

Barriers Involved With Implementing The D.School's Design Thinking Model With Manufacturing Companies

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[Abstract] Design Thinking (DT) has become crucial for manufacturing companies striving to meet consumer expectations and stand out in competitive marketplaces. This qualitative study explores barriers to implementing a commonly used DT model (the d.school's DT model) in manufacturing companies, as perceived by DT consultants. While existing literature extensively covers DT processes, few studies focus on practitioner perspectives, such as the consultant, to understand the challenges of implementing the process within an organizational structure. This research identifies trust as the primary obstacle for DT consultants working with organizational members to overcome. Data was collected through semi-structured interviews and analyzed using open, axial, and selective coding to identify themes and ascertain a theoretical meaning relevant to DT practitioners and literature.

[Keywords] design thinking, barriers, implementation, the d.school, manufacturing, consulting

Introduction

When individuals unfamiliar with the method of Design Thinking (DT) encounter the term, they generally think about the look and feel of an object or how navigable a digital interface or app is to operate (McKendrick, 2020). However, in today's interconnected global market, McKendrick (2020) notes that the process involved with DT "is no longer the fun stuff exclusive to product designers – it affects every part of the organization, and the experience customers and users have with the people and systems with which they interact" (para. 12). As a result of DT's increasing effectiveness within organizational structures and how it essentially serves "as a human-centric yet goal-oriented approach" (Ramanujam, 2021, p. 552) to identifying and developing innovative solutions for stakeholders, many such as Butler and Roberto (2018), have come to view the concept of DT as the accelerant required to propel breakthrough innovations and generate organizational growth.

In a recent Forbes Insight and Alfresco survey, which collected the thoughts of top-tier executives pertaining to the organizational characteristics of companies that continue to outperform their competitors, 39% reported that they had implemented attributes of DT within their day-to-day operations and subsequently experienced positive organizational growth (McKendrick, 2020). In a similar study conducted by Forrester Consulting on behalf of Adobe, Brozek (2016) shares that firms open to incorporating design-based activities, such as DT, within their organizational structure were 1.5x more likely to demonstrate a greater market share over competitors and 1.4x more likely to possess a base of satisfied and loyal customers. As a result of such statistics and demonstrated outcomes, it is feasible to observe why organizations such as Dell, Intel, and American Express have become captivated by the concept of DT (Ramanujam, 2021;

Butler & Roberto, 2018). By utilizing what appears to be a "structured methodology for generating innovation" (Butler & Roberto, 2018, p. 45), practitioners within the field of business can experience a sustained competitive advantage (McKinsey, 2016). However, while such statistics concerning the usage and effects of DT appear to provide organizations with marketplace advantages, they inadvertently open the door for inquiry concerning the impediments preventing more organizations from successfully implementing the DT process.

One possible reason that only 39% of organizations have reported experiencing positive growth following the implementation of DT may be linked to Groeger and Schweltzer's (2014) indication that "there is no one best design thinking process" (p. 5) to use. At the same time, various scholars/practitioners can agree that the various DT models generally align with the notion that the process is concerned with "understanding the problem and identifying the user's needs, refining the problem in a human-centric way, then proceeding to develop and test solutions based on the identified needs" (Traifeh et al., 2019, p. 2), DT as a concept lacks a universally approved definition (Micheli et al., 2018). As such, it is seemingly difficult for practitioners not fully versed in DT to fully comprehend the intent/role of DT within their organization.

An additional possible explanation for why organizations and DT consultants are not experiencing a greater degree of success implementing DT may be due to the premise that what initially appears to be a structured approach is, in actuality, an iterative and organic process (Traifeh et al., 2019). Organizations not structured to work in such a manner will find that they struggle to meaningfully engage with the DT methodology (Gobble, 2014). Another possible reason organizations may not be experiencing greater success utilizing DT may be the result of fear on behalf of organizational leaders. Furstenthal et al. (2022) support this notion and note that innovating revolves around the ability to engage boldly within areas of uncertainty, internal/external criticism, self-doubt, and occasional obstacles.

In an attempt to understand further the challenges involved with successfully implementing DT, Calgren (2013) indicates that it may be beneficial to study DT from the performance perspective, as few studies have been conducted from this viewpoint (Cousins, 2018). To ensure that businesses are able to fully benefit from the DT process, David Glen, Director of KPMG Digital and Mobile Solutions department, indicates that it "needs to be deployed by experienced hands" to ensure that it is being implemented and managed properly (Bishop, 2017).

Within practice, it appears that organizations are aligned with Glen's notion of integrating skilled practitioners in their workplace environment, as demonstrated by the recent trend of companies such as GE Healthcare, Coca-Cola, and Apple contracting the services of consultants skilled in implementing the DT process. The decisions of such companies to look outside of their organizational structure for assistance in the implementation of the DT process indicates that a shift in how DT is studied would be a valuable counterbalance to existing studies that generally discuss/analyze DT solely from the perspective of internal organizational stakeholders. The ability to contribute performance-based insight concerning DT from the perception of skilled design thinkers would serve as a critical element in understanding the barriers involved with successfully implementing the DT process within organizations.

Purpose of the Study

To date, various studies concerning DT discuss the processes and challenges associated with successfully implementing the method of DT in practice. However, most research within existing literature mainly approaches these topics from the organization's viewpoint. With the increasing trend toward organizations choosing to collaborate with/hire consultants skilled in implementing the DT process to achieve organizational objectives, evidence suggests that a study considering

DT consultants' perceptions would be a valuable addition to DT literature. Conducting such a study would directly contribute to identifying the primary barriers involved with manufacturing companies' ability to achieve successful outcomes when using a leading DT model (the d.school's DT model). Additionally, the benefits of such a study would provide a foundational understanding of what DT consultants view as a successful outcome of implementing the d.school's DT model in practice. In what Volkova and Jabosone (2016) illustrate as a current business environment comprised of scarce resources, hyper-competition, and globalization, the ability to effectively associate or to "make surprising connections across areas of knowledge, industries, even geographies – is an often-taken-for-granted skill" (Dyer et al., 2019, p. 41) that can make the difference between sustainable organizational growth or failure.

