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Contents

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ABSTRACT

Over the past 20 years, design thinking as an innovation approach has received substantial and increasing interest from both practice and academia. Companies have hired Chief Design Officers, trained their employees in design thinking, and acquired entire design firms. Similarly, academic researchers across a substantial variety of fields have tried to identify the successful application of design thinking tools, practices, and mindsets. And yet, this interest and efforts have so far not produced a reliable method in the literature on how to operationally manage design thinking successfully: a search for "design thinking" across the top 10 operations management journals over 30 years returned only three articles.

A major issue behind this problem is the lack of reliable design thinking process measurements. To address this issue, I apply an operations management lens to design thinking and construct a set of literature references across multiple disciplines and domains covering the last 30 years (1992–2022). Building on a simple operations model I expand it in two directions. First, the outcome measurement is stepwise expanded to include not only the design thinking project, but also the design thinker, the team, the organization,

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and ultimately the society and the environment. Second, I unpack the design thinking process into its phases empathy, synthesis, ideation, and prototyping, and add considerations of the elements of the overall process gestalt and team diversity. For each of these specific aspects of design thinking, I identify the current state of knowledge in the literature and provide suggestions for future research to expand the current frontier.

This analysis produces major insights in two arenas. One insight is that the better measures that are needed for the study of the operations of design thinking processes will have to be more complex by integrating multiple dimensions of process metrics and performance outcomes. To accomplish this will require more interdisciplinary work beyond operations management, including disciplines such as organizational behavior, ethics, psychology, design, engineering, and systems thinking. The second insight suggests that the increasing diffusion of digital tools, especially the rapidly evolving world of data science and artificial intelligence, across innovation work such as design thinking, will reshape many, if not all, of the process steps involved. Both arenas offer fertile ground for future research on design thinking for operations management.

1

Introduction

Over the past two decades, design thinking as an innovation practice has experienced substantial interest across various domains, including the commercial realm, the general public, and academia. However, this growth in interest has been uneven within these domains, and often disconnected between them.

In recent years, most larger firms, and many small ones, in industries ranging from consumer goods to health care to financial services and insurance have turned to design thinking to improve their organization's user-centeredness specifically, and their innovation capability more generally. Application areas of design thinking range from products to services to organizations to strategy (Rau *et al.*, 2017).

Companies have chosen a whole range of paths to accomplish these goals: Some have created new top-level executive positions such as Chief Design Officer, e.g., PepsiCo., some have trained large portions of their employees in the practice of design thinking, e.g., Infosys (PTI, 2018), others have created a corps of innovation catalysts who are trained design thinking specialists, and whose role it is to spread design thinking techniques throughout the organization and support their co-workers in innovation projects, e.g., Intuit (Martin, 2011; Smith, 2015), and

yet others simply acquired entire design firms to add design thinking capability to their existing ones, e.g., consulting company McKinsey acquiring design firm Luna.

In line with the increased engagement with design thinking in industry, the interest in design thinking has spread to other sectors of the economy, ranging from K-12 education, to non-profit and social ventures (Brown and Wyatt, 2010), to business higher ed (Dunne and Martin, 2006; Fixson and Read, 2012; Glen *et al.*, 2014) all the way to prisons (Budds, 2016). As of this writing in early 2023, an internet search of the term "Design Thinking" returns almost 50 million hits, a search using the term "Design Thinking" on Amazon.com returns over 3,000 results for books, and a search in Google Trends indicates increasing interest in design thinking since around 2010, reaching its highest value so far in September 2022 (the growth trend shows a slight dip for 2020 and 2021, most likely due to the Covid-19 pandemic).

And yet, despite all this interest and efforts, so far research has not produced a reliable method on how to operationally manage design thinking successfully: Looking at the past 30 years, there are only a very small number of publications in the field of Operations Management that focus on design thinking ($n = 3$). More broadly, this absence of a focus on innovation in the operations management research community shows up in other analyses, too. For example, Zhang *et al.* (2020) identify in their study of 4,188 articles published in five top operations management journals over 21 years (1997–2018) the top 20 keywords (e.g., supply chain, inventory, etc.) and none includes innovation, let alone design thinking.

In practice, similar gaps exist. For the broader activity *innovation*, surveys with C-level executives show that a large portion of the executives (84%) views innovation as critical for organizational growth, but only a fraction of them (6%) is satisfied with their organization's innovation performance (McKinsey, 2016). Longitudinal data confirms that very few firms are able to consistently perform innovation well (Manly *et al.*, 2023). For the narrower topic of design thinking a similar picture emerges. While there are numerous anecdotes of successful design thinking implementation (Liedtka *et al.*, 2013; Schweitzer *et al.*,

2023), there is very little systematic research that empirically shows how to operationally run design thinking successfully. At the heart of this situation exists a gaping hole of our understanding of how to measure progress in innovation processes in general, and of practices such as design thinking, in particular.[1]

To address this gap in measurement, this monograph aims to provide a map of what is known about mechanisms of design thinking when looking through an operations management lens, and to identify areas where knowledge gaps still exist. For this purpose, I conducted a significantly expanded literature search across multiple disciplines and domains, resulting in over 140 references. In addition, applying the operations management lens I construct a simple framework for how to assesses progress in design thinking activities. To provide improved design thinking progress measures, I expand this framework by considering multiple dimensions of these measures in greater detail: the outcomes of an operation, and its transformation function. Applying the reference set to these multiple dimensions of the expanded framework identifies contributions from other disciplines that can help explain the conditions under which design thinking operations can be managed successfully, and pinpoints unexplained gaps that are worthy of future research.

The remainder of the monograph is structured as follows. The next section prepares the methodological ground for this monograph by putting the attempt to search for better design thinking process measures in the context of existing research approaches. Section 3 summarizes in broad strokes the origins and characteristics of design thinking and provides an overview of the progress measures that have been proposed for design thinking. Section 4 describes the process by which the literature sets analyzed for this monograph were constructed. Section 5 introduces an operations management perspective for design thinking as an innovation production process. In Section 6, I expand this perspective by introducing multiple dimensions and finer grained

[1] Likewise, design innovation researchers have identified the need for investigating "the specific processes, practices, and techniques that enable (or hinder) design innovation" (Gemser and Barczak, 2020, p. 466) as a promising future research topic.

measures and apply this extended framework to the data set from Section 4 to pull together the current understanding of design thinking and to identify future research opportunities. Section 7 concludes with some broader reflections.

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