

## INNOVATION THROUGH DESIGN THINKING: CONTEXT, METHODOLOGY AND RESULTS

**Hanis Sultana A<sup>1</sup>, Vishnu Priya V<sup>2</sup>, Preetha G<sup>3</sup>, Prabakaran V<sup>4</sup>, Krishnaveni P<sup>5</sup>, Swarnam S<sup>6</sup>, Senthil Kumar S<sup>7</sup> & Shamini SD<sup>8</sup>**

<sup>1</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>2</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>3</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>4</sup>Associate Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>5</sup>Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>6</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>7</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

<sup>8</sup>Assistant Professor, Department of Management Studies, SNS College of Technology, Coimbatore.

### ABSTRACT

The application of design thinking to promote innovation across a range of industries has become ubiquitous. The number of publications has been increasing quickly due to its prominence in theory and practice. The goal of the present research is to create a research framework that takes into account the state of the field and makes it possible to identify research gaps. The present study uses 164 academic publications on design thinking as the basis for their thorough review of the literature. The framework proposed in this study highlights the stages of a typical design thinking process together with its guiding principles and tools, the individual and organizational outcomes of a design thinking project, and contextual aspects related to both. In contrast, earlier assessments concentrated on certain facets of design thinking, such as its traits, the organizational culture's setting, or its influence on the creation of new products.

**KEYWORDS:** Design Thinking, Outcomes, Process, Innovation

### INTRODUCTION

An established method used in businesses to address issues and foster creativity is called Design Thinking (DT) (Brown, 2008). Differentiating itself from merely analytical procedures, DT is creative and intuitive (Mansoori and Lackéus, 2020; Nakata, 2020). By placing a major emphasis on the demands of the user, DT promises benefits for improvements in products or services (Brown, 2008). It is thought that being fully immersed in the user scenario facilitates the identification of user needs. Additional advantages include learning effects (Beckman and Barry, 2007), lowering cognitive biases in decision-making (Liedtka, 2015), and changing the organizational culture to foster innovation (Elsbach and Stigliani, 2018; Kolko, 2015).

The idea of using design principles in a commercial setting is still relatively new, even if design research extends back to the 1960s (Johansson-Skoldberg et al., 2013). As such, research has traditionally focused on characterizing traits that connect the field of design to business and management (Carlgren et al., 2016b; Micheli et al., 2019). Since then, several studies on the potential applications, circumstances, and outcomes have been carried out (Chouki et al., 2021). For a considerable amount of time, case studies detailing real-world applications served as the main basis for conclusions (Holloway, 2009; Liedtka, 2015). To gauge the effects of DT, researchers have recently begun to employ quantitative approaches (Suci et al., 2021; Nakata and Hwang, 2020; Nagaraj et al., 2020).

Owing to its widespread application, DT has drawn more scholarly attention throughout time, which has resulted in an increase in the quantity of DT publications. Nonetheless, it is possible to characterize the vast literature landscape as complicated and fragmented. Consequently, the researcher's goals were to present a synopsis of the DT field and suggest a research methodology. The researcher conducts a thorough literature review with this goal in mind.

The review's more comprehensive methodology enhances earlier reviews. The features of DT (Micheli et al., 2019), organizational culture (Elsbach and Stigliani, 2018), and new product development (De Paula et al., 2022) were the subjects of earlier reviews. The current analysis of the literature adds to the body of knowledge on DT by offering a comprehensive and methodical summary of DT as a recognized technique for creativity and problem-solving in businesses. Specifically, the current study suggests an umbrella definition that emphasizes the essential tenets of this particular process as well as a research framework that arranges the data of earlier and later studies. Context considerations, a simple three-stage process model that unifies earlier process conceptualizations, and typical outcomes of DT processes are all included in the framework.

## **METHODOLOGY**

Through an analysis of the most recent research on the subject, this paper seeks to present an overview of the current findings of DT. To develop a study framework for DT, definitions, traits, influencing factors, and impacts are expanded upon based on the literature. The study examined previously published research in order to achieve this goal (Kraus et al., 2020, 2022; Linnenluecke et al., 2020; Tranfield et al., 2003).

Previously published research work in the field of DT were considered for the research work. Specifically, the search was restricted to publications having the term "design thinking" in the title, to make sure that DT is addressed centrally rather than as an afterthought. To be more precise, the search is restricted to the "business" and "management" categories, and at least one citation is required. Following the use of these criteria, 164 articles remained.

## **ANALYSIS**

The current study used a concept-centric approach to synthesis the data, as recommended by Kraus et al. (2020). The researcher then read the texts through to the end in order to conduct a more thorough study (Denyer and Tranfield, 2009). The researcher guided our review and categorized our findings using the Ma et al. (2019) model, which consists of context variables, process, and outcome for our research framework structure. Additionally, the results of the data analysis were documented in the current study using Excel. The current study followed similar procedure by tabulating the key points from each publication. In order to uncover research gaps for additional study, the researcher finally looked for connections between the insights that were discovered and assembled them into a framework.

## **RESULTS**

The understanding of design theory that exists today stems from early design research conducted in the 1960s (Elsbach and Stigliani, 2018). The goal of this research was to break down large, unstructured problems into smaller, more manageable challenges in order to create better solutions (Beckman and Barry, 2007). According to Johansson-Skoldberg et al. (2013), there are two types of thinking that are used in design: designerly thinking, which refers to the practices and competences of designers used in the field, and design thinking, which is the application of these practices and competencies by non-designers to address specific problems. In this sense, Brown's (2008) publication of his experiences working with the consulting company IDEO contributed to the current understanding of DT in a management context. This idea states that DT is a human-centered approach that blends a business perspective with design methods (Brown, 2008; Henseler et al., 2021). According to Martin (2010), this is the strategic fusion of intuitive and analytical thinking, which is anticipated to provide an edge over competitors.