Literature Review

Design Thinking (DT) can be viewed as a linear approach that organizations, such as manufacturers, can utilize to differentiate their product(s), inspire innovation, and identify novel pathways for organizational growth. However, in practice, Lindberg et al. (2010) describe that the concept of DT is, in reality, a "paradoxical" process. Through this perspective, DT participants engage with various phases "repeatedly, simultaneously, and at different times in a nonlinear fashion" (Groeger and Schweltzer, 2014, p. 5). At present, Marelaro et al. (2015) indicate that several DT models of varying phase segments and implementation modes have been developed (Dosi et al., 2018) by organizations such as IDEO and IBM, to name a few (Micheli et al., 2018), to assist in such an approach. Dunne et al. (2022) indicate that organizations not fully versed in the use of such a methodology often fail to achieve their desired aim. As a result of such an outcome, it is common for companies to hire consultants skilled in effectively blending the analytic and creative structures involved with the DT process (Gobble, 2014).

Recognizing the linear/nonlinear point of divergence between how DT is practiced and how it may be perceived, it is critical to establish a clear theoretical framework from which the DT process and interrelated interactions between consultants and clients can be studied. The d.school's five-phase model, a comprehensive and widely accepted design thinking (DT) framework (Dam & Siang, 2018; Micheli et al., 2018) was used as a theoretical foundation for this study. By working within this framework, the researcher identified the barriers to successfully implementing the DT process with manufacturing clients, as perceived by DT consultants.

At present, a universally accepted definition of DT still appears to be lacking within literature (Micheli et al., 2018), which Ramanujam et al. (2021) indicate places the concept at risk of being observed as an umbrella construct. However, when the three most widely cited DT models in literature are viewed more closely, as demonstrated in Table 1, Micheli et al. (2018) share that a commonality (expressed in differing terms/timelines) emerges among DT approach and intent. In essence, all three DT models advocate that the process begins with the ability to understand the problem at hand, progresses through an ideation stage, and concludes with a phase dedicated to prototyping and testing. An additional but essential common thread connecting each of the illustrated DT models further is demonstrated through the understanding that the process is intended to be iterative.

Table 1*Most Commonly Cited Design Thinking Models in Literature*

Model	DT Phases	Espoused Themes of Commonality
IDEO	<ul style="list-style-type: none"> • Inspiration • Ideation • Implementation 	1. Each model begins with the intent of “understanding the problem to be solved” (Micheli et al., 2018, p. 8).
The Hasso-Plattner Institute of Design at Stanford (The d.school)	<ul style="list-style-type: none"> • Empathy • Define • Ideate • Prototype • Test 	2. Each model progresses to “an ideation phase to generate possible alternatives” (Micheli et al., 2018, p. 8).
IBM	<ul style="list-style-type: none"> • Understand • Explore • Prototype • Evaluate 	<p>3. Each model concludes its process with “an implementation and testing phase, based on prototyping” (Micheli et al., 2018, p. 8).</p> <p>4. Each model utilizes and values the act of “iteration” (Micheli et al., 2018, p. 8) throughout the exploratory process.</p>

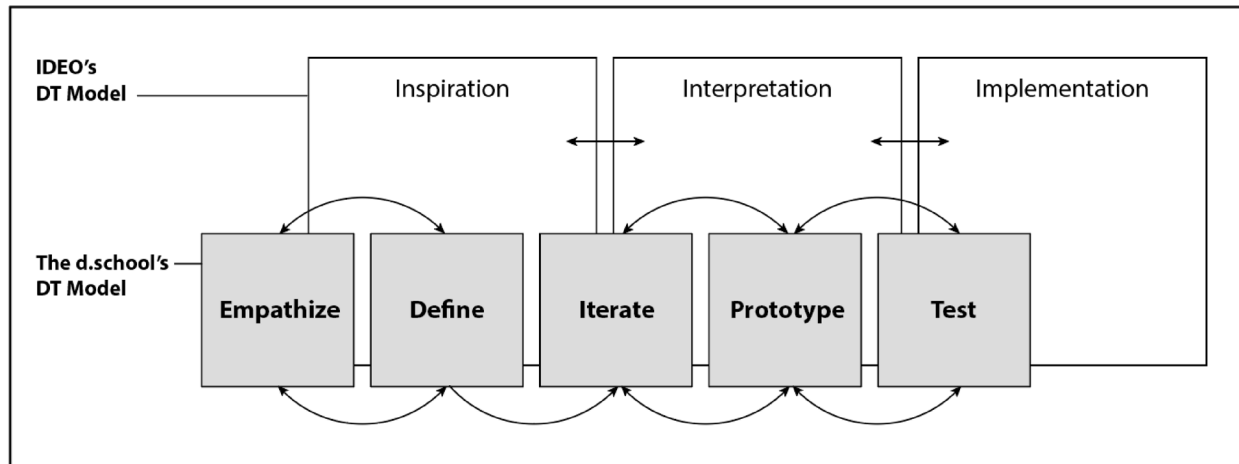
Note. This table has been adapted from Micheli et al. (2018, p. 8) in format and data.

Through the use of five constructs (empathize, define, ideate, prototype, test), developed by the d.school in 2005, where the notion of empathizing with human-based values serves as the foundational basis for the school's DT process, Micheli et al. (2018) share that the d.school's model has become one of the most cited and well-known DT models used to identify innovative outcomes in practice. While not substantiated within literature, it is possible to accept that the d.school's renowned reputation is the by-product of its interconnected relationship with the historical footings/teachings of the Joint Program in Product Design (JPD) of Stanford University and subsequently with its five decades of graduates, as well as the two decades worth of individuals that enrolled in d.school courses and have since implemented their teachings within their organizations.

