



THE BEGINNING OF A NEW ERA: USING DESIGN THINKING TO IDENTIFY DIMENSIONS FOR PRODUCT ASSESSMENT

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Abstract

A careful user needs assessment is one of the essential factors in the successful development of new products and services. Strategies for need assessment are often used to assess and select ideas during the idea generation phase of the new product development process. However, there is still a large gap between evaluating ideas and evaluating the performance of a product according to the user's needs. To address that gap, this paper aims to formulate propositions and identify key insights on how to evaluate the performance of new products according to the user's needs from a design perspective. Towards our aim, we conducted 10 in-depth interviews with design thinking professionals from Hasso Plattner Institute (HPI) in order to identify relevant concepts that could be used for product assessment. The findings provide preliminary results of how to link need assessment in product performance and idea selection in design thinking. This research intends to contribute to the literature by advancing the discussions on need assessment in new product performance by adding new perspectives from design.

Keywords: Design thinking, Innovation, New product development, Need assessment, Early design phases

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1 INTRODUCTION

A careful user needs assessment is one of the essential factors in the successful development of new products and services. Understanding how to conduct a proper user needs assessment can lead to superior new product performance, which subsequently affects organizational performance. For approximately 30 years, identifying strategies for need assessment to improve the value of new products has been a continuing concern in the new product development (NPD) literature (Andersen, 1983; Chang et al., 2008).

To assess and select ideas during the idea generation phase of the NPD process, several different methods for need assessment are currently in use. Previous research has described 27 methods for need assessment (Holt et al., 1982) and several dimensions (Andersen, 1983) that can be used when selecting methods for specific projects. Although there are several investigations into how to use methods of need assessment at the early stages of the NPD process, there is still a large gap between evaluating ideas and evaluating the performance of a product according to the user needs (Simon and Gómez, 2014; Cankurtaran et al., 2013). To address this gap, this paper aims to formulate propositions and identify key insights on how to evaluate the performance of new products according to the user needs from a design perspective. Overall, it has been proposed that understanding how user need information is carefully assessed in the early phases of NPD can provide valuable insights on how to assess a product performance according to the user needs.

For this exploratory study, we follow the theoretical lens of design thinking (DT) as an organizational resource (Kimbell, 2011). Design thinking is “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technically feasible and what business strategy can convert into customer value and market opportunities” (Brown, 2008, p. 1). Therefore, design thinking is all about understanding people’s needs. Studying the way design thinkers work to develop the product concept could be interesting for product assessment because designers have been dealing with identification and assessment of user needs for many years (Dorst, 2011).

Towards this aim we conducted ten in-depth interviews with design thinking professionals from a large German organization and also from the Hasso Plattner Institute (HPI) in order to identify relevant concepts that could be used for product assessment. HPI was chosen for this study because of its relevance and high prestigious as an international innovation school and the selected large organization is the leading provider of executive education in the fields of design thinking, IT-trends and business innovation. The interview questions contained three sections. The first section covered the interviewee’s general experience with design thinking. The answer from the previous section served as a guide for the next sections. The second section sought to collect data about the value of design thinking to NPD and to understand how design thinking teams perform need assessment in order to select ideas. The third section aimed to raise assumptions from the interviewees about how companies should perform need identification and assessment.

Two objectives guide this exploratory study: (1) to identify dimensions whereby the concepts of idea selection and product assessment both operate and interact and (2) to formulate propositions that identify key insights on design thinking and product assessment for further research. This study intends to contribute to research by advancing the discussions on need assessment in new product performance by adding new perspectives from design.

2 LITERATURE REVIEW

In this section, concepts and definitions of new product performance and its dimensions are elaborated. Moreover, relevant studies on the importance of evaluation and selection of new ideas are discussed.

2.1 Concepts and background

Defining new product performance is essential when it comes to revising NPD strategy decisions and analyzing the contribution of new product performance for organizations. Performance of new products has been defined in different ways because scholars have focused on different products and considered new product performance from different perspectives. A substantial number of publications have tried to identify the best way to define new product performance from a theoretical (Schreier, 2014; Hauschildt, 1991) as well as an empirical point of view (Griffin, 1993). Another contribution related to

the description of new product performance is based on the way new product performance dimensions are developed and evaluated. Recent literature focuses on providing product developers with useful dimensions with which to monitor and evaluate new products. Table 1 summarizes relevant studies from a large body of literature dealing with the most suitable performance dimensions.