A unified definition is absent because of disparate foci and viewpoints (Liedtka, 2015; Nakata and Hwang, 2020). Table 1 contains a collection of definitions. The definitions demonstrate a broad range of DT conceptualizations. Accordingly, DT is a process (Beckman and Barry, 2007; Beverland et al., 2015; Glen et al., 2014; Liedtka, 2015; Shapira et al., 2017), an approach (Elsbach and Stigliani, 2018), attitudes/principles (Kolko, 2015; Shapira et al., 2017), thinking modes (Martin, 2010), or the application of methods (Seidel and Fixson, 2013). While it is impossible to categorically label any interpretation as incorrect, the various writers approach DT from various angles and with various focuses. Although the process perspective is prevalent, it is important to include the other conceptualizations as well.

**TABLE 1: DEFINITIONS OF DESIGN THINKING**

Author(s)	Definition
Beckman and Barry (2007)	A generic innovation process, grounded in models of how people learn
Brown (2008)	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
Martin (2010)	A balanced dynamic interplay between analytical thinking and intuitive thinking
Seidel and Fixson (2013)	The application of design methods by multidisciplinary teams to a broad range of innovation challenges
Glen et al. (2014)	An iterative, exploratory process involving visualizing, experimenting, creating, and prototyping of models, and gathering feedback
Beverland et al. (2015)	A creative and strategic process characterized by the following hallmarks: abductive reasoning, iterative thinking and experimentation, holistic perspective, and human-centeredness
Kolko (2015)	A set of principles collectively known as design thinking—empathy with users, a discipline of prototyping, and tolerance for failure chief among them—is a tool for creating simple, intuitive and pleasurable interactions and developing a responsive, flexible organizational culture
Liedtka (2015)	A hypothesis-driven process, that is problem and solution focused, best suited to decision context in which uncertainty and ambiguity are high, composed of empathy, abduction, cocreation and collaboration, visualization and prototyping, and iteration
Shapira et al. (2017)	A process and attitude that harnesses creative problem-solving by focusing on the discovery of root causes and needs, collaborating across disciplines, cultivating optimism, and experimenting with solutions in order to learn and adapt more quickly
Elsbach and Stigliani (2018)	Design thinking comprises an approach to problem-solving that uses tools traditionally utilized by designers of commercial products, processes, and environments

To consolidate the different views, the present study propose the following definition:

“In businesses, Design Thinking is an iterative process for innovation and problem-solving that is founded on certain ideas (such emphasizing user requirements and fostering multidisciplinary) and employs certain techniques (like creative thinking, experimentation, visualization, and so on)”.

**DT PROCESS**

The literature has proposed a variety of DT process topologies, ranging in number from three to six phases. Nonetheless, the various process models all have the same fundamental concept. Only a finer subdivision is shown by models with more phases. Every DT process has three basic steps that can be regarded as its foundational phases. They are

- Gathering information about the issue
- Coming up with solutions
- Putting the ideas to the test (Brown, 2008; Liedtka, 2015).

Some stages are divided into sub-stages in the other models with more stages (Beverland et al., 2015; Liedtka, 2015; Brown, 2008). In practice, two popular models are the six-stage D.School model (Da Silva et al., 2020) and the five-stage IDEO process model (Shapira et al., 2017). Because the processes are typically iterative, switching back and forth between different stages is conceivable (Brown, 2008). The present study, which refers to the three categories of design tools according to Seidel and Fixson (2013), focuses on the three-stage conceptualization (Liedtka, 2015) as the least common denominator and relates the stages to the appropriate methodologies and principles.

**Data Gathering**

DT begins with situation observation and analysis with an emphasis on the user (Brown, 2008). It's about realizing who the user is and what demands they may be hiding (Furue and Washida, 2017; Nagaraj et al., 2020). Building empathy, which is the ability to identify and comprehend the feelings, ideas, motivations, and personality qualities of other people, is crucial to this (Brown, 2008; Carlgren et al., 2016b; Glen et al., 2015). It is possible to identify fresh prospects and possibilities thanks to this immersion (Liedtka, 2020). Using the data, "personas" are generated that represent the traits, behaviors, and requirements of the average user (Welsh and Dehler, 2013). DT aspires to a full understanding of the problem that encompasses environmental elements, relationships, context, trends, and user demands, often known as the gestalt perspective (Holloway, 2009). System thinking gives rise to the idea of investigating the entire problem by breaking it down into its component elements and looking for connections and patterns (Buchanan, 2019). Designers can determine the latent demands of users with this knowledge (Liedtka, 2015).