While the d.school and IDEO share founders, it is important to indicate that foundational differences exist between the d.school's DT model and IDEO's DT model. For instance, as illustrated in Figure 1, while IDEO's model encapsulates the act of DT within three overarching activities (inspiration, ideation, implementation) (IDEO, n.d.), Öztürk (2021) indicates that the d.school's five-phase approach is a more tangible process for non-design oriented practitioners to comprehend and subsequently utilize as it clearly illustrates the specific steps involved within DT. While both models possess a human-centered approach to resolving wicked challenges, the d.school's model places increased emphasis on the ability to understand the people associated with the challenge at hand through the inclusion of a robust empathy phase and the intent to iterate around a process of prototyping and testing until a solution has been identified (Öztürk, 2021).

Figure 1

Comparison of the d.school's and IDEO's Design Thinking Models

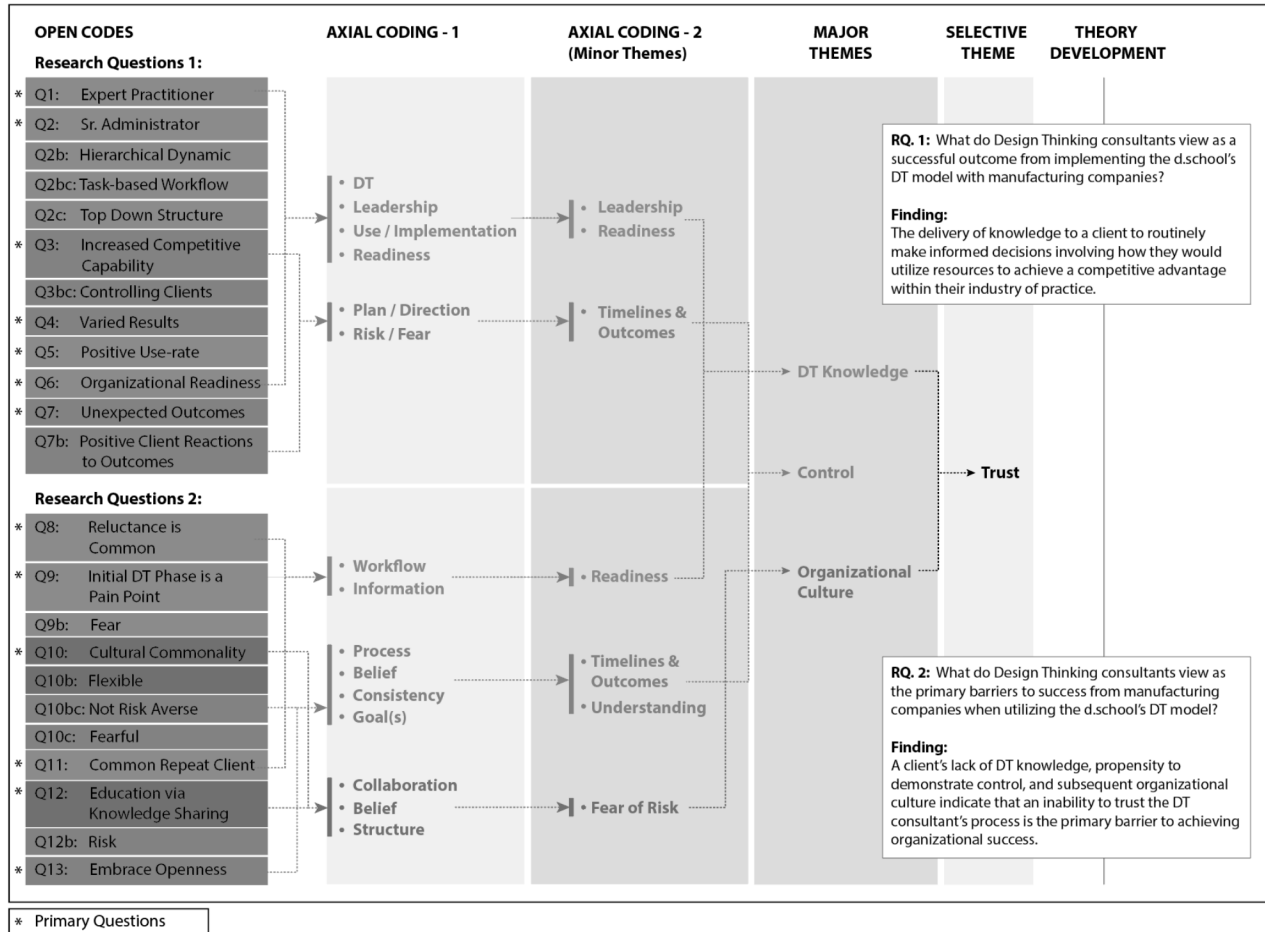


Methods

Following IRB approval, a general qualitative approach was utilized within the study and enabled the researcher to incorporate an open, axial, and selective coding strategy to "progressively integrate the emergent themes acquired during data collection" (Williams & Moser, 2019, p. 54). Through the incorporation of semi-structured interviews, the researcher possessed the ability to investigate the perceived barriers associated with successfully implementing DT to a greater degree. Otter.ai transcription software was used to aid in transcribing recorded semi-structured interviews. The demographics of interviewees in the study consisted of three U.S.-based DT consultants who implement the phases of the d.school's DT model when working with U.S.-based manufacturing organizations.

Within these boundaries, it was important that all participants had at least five years of DT consulting experience in which they were solely responsible for managing the DT process with manufacturing clients. Attributes such as participants' gender, race, age, ethnicity, or any other identifying characteristics for this study's sample group were not applicable. Experiences varied across manufacturing subindustries, such as printing and publishing, consumer goods, and pharmaceuticals. Additional commonalities between each interviewee were that they each held an advanced educational degree (Master's). The use of incorporating an inductive approach in the study provided the ability to collect and analyze data from what Creswell and Plano Clark (2007) describe as working from "the bottom-up, using the participants' views to build broader themes and generate a theory interconnecting the themes" (Soiferman, 2010, p. 3), as depicted in Figure 2.

