Speed Dating with Design Thinking:
An empirical study of managers solving business problems with design

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Abstract

The concept of design thinking has received increasing attention during recent years, particularly from managers around the world. However, despite being the subject of a vast number of articles and books stating its importance, the effectiveness of this approach is unclear, as the claims about the concept are not grounded on empirical studies or evaluations. In this study, we investigated the perceptions of six design thinking methods of 21 managers in the agriculture industry as they explored employee and business-related problems and solutions using these tools in a 6-hour workshop. The results from pre and post-survey responses suggest that the managers agreed on the value design thinking could bring to their own domains and were able to articulate on how they can use them in solving problems. We conclude by proposing directions for research to further explore adaptation of design thinking for the management practice context.

Keywords: Design thinking; management workshop; innovation process

Design thinking is the way designers identify needs, frame problems and provide solutions through a series of iterative cycles. It's the thought process of designers in creating product, service and system solutions. There is a strong interest expressed by the business and management communities in using design thinking as they recognize a need to identify strategies for solving complex and open-ended challenges (Stacey, Griffin, & Shaw, 2000). Means for applying and adopting design approaches and processes to management is rather new and not well-defined (Dunne & Martin, 2006; Simon, 1969). Even though the parallels between design and management fields are explored (Boland & Collopy, 2004), design thinking's integration and effectiveness on management are still vague.

Managers pursue opportunities, incubate innovation, develop new resources, and push their organizations forward. Solving management problems as designers explore and solve design problems – may have important implications for management (Dunne & Martin, 2006).

However, designers and managers' work flow differ significantly as well as the nature of their tasks. While managers avoid wicked problems and mainly focus on routine tasks, designers focus on wicked problems requiring cross-disciplinary collaborations (Martin, 2005). The question to pose here is how to better integrate design thinking methods into

management to allow for them to immediately see the value and implementation. Management scholars have been increasingly interested in how innovation challenges can use design methods (Verganti, 2008; Veryzer, 2005) and design practitioners and educators promote the use of design thinking across many areas of business (Brown, 2008; Lockwood, 2010). Despite the increasing amount of research on design thinking, the main focus remains on education cases and the way this thinking process is used in classroom settings for innovation. There is yet much to be done in exploring how practitioners from domains other than design respond to this thinking approach and how they see its integration into their own situations.

Our goals in this study were to assess the value and ease of implementing design thinking methods with managers in the fields outside of traditional design and gain insights on how these methods can be made more practical in the field. Data collection included the pre- and post- workshop surveys, and reflections cards after each method is applied to collect practitioner feedback. This paper describes the workshop structure, data collection and analysis, general observations and limitations of the study and implications for both educators and practitioners.

Literature Review

Design thinking was first used by Herbert Simon in his book called The Sciences of the Artificial (Simon, 1969) which became topic of interests by many design researchers in the field (Rowe, 1987). The Design Thinking Research Symposium was one of the initial explorations of design thinking as a new methodology for design research (Cross, Dorst, & Roozenburg, 1992). Today, "Design Thinking" is identified as an exciting paradigm for dealing with problems in many professions (Dorst, 2011) including information technology (Brooks, 2010; Lindberg, Meinel, & Wagner, 2011), engineering (Dym, Agogino, Ozgur, Frey, & Leifer, 2005), and business (Martin, 2009).

Roger Martin, in his Strategy & Leadership article (Martin, 2010) describes design thinking as a process of continuous business development using insights based on customer intimacy, which is often used in product, process and business model innovation. Tim Brown, CEO of IDEO – a renowned design consultancy firm, describes design thinking as applying methodologies and approaches of design to a broader set of issues and problems in business and society (Brown, 2008). The distinction and exchange between the problem and solution space clarifies the approach of design thinking (Newell & Simon, 1972), where the divergent and convergent thinking loops take place (Yilmaz & Daly, 2016). It's the interchange between divergent exploration of problem and solution spaces while converging through using the processes of synthesizing and selecting the most promising outcomes (Lindberg et al., 2011). It seeks for exploring the problem space thoroughly, building intuitive understanding of the stakeholders, generating a diverse range of alternative solutions and conscious and justified decisions on the most promising solutions. It's not a linear algorithm as it is more of an iterative cycles of both the problem and solutions spaces' explorations.

