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Design Thinking As Problem-Solving Approach to Create Innovation

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Abstract: Design Thinking is a great concept. The Design Thinking plays the important role in addressing problems differently, developing new ideas, enhancing experiences, balancing exploration and exploitation better and transferring the complexity or difficulty by being more innovative. Problems have to be approached in different perspectives and angles. Therefore, there should be a collaborative effort of viewpoints and a variety of interpretation on the subject which will bring innovative solutions. By using 5 stages of Design Thinking, problems can be resolved with better solutions. The stages involved are 1. Empathize, 2. Define, 3. Ideate, 4. Prototype and 5. Test. All these stages are connected with one another. In 2007, the need for 21st century mind sets and protocols has sparked interest in design thinking. That is a human entered, prototype driven process for the exploration of new ideas that can be applied to operations, products, services, strategies, and even management. Design thinking revolves around three key phases: inspiration, ideation, and implementation. During these phases, problems are framed, questions are asked, ideas are generated, and answers are obtained. The phases are not linear; they can take place concurrently and can also be repeated to build up ideas along the continuum of innovation. Design Thinking shows the effectiveness and significance of clarification in any arguments in the management. It contributes solutions and delivers better result.

Key words: Design Thinking, Problem Solving, Innovation

INTRODUCTION

Design is challenging. Being successful in today's highly technological and globally competitive world requires a person to develop and use a different set of skills than were needed before [1]. One of these skills is called design thinking. Design thinking has also started to receive increased attention in business settings. This is because the design of products and services is a major component of business competitiveness, to the extent that many known companies have committed themselves to becoming design leaders [2].

> "*And although design thinking has become an integral part of the design and engineering fields as well as business, it can also have a positive influence on 21st century education across disciplines because it involves creative thinking in generating solutions for problems. That is, in academic environments, students are required to read critically, think and reason logically, and solve complex problems*" [3]. What's new is the growing degree to which individual and collective success is seen as depending on having such skills.

In addition to business settings, design thinking has received a lot of attention in engineering, architecture, and design majors in universities because it can change how people learn and solve problems. (e.g., Dym, Agogino, Eris, Frey, & Leifer [4], Fricke [5], Nagai & Nagouchi [6]). The topic of expertise in design thinking has also been receiving increasing attention in design research. In support of these claims, consider the large number of research articles published on the topic of design thinking (e.g., Do & Gross [7]; Goldschmidt & Weil [8], Owen [9], Stempfle & Badke- Schaube [10], Tang & Gero [11]).

Around the early 2000s, the concept of design thinking (DT) emerged as an approach to innovation, and within a few years, interest had grown blasted among managers determined to transform their business, and business schools wanting to better prepare their students for an increasingly complex and uncertain

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environment. Advocates of DT suggest that if firms could only learn to think and work more like designers, they would learn how to address problems differently, come up with breakthrough ideas, balance exploration and transform their business by being more innovative.

Of course such miracle cures can be questioned, and the concept has already been accused of being the latest management fad, a flower of the day. Furthermore, an increasing number of firms are implementing DT in various ways, and to judge from subjective evidence in increasing numbers of books and business press articles, they are doing so with some success.

Yet, to date there is very little empirical research on DT in organizational settings, and in particular research investigating DT in relation to innovation. This paper seeks to fill the gap, by exploring DT as a concept, and as a potential enabler of innovation in the context of large organizations.

Design Thinking Stages

The first step of Design Thinking process is to define the problem in the organization and to implement some solutions. It is important to visualize the problem and involve everyone in the discussion. This process focuses on need finding, understanding, creating, thinking, and doing. The core of this process is biased towards action and creation: by creating and testing something, we can continue to learn and improve upon our initial ideas [12]. The design thinking process consists of these 5 steps:

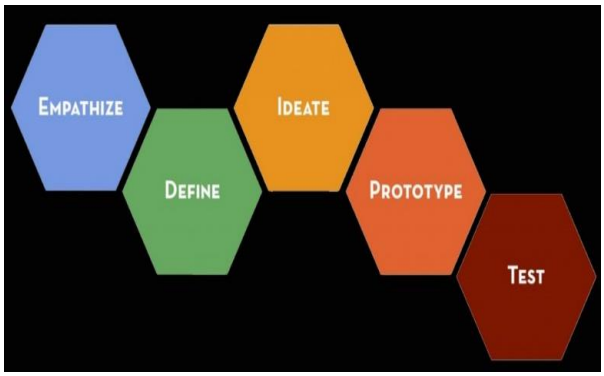


Fig 1 Design thinking steps

Empathy is the first step and the most important of the human-centered design process. The Empathize mode is to understand people, the way they do things and why, how they think about the world, their physical and emotional needs and the meaning to them [13]. According to Brown, T. & Wyatt, J. [14] empathy is the foundation to all the process. To empathize we can observe by viewing the users' behaviours in the context of their lives. Then, we engage by interacting and interviewing users both scheduled and with short "intercept" encounters and finally we immerse the experiences; what our users experience [15]. Empathize is important because the problems raised are rarely your own- they are those of particular users. It means that, to design for our users we should build up empathy for who they are and important for them. Observing what people do and how they interact with the environment will give clues of what they feel and think. It also helps us learn about their needs. In addition, by watching people you can capture their experiences.

The define mode in the process is all about bringing clarity and more focus to the design space. The goal of define mode should be a guiding statement that focuses on insights and needs of certain users. Define mode can easily serve to develop a deep understanding of your users and based on that understanding, come out with an actionable problem statement – it is your point-of-view [16]. Framing the right problem is the only way to create the right solutions. Define mode is critical to the process because it will result the point–of-view (POV): the expression of the problem that you try to solve and address. POV can be defines as the RIGHT challenge to address based on the understanding of the problem and people. The define mode is to synthesize our scattered finding into strong and powerful insights [17]. A good point-of-view (POV) is one that provide focus and frames the problem, it could inspire the team, empower the team to make decision independently, capture the heart and mind people we meet and guide our innovation efforts.

Ideate

Ideate in the Design Thinking process is to focus on the idea generation. It represents a process of "going wide" in term of concept and outcomes. The team comes up with various ideas to the problem [18]. There is no wrong or right answers or ideas, they share the ideas and put it on the stick up paper. According to Vianna et al. [13], ideation provides both the fuel and one of the source materials for building prototype and will be tested by the users. The ideation process is a transition from identifying the problem into exploring the solutions for the users. The benefits of the various forms

of ideation are that they harness the collective perspectives and strengths of your team, uncovering unexpected areas of exploration and create volume and variety in the innovation options. Plattner, H. [16] mentioned that the method of the ideation process applies when mixing intentionally between generating ideas and evaluating ideas.

Prototype

Prototyping is getting ideas from others, exploring it and putting it into the physical world. The prototype mode can be anything that a user can interact with for example a gadget you put together, a role playing activity, an interface or even a storyboard [16]. The resolution of the prototype should be the same with the progress in your project. In early exploration, the prototype might be rough or rapid to allow us to learn and investigate quickly in different possibilities. The most successful prototypes are when we (the design team, the user and others) can experience and interact with them [13]. Based on what we learn from those interactions which can help us to understand deeper empathy as well as to obtain successful solutions. Many goals of the prototyping are as follows:

i. To learn: A prototype is worth a thousand pictures.
ii. To solve disagreements: Prototyping is the best tool that can eliminate ambiguity, reduce miscommunication and assist in ideation.
iii. To start conversation: A prototype can be a better way to have a different kind of conversation with users.
iv. To fail quickly and inexpensively: creating quick prototypes allow us to test several number of ideas without investing a lot of time and money.
v. To manage the solution-building process: Encourage to break a large problem into smaller testable chunks.