Figure 2
Open, Axial, and Selective Coding Filtering of Thematic Findings

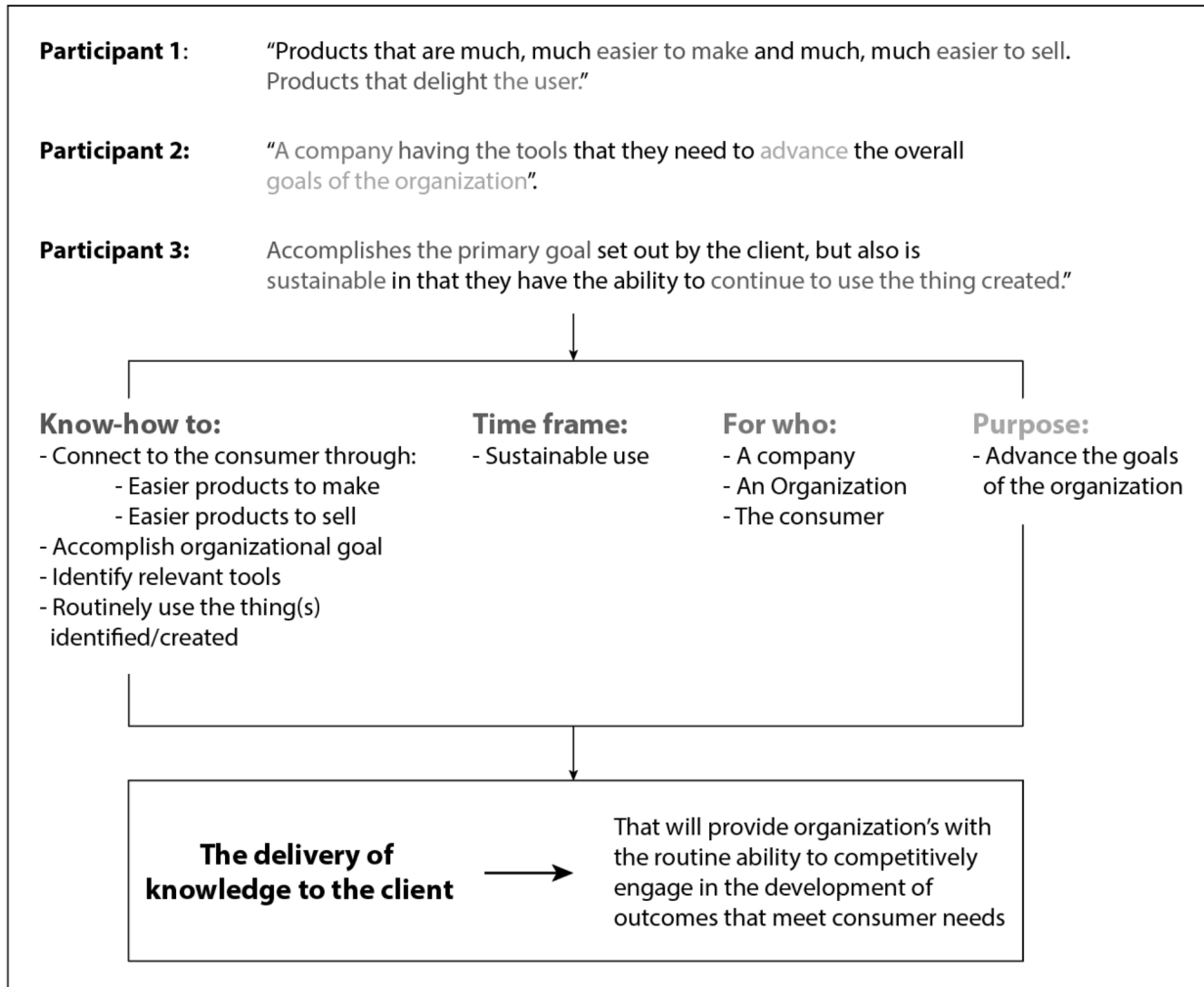


Summary of Findings

The ability of an organization to establish a competitive advantage within its industry consequently influences its fate as a business (Mukerjee, 2016). In today's rapid and ever-changing business landscape, Brown (2015) outlines that for businesses to sustain a competitive advantage, organizations must embrace and become expert practitioners of the DT process. The participants (DT consultants) interviewed in this general qualitative study spoke of professional experiences and interactions that they have had with clients in the manufacturing sector. The participants shared their perceptions concerning the value that clients place on their knowledge of the DT process, the organizational cultures that they believe embrace DT, the challenges they have experienced when working with various clients, and perceived obstacles to achieving successful DT outcomes.

Figure 3

Affinity Diagram Depicting the Filtering Process of Participant Viewpoints



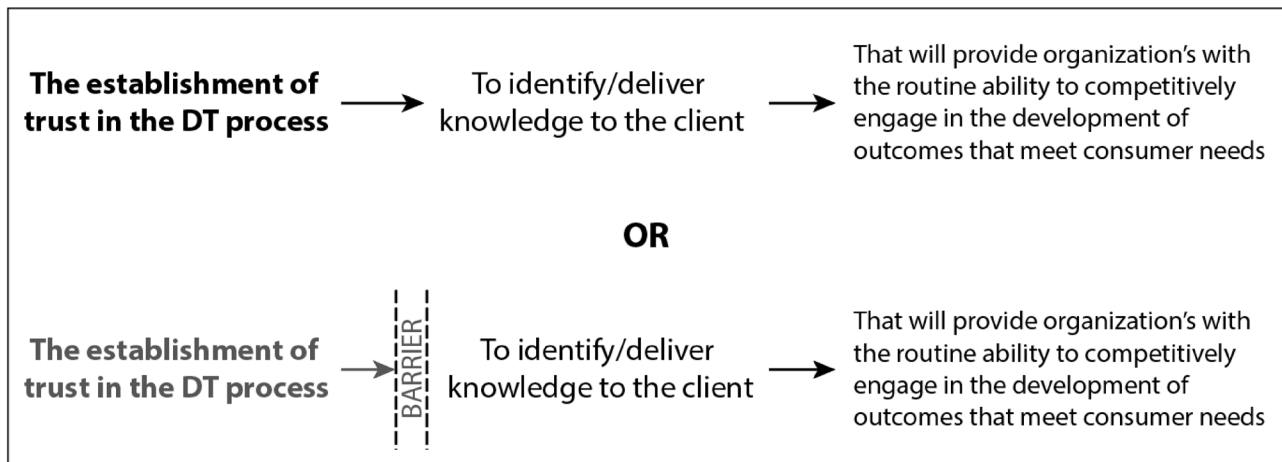
The findings of this study emphasize the crucial role of early collaboration focused on engaging organizational members in the Design Thinking (DT) process. This engagement is accomplished through prototyping activities that allows for the visual sharing of ideas that can be tested by members to establish trust and lay the groundwork for effective working relationships between Design Thinking (DT) consultants and individuals who may be hesitant or unfamiliar with the DT process. The shared experience of thinking and collaborating amongst the DT consultants and members of the organization enables the formation of a common language that transcends disciplines and experiences, allowing for the achievement of mutual objectives. These findings extend to other DT models beyond the d.school's five-phase DT model. The similarities in purpose of these models create the foundation for the success of this approach.