While differences exist across design thinking definitions and the process, some common themes emerge. For example, Beckman and Barry described the design-led innovation process where they identified four main steps as observation, the user of frameworks for insights, the

development of ideas, and the selection of solutions (2007). Throughout this process, three key methods are cited the most for a design thinking approach (Brown, 2008; Lockwood, 2010): 1) needfinding, 2) brainstorming, and 3) prototyping. Needfinding includes a set of activities to determine the requirements and specifications of the solution space where the designer immerses himself in the user's context to gain insights (Leonard & Rayport, 1997; Brown, 2009).

Brainstorming is a group process to promote alternative solutions through bouncing ideas among the team members (Sutton & Hargadon, 1996). Prototyping is the process by which preliminary models are built based on the novel ideas for assessing the quality of the idea and communicating the outcome with a broader audience to gather feedback (Hargadon & Sutton, 1997).

In summary, the three areas provide the basis for how a 'design thinking' approach can be applied in organizations. In addition to the methods, there are also toolkits (IDEO, 2013; Stanford, 2010) and frameworks (Hassi & Laakso, 2011; Liedtka & Ogilvie, 2011) proposed for design thinking. However, many of these are not empirically studies, and the one that are studied are usually examined under experimental conditions within academic settings. Little research has looked at their applications for fields outside of design industry and sought for the immediate perceptions of the managers to these methods.

Research Methods

The data analysed in this paper were collected as outcomes of a workshop developed for executives in the agriculture business, as part of an annual conference to provide a unique forum for assessing emerging trends and issues facing agribusiness today. The workshop was facilitated by the authors. Executives who attended the workshop were informed that their participation was voluntary and they could opt out of providing data throughout the session and/or the surveys.

The three specific challenges addressed in the workshop where the design thinking methods applied were:

> (1) addressing cross-functional team issues,
> (2) training employees to engage and push the boundaries of innovation, and
> (3) moving from a problem identification culture to a solutions-oriented culture

In order for the attendees to gather new ways of addressing these challenges, we designed a six- hour workshop with a focus on collaborative problem identification and solution. The workshop was structured around the principles of design thinking, and the participants walked through each phase of the process using six design thinking methods in order to understand and reframe the problems, in addition to solve and test the outcomes. This workshop used a selection of design thinking methods as they applied to business – namely, methods related to problem restructuring, ideating, and assessing the qualities of the ideas generated. The goal of the workshop was not to create an ultimate solution, but to build an understanding on the impact of design thinking approach in a way that would facilitate novel perspectives among individuals outside of the design field, as well as provide different insights to push each participant's boundaries.

Research Questions

The questions we posed in this study were:
1. How do managers' definitions for design thinking vary after a short workshop?
2. How do managers in a field outside of design perceive design thinking process and the methods?
3. How would the managers use the methods introduced to address a challenge within their organizations?

Participants

The study participants were executives from a diverse range of companies. They varied in their experience, age, and area of residence but all were employed at a company directly related to agriculture. In total, 28 professionals participated in our 6-hour workshop; of these, 21 attended the entire workshop and responded to our pre-post workshop surveys; thus, our sample is those 21 participants (N=21). Three of the participants were CEOs or presidents, four were vice presidents, four were directors or executive directors, and seven were managers in their companies. The other participants had titles such as an analyst or a consultant. Participant ages varied between 25 and 70 (M= 46, SD=13.35); five of the participants were female, and ten of the participants had master's degrees, with the rest holding a bachelor's degree. Fourteen of the participants have had over ten years of professional management experience.

