts and techniques from both the academy and the job market, there is confusion among practitioners and researchers about their definitions and best practices (Fleury et al., 2016). Furthermore, it is still not clear what are the consolidated results obtained with the application of the design thinking in different organizational contexts, in addition to relevant scientific literature on how organizational structures affect the design thinking practice being scarce (Correia et al., 2017).

4   Theoretical background

4.1   Design thinking

Design thinking, as showed in Figure 1, is a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity (Brown, 2008). Additionally, it is a human-centered approach applied to wicked problem-solving that starts with the understanding of different users' perspectives and involves multidisciplinary teamwork based on the balance between cooperation-conflict among different actors in a co-creation process, in which conflict of ideas becomes the genesis for the establishment of innovative solutions (Fleury et al., 2016). Nowadays, the concept has been understood as an iterative and integrative practice that is related to business and innovation (Nitzsche, 2012).
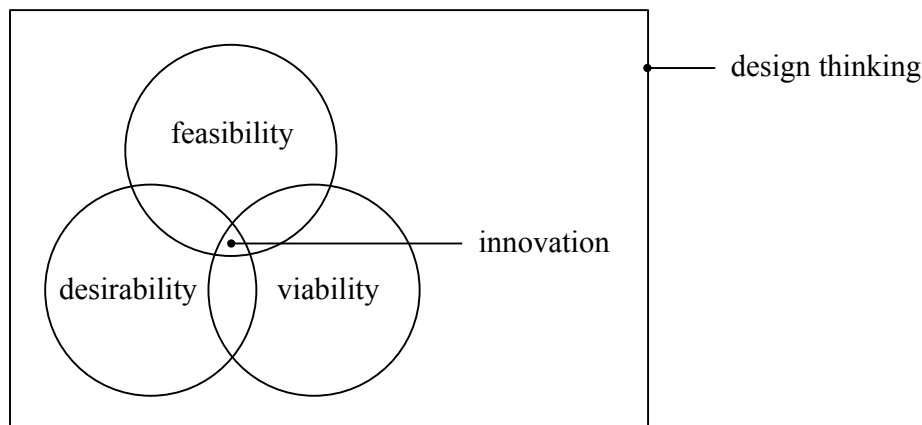

Figure 1. Design thinking, based on Brown (2009).

Johansson-Sköldberg et al. (2013) identified three different origins of the design thinking discourse: (1) design thinking as design company IDEO's way of working with design and innovation (Kelley, 2001, 2005; Brown, 2008, 2009); (2) design thinking as a way to approach indeterminate organizational problems, and a necessary skill for practicing managers (Dunne and Martin, 2006; Martin, 2009); (3) design thinking as a part of management theory (Boland and Collopy, 2004).

Seidel and Fixson (2013) argue that even though there are some differences in terminology about formal methods related to the design thinking approach, similarities emerge. In this manner, three methods are commonly cited within the design thinking approach (Brown, 2009; Lockwood, 2010; Martin, 2009): (1) need finding, encompassing the definition of a problem or opportunity through observation; (2) brainstorming, a formal framework for ideation; (3) prototyping, the act of building models to facilitate the development and selection of concepts.

Table 2. Common design thinking methods, based on Seidel and Fixson (2013).

Common design thinking methods	
Need finding	Encompasses the definition of a problem or opportunity through observation.
Brainstorming	A formal framework for ideation.
Prototyping	The act of building models to facilitate the development and selection of concepts.

The intrinsically human-centered nature of design thinking suggests managers use empathy and understanding of people to design experiences that create opportunities for active engagement and participation (Brown, 2009). As a result, an organization that promotes empathy, curiosity, and collaboration is closer to its consumers, besides being faster and more sensitive in facing market changes, which reduces the chance of failure and increases opportunities (Ferreira and Pinheiro, 2017).

4.2 Organizational structures

The environment itself is a complex system which consists of multiple types and dimensions (Ackoff, 1981). Accordingly, organizational variables have been widely studied and considered primarily important as determinants of innovation (Damanpour, 1991).

Organizational structures are what define the way responsibility and power are allocated, and work procedures are carried out, among organizational members (Blau, 1970). Therefore, they are directly related to the organizational environment and its context.

Damanpour (1991), through an extensive literature review, documented that researchers have used to describe as organizational structures the concepts of administrative intensity, centralization, external communication, formalization, functional differentiation, hierarchy, internal communication, managerial attitude toward change, managerial tenure, professionalism, slack resources, specialization, and technical knowledge resources. Additionally, Daft (1995) provides a list that includes the concepts of complexity, personnel ratios, and standardization.