**TABLE 2: DT DIFFERENT PROCESS**

Authors	Process
---------	---------

Beckman and Barry (2007)	Observe and Notice - Frame and Reframe - Imagine and Design - Make and experiment
Beverland et al. (2015)	Destabilization - Define and Develop - Transformation
Brown (2008)	Inspiration – Ideation - Implementation
Glen et al. (2015)	Problem finding & Observation - Visualization/ sensemaking – Ideation - Prototype, testing & Viability testing
Da Silva et al. (2020)	Understand, Observe - Define, Ideate – Prototype - Test
Shapira et al. (2017)	Discovery - Interpretation - Ideation - Experimentation, Evolution
Liedtka (2015)	Data gathering about user needs - Idea Generation - Testing

**Idea Generation**

Ideation is essentially the process of creating theories about potential answers to issues or demands from users (Liedtka, 2020). Finding patterns and coming up with ideas might be aided by framing and rephrasing the previously gathered data (Beckman and Barry, 2007). In order to better grasp the nature of the issue and identify potential areas for resolution, it entails searching for hidden problems (Carlgren et al., 2016b). When producing ideas by incorporating diverse views and complementary information, collaboration within interdisciplinary teams can be a significant success element (Brown, 2008; Li, 2002; Seidel and Fixson, 2013). Teams use two processes to generate ideas: divergent thinking to generate a wide range of ideas, followed by convergent thinking to evaluate and focus these ideas (Carlgren et al., 2016b). As a result of the emergence of various ideas from sizable stakeholder groups, new solutions are created through the fusion of analysis and intuition (Nagaraj et al., 2020). By posing questions like "what if?" and "what might be?" (Liedtka, 2015), abductive reasoning plays a crucial role in bridging the gap between intuitive and analytical thinking (Martin, 2010). Within DT teams, curiosity and openness are increased and ingrained behavioral patterns are changed as a result of varied ideas and abductive reasoning (Liedtka, 2015).

Conventional methods for generating ideas are related to visual aids and brainstorming (Seidel and Fixson, 2013). High levels of team reflexivity are necessary for brainstorming, as demonstrated by frequent team talks about the ideas (Seidel and Fixson, 2013). While speedstorming is modeled after speed dating, brainwriting involves individual thought writing followed by group discussion (Thompson and Schonthal, 2020). By making the ideas real through illustration with diagrams, sketches, Post-it notes, or scribbles on whiteboards, visualization enables the presentation of the

ideas and the detection of overlooked possibilities (Carlgren et al., 2016b). Mind mapping can help the team get to a shared understanding by connecting the vast amount of knowledge (Liedtka, 2015). Additional methods in this stage include sociodrama (Wyman et al., 2012) and narratives and storytelling (Liedtka, 2015).

## Testing

During the testing phase, concepts and assumptions that have already been generated and selected are turned into prototypes and tested through iterative experiments that are repeated multiple times with new tweaks until the best answer is discovered (Carlgren et al., 2016b). Learning via action is a tenet of this stage (Liedtka and Kaplan, 2019). Prototyping depicts ideas by building a product with little input to get feedback on the concept, as opposed to engineering prototyping, which creates a technically complex test model (Glen et al., 2015). The generate-test cycles provide prompt feedback and the direct reintroduction of new knowledge into new combinations to find the optimal fit between environment, product attributes, and user needs (Nagaraj et al., 2020). Admitting mistakes offers valuable insights in this regard (Carlgren et al., 2016).

Elsbach and Stigliani (2018) state that idea-testing tools aim to evaluate proposals based on three criteria: user desire, technological feasibility, and business viability. Achievement in these three areas creates the space for invention. By creating tiny models quickly and cheaply, rapid prototyping turns ideas into concrete products (Brown, 2008). There are parallels to pragmatism in this sense since it involves identifying the best course of action and using the insights gained to explore alternative options (Dalsgaard, 2014). Field experiments are a common method for testing the hypotheses developed in the previous phase with external stakeholders (Liedtka, 2015; Micheli et al., 2019).

## CONTEXT FACTORS

### Application Context

According to Dell Era et al. (2020), problem-solving and innovation are the main application areas of DT. DT can be applied to challenges that are particularly challenging to identify thanks to its three steps of ideation, testing, and data collecting (Liedtka, 2015). Furthermore, ambiguity and uncertainty can be found in the application sectors (Elsbach and Stigliani, 2018; Luotola et al., 2017). Thus, DT is also applied in times of crisis to identify creative fixes (Cankurtaran and Beverland, 2020). However, the issue need not be very difficult (Nakata and Hwang, 2020). DT can be applied to both stages of research and development (Magistretti et al., 2021b). According to Nakata (2020), DT can be utilized in the front end of the product development process (Brand et al., 2021) and in the back end using an alternative technique such as Stage Gate, which is grounded in milestone planning and analytical decision-making. By incorporating its guiding principles and values—such as user focus, collaborative norms, risk-taking, ambiguity, experimentation, learning from failure, and design-led strategic thinking—DT may also be used to change an organization's culture (Elsbach and Stigliani, 2018).

## Organizational Factors

Non-designers must acquire the design concepts and abilities for handling ambiguity and uncertainty, creating a holistic perspective, and working in teams to combine divergent and convergent thinking in order to adopt DT (Dym et al., 2006). As a result, in order to perform the process, individuals must practice overcoming cognitive challenges (Butler and Roberto, 2018). The full utilization of DT's unique potential may require some time (Ben Mahmoud-Jouini et al., 2019). Scholars advised using a facilitator to teach design methods, provide guidance through the stages, and mediate between the organization's barriers and the design process when needed for implementation in existing structures (Daniel, 2016; Holzle and Rhinow, 2019; Starostka et al., 2021; Wrigley et al., 2018). When DT disagrees with established procedures and structures or is incompatible with the organizational culture, conflicts may occur at the organizational level (Carlgren et al., 2016a; Coco et al., 2020). Consequently, the company needs to have a strategic vision and goals that are well-known to staff members and connected to the DT process (Dunne, 2018; Wrigley et al., 2020).