Workshop Flow

The flow of the design thinking workshop is illustrated in Figure 1. We took Liedtka and Ogilvie's (2011) design thinking process visualization and after many discussion, we chose methods that would be most relevant for this particular audience, across this process. Before the workshop session, participants were asked to complete an online survey, through which collected demographic information, educational background, current position in the company and responses to questions such as what is design thinking, how would design thinking be applicable in the context of management, and what are their expectations from the workshop.
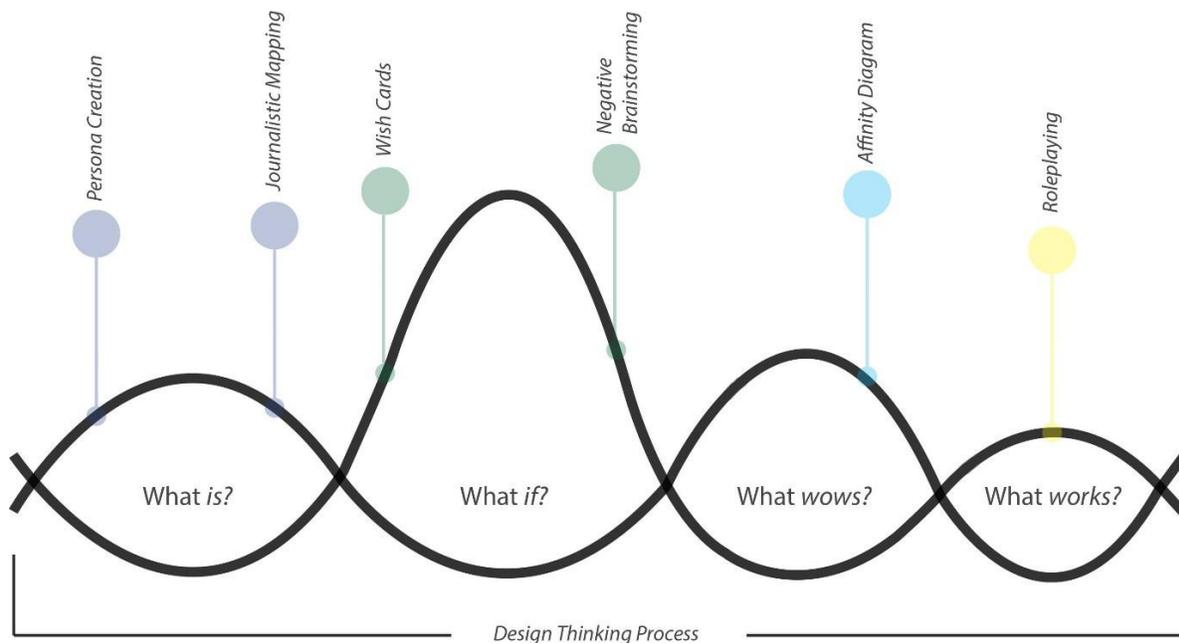
Persona Creation · Journalistic Mapping · Wish Cards · Negative Brainstorming · Affinity Diagram · Roleplaying

What *is?* · What *if?* · What *wows?* · What *works?*

Design Thinking Process

Figure 1. The flow of the design thinking methods introduced to the participants (modified from Designing for Growth, Jeanne Liedtka and Tim Ogilvie, Columbia Press (Liedtka & Ogilvie, 2011)).

During the workshop, participants were introduced to the definition of design thinking and a series of examples of how design thinking is implemented in different industries to solve known problems through an uncommon perspective. The design thinking process (Brown, 2008; Liedtka & Ogilvie, 2011) was explained in detail, with the steps to be taken. After the pre-survey and the introduction, participants were given 30 minutes for each activity and 15 minutes for discussion as a team. In total, 7 teams were formed. The teams were aligned around one table, working together during the entire session. An image of the room set up is seen in Figure 2.

Figure2. Workshop room set-up

After each method's application, participants were handed out a reflection card asking them to respond to 'How would you use this method to address a challenge within your organization?' (Figure 3). Following the workshop, a post-workshop survey was distributed to the participants with questions specific to each method to help us understand their value and ease of application for the participants. Their suggestions were also sought to improve future workshops.

Figure 3. Example reflection card, front and
back

Design Thinking Methods applied during the workshop

Each method introduced a different mode of understanding what the true problem is and extracting creative solutions to common issues in the workplace, namely: cohesiveness within cross-functional teams, the challenge of employee motivation, the cultivation of a creative atmosphere, and organizational structure pitfalls that limit productivity. The workshop integrated collaborative discussion and feedback from participants. Each method used in the workshop is described briefly below. The methods were categorized into four stages of the design thinking process (Liedtka & Ogilvie, 2011): what is, what if, what wows and what works.