Table 1. New product performance dimensions (Adapted from Molina-Castillo and Munuera-Alemán, 2009)

Authors	Performance dimensions
Griffin (1993)	<ul style="list-style-type: none"> • Customer acceptance (customer satisfaction, revenue goals) • Financial performance (break-even time, margin goals, profitability goals) • Product (development cost, launched on time, product performance,)
(Langerak et al., 2004)	<ul style="list-style-type: none"> • Market (unit volume goals, revenue goals, sales growth goals) • Customer acceptance (customer satisfaction, number of customers) • Financial (profitability goals, contribution margin goals, development cost) • Product (performance specifications, quality specifications) • Timing (launch on time, time to market, break even time)
(Lee and O'Connor, 2003a)	<ul style="list-style-type: none"> • Market (market share, volume sales, rate of market penetration) • Customer acceptance (customer satisfaction, customer loyalty) • Financial (net profits margin, gross profit margin, return on investment) • Market extension (extension in new markets and new product categories)
(Huang et al., 2004)	<ul style="list-style-type: none"> • Objective/Subjective customer acceptance (revenue growth, customer satisfaction) • Financial performance (break-even time, margin goal, profitability goal) • Technical measures (development cost, launched on time)

A set of dimensions generally accepted by academics and practitioners alike was proposed by Griffin (1993), which offers the most relevant new product performance dimensions at project level (customer acceptance, financial performance, product level and firm level). In recent years, new performance dimensions (strategy based, market-based, etc.) have been suggested by Langerak et al. (2004). Even though authors define performance dimensions in different ways, there is one dimension generally accepted by both academics and managers: customer satisfaction-based performance (Lee and O'Connor, 2003b). Building on that, Huang et al. (2004) defend two different metrics for customer satisfaction: objective and subjective. The subjective-based metric is directly associated with customer acceptance and satisfaction. Customer satisfaction reflects the level of fulfillment of customer's needs and expectations with the use of a new product compared to competing products and original goals (Oliver et al., 1997).

Several studies have considered the relationship between customer satisfaction and the company's performance. The results show that customer satisfaction generally provides economic benefits to the firm. For instance, customer satisfaction has been linked to reduced costs (W.Anderson et al., 1997), increased profitability of a firm (Capon et al., 1990) and its market value (Aaker and Jacobson, 1994). However, favorable customer-based outcomes depend on the firm's ability to assess and evaluate ideas during the idea generation phase of the NPD process (Koen et al., 2001).

2.2 The importance of evaluation and selection of new ideas

Ideation or idea generation is the activity of generating ideas, and it is one designated steps of the design thinking process. Design thinking has been considered a powerful organizational resource to bring user-centered innovation and creativity to business organizations (Brown, 2008).

Evaluation and selection of ideas have been the subject of research for many years. Holt et al. (1982) have described 27 methods for need assessment. Based on this study, Andersen (1983) classified the methods into different classifications according to the type of information for specific projects. More recent research investigates the use of analytical and logical processes to reduce the number of ideas (Alves et al., 2005) and presents a model of ideas evaluation process for product development (Chang et al., 2008).

Overall, it has been proposed that idea assessment and selection are critical activities during the early phases of the new product development process for which the influence on customer satisfaction and

therefore economical growth has already been established. Although there are several investigations into how to use methods of need assessment for selecting an idea, there is still a large gap between evaluating ideas and evaluating the performance of a product according to the user needs (Simon and Gómez, 2014) (Cankurtaran et al., 2013). It is therefore necessary to better understand the concepts used by designers to assess ideas in order to verify whether those concepts could also be used to assess the performance of products.