Furthermore, it is imperative to properly delineate the previously mentioned norms and obligations (Carlgren et al., 2016a; Wrigley et al., 2020). There may be conflicts between the design process and earlier project work when DT is introduced into ongoing projects that are measured strictly by efficiency and objective achievement (Dijksterhuis and Silvius, 2017; Holzle and Rhinow, 2019; Nakata, 2020). However, academics advise against using DT as a strict procedure and instead view it as an adaptive approach that offers a range of tools for various scenarios and application scenarios (Chen and Venkatesh, 2013).

## OUTCOMES

### Organizational Level

Businesses can perform better when they employ DT (Suci et al., 2021). Because user needs are prioritized in product development, high-utility products that satisfy consumer demands can be created (Chen et al., 2018). Radical inventions can be fostered in this way (Radnejad et al., 2020; Tiberius et al., 2021). Additionally, DT can be used to strengthen organizational culture (Snyder et al., 2018), form dynamic capabilities (Magistretti et al., 2021a), help with strategy development (Liedtka and Kaplan, 2019; Holloway, 2009), and enhance a company's ability to be ambidextrous in its brand (Zheng, 2018). Beverland et al. (2015) demonstrated how DT fosters brand ambidexterity, or the capacity to concurrently pursue two distinct strategic trajectories: relevance and consistency. This is about making the most of the resources that a business already has, which might result in small-scale breakthroughs. However, radical innovations can result from experimenting and discovering new possibilities (Beverland et al., 2015; Zheng, 2018).



## Individual Level

According to Lee et al. (2019), Kim (2020), Cummings and Yur-Austin (2021), and Sandorova et al. (2020), the DT process improves participants' creativity on an individual basis. Furthermore, inertia is broken and cognitive biases are removed, opening the door to new directions (Liedtka, 2015; Nagaraj et al., 2020). Additionally, it leads to increased levels of self-confidence (Rao et al., 2021; Liedtka, 2020) and psychological empowerment (Roth et al., 2020). To further enhance entrepreneurial skills, DT can be beneficial (Lynch et al., 2021; Sarooghi et al., 2019).

## DISCUSSION

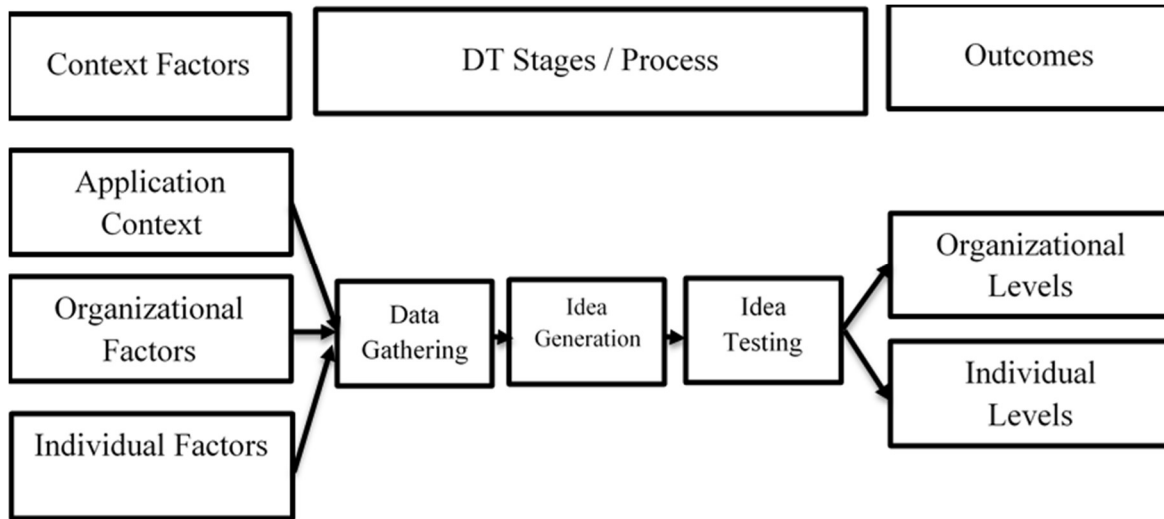
### Research Framework

An orderly summary of the increasing amount of articles on the still developing topic of DT is provided by the systematic literature review. The current study suggests a framework based on the available literature that takes into account the context elements, results, and stages of the process as well as principles and tools. Moreover, research gaps can be identified using the framework.

### Context Factors

The DT process can be supported by a number of organizational elements. On the one hand, the rooms and resources needed for the implementation of DT must be given, together with the requisite equipment (Wrigley et al., 2020). However, DT should complement the corporate culture and not conflict with current procedures (Carlgren et al., 2016a). How and at what levels DT is delivered are key factors in determining the circumstances that must be established (Starostka et al., 2021). When applying DT as a method for a particular project, organizational restrictions must be established to keep DT from violating accepted practices (Holzle and Rhinow, 2019). In addition to structural conditions, adopting DT as a mentality in an organization has an impact on the organizational culture and strategic vision (Wrigley et al., 2020). The organizational culture and the ideals must mesh. For instance, the culture would need to be changed to reflect the DT principles in firms where efficiency is the primary goal, or a separate space dedicated to the design mindset would need to be established (Dunne, 2018). Furthermore, the incorporation of attributes like empathy, customer focus, creativity, openness to failure, and readiness to experiment can enhance the culture of the company and motivate staff members to collaboratively pursue innovation (Coco et al., 2020; Elsbach and Stigliani, 2018; Kolko, 2015). Process execution greatly depends on the sort of leadership style used.