WHAT IS - Method 1. Persona Creation: Personas are 'fictitious, specific, concrete representations of target users' and used commonly in improving communication about the target users within the design team and other stakeholders. In order to create empathy with employees, the executives were provided a set of simple personas that were created by the workshop team based on the pre-defined problem areas (Cooper, 1999; Pruitt & Adlin, 2006). Each team was then asked to add details, such as, persona's needs, wants, goals, and feelings, to these personas to reflect their own experiences with the employees in their organizations. Some of the prompting questions listed on these personas were: "What motivates this person?" and "What does this person value in life?" After a brief discussion among the team members, the teams created and explained why their persona had certain characteristics or feelings. Figure 4 shows examples of the persona sheets provided to the participants.
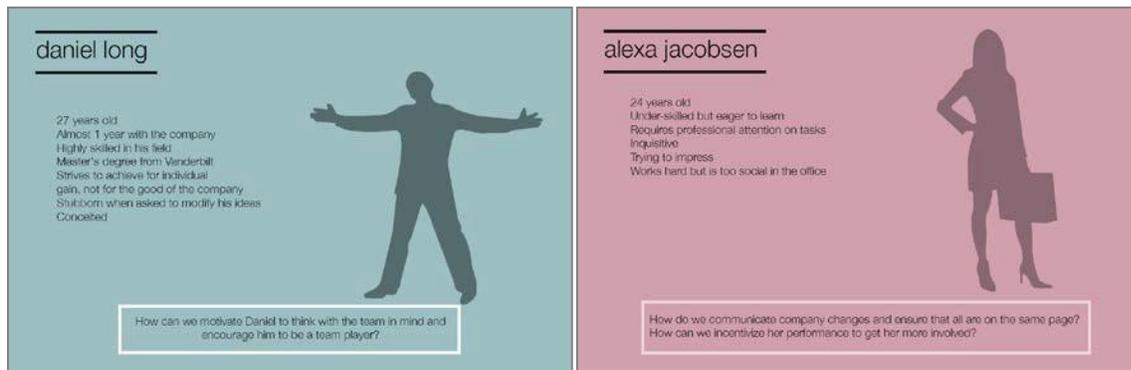
Figure 4. Undeveloped personas provided to the teams.

WHAT IS - Method 2. Journalistic Mapping: In the next step, participants were asked to systematically unpack the abstract thoughts that initially surround a problem statement. It is similar to a mind map where the graphical representations of ideas and aspects are aligned around a central theme. The main difference of this method that it's based on Journalistic 6 questions that help journalists to find a focus, tell better stories and allow them to never stop questioning (Group, 2008; Huang, 2014). Participant teams were given a list of problem statements relevant to agriculture business and asked to choose one of the problem statements to address. For example, 'How to motivate____to take initiative within the organization? 'How can we create an environment where_____feels comfortable failing?' 'How do we facilitate a company culture that drives innovation?' Participants were also provided noun-verb combinations, such as, motivate-initiative, embrace-cross-functional teams. Using the correlating noun-verb combinations, participants explored their problem statements by asking who, what, when, where, why and how.

WHAT IF - Method 3. Wish Cards: Wish cards are used to engage imaginary and fictional thinking, encouraging participants to think divergently in proposing solutions (Michalko, 2006). Participants were encouraged to think imaginatively by filling out "I wish…" cards (Figure 5) that were provided in stacks. After ten minutes of individually recording many wishes as a response to the prompts provided in the journalistic mapping session, participants were told to place all the wish cards in the middle of the table, shuffle them, and randomly select a handful of cards. Their next task was to read each wish and propose a way to make that wish come true by answering the question on the back of the wish cards focusing on "How?" This approach allowed them to generate divergent, unconventional ideas first, and to assess and identify means to accomplish these next.
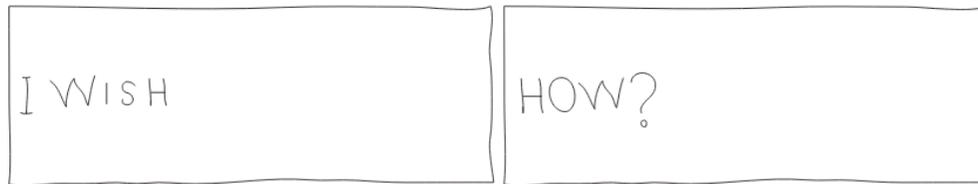
Figure 5. 'I wish' cards provided to the participants