In order to delimitate this research in a structured way so it could achieve its objective - to offer guidelines on how to practice design thinking assertively taking its context into consideration - three organizational structures were chosen to undergo further analysis in order to be related to the design thinking literature: formalization, hierarchy, and functional differentiation.

4.2.1 Formalization

Formalization is related to the degree to which workers are provided with rules and procedures inside an organization. According to Damanpour (1991), it is typically measured by the presence of rule manuals and job descriptions, or, more generally, by the degree of freedom available to organizational members as they pursue their functions and responsibilities versus the extent of rules that precisely define their activities (Cohn and Turyn, 1980).

4.2.2   Hierarchy

Hierarchy levels arose to help in the administration of military, religious, and governmental activities (Simon, 1973). The concept is related to the degree to which an organization has many versus few levels of management and is also called vertical differentiation (Damanpour, 1991).

4.2.3   Functional differentiation

Functional differentiation is related to the degree to which departments and workers are functionally specialized versus integrated in their works, skills, and training. It represents the extent to which an organization is divided into different units (Damanpour, 1991).

5   Design thinking and organizational structures

5.1   Design conductive formalization

According to Lockwood (2009), the real challenge for design leaders in implementing a design thinking culture is to reshape the organization to create an ecosystem that is conductive, and non-antagonistic, to design. The author states that design leaders and their organizational sponsors need to be aware that their task involves undertaking an entire cultural transformation that welcomes uncertainty and exploration. In addition, Martin (2009) states that in the organizational environment it is easier to defend analytical thinking and reliability instead of design thinking and validity. That is because most managers are trained and shaped based on deductive and inductive reasoning due to their formal managerial both scholar and practical background. Considering that, it is challenging for a company to introduce validity to its nature. Thus, according to the author, organizations need to develop structures and processes that promote, support, and reward the design thinking abductive culture to make its introduction more effective.

According to Damanpour (1991), some researchers have emphasized the need for a well-established, rigid purpose and clearly specified work rules for the successful introduction of innovations in organizations (Evan and Black, 1967; Ettlie et al., 1984). Besides that, Zaltman et al., (1973) attempted to resolve the issue by proposing that low formalization is needed for the initiation of innovations and high formalization for their implementation, but Lockwood (2009) states that the cult of productivity and busyness creates organizational environments in which calendars are full and it is almost impossible to get the necessary group of stakeholders in a room at the same time to establish intent around a design project or to make important design decisions, the cult of risk avoidance ties new ideas up in interminable business case processes rather than letting them flourish, proliferate and emerge into new forms, and the cult of rigorous process as salvation insists that an activity will produce a good outcome if only the people concerned follow a rigorous procedure.

Brown (2009) defends that those who navigate the transition from a culture of hierarchy and efficiency to one of risk taking and exploration are likely to become more deeply engaged, more highly motivated, and more wildly productive, and suggests that to be creative, a prerequisite is an social and spatial environment in which people know they can experiment, take risks, and explore the full range of their faculties. Additionally, Nitzsche (2012) defends that the design thinking practice requires a natural creativity, a humanistic attitude, and the full knowledge of administrative procedures so that designers are able to navigate efficiently through the business, and Leavy (2010) states that in order to develop a capacity for design thinking, most organizations must first acknowledge and confront their built-in bias for exploitation and analytical thinking, and their tendency to favor reliability over validity.

Therefore, it can be concluded that for design thinking to be effectively exercised in an organizational environment, employees must be provided with clearly specified rules and

procedures that encourage creative, exploratory, and risk friendly work and learning in a design conductive ecosystem so engagement, motivation and productivity can be increased.

5.2 Responsible hierarchical presence

According to Doll and Vonderembse (1991), a hierarchical authority structure, using formal information systems, can have a chilling effect in opportunities for learning and innovation because it controls task execution and coordinates sequential activities and hierarchical boundaries that maintain the more intellectually substantive tasks within managerial ranks. The authors also state that in industrial systems, tasks are bifurcated between unskilled manual work and functionally specialized work groups performing intellectual work and defend that the bifurcation of work encourages task specific innovation but makes innovation across the value chain more difficult. In addition, Hull and Hage (1982) state hierarchical levels increase links in communication channels, making communication between levels more difficult and inhibiting the flow of innovative ideas. Furthermore, many practitioners and educators have also espoused the negative relationship between administrative intensity and performance, arguing that excess management often stifles innovation and may get in the way of firm productivity (Peters and Waterman, 1987; Timmons et al., 1994).