According to Brown (2009), design thinking enhances idea generation, and facilitates product appropriateness and adoption, which leads to customer satisfaction. Dorst (2010) claims that there are four different levels that design thinking could be used to frame problems in order to generate and select ideas: design activities within an existing frame, design activities that involve reframing, design activities for when the frame originates from the existing company practice and design activities when a new frame has been brought or developed by an outsider. These different applications are usually associated with different concepts and dimensions related to need assessment. Consequently, the question arises on how design thinkers identify the most promising product ideas, after generating them, taking into consideration those different types of applications.

To sum up, having a proper need assessment is the first step in ensuring that the actual product performance meets or exceeds the desired product performance. This requires understanding the how ideas are selected and assessed by design teams during the initial creative process.

3 RESEARCH METHOD

This paper aims to formulate propositions and identify key insights on how to evaluate the performance of new products according to the user needs based on a design thinking perspective. Towards this aim, we conducted ten in-depth interviews with design thinking experts in order to identify relevant concepts that could be used for product assessment.

3.1 Selection of respondents

The study follows a non-probability sampling technique in the selection of respondents to be part of the research. Non-probability sampling is a method of choosing respondents that is not based on random selection; rather, respondents are chosen purposefully (Kumar, 2011). Table 2 illustrates the interviewees' backgrounds.

Table 2. Overview of interviewees' backgrounds

Participant ID code	Highest educational qualification	Professional experience (years)	Role in project
AB1	Masters	6-10	Program Lead
AB2	Masters	2-6	Coach
AB3	Masters	2-6	Coach
AB4	Masters	6-10	Coach
AB5	Masters	6-10	Coach
AB6	Masters	6-10	Coach
AB7	Masters	6-10	Coach
AB8	Bachelors	6-10	Coach
AB9	Masters	6-10	Program Lead
AB10	Masters	2-6	Coach

In total, ten design thinking professionals were selected from three educational programs at Hasso Plattner Institute (Germany), and also from a large German organization (name not disclosed due to privacy reasons). One of the three selected educational programs aims to bring together multidisciplinary students to challenge them to solve real-world product development challenges, whereas the two other programs aim to teach students design thinking practices in which experienced design thinking coaches help them develop the mindset of design thinking. Finally, the selected large organization is the leading provider of executive education in the fields of design thinking, IT-trends and business innovation. The criterion to select the interviewees was based on their level of experience with design thinking (e.g., more than two years working with design thinking).

3.2 Data collection technique

In this study, primary data was gathered via semi-structured interviews. This approach is normally used in exploratory studies due to its flexible nature making it possible to discuss and expand on the responses of the interviewees (Charmaz, 2014).

3.2.1 Interview procedure

The interview questions (see Appendix A) were adapted from Bohlmann et al. (2013). Interviews typically lasted 30 minutes and were recorded for subsequent analysis. The interview questions were designed to elicit each interviewee's perspective on need identification and assessment, and thus started with very general questions.

The interview questions were split into three sections. The first section covered the interviewee's general experience with design thinking. The answer from the previous section served as a guide for the next sections. The second section aims to collect data about the value of design thinking to NPD and to understand how design thinking teams perform need assessment in order to select ideas. The third and final section aimed to raise assumptions from the interviewees about how companies should perform need identification and assessment.

The method, scope, and a number of interviews for this exploratory study are similar to other studies rely on in-depth interviews (Bohlmann et al., 2013). Additionally, Strauss and Corbin (2008) state that the focus of qualitative research is not on the size of the sample but rather on the quality and depth of the information obtained. Moreover, it is only necessary to continue with interviews until theoretical saturation occurs (Charmaz, 2014). For this study, ten in-depth interviews were conducted with design thinking professionals.

3.3 Data analysis

The purpose of qualitative data analysis is to organize, categorize and elicit meanings from the data collected in the field (Strauss and Corbin, 2008). Data was analyzed using a constant comparative method of data analysis, which consists of iterative analysis sessions of the recorded interview, each time going deeper into the material to note connections, patterns, and juxtapositions. The constant comparative analysis is the process of comparing the similarities and differences between the categories that emerged from the data collected (Harding, 2013).

3.3.1 Coding

Coding is the first step of data analysis as it helps to move away from particular statements to more abstract interpretations of the interview data (Charmaz, 2014). For this study, open coding was used with the help of the qualitative analysis software *NVivo*. The interviews were coded and labeled according to concepts related to need assessment and idea selection factors. Finally, emerging patterns were structured into more general categories that helped to refine the dimensions and define key concepts.