WHAT IF - Method 4. Negative Brainstorming: A second method chosen for the ideation phase was negative brainstorming. Negative brainstorming focuses on generating bad solutions to the problem, and then see how those could be transformed into good solutions (How, 2012).Participants were told to refer back to the problem statement they chose in the journalistic mapping session, such as 'How to motivate___to take initiative within the organization?, and, as a team, asked to restate the problem three times so that the new problem statements were posing the same question in an opposite way. For example, 'How could I possibly cause the problem?' or 'How could I possibly achieve the opposite effect?' The second step in the process was to generate solutions to the reversed problem statement and reversing these solutions into solution ideas for the original problem statement (Tools, 1996). The purpose of this activity was to show how negative problem reframing could lead to more creative and innovative solutions and how thinking of a problem from a reversed point of view could broaden up the scope of the solutions.

WHAT WOWS - Method 5. Affinity Diagramming: The next method for the workshop was the affinity diagrams to organize the generated solutions according to their natural relationships. Affinity diagrams are a popular "six Sigma" tool for organizing ideas into categories based on their underlying similarity, and they help to identify patterns and establish related groups that exist in qualitative datasets (Pyzdek, 2003; Shafer, Smith, & J.C., 2005). At the workshop, it is used to review and categorize the ideas generated during the wish cards session to be sorted into clusters. This exercise revealed patterns of thinking and allowed participants to visualize the common paths of thinking that were present in the group.

WHAT WORKS - Method 6. Roleplaying: Roleplaying takes the individuals out of their chairs and into the physical and social space where they would explore the solutions at a very early stage (Svanæs & Seland, 2004). It is commonly used as a way for designer and users to have a dialogue about design ideas (Brandt & Grunnet, 2000). Within each team, participants were split into employers and employees. Drawing from previous solutions and conversations they had, they created a scenario and acted as their character in order to test the validity of their ideas.

Discussion
The results of our study are presented by each session, beginning with personas and proceeding through each of the seven design thinking methods. In each case, we start with observations about the practitioners' performance in the appropriate session, and then move to their perceptions about its value, ease of use, and application. Following these discussions, we present a summary section in which performance and perception data across the seven methods are analysed.

Design Thinking definitions provided by participants
As part of the pre-survey, participants were asked to respond to whether they have heard of the term 'design thinking', and if so, whether they could define it. Three participants out of 21 said that they have heard about the term; however, their definitions were rather simple statements mostly focusing on different ways of approaching to problem solving. Below are the three definitions:

> P3: *"Alter our way of thinking"*
> P15: *"Different structures to use to develop solutions"*
> P16: *"Utilizing different creative thinking strategies to address business issues"*

When the same question was posed at the end of the workshop, as part of the post-survey, all 21 participants were able to respond to what design thinking was. Their responses were characterized in three categories. First category was about the thinking process, second one focused on the systematic approach, and the third one was about using the tools in an optimized manner. Examples from each category are provided in Table 1.