## FIGURE 1: DT FRAMEWORK



Unlike the organizational viewpoint, there is a dearth of study on the prerequisites that individual participants must have prior to the Design Thinking process, the qualities that may conflict with design principles, and the implications of these discrepancies for the final product. Building empathy, presenting ideas orally or in writing, and cooperating in groups are all expected of participants (Micheli et al., 2019). Thus, it would be possible to investigate if participation in the process requires certain skills and how to better incorporate personal traits that conflict with DT's worldview.

### Design Thinking Process

The DT process is explained at the heart of the framework. The examination revealed the various interpretations of the individual process phases, all of which share a creative approach to problem-solving. The phrasing and organization of the differences are more important than the information itself. According to Liedtka (2015), a three-stage classification of the process steps was selected for the framework, and it consists of the phases of obtaining user needs data, concept generation, and testing. Three higher-level stages were chosen, however this does not mean that models with more than one sub-step are not acceptable. Then, the components of Carlgren et al. (2016b) that were often cited—user focus, problem framing, visualization, experimentation, and diversity—were categorized into the three stages as essential factors. This article's classification of management tools was taken from Elsbach and Stigliani (2018) and Seidel and Fixson (2013). Three distinct viewpoints on DT in research are shown by the definition search. All three perspectives are included in this framework: (1) process, which follows a standard three-step process structure; (2) mindset, which consists of the ideas that underpin DT mentality; and (3) tools, which are employed to complete the various tasks. The features and properties of DT have been the subject of extensive research (Carlgren et al., 2016b; Elsbach and Stigliani, 2018; Liedtka, 2015; Micheli et al., 2019). Research on the individual effects of the tools is required in order to make better decisions on the selection of design tools. Studies have not yet taken into account the potential links and combinations of tools and methodologies. Critical realizations for practitioners

may arise from this. Furthermore, studies might be done to find out which instruments work best in particular contexts or sectors of the economy. The use of new technologies, such as augmented and virtual reality (Earle and Leyva-de la Hiz, 2020) or netnography, a digital version of ethnography intended for social media applications (Ashman et al., 2021), should be part of early research on developing tools.

Research on the effects of DT has shifted in focus and now demonstrates advantages for both individuals and organizations. Early case studies illustrating DT's adoption in practice were frequently used in research to highlight the use and impact of DT (Beverland et al., 2015; Clune and Lockrey, 2014; Holloway, 2009; Leavy, 2010; Liedtka, 2014; Vetterli et al., 2016). In the field of DT research today, case studies continue to be the most widely utilized research methodology (Knight et al., 2020; Magistretti et al., 2021b; Mount et al., 2020; Pham et al., 2022; Wrigley et al., 2020). However, research measuring the effects and advantages of DT empirically was lacking, which would have solidified its position as an innovation management tool (Micheli et al., 2019). Prior study has addressed this gap in the literature. The impacts that were previously assumed based only on case studies have been confirmed by recent empirical studies. It has been demonstrated that DT has a major impact on innovation and the development of new products (Chen et al., 2018; Nagaraj et al., 2020; Nakata and Hwang, 2020). It also enhances the general performance of teams (Nakata and Hwang, 2020; Suci et al., 2021). Engaging in design thinking (DT) promotes creativity both individually and in groups (Lee et al., 2019; Cummings and Yur-Austin, 2021; Kim, 2020). Kim (2020) also demonstrated how the degree of creativity is influenced by each person's creative capacity. Additional results at the individual level include higher levels of self-confidence (Liedtka, 2020; Rao et al., 2021) and motivation and empowerment, which act as a mediator for project performance (Roth et al., 2020).

According to each stage's characteristics such as user focus, collaboration, risk-taking, ambiguity, experimentation, learning from failure, and design-led strategic thinking—DT can be incorporated into an organization's strategy (Coco et al., 2020). It can also change the organizational culture (Elsbach and Stigliani, 2018; Kolko, 2015). Additionally, DT can promote improved decision-making and dissolve hierarchies (Liedtka, 2015). It can be difficult for businesses that depended solely on analytical thinking in the past to combine analytical and intuitive thinking. Persuasion may also be required while presenting DT in order to support its applications and advantages. For this reason, Dunne (2018) suggested applying DT in projects where it exhibits rapid success and provides a means of participant training in order to initially pick the "low-hanging fruits." It is advantageous to have a facilitator throughout implementation who can lead the team through the design process and step in when needed (Wrigley et al., 2018). Giving the participants the self-assurance and room to explore ingenuity is crucial in this situation. Training and time are required to fully utilize the design skills, but this shouldn't be a barrier because even unskilled teams can make progress (Seidel and Fixson, 2013).

## CONCLUSION

The DT literature is examined in this paper. The dataset suggests that DT has been more important in research in the last few years. The researcher offers a unified definition of design thinking (DT) as an iterative process of innovation and problem-solving that employs particular techniques (like creative thinking, visualization, experimentation, etc.) and is grounded in particular principles (like a focus on user needs, multidisciplinary, etc.).

A comprehensive summary of the procedure, the results, and the surrounding variables is given by our suggested framework. DT encourages the creation of novel products as well as the growth of creative abilities and behaviors both within organizations and among individuals. It necessitates and encourages an environment where people can be innovative and view failures as valuable learning opportunities. Furthermore, cooperation among team members should be feasible, embracing dissenting viewpoints and dismantling cognitive prejudices.