The delivery of knowledge to the client within the manufacturing company is the primary objective of the DT consultant. This knowledge empowers organizations to make informed decisions about utilizing resources to achieve a competitive advantage within their industry. While clients may feel out of control during the DT process, they ultimately control how the insights provided by the DT consultant are used within the organization. The most impactful outcome a DT

consultant can provide is the knowledge required for the client to make data-based decisions about how to proceed.

However, the primary barrier to successfully implementing the d.school's DT model is the client's ability to trust in a process that may not align with their usual business practices. Organizational cultures that are risk-averse and fearful of the unknown can hinder the establishment of trust between DT consultants and employees. To overcome this barrier, DT consultants must be mindful of their engagement with employees, ask trust-building questions early in the process, demonstrate their innocuous presence, and incrementally share their insights through prototyping. By actively defining and analyzing prototypes, consultants can create a dialogue with clients, fostering understanding and collaboration. This approach shifts the focus away from individuals and onto the challenge at hand, allowing employees to feel more control over the process and setting the foundation for continued work with the organization.

Figure 4
Organizational Trust: Organizational Objectives

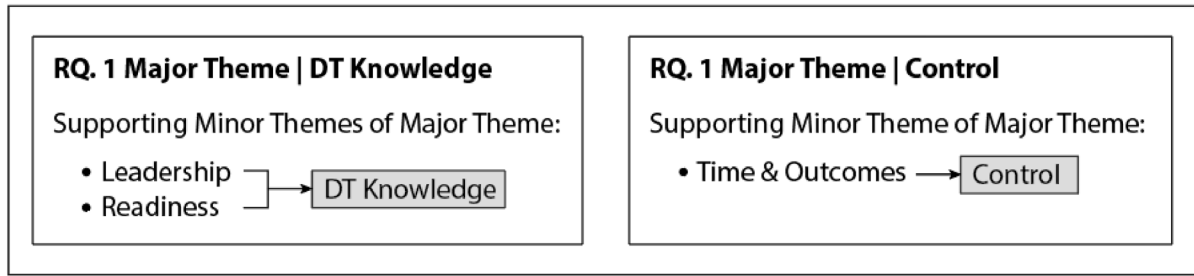


Note. Failure to establish trust in the DT process serves as a barrier to an organization’s ability to acquire the critical knowledge necessary to compete within industry.

Thematic Findings

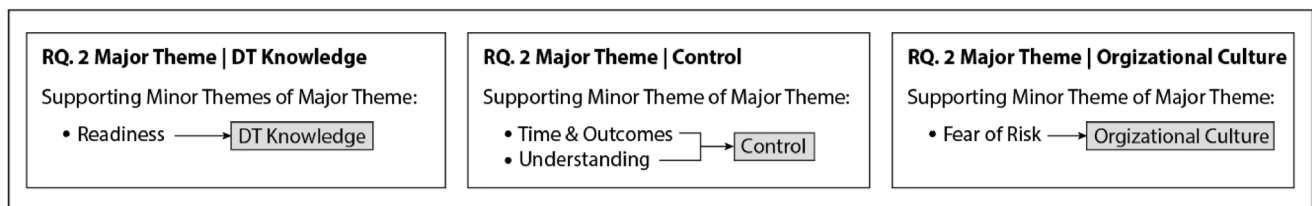
Each participant interviewed communicated the belief that DT consultants are not only the providers of a valued skillset but are also perceived by their clients as essential educators and/or guides concerning the proper implementation of the DT process in practice. In addition to this viewpoint, each participant acknowledged that possessing knowledge within the process of implementing DT is generally perceived by companies as a critical attribute in effectively resolving organizational challenges. Interview participant 1 reinforced this notion by stating that some "companies just had problems that needed solving and didn't know how to do it. These companies generally did not have a roadmap for resolving these problems." Interview participant 2 shared with the researcher that clients of his believe there is "an inherent benefit of getting a fresh set of eyes on the company itself, the processes that are used currently, and getting them to take a fresh look at their goals and approach and asking some of those questions that might not occur to someone who is in-house."

Figure 5
Axial Coding of Major Themes from Minor Themes



Note. The major and minor thematic findings were identified from interviewee responses to questions 1-7.

Figure 6
Axial Coding of Major Themes from Minor Themes



Note. The major and minor thematic findings were identified from interviewee responses to questions 8-13.

Minor Theme: Leadership

Participants acknowledged that it was common practice for the consultants to work with a variety of mid-level employees and upper-level administrators on a daily basis. However, while the interviewees unanimously shared that they possessed impunity when working within a company's organizational structure, each communicated that their primary point of contact, and in essence, their client, was an upper-level administrator. All interview participants recognized that the upper-level administrators they have worked for were fairly knowledgeable of the DT process but lacked a high level of understanding. Interview participant 2 communicated that the senior-level administrators that usually hired him "knew enough to bring in an outside consultant, but they didn't know enough to do it themselves." Interview participant 3 reinforced this notion by stating that "they didn't know how to solve the problem themselves. So, they were open to being guided."