Table 1. Examples of Design Thinking definitions provided by the participants

What is Design Thinking?	Example Definitions
Emphasis on process	P8: *"Define the problem, analyze the pros and cons by asking good questions practice/test a solution then implement this solution (execute)"* P9: *"Digging deeper into a core assumption by understanding more about people and then coming at the assumption through various angles"* P14: *"Process to identify what works by placing self in shoes of others and working through concepts/ideas from that point of view"*
Emphasis on systematic approach	P3: *"A different way of thinking that leads solutions/answers that aren't the most obvious - forces us to frame the problem in a systematic way"* P26: *"Discovery, iteration, trial, and movement forward"*
Emphasis on the use of tools	P4: *" Using deliberate and purposeful tools to drive the best and most innovative outcome of a team"* P6: *"An approach to solve multidimensional problems through creative methods"*

The definitions provided by the participants demonstrated that they saw design thinking as a thought process requiring a systematic way to understand the real problem and through going through series of steps, offering unique solutions. Another important part of their proposed definitions was the focus on the user which is critical for design thinking. They also seemed to understand the purpose of the methods introduced and how they can be used to investigate complex problems regardless of the domain they are coming from.

On another question, when participants were asked how they thought design thinking would

influence their organizations, their responses varied across two topics: stimulating creativity throughout the entire organization and aiding in improved competency and efficiency. Based on their responses, it is clear that they were able to elaborate on how design thinking could bring an additional edge to their competency and make their processes more efficient. They also commented on its potential influence on long term solutions and building an innovative culture within the organizations. A set of example responses are provided in Table 2.

Table 2. Example responses to the question on the potential influence of design thinking on participants' organizations

What can be the influence of Design Thinking on your organization?	Example Responses
Emphasis on stimulating creative thinking	*P3: "Involves a level of critical/innovative thinking that goes beyond the surface level. Allow to find real long term solutions"* *P20: "Can influence us to be more creative in how we solve issues and problems"* *P21: "Helping people think outside box - no dummies, no bad ideas"*
Emphasis on improved competency and efficiency	*P1: "Helps you get to the root cause of issues in a more effective way"* *P11: "Companies need to constantly be working ahead and finding ways to differentiate itself"* *P16: "Gives me a systematic approach to find viable solutions faster"*

Participants' Perceptions of the Design Thinking Methods introduced

The reflection cards gathered after each method was introduced and applied provided another set of information about participants' perceptions of the potential impact of design thinking into their individual organizations. We describe the patterns of the responses provided by the participants for each method and discuss their implementation for industry, in general.

Design Thinking Method 1. Persona Creation

Most participants seemed to understand the application of personas as part of the design thinking process and were able to explain how they could use it to address a challenge within an organization. Five of them found this method being the most immediately applicable method for their organizations where Participant 5 said that they could benefit from taking his own personal ideas and opinions out of the situation and truly find solutions that would fix a problem for the people it impacts. The responses, in general, focused on how personas could be used for changing one's perspective on the problem and seeking improvements for existing solutions.

Below are some of the example responses.

> P3: "Requires you to seek to understand the employee or customer to better tailor solutions"
> P9: "Understand the why's behind someone's action; Better feel for where that person is in life; what the person sees as relevant"

P13: "To seek an understanding outside of my own thoughts and opinions. It would help to remove myself and think in terms of someone else"
P28: "Understand the value system of an individual - what makes them talk and how they think"

Design Thinking Method 2. Journalistic Mapping

Journalistic mapping rated as the most applicable method to participants' individual organizations (8 out of 21). The responses were rather articulate and detailed and focused on revealing the root of the problem in order for a thorough understanding of the problem given. Below are some of the example responses:

P3: "Drives problem solving to the root. Most negative characteristics of our persona are symptoms of a larger root problem. Mapping forces us to ask the right questions to get the root of the issue"
P20: "Helps determine what questions we may not know the answer to and need to be asked => furthers relationship development and understanding of issue"
P24: "Writing down the verb: noun combinations that solidifies the essence of the problem as a means to keep a problem solving team focused on the core issue"

Design Thinking Method 3. Wish Cards

Wish cards were also rated highly for their immediate application in organizations (6 out of 21). The responses suggested that the participants saw value of using them in bringing people together by allowing freedom to explore while creating spontaneity across team members. Since the method doesn't ask for verbal contribution from the team members, participants saw this a positive approach in getting open-minded responses where nobody is judged or assessed.