Test

The test mode comes in when we obtain the feedback about the prototype that we have created. The feedback came from the users. In addition, testing is another opportunity to gain empathy from the people you design for and to understand the users. Both these things tend to focus on the interaction with the users. Testing can improve to focus and learn about the person and the problem as well as the solutions [16]. Ideally we can test the physical product by asking them to take it with their normal routines. While for an experience, try to create a scenario in a location that would capture the real situation. Test mode is the last stage in the process. The importance of the testing steps are as follows:

1. To refine prototypes and solutions: Testing informs the next alteration of the prototypes. This means going back to the drawing board.
2. To learn more about your user: Testing is another opportunity to build up empathy through observation and engagement that have been done at the first stage.
3. To refine point-of-view (POV): Testing might reveal that we failed to frame the problem correctly thus we could not get the right solution.

Design thinking as problem-solving approach to innovation

In a world of continuous fluctuation, where markets mature more rapidly and everyone is affected by information, organizations concern innovation, including management innovation, as the major driver of sustainable competitive advantage. To unlock opportunities, some of them use mind sets and protocols from the field of design to make out implicit wants and deliberately imagine for futures [19].

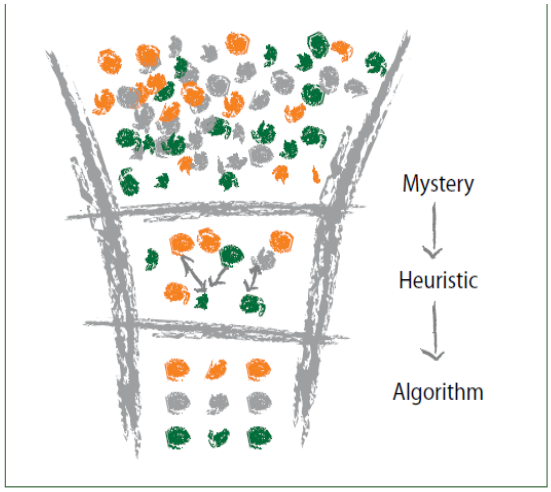
Design is more important when function is taken for granted and no longer helps stakeholders differentiate. In the last five years, design thinking has emerged as the quickest organizational path to innovation and high-performance, changing the way creativity and commerce interact (Apple in particular, but also General Electric, Levi Strauss, Nike, and Procter & Gamble, to name a few, pioneered the notion some time ago). All the big companies are using the concept of design thinking (DT).

In the past, design was a downstream step in the product development process, aiming to enhance the appeal of an existing product. Today, however, organizations ask designers to imagine solutions that meet explicit or latent needs and to build upstream entire systems that optimize customer experience and satisfaction.

Therefore, although the term "design" is commonly understood to describe an object (or end result), effective form a process, an action, and a verb, not a noun: essentially, it is a protocol to see, shape, and build.

In 2007, the need for 21st century mind sets and protocols has sparked interest in design thinking. That is a human centered, prototype driven process for the exploration of new ideas that can be applied to operations, products, services, strategies, and even management.

Design thinking revolves around three key phases: inspiration, ideation, and implementation. During these phases, problems are framed, questions are asked, ideas are generated, and answers are obtained. The phases are not linear; they can take place concurrently and can also be repeated to build up ideas along the continuum of innovation. The design thinking process allows information and ideas to be organized, choices to be made, situations to be improved, and knowledge to be gained as depicted in Roger Martin's three-stage funnel [20] as stated below.



Source: Roger Martin. 2009. *The Design of Business: Why Design Thinking is the Next Competitive Advantage*. Harvard Business School Publishing. Rotman Designworks. 2010. Available: www.rotmandesignworks.ca/business_design.html

Fig 2. Roger's Martin three-stage funnel

Roger added that, by the same situation, design is never finished: a market is always changing, least of all because good ideas are imitated, and design must change with it. Design success is the integration of design thinking into an organization. Hence, at this level, it becomes a powerful tool to solve unpredictable problems. Therefore it is clear that DT can boost up the innovation element in order to solve a problem.