Minor Theme: Readiness

A commonality that emerged from 67% of the interview sessions was the belief that the client used at least 75% of the DT outcomes identified by the consultants. However, as interview participant 1 shared, this outcome is largely "dependent on the readiness of the client and/or consumer." Interview participant 2 supported this notion, sharing that the 25% or less of the DT outcomes that do not move forward "is not because there's not a willingness" on behalf of the company but, rather, there may be a lack of understanding concerning how to implement the outcomes in full and in a timely manner, as opposed to the client's predetermined timeline and/or available resources.

Major Theme: Control

Each participant's responses indicated that the desire to maintain control throughout the implementation of the d.school's five-phase DT process was a challenge for many of their clients to overcome. Interview participant 1 shared that, at times, he was forced to fire clients due to their desire to be "overly prescriptive and dictate everything we did." Interview participant 1 added, "how do you follow a process when someone else believes they're controlling the pencil." However, interview participant 2 explained that in the case that "you can get those individuals in question to become comfortable with taking a more long-term view because DT is not quick," it is possible to then establish an environment where such individuals are apt to work with the process and subsequently demonstrate a "willingness to embrace failure and turn it into success."

Minor Theme: Timelines and Outcomes

In addition to showcasing discomfort in maintaining control of the information used and/or identified throughout the DT process, the data gathered during interview sessions stressed that manufacturing clients also struggled with the concept of control relating to the minor theme of timelines and outcomes associated with the DT process. Interview participant 2 shared that it is often difficult for clients "to see the value in a process that is sometimes slow, certainly in comparison to day-to-day business, is light, and sometimes is a non-intuitive process." Participant 2 adds, "even when a client understands what is required to advance the organization, they don't know how going through the design process to get it makes it an even better result." This sense of unknowing and unfamiliarity places organizations in an unsettling state of ambiguity and consequently prone to feeling out of control throughout the relationship with DT consultants. Interview participant 1 supported this viewpoint and shared that "it sometimes takes time" to establish trust in the process. Rather than naturally collaborating with the consultant during the DT process, interview participant 2 outlined that clients often find it challenging to "embrace the process with open arms." However, interview participant 2 explained that "if you can tie that realization to an achievable action, an implantable solution is very favorable."

Minor Theme: Understanding

All of the participants interviewed acknowledged that by mitigating the vagueness and ambiguity that naturally accompanies the d.school's DT approach, particularly during the emphasizing and testing phases of the model through clear and timely communication, it is possible to infuse the client with a sense of understanding and ultimately the feeling of control over the DT process. Participant 3 shared that "communication and transparency are critical to successful business relationships. In order for a client to feel confident in what I am going to provide for them, I have to earn their trust through strong communication, transparency, and disclosing my process." Participant 2 expanded upon this notion and shared that the DT outcomes communicated with the client should subsequently be "viewed as wonderful design serendipity" as opposed to outcomes that were unanticipated and "nobody knows what to do with." Participant 3 was aligned with this viewpoint and shared that "never when you get to the end of a project, should there be an outcome that was unexpected" by the client. Interview participant 1 reinforced both of these viewpoints and explained that as a DT consultant "your role is to only explain, you can never defend." Interview Participant 1 adds that by actively defining through the use of a prototype and then analyzing the prototype, a dialogue (collaboration) with the client can be created from which understanding emerges.

Major Theme: Organizational Culture

A reoccurring point of emphasis that each of the interviewed participants unanimously acknowledged was that an organization's culture played a role throughout the implementation of the d.school's DT process. When each of the participants interviewed was asked how they would describe an organizational culture that accepts DT?", they communicated elements that would generally align with Cameron and Quinn's (2006) adhocracy dimension of the competing values framework. For instance, interview participant 2 explained that companies with cultures supportive of the DT process "display a flexibility and a willingness to examine and reexamine goals and methodologies and a willingness to even consider new approaches and consider things that they haven't thought of before." Interview participant 1 was aligned with this notion and shared that organizational cultures that tend to support the DT approach are also "very good about developing testing methods and ways of looking at things."

While the aspects of an organization possessing the cultural elements of being externally focused, innovative and dynamic, and entrepreneurial were supported during the interview sessions, each participant emphasized the importance of an organization's ability to be flexible and responsive when engaging with the DT process. Interview participant 2 shared that companies who are able to embrace the DT process naturally "have structures that enable them to be more nimble on a daily basis." Additionally, participant 2 communicated that in his experience, the more crossover experiences that constituencies within that business have with each other, the more apt they are to perform in such a manner. Interview participant 3 explained that she often experienced this type of dynamic in organizations that are smaller where "it is easier to communicate." Interview participant 1 reinforced participant 2's observation and explained that organizations that are culturally aligned with "being open to possibilities are probably really the key to success." Participant 1 expanded upon this statement and communicated that the more open an organization is "to trying things, you've just increased your level of success potential." Interview participant 2 concurred with this line of thought and shared that if an organization's culture is not aligned with this type of mindset, "the Design Thinking process is always going to be tough for you."

Minor Theme: Fear of Risk

When interview participants described experiences where the implementation of the DT process generated an unwillingness from clients to engage, they often involved moments where the process would run counter to an employee's and/or organization's understanding of the DT process or workplace routine. Interview participant 1 communicated that sometimes these obstacles came in the form of the owner, individuals who felt threatened for their jobs, or personnel/departments that had an over-reliance on internal opinions instead of the consumers. When interview participant 2 shared his experiences working with clients unwilling to embrace the DT process, he communicated that the typical response received was "the classic, we've never done it that way." Interview participant 1 communicated similar client experiences and explained that this reaction from employees is a natural response to the fear of trying something different and possibly being wrong.