P4: "It is a great way to get individual participation without having to call out a person individually"
P9: "Be open minded when thinking of solutions; solve the problem or at least try; Dream big; don't throw it out; consider it"
P27: "Very oral method which encourages teamwork & spontaneity - a process that "forces" creative in a retained and fair way into problem solving process"

Design Thinking Method 4. Negative Brainstorming

Participants found negative brainstorming as another effective method for promoting novel solutions. Reversing the problem into a negative statement allowed them to cover all levels of possible solutions. They acknowledged the importance of negative thinking to generate unique solutions that may not be obvious otherwise.

P2: "Don't ignore the negative. There is a lot to be learned from what is not working… do the opposite and you can make it work"
P14: "Intend to use this when employees say something "can't be done" - list reasons why it can't and reverse those to 'how they can'"
P20: "Would help get around 'road blocks' that may have people stuck in decision making process; May reveal a solution that is 'outside the box'"

Design Thinking Method 5. Affinity Diagramming
Affinity diagramming was found useful for evaluating the importance and relevance of the different solutions to the problem at hand and prioritizing the goals. Participants also found this method helpful for its contribution to decision making and creating a consensus across the team member to agree on the chosen concept.

> P5: *"We often have several different initiatives at a time. This would help us prioritize initiatives"*
> P6: *"Could be useful in our strategic planning each year to prioritize new ideas or allocation of limited capital"*
> P20: *"Focus resources & time on the higher scoring/higher benefit component ideas or solutions"*

Design Thinking Method 6. Roleplaying
Roleplaying was rated as the most challenging method (11 out of 21) as it required participants to get out of their comfort zones and act as other people without a written script. Participants who found this method effective stated that it would be useful in training employees for new positions as part of employee orientation programs or tough conversations, such as firing an individual. Seeing both sides of the conversation through empathizing with others was acknowledged often.

> P9: *"See yourself in the situation; Go through possible scenarios; See both sides"* P13: *"This is a great context to use for solving uncomfortable situations within a management team or organization"*
> P28: *"Role playing would be helpful in teaching people about how others respond. I would use it when trying to impress how various people and value systems show up differently in the work place"*

Our results revealed strengths and weaknesses of each of the design thinking method introduced. All of the participants acknowledged the importance of design thinking as a new thinking process and its potential value for their organizations. Adopting this new approach seemed to be easy for many managers as they were comfortable with elaborating how they could integrate these methods to solve some of the problems in their existing settings. While there were some differences in precise definitions, they were mostly able to integrate some of the design thinking terminology when they were asked to describe what design thinking was.

Out of the six methods introduced, participants found journalistic mapping and wish cards to be the most applicable methods as one was asking for deep dive on the problem space with WWWWWH questions and the other was opening the solution space without any limitations or judgements. On the other hand, roleplaying was seen as a challenging method for a business context since it required participants to move out of their comfort zones and act as different people after building empathy. Overall, the workshop was well-received and the goals of the session were achieved. We argue that the adaptation of methods commonly used in design context to business context needs extra effort on the researchers and educators as the purposes of using such methods often vary. For example, instead of introducing personas to the group and letting them figure out how to apply, we prepared simple personas that the managers could relate to immediately and add details to reflect their potential employees. On another example, we provided a set of questions for them to choose from as an initiation step

for journalistic mapping which allowed the teams to focus on a related business problem and explore what additional problems could be involved. While this additional effort can be time consuming, it seemed to facilitate in-depth conversations on building empathy, fully exploring the problem and solution spaces, as well as assessing the outcomes.

The small sample size for this study limits our ability to generalize; however, such studies, especially with practitioners, are not intended to generalize but instead offer important insights about the ways the design thinking methods could be modified to better suit the audience. Due to the limited timeline for the entire workshop, participants were only given thirty minutes to practice with the methods. Our future work will include additional studies with both practitioners and students on different design thinking methods.

Conclusions

In this paper, we have discussed the perceptions of managers on design thinking approach and how they recognize the value it could bring to different business settings. We have also discussed the need for more empirical research on the adoption of these methods by management discourse and argued that further research is needed that would help in making the transition from one domain to another. Next steps would be revisions of the supporting materials for each design thinking method based on the feedback from the participants in this study, additional studies with larger samples, designing and developing supporting materials for different academic contexts, and dissemination of these methods to general practitioners based on practice in the field.

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