There are still some research gaps. Empirical research should be conducted to verify the usefulness and efficiency of the DT process as well as its unique techniques. Research on leadership philosophies that are beneficial for DT is desperately needed in relation to the organizational elements. When it comes to the size and level of interdisciplinary of teams, research may offer insightful information. Furthermore, no studies on the effects of personal traits on DT implementation were discovered. While there has been significant progress in elevating DT to an acknowledged process in the management literature, further study is still necessary to fully realize its potential.

## REFERENCES

1. Ashman, R., Patterson, A. and Kozinets, R.V. (2021), "Netnography and design thinking: development and illustration in the vegan food industry", *European Journal of Marketing*, Vol. 55 No. 9, pp. 2491-2514, doi: 10.1108/EJM-02-2020-0155.
2. Ben Mahmoud-Jouini, S., Fixson, S.K. and Boulet, D. (2019), "Making design thinking work: adapting an innovation approach to fit a large technology-driven firm", *Research Technology Management*, Vol. 62 No. 5, pp. 50-58, doi: 10.1080/08956308.2019.1638485.
3. Beverland, M.B., Wilner, S.J.S. and Micheli, P. (2015), "Reconciling the tension between consistency and relevance: design thinking as a mechanism for brand ambidexterity", *Journal of the Academy of Marketing Science*, Vol. 43 No. 5, pp. 589-609, doi: 10.1007/s11747-015-0443-8.
4. Brand, M, Tiberius, V, Bican, P.M. and Brem, A. (2021), "Agility as an innovation driver: towards an agile front-end of innovation framework", *Review of Managerial Science*, Vol. 15 No. 1, pp. 157-187, doi: 10.1007/s11846-019-00373-0.
5. Brown, T. (2008), "Design thinking", *Harvard Business Review*, Vol. 86 No. 6, pp. 84-92.

6. Buchanan, R. (2019), "Systems thinking and design thinking: the search for principles in the world we are making", *She Ji*, Vol. 5 No. 2, pp. 85-104, doi: 10.1016/j.sheji.2019.04.001.
7. Butler, A.G. and Roberto, M.A. (2018), "When cognition interferes with innovation: overcoming cognitive obstacles to design thinking: design thinking can fail when cognitive obstacles interfere; appropriate cognitive countermeasures can help disarm the traps", *Research Technology Management*, Vol. 61 No. 4, pp. 45-51, doi: 10.1080/08956308.2018.1471276.
8. Cankurtaran, P. and Beverland, M.B. (2020), "Using design thinking to respond to crises: B2B lessons from the 2020 COVID-19 pandemic", *Industrial Marketing Management*, Vol. 88, pp. 255-260, doi: 10.1016/j.indmarman.2020.05.030.
9. Carlgren, L., Elmquist, M. and Rauth, I. (2016), "The challenges of using design thinking in industry – experiences from five large firms", *Creativity and Innovation Management*, Vol. 25 No. 3, pp. 344-362, doi: 10.1111/caim.12176.
10. Chen, S., Benedicktus, R., Kim, Y. and Shih, E. (2018), "Teaching design thinking in marketing: linking product design and marketing strategy in a product development class", *Journal of Marketing Education*, Vol. 40 No. 3, pp. 176-187, doi: 10.1177/0273475317753678.
11. Chouki, M., de Mozota, B.B., Kallmuenzer, A., Kraus, S. and Dabic, M. (2021), "Design thinking and agility in digital production: the key role of user experience design", *IEEE Transactions on Engineering Management*, in press, doi: 10.1109/TEM.2021.3099094.
12. Clune, S.J. and Lockrey, S. (2014), "Developing environmental sustainability strategies, the double diamond method of LCA and design thinking: a case study from aged care", *Journal of Cleaner Production*, Vol. 85, pp. 67-82, doi: 10.1016/j.jclepro.2014.02.003.
13. Coco, N., Calcagno, M. and Lusiani, M. (2020), "Struggles as triggers in a design-thinking journey", *Creativity and Innovation Management*, Vol. 29 No. S1, pp. 103-115, doi: 10.1111/caim.12384.
14. Cummings, C. and Yur-Austin, J. (2021), "Design thinking and community impact: a case study of project-based learning in an MBA capstone course", *Journal of Education for Business*, Vol. 97 No. 2, pp. 126-132, doi: 10.1080/08832323.2021.1887795.
15. Da Silva, R.H., Kaminski, P.C. and Armellini, F. (2020), "Improving new product development innovation effectiveness by using problem solving tools during the conceptual development phase: integrating design thinking and TRIZ", *Creativity and Innovation Management*, Vol. 29 No. 4, pp. 685-700, doi: 10.1111/caim.12399.
16. Dalsgaard, P. (2014), "Pragmatism and design thinking", *International Journal of Design*, Vol. 8 No. 1, pp. 143-155.
17. Daniel, A.D. (2016), "Fostering an entrepreneurial mindset by using a design thinking approach in entrepreneurship education", *Industry and Higher Education*, Vol. 30 No. 3, pp. 215-223, doi: 10.1177/0950422216653195.