The fear of a client or employee taking a risk on the DT process and being wrong was a theme that was also familiar to interview participant 3. Participant 3 shared that a common point of frustration for the client with the DT process was "if your research wasn't showing them what they had hoped for it to show." Participant 3 explained that in the client's mind, there is the financial implication of having taken a risk and the fear of what it might mean to an individual employee and/or organization if that risk does not demonstrate immediate value for the company. In essence,

the insight gathered from interview participants demonstrated that clients unwilling to engage in the non-linear and occasionally ambiguous process of DT had an organizational culture that opposed scenarios involving risk.

Discussion

The purpose of this qualitative study was to understand the perception of Design Thinking consultants on the barriers involved with successfully implementing the d.school's five-phase Design Thinking model within manufacturing companies. The ability of the DT consultant to overcome the barrier of trust when engaging with organizational members is the primary obstacle for DT consultants to navigate. By approaching this study through the experiences of DT consultants, the researcher obtained a unique perspective into the mindset of manufacturing organizations and their employees that have engaged with the DT process. While the outcome of this approach resulted in practical insight for practitioners to utilize when working with clients, it also expanded the existing base of DT literature by contributing knowledge relating to understanding the barriers involved with successfully implementing a DT model in practice. The major and minor thematic findings of this study reinforce this notion and serve as the basis from which the researcher is able to draw parallels to existing literature and further validate the study's findings.

Within the current body of DT literature, it is not uncommon to find studies that align with the interview participant's responses that organizations/individuals unfamiliar with the DT process find it difficult to engage with the DT process. Butler and Roberto (2018) support this view and explain that the DT process can be observed to be "an unnatural act that challenges the human brain to work in ways that run counter to routine patterns of thinking" (p. 45). Existing literature describes a few common points of frustration that non-designers have with the DT process is its non-linear structure (Dunne, 2018), iterative nature (Boland and Collopy, 2004), and propensity to explore vague and ambiguous concepts (Gobble, 2014). While these existing insights may be accurate, this study's approach of investigating the DT process through the lens of external expert practitioners (DT consultants) demonstrated that a primary finding (major theme) of this study was not necessarily the previously outlined points of frustration, but is an organization's and/or individual employee's inability to exhibit control over these interconnected factors associated with DT.

When observing barriers involving innovation, Furstenthal et al. (2022) reinforce the notion that the concept of control is a primary point of frustration with entities unfamiliar with the innovation process and that a significant challenge that practitioners face is the capacity to engage with elements of uncertainty and the loss of control that accompanies it. Furstenthal et al. add that the feeling of not being in control of a scenario triggers a cognitive bias that guides individuals to avoid uncertain outcomes. While the point of contention may be centered around an individual that is unfamiliar with a new process, evidence from this study, as well as Dunne (2018), supports the notion that organizations/individuals who struggle to effectively utilize and efficiently engage with the DT process do so in response to their inability to demonstrate control over an unfamiliar subject matter. Dunne (2018) explains that DT's "freewheeling nature," qualitative approach, and utilization of methods such as storytelling can be testing for organizations that routinely rely on certainty, quantification, and efficiency to implement.

Additionally, insight gathered from interview participants also demonstrated that an organization's culture plays a critical role in how members view and choose to interact with the DT process. Groeger and Schweitzer (2014) support this finding and note that "following a DT

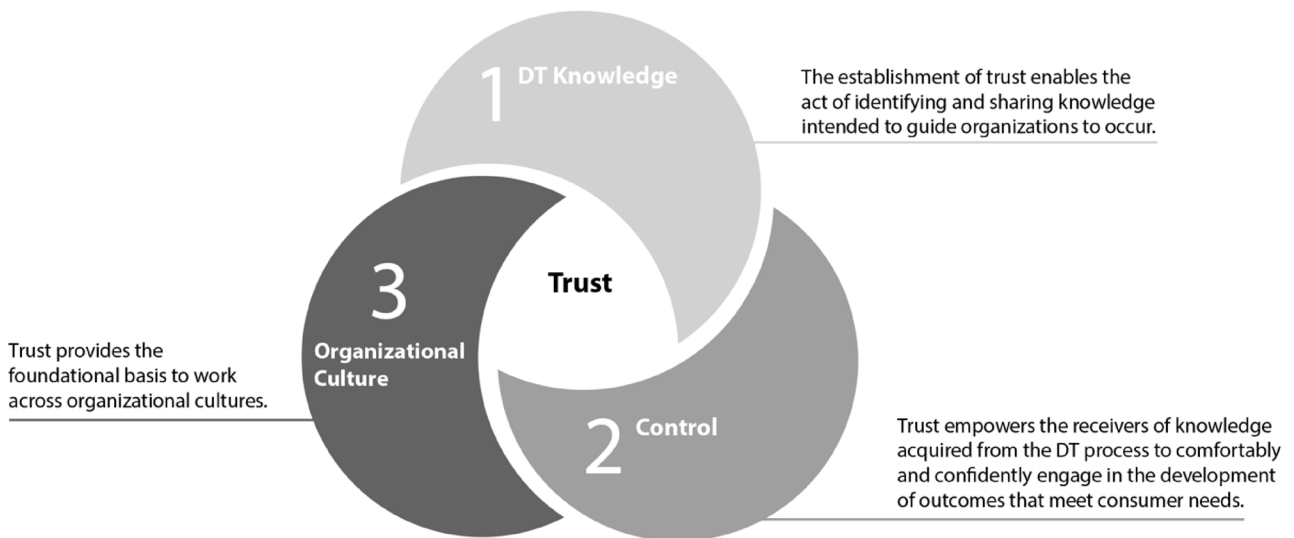
model without establishing the necessary culture and mindset leads to failure" (p. 7). While interview responses indicate that such an outcome may not be entirely accurate, given the high rate of results generated by DT consultants that are used by organizations (at least 75%), it is important to note that organizations that promote a stable yet results-oriented culture, as demonstrated in Cameron and Quinn's (2006) competing values framework of hierarchical or market-driven cultures, may unintentionally foster employees that are subsequently fearful of working outside of their daily work modality to implement an unfamiliar method intended to produce innovative results for the company.