Ambrose and Harris (2016) suggest the design thinking process should be manager-free because the presence of line managers, according to the authors, may inhibit the flow of ideas, but Ward et al., (2009) defend senior management must be integral to the process so that strategic decisions can be made quickly. Likewise, Leavy (2012) states that, in practicing design thinking, for co-creation to work, which is intrinsic to the process, it is the top leadership's responsibility to ensure that company policies: (1) promote dialogue so people can share and communicate and also make sense of the context through conversation; (2) provide sufficient access so that participants can not only use the content, but also modify and extend it; (3) foster reflexivity or reflective learning, so that the inputs of participants and their interactions can be used to both improve the content and the experience of the users themselves; (4) encourage transparency to gain trust and establish authenticity.

Doll and Vonderembse (1991) believe that a realistic assessment of the type of innovation that will be successful, and how it should be introduced, depend upon an understanding of the productive process that will receive it. Line workers, for instance, understand the production process but do not possess the technical skills to design innovations. Staff engineers possess the technical skills but may not have the insights that come from experience implementing innovations that cause change throughout the process.

Correspondingly, it is possible to conclude that although some authors defend the presence of managers may inhibit the flow of ideas or even chill learning opportunities, in order to assertively exercise design thinking, managerial responsibilities and roles must be designated so strategic decisions can be made quickly and co-creation can work.

5.3 Integrative functional differentiation

Diverse authors defend the presence of interdisciplinary teams in design thinking processes as being very important (Brown, 2009; Holloway, 2009; Lockwood, 2009; Vianna et al., 2012; Fleury et al., 2016). Holloway (2009) states that by using interdisciplinary teams in design thinking new ideas are incorporated because of the diversity and leverage of different paradigms, besides tool sets from different professions to analyze, synthesize, and generate insights. In addition, the interdisciplinary nature of design also ensures that innovations are balanced between the technical, business, and human dimensions. According to Lockwood (2009), the key is to enable integrative thinking by combining the creative ideas with more traditional strategic aspects in order to learn from a more complete and diverse point of view.

Likewise, in collaboration, constraints can be removed, and great ideas can emerge. Moreover, Vianna et al., (2012) believe it is important for design thinking processes to have a considerable variety of profiles involved so there can be different expertise together and people can contribute with different perspectives which makes the final result richer and more assertive. Significantly, building a design thinking culture may require a fundamental transformation — not only in the way an organization approaches innovation, but in how it conceives it (Gobble, 2014). Brown (2009) encourages organizations to think about how they can spend more time doing collaborative, generative work that will produce a tangible outcome at the end of the day and defends that face-to-face time cultivates relationships and nourishes teams. Similarly, Leavy (2012) explains the transition from creation to co-creation is likely to be an evolutionary one and declares it is becoming clear that the full embrace of the co-creation principle will eventually involve a complete transformation of the capabilities and culture of the enterprise in conceiving, designing and executing value.

Furthermore, according to Doll and Vonderembse (1991), to enhance learning, tasks are designed to permit people and groups to plan and execute their own work. The authors explain that work groups are capable of self-direction once they understand how their activities add value to the customer. Accordingly, these self-directing and self-organizing work groups enhance the organization's ability to implement more integrative innovations across the value chain because they are capable of learning. Additionally, Brown (2009) states that instead of an inflexible, hierarchical process that is designed once and executed many times, organizations must imagine how they might create highly flexible, constantly evolving systems in which each exchange between participants is an opportunity for empathy, insight, innovation, and implementation. Besides, according to the author, most organizations have metrics that measure the effectiveness of a division in its own terms and this type of thinking undermines effective collaboration across departmental silos, but it is precisely in the interstitial spaces, however, that the most interesting opportunities lie.

In conclusion, despite the extent to which an organization is divided into different units and the levels of specialization to their employees, for the design thinking exercise to be effective and assertive, functional differentiation has to contemplate integrative, human-centered, and collaborative work, with the existence of interdisciplinary teams for a rich mix of expertise and points of view so opportunities can be better seized.

Table 3. Design thinking for organizations: functional guidelines.