3.4 Validity and reliability of the study

Reliability in this study was ascertained through the triangulation of data sources, which involves the use of different methods of data collection within one study in order to ensure that the data and findings are accurate (Charmaz, 2014; Strauss and Corbin, 2008). In this study, triangulation was established by comparing the data collected from interviews with participants, informal discussions as well as field notes. Peer review was also employed by the authors to establish the credibility of the study. A peer review is the review of the data and research process by someone who is conversant with the research or the phenomenon being explored (Creswell and Miller, 2000).

4 FINDINGS

The first section of the interview guideline covered the interviewees' general experience with design thinking. The answer from that section served as a guide for the next two sections, which are explained as follows.

4.1 Understanding the value of design thinking

The second section of the interview guideline aimed to collect data about the value of design thinking to new product development.

Firstly, different definitions and applications of design thinking became apparent in the interviews. In some cases, a company goes through the entire process by following the steps that take them from understanding to testing. Another scenario is when a company is interested in using only one part of the process (e.g., ideation). Based on these two scenarios, we asked the interviewees whether they believe that the team from the last case was just using practices from design thinking rather than design thinking itself. The answer was that it depends on how one would define design thinking. In general, the interviewees agreed that doing design thinking is not necessary when a team goes through the entire design thinking process. Instead, it is when non-designers have the mind-set to perform design activities that normally only designers would do. In this way, the last case could also be defined as design thinking. Another interesting definition of design thinking that emerged from the data was the idea of understanding people's needs. The mindset of DT is about shifting the user's frame of thought on a given problem from a personal or business point of view, to an understanding of other people's perspectives. Based on this definition, it is possible to establish that design thinking contributes to business organizations by focusing on multidisciplinary teams and the understanding of people.

Therefore, from the interviewee's perspective design thinking is not about the outcome, but the mind-set towards understanding people's needs instead. The core of design thinking is about developing empathy to understanding people's feelings and behaviors. Empathy allows the team to feel people's frustration to better understand the key issues associated with their beliefs – a prerequisite for a human-centered approach. As a human-centered approach, design thinking guides the team to connect more deeply with users and non-users in order to discover opportunities for innovation.

Additionally, the greatest contribution of design thinking that was identified was centered on teamwork. Design thinking is not only for designers. Ideally, a design thinking team should be composed of people with different backgrounds from different departments in the company. The idea behind combining people who were supposed to work on the product in different stages is to make them familiar with the product concept at the early stages of the development. By doing that, the project moves from an individualistic way of thinking to a culture of shared creation, which has the potential to result in more innovative solutions.

Overall, a good DT process is when the team learns how to work with design practices in a multidisciplinary team, and also when they discover a need that the user did not know about previously.

4.1.1 Idea selection

The third and final section of the interview aimed to raise questions about need identification and assessment in order to understand the concepts that design thinking teams take into consideration when selecting ideas.

Initially, the team engages in discussions in order to identify common knowledge about the topic. Based on that, hypotheses and research questions are created. Depending on the type of research, the team decides what research methods will be performed (e.g., interview, observation, immersion). When talking to the users, the team should look for contradictions. Contradiction is an important driver for creative design because it will determine the number of conflicts and constraints that could eventually be transformed into opportunities for innovation. Thereby, in order to understand people's needs, it is necessary to understand people's contradictions. Based on the data collected, the teams go through the synthesis phase, which is the practice of integrating, organizing and evaluating user's information. Once the team has clustered the data collected from the fieldwork, an idea generation technique is performed. Normally, many ideas emerge from the ideation phase, therefore making it a necessary step in achieving/selecting the best options.

In some cases, the team combines several ideas into one solution. In other cases, the team has to choose only one idea from a range of options. Figure 1 illustrates the dimensions that our interviewees take into consideration during the idea selection phase.