Another theme identified through this study, central to an organization's ability to create a competitive advantage within its industry and ultimately advance the company, is the obtainment of DT knowledge. Findings from this study supported the notion that the ability to acquire DT Knowledge from implementing the DT process was the most valuable outcome to manufacturing organizations. Interview participants communicated that organizations believe that the ability to properly implement the DT process is highly valuable as it has a track record for generating new ideas, pushing boundaries, providing fresh perspectives, and delivering original data. Kimball (2011) supports this notion and adds that "the ways professional designers' problem-solve is of value to firms trying to innovate" (p. 285).

When viewed individually, it is possible to acknowledge that none of the study's major themes present a strong case that the concept of trust would be the primary barrier to manufacturing organizations successfully implementing the d.school's DT model. However, when each of the themes are viewed collectively, as depicted in Figure 7, it is possible to visualize how each theme reinforces the linear viewpoint that in order for an organization that may not be predisposed (organizational culture) to engaging with the DT process to ascertain the knowledge necessary to comfortably/confidently engage and control how its business will proceed, they must first establish trust in the DT process and subsequently with those that they hire to guide the process.

Figure 7

Trust's Role in Successfully Implementing the DT Process with Manufacturing Organizations



Dunne (2018) outlined that organizations are developed to be efficient; introducing an approach such as DT that runs counter to how most companies operate can be viewed as challenging what is familiar and acceptable to organizational members. Interview participant 2 explained, as a consultant, an external entity, "people need a reason to trust you, and it is simply not there when you're a new face." Through this viewpoint, it is possible to compare that as an external methodology to most organizations; people also need a reason to trust in a process that asks them to work differently than they have been trained to operate. Furstenthal et al. (2022) share that trust is a byproduct of establishing "a sense of belonging and safety through a shared commitment to innovation" (p. 5). By utilizing the constructs of the d.school's DT model early and often with employees, most notably the prototyping construct where collaboration is essential, interview participant 2 explained that it is possible to "build incremental trust by demonstrating insights throughout the project." Interview participant 1 reinforced Furstenthal et al. notion of establishing a shared commitment to innovation to build trust by suggesting that DT consultants should strive to foster a dialogue with organizational members by actively sharing insights through which understanding can emerge and, in time, trust can be developed.

Recommendations for Application and Research

Practical Implications

According to the interview participants of this study, the ability of organizational members and DT consultants to collaborate early in the process has been beneficial to establishing trust with each other and in the DT process. Furthermore, evidence from this study also demonstrated that an effective way for collaboration between entities to occur was through the use of the d.school's prototyping construct. Each interview participant acknowledged that valuing the thinking you can show (prototyping) makes it possible to build incremental trust with organizational members. These findings suggest that early collaboration through prototyping activities is critical to a DT consultant's ability to establish trust in the process and set the foundation for a working relationship with individuals who may be reluctant to engage and/or unknowledgeable of the DT process.

Conversely, through this lens, it is also possible to accept that the data identified in this study are ubiquitous to all individuals, not only DT consultants. For instance, individuals such as in-house organizational members tasked with leading a DT initiative could also benefit from this notion that early collaboration through the visual sharing of ideas (prototyping) can establish the trust required to effectively engage in the DT process. As interview participant 1 explained, "Design Thinking is thinking. So, if someone is thinking and you are too, you are much more likely to have a shared experience, you are much more likely to understand how to collaborate," and in essence capable of formulating a common language that spans experiences/disciplines to achieve a mutual objective.

Each of these suggestions is situated around the use of the d.school's five-phase DT model. Literary findings support that most DT models, such as IDEOs and IBMs, are phase-based models that begin with understanding the problem and people at hand. Through this perspective, it is also possible to accept that the results from this study support that the early use of collaborative activities with organizational members to develop an understanding of the DT process and, in time, trust in the process and those leading it would also be beneficial to practitioners/organizations using DT models other than the d.schools.

Recommendations for Further Research

Recognizing that the concept of DT, as outlined by Micheli et al. (2018), still lacks a universally accepted definition, it is possible to acknowledge that there are various gaps and perspectives from which researchers could investigate the topic further. However, within the scope of this study's purpose of understanding the perceptions of DT consultants on the barriers to implementing the d.school's five-phase DT model with manufacturing companies, further research could be conducted to gain an in-depth understanding that an organization's culture has on the implementation process of the d.school's DT model. Also, a study that investigated and analyzed the varying leadership styles of DT consultants that successfully implemented the d.school's DT model with manufacturing organizations would provide valuable scholarly insight and expand upon this study's findings.

Additionally, research that delves into the type(s) of trust essential to developing strong working relationships and engagements throughout the DT process with participants would be beneficial for practitioners to understand. Lastly, this study identified that fear contributed to organizational members' ability to engage in the DT process. Further research to understand the leading fears and root causes of those fears within the context of manufacturing organizations would be valuable for DT practitioners to understand and be aware of before attempting to implement the DT process with clients.

Conclusion

Within today's evolving business environment, the ability of organizations to routinely identify insights capable of providing value to their consumer(s) is critical. To achieve this outcome, Butler and Roberto (2018) share that companies are turning to DT as a method for generating innovative results intended to delight consumers and provide them with an advantage in the marketplace. However, while scholarly and practitioner literature has documented various organizational achievements that have resulted from applying the DT process, these outlets have also shared that many organizations find successfully applying the DT process challenging. This study provided insight into the barriers to successfully implementing the d.school's DT model within manufacturing companies, as perceived by DT consultants. The findings from this study identified that the ability to overcome the barrier of trust when engaging with organizational members is the primary obstacle for DT consultants to navigate.

The study's findings demonstrated that the inability to establish trust early in the DT process with organizational members ultimately prohibits the identification/sharing of meaningful knowledge between DT consultants and clients. This failure to secure trust among DT participants also serves as a barrier preventing organizations from acquiring the insight required to control how they will engage consumers and compete within their industry of practice. These findings signal that manufacturing companies who choose to implement the d.school's DT model due to its ability to generate innovative and applicable outcomes will be unsuccessful if they cannot establish organizational trust early in the DT process.

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