Definition of Innovation

While the practice of innovation is probably as old as human activity, innovation research goes back to Schumpeter's *"Theory of Economic Development"* [21], but has gained increasing attention since the 1990s [22]. There is also a growing interest in innovation in the society, with innovation being a central theme in policy-making and government research funding at national and international levels [22], Fagerberg [23].

"Innovation is a complex concept, and can have multiple meanings, drawing on theories from a variety of disciplines and studied using a wide range of research methodologies" [22, 24]. The term innovation can be defined as an innovative output or a process or activities that is involved in generating the innovative output. Moreover, "*Innovation is sometimes understood as invention an idea, but Schumpeter* [21] *argues that what is novelity can only be seen as an innovation if it also succeeds in creating economic value."*

Understanding design thinking as a concept

A passionately debated topic is how to understand the concept of DT in theory and in practice. As Johansson-Sköldberg et al. [25] and Kimbell [26] note, DT is a rather loose term that can have several different meanings. "*Descriptions of DT range from a prescriptive process where multidisciplinary teams use a user-oriented approach to come up with relevant solutions to 'wicked problems' (to use the vocabulary of design research) to a set of cognitive characteristics that managers can learn from designers*" [25-26].

Summarizing the various practitioner-based descriptions of DT, Jahnke [27] states that DT is often understood as a problem-solving approach to innovation, in line with Herbert Simon's perception of design. Roger Martin [20] perceives DT as the ability of professional designers to switch between adductive, inductive and deductive ways of reasoning. He states that if managers were to follow this viewpoint, they would not only choose between given alternatives, but also come up with entirely new solutions.

According to Martin [2], *"DT in practice could help managers to cope with classical challenges such as balancing between exploration and exploitation*." Tim Brown of Director of IDEO (company of a global innovation and design firm) defines DT as a discipline that uses "the designer's sensibility and approaches to match people's needs with what is technologically

feasible and what a viable business strategy can convert into customer value and market opportunity" [28; p. 86].

Kimbell [26] *"characterizes DT as: 1) a cognitive style of individual designers involved in problem solving, 2) a general theory of design as a field or discipline focused on solving wicked problems, 3) an organizational resource for businesses and other organizations."*

Another attempt to identify common elements of DT is provided in the literature-based study by Seidel and Fixson [29] who propose three broad methods: 1) need finding, encompassing the definition of a problem or opportunity through observation; 2) brainstorming, a formal framework for ideation; 3) prototyping, building models as a source of ideation and the testing of ideas.

The Promise of design thinking

A miracle cure DT is advocated as an all-purpose problem-solving approach [28, [30-31], a creativity booster for organizations and their employees [32-33] and a mind-set that will help organizations better balance analytical and creative thinking and exploration [2, 20].

Organization using DT can expect greater innovation output because more desirable solutions that offer creative alternatives which go beyond aesthetics and are *"emotionally satisfying and meaningful"* [28]. It is also argued that implementing DT will improve aspects of the innovation, for example by improving collaboration and motivation through empathy and knowledge sharing through prototyping [2, 28]. Organizations can also expect a more efficient development process and that will bring innovations to the market more quickly by *"converting learning from the user into viable business outcomes"* [2].

"Refer to Cruickshank [22], innovation is not separated from invention, and often focuses on invention: *"innovation here is not defined or explicitly addressed but instead is used as an umbrella description for creative practices, such as brainstorming, 'unfocused groups', and ethnographic approaches"*

CONCLUSION

There is always a demand for the talented designers to solve problems, care about users and create innovative and competitive products or services. The future of Design Thinking is not evenly distributed. Some agencies and schools practise design thinking in the holistic ways. For example, The Innova School System applies design thinking across its platform to build up in the curriculum. People with design skills are able to guide and lead innovation in business and organisation in the time ahead. This challenge may lead to different skills and qualities. The designers must become a true team player and productive member of a multidisciplinary group that solve complex problems and create new opportunities. In addition, scholars such as Beckman and Barry [34] argue that DT as a generic innovation process which enables teams and organizations to learn and develop, and that an understanding of meaning-based user needs may lead to more essential innovation.

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