18. De Paula, D., Cormican, K. and Dobrigkeit, F. (2022), "From acquaintances to partners in innovation: an analysis of 20 years of design thinking's contribution to new product development", *IEEE Transactions on Engineering Management*, Vol. 69 No. 4, pp. 1664-1677, doi: 10.1109/TEM.2021.3084884.
19. Dell'Era, C., Magistretti, S., Cautela, C., Verganti, R. and Zurlo, F. (2020), "Four kinds of design thinking: from ideating to making, engaging, and criticizing", *Creativity and Innovation Management*, Vol. 29 No. 2, pp. 324-344, doi: 10.1111/caim.12353.
20. Dijksterhuis, E. and Silviu, G. (2017), "The design thinking approach to projects", *Journal of Modern Project Management*, Vol. 4 No. 3, pp. 32-41.
21. Dunne, D. (2018), "Implementing design thinking in organizations: an exploratory study", *Journal of Organization Design*, Vol. 7 No. 1, doi: 10.1186/s41469-018-0040-7.
22. Dym, C.L., Agogino, A.M., Eris, O., Frey, D.D. and Leifer, L.J. (2006), "Engineering design thinking, teaching, and learning", *Journal of Engineering Education*, Vol. 94 No. 1, pp. 103-120, doi: 10.1002/j.2168-9830.2005.tb00832.x.
23. Earle, A.G. and Leyva-de la Hiz, D.I. (2020), "The wicked problem of teaching about wicked problems: design thinking and emerging technologies in sustainability education", *Management Learning*, Vol. 52 No. 5, doi: 10.1177/1350507620974857.
24. Eggers, F., Niemand, T., Kraus, S. and Breier, M. (2020), "Developing a scale for entrepreneurial marketing: revealing its inner frame and prediction of performance", *Journal of Business Research*, Vol. 113, pp. 72-82, doi: 10.1016/j.jbusres.2018.11.051.
25. Furue, N. and Washida, Y. (2017), "Scanning and design thinking: organizational roles for innovation", *Foresight*, Vol. 19 No. 4, pp. 337-353, doi: 10.1108/FS-11-2016-0051.
26. Glen, R., Suciu, C., Baughn, C.C. and Anson, R. (2015), "Teaching design thinking in business schools", *International Journal of Management Education*, Vol. 13 No. 2, pp. 182-192, doi: 10.1016/j.ijme.2015.05.001.
27. Henseler, J., Guerreiro, M. and de Matos, N. (2021), "The interplay of marketing and design", *Review of Managerial Science*, Vol. 15 No. 5, pp. 1129-1137, doi: 10.1007/s11846-021-00470-z.
28. Holzle, K. and Rhinow, H. (2019), "The dilemmas of design thinking in innovation projects", *Project Management Journal*, Vol. 50 No. 4, pp. 418-430, doi: 10.1177/8756972819853129.
29. Holloway, M. (2009), "How tangible is your strategy? How design thinking can turn your strategy into reality", *Journal of Business Strategy*, Vol. 30 Nos 2/3, pp. 50-56, doi: 10.1108/02756660910942463.
30. Johansson-Skoldberg, U., Woodilla, J. and Çetinkaya, M. (2013), "Design thinking: past, present and possible futures", *Creativity and Innovation Management*, Vol. 22 No. 2, pp. 121-146, doi: 10.1111/caim.12023.
31. Kim, T. (2020), "The effect of creative potential on innovation behavior: focusing on design thinking", *Journal of Distribution Science*, Vol. 18 No. 8, pp. 65-74, doi: 10.15722/jds.18.8.202008.65.

32. Kolko, J. (2015), “Design thinking comes of age”, *Harvard Business Review*, Vol. 93 No. 9, pp. 66-71.
33. Kraus, S., Breier, M. and Dasí-Rodríguez, S. (2020), “The art of crafting a systematic literature review in entrepreneurship research”, *International Entrepreneurship and Management Journal*, Vol. 16 No. 3, pp. 1023-1042.
34. Kraus, S., Breier, M., Lim, W.M., Dabić, M., Kumar, S., Kanbach, D., Mukherjee, D., Corvello, V., Piñeiro-Chousa, J., Liguori, E., Palacios-Marqués, D., Schiavone, F., Ferraris, A., Fernandes, C. and Ferreira, J.J. (2022), “Literature reviews as independent studies: guidelines for academic practice”, *Review of Managerial Science*, Vol. 16 No. 8, pp. 2577-2595.
35. Leavy, B. (2010), “Design thinking – a new mental model of value innovation”, *Strategy and Leadership*, Vol. 38 No. 3, pp. 5-14, doi: 10.1108/10878571011042050.
36. Li, M. (2002), “Fostering design culture through cultivating the user-designers' design thinking and systems thinking”, *Systemic Practice and Action Research*, Vol. 15 No. 5, pp. 385-410, doi: 10.1023/A:1019933410857.
37. Lynch, M., Kamovich, U., Longva, K.K. and Steinert, M. (2021), “Combining technology and entrepreneurial education through design thinking: students' reflections on the learning process”, *Technological Forecasting and Social Change*, Vol. 164, doi: 10.1016/j.techfore.2019.06.015.
38. Ma, S., Kor, Y.Y. and Seidl, D. (2019), “CEO advice seeking: an integrative framework and future research agenda”, *Journal of Management*, Vol. 46 No. 6, pp. 771-805, doi: 10.1177/0149206319885430.
39. Magistretti, S., Ardito, L. and Messeni Petruzzelli, A. (2021a), “Framing the microfoundations of design thinking as a dynamic capability for innovation: reconciling theory and practice”, *Journal of Product Innovation Management*, Vol. 38 No. 6, pp. 645-667, doi: 10.1111/jpim.12586.
40. Magistretti, S., Dell'Era, C., Verganti, R. and Bianchi, M. (2021b), “The contribution of design thinking to the R of R&D in technological innovation”, *R&D Management*, Vol. 52 No 1, pp. 108-125, doi: 10.1111/radm.12478.
41. Mansoori, Y. and Lackéus, M. (2020), “Comparing effectuation to discovery-driven planning, prescriptive entrepreneurship, business planning, lean startup, and design thinking”, *Small Business Economics*, Vol. 54 No. 3, pp. 791-818, doi: 10.1007/s11187-019-00153-w.
42. Martin, R. (2010), “Design thinking: achieving insights via the ‘knowledge funnel’”, *Strategy and Leadership*, Vol. 38 No. 2, pp. 37-41, doi: 10.1108/10878571011029046.
43. Micheli, P., Wilner, S.J.S., Bhatti, S.H., Mura, M. and Beverland, M.B. (2019), “Doing design thinking: conceptual review, synthesis, and research agenda”, *Journal of Product Innovation Management*, Vol. 36 No. 2, pp. 124-148, doi: 10.1111/jpim.12466.