Design thinking for organizations: functional guidelines	
Design conductive formalization	Employees must be provided with clearly specified rules and procedures that encourage creative, exploratory, and risk friendly work and learning in a design conductive ecosystem so engagement, motivation and productivity can be increased.
Responsible hierarchical presence	Managerial responsibilities and roles must be designated so strategic decisions can be made quickly and co-creation can work.
Integrative functional differentiation	Functional differentiation has to contemplate integrative, human-centered, and collaborative work, with the existence of interdisciplinary teams for a rich mix of expertise and points of view so opportunities can be better seized.

6   Concluding reflections

6.1   Design thinking for organizations: functional guidelines

According to Fleury et al. (2016), although design thinking is considered powerful for the development of disruptive innovations inside companies, it is still not clear what are the consolidated results obtained with the application of such approach in different organizational contexts. Therefore, the findings from empirical research have to be systematized aiming to evidence the best practices for design thinking, both in quantitative and qualitative terms. This qualitative research aimed to contribute to this matter by proposing functional guidelines about how to practice design thinking effectively while taking into consideration the practicing environment and its characteristics according to a literature review in both design thinking and organizational structures bodies of knowledge.

Correspondingly, the proccess of systematic analysis of qualitative data (Miles and Huberman, 1994) followed the immersion/crystallization analysis style (Crabtree and Miller, 1999), where the researcher organises data by examining the text thoroughly and then crystallizing out the most important aspects. Following the instructions of Cherryholmes (1994), emphasis was placed on the relationships between belief, knowledge and actions where truth and meaning of ideas were derived from their practical usefulness within real world contexts. Accordingly, three functional guidelides about how to practice design thinking taking into consideration the practicing environment and its characteristics were proposed: (1) design conductive formalization, which stated employees must be provided with clearly specified rules and procedures that encourage creative, exploratory, and risk friendly work and learning in a design conductive ecosystem so engagement, motivation and productivity can be increased; (2) responsible hierarchical presence, which stated managerial responsibilities and roles must be designated so strategic decisions can be made quickly and co-creation can work; (3) integrative functional differentiation, which stated functional differentiation has to contemplate integrative, human-centered, and collaborative work, with the existence of interdisciplinary teams for a rich mix of expertise and points of view so opportunities can be better seized.

6.2   Discussions, limitations, and future work

In order to provide the lenses for evaluating the findings of this qualitative research in terms of precision (Winter, 2000), credibility, and transferability (Hoepfl, 1997), some conditions must be taken into consideration.

Qualitative research, broadly defined, means any kind of research that produces findings not reached by means of statistical procedures or quantification (Strauss and Corbin, 1990) and instead, the kind of research that produces findings reached from real-world settings where the phenomenon of interest unfolds naturally (Patton, 1990). Unlike quantitative researchers who seek causal determination, prediction, and generalization of findings, qualitative researchers seek instead illumination, understanding, and extrapolation to similar situations (Hoepfl, 1997). Considerably, in qualitative research, the conception of truth assumes diverse forms, because the discussion over measuring scales used frequently in quantitative research do not apply, which makes it necessary for the comprehension of validity - a paradigm for positivist quantitative research - to happen in other perspectives (Malterud, 2001). Hence, validity - or the alternative for validation - in qualitative research is not about final, fixed, and universal conceptions, but a construct tightly attached to processes and intentions to each and every project and research methodology (Golafshani, 2003).

Malterud and Hollnagel (1999) state the qualitative researcher's task is to explain, and maybe question, the hypotheses as ingredients of the preconceptions and as reflections rather than applying procedures for testing them.

Moreover, creativity cannot be standardized into a process. According to Hennessey and Amabile (2010), although creativity literature has seen substantial growth in volume and scope as well as methodological and theoretical sophistication, deeper understanding of it requires more interdisciplinary research based on systems view of creativity itself that recognizes a variety of interrelated forces operating at multiple levels. According to the authors, if strides are to be made in the sciences, humanities, and arts, we must arrive at a far more detailed understanding of the creative process, its antecedents, and its inhibitors.

Additionally, taking into consideration there are other organizational structures such as administrative intensity, centralization, complexity, external communication, internal communication, managerial attitude toward change, managerial tenure, personnel ratios, professionalism, slack resources, specialization, standardization, and technical knowledge resources, future research could propose different new guidelines to increasing assertiveness in the design thinking practice.

Nevertheless, the functional guidelines proposed in this article might represent an initial contribution to a better understanding of the relationship between design thinking and its environment, which could help practitioners, students, and researchers to exploit the relationships between one another in order to practice design thinking more assertively.

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