44. Nagaraj, V., Berente, N., Lyytinen, K. and Gaskin, J. (2020), "Team design thinking, product innovativeness, and the moderating role of problem unfamiliarity", *Journal of Product Innovation Management*, Vol. 37 No. 4, pp. 297-323, doi: 10.1111/jpim.12528.
45. Nakata, C. (2020), "Design thinking for innovation: considering distinctions, fit, and use in firms", *Business Horizons*, Vol. 63 No. 6, pp. 763-772, doi: 10.1016/j.bushor.2020.07.008.
46. Pham, C.T.A., Magistretti, S. and Dell'Era, C. (2022), "The role of design thinking in big data innovations", *Innovation*, Vol. 24 No. 2, pp. 290-314, doi: 10.1080/14479338.2021.1894942.
47. Radnejad, A.B., Ziolkowski, M.F. and Osiyevskyy, O. (2020), "Design thinking and radical innovation: enter the smartwatch", *Journal of Business Strategy*, Vol. 42 No. 5, pp. 332-342, doi: 10.1108/JBS-02-2020-0044.
48. Rao, H., Puranam, P. and Singh, J. (2021), "Does design thinking training increase creativity? Results from a field experiment with middle-school students", *Innovation: Organization and Management*. doi: 10.1080/14479338.2021.1897468.
49. Roth, K., Globocnik, D., Rau, C. and Neyer, A.K. (2020), "Living up to the expectations: the effect of design thinking on project success", *Creativity and Innovation Management*, Vol. 29 No. 4, pp. 667-684, doi: 10.1111/caim.12408.
50. Sandorova, Z., Repaňova, T., Palencikova, Z. and Betak, N. (2020), "Design thinking - a revolutionary new approach in tourism education?", *Journal of Hospitality, Leisure, Sport and Tourism Education*, Vol. 26, doi: 10.1016/j.jhlste.2019.100238.
51. Sarooghi, H., Sunny, S., Hornsby, J. and Fernhaber, S. (2019), "Design thinking and entrepreneurship education: where are we, and what are the possibilities?", *Journal of Small Business Management*, Vol. 57 No. S1, pp. 78-93, doi: 10.1111/jsbm.12541.
52. Shapira, H., Ketchie, A. and Nehe, M. (2017), "The integration of design thinking and strategic sustainable development", *Journal of Cleaner Production*, Vol. 140 No. 1, pp. 277-287, doi: 10.1016/j.jclepro.2015.10.092.
53. Snyder, K., Ingelsson, P. and Backstrom, I. (2018), "Using design thinking to support value-based leadership for sustainable quality development", *Business Process Management Journal*, Vol. 24 No. 6, pp. 1289-1301, doi: 10.1108/BPMJ-02-2018-0045.
54. Starostka, J., Evald, M.R., Clarke, A.H. and Hansen, P.R. (2021), "Taxonomy of design thinking facilitation", *Creativity and Innovation Management*. doi: 10.1111/caim.12451.
55. Stephens, J.P. and Boland, B.J. (2015), "The aesthetic knowledge problem of problem-solving with design thinking", *Journal of Management Inquiry*, Vol. 24 No. 3, pp. 219-232, doi: 10.1177/1056492614564677.
56. Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14, pp. 207-222, doi: 10.1111/1467-8551.00375.



57. Welsh, M.A. and Dehler, G.E. (2013), “Combining critical reflection and design thinking to develop integrative learners”, *Journal of Management Education*, Vol. 37 No. 6, pp. 771-802, doi: 10.1177/1052562912470107.
58. Wrigley, C., Mosely, G. and Tomitsch, M. (2018), “Design thinking education: a comparison of massive open online courses”, *She Ji*, Vol. 4 No. 3, pp. 275-292, doi: 10.1016/j.sheji.2018.06.002.
59. Wrigley, C., Nusem, E. and Straker, K. (2020), “Implementing design thinking: understanding organizational conditions”, *California Management Review*, Vol. 62 No. 2, pp. 125-143, doi: 10.1177/0008125619897606.
60. Wyman, G., Holland, V.M. and Yates, S. (2012), “Conversations with the marketplace: an application of design thinking and sociodrama action methods in an innovation workshop”, *International Journal of Innovation Science*, Vol. 4 No. 2, pp. 77-87, doi: 10.1260/1757-2223.4.2.77.
61. Zheng, D.L. (2018), “Design thinking is ambidextrous”, *Management Decision*, Vol. 56 No. 4, pp. 736-756, doi: 10.1108/MD-04-2017-0295.