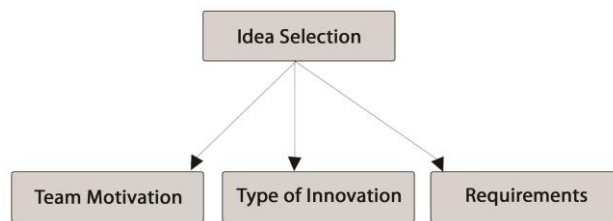


Figure 1. Idea selection dimensions

Team motivation was criterion most mentioned for idea selection. As mentioned before, one of the cores of design thinking is teamwork, which means that team motivation has a relevant influence on team performance. And motivation is directly linked to how passionate the team members feel in relation to the solution. One of the interviewers mentioned, "Hardly someone will create a good design when he or she is not passionate about it." Thereby, the teams' excitement about the solution is one of the criteria for idea selection.

The type of innovation (e.g. disruptive, incremental, etc.) is also taken into consideration when selecting ideas. Does the team want to improve an existing solution? Does the team want to introduce an existing solution to a different market? The selection of an idea depends on the team's decision about which type of innovation they want to create. Most of the interviewees mentioned the importance of being inspired by wild ideas. One of them said, "If you want to go for normal ideas, you don't have to use design thinking. If you want to make a real impact, use design thinking to learn how to work with wild ideas". However, according to another interviewee, "I would not suggest working with wild ideas because design thinking is not always about disruption." The different points of view create an opportunity for future research to discuss the relationship between DT and types of innovation. The quote was not associated with an interviewee described in Table 02 for reasons of privacy.

In relation to requirements, these differ between users and organizations and the solution should present a balance between them. Regarding the user, a good solution should solve a need, be simple and practical. Moreover, it is necessary to consider different types of users (e.g., extreme users, normal users, and non-users). Designing for extreme users and non-users is the key to design thinking. Extreme users are important to understand the reasons behind the passion for the proposed solution and how the solution is actually solving their problems. The non-users might spark creativity by exposing the team to a scenario with a different problem to be solved. In the context of business and technology, ideas should be translated into solutions that drive growth and profitability.

4.2 Need assessment of new product performance from a DT perspective

Based on the interviewees' answer to the last question and the insights mentioned in the previous subsection, we formulated propositions on how to evaluate the performance of new products according to the user needs from a design thinking perspective. Figure 2 illustrates two dimensions that could be used for need assessment. Concept comparison refers to the contrast of the initial concept idea developed by the design thinking team versus the product that has been delivered to the market. In order to assess the product, we propose to go back to the initial documentation and check whether the product is solving the initial problem that had been identified. Normally, design thinking teams present documentations to the development team containing information about the development of the product concept. By analyzing the initial document, it would be possible to verify if the problem has changed or if the development team/marketing team changed the product concept. In the case where the problem was changed during the process, the company should perform a new need assessment to verify what has been changed and why in order to add new modifications to the product. If another department has changed the initial concept, it is necessary to verify what new problems arrived after the design thinking team finalized the documentation. Additionally, organizations should also compare if the type of innovation delivered to the market is the same as the DT team initially described. We suggest that companies could benefit from this comparison between product concept and final product regarding need assessment.

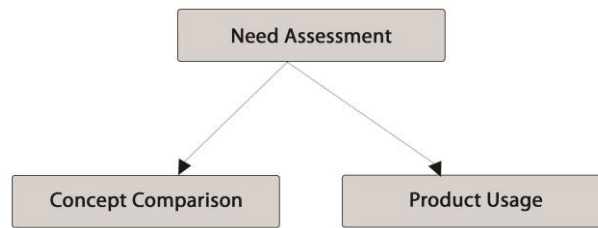


Figure 2. Need assessment dimensions

Product usage takes into consideration the target group that actually uses the product versus the target group that was expected to use the product. By analyzing who is actually using the product, organizations can verify if new needs or problems emerged after the launch of the product and how the product solves - or does not solve - these. Companies should check how extreme users use the product and why non-users do not and compare these results to the user-requirement pre-defined by the design team. One way to compare product usage is by observing how people use the product. A more efficient way would be to collect data through functionalities already implemented on the product. For instance, the team could implement remote tests to verify how the user interacts with the product (usability), how frequently the users are using the product (retention) and if the users recommend the product to other people (recommendation). Overall, we suggest need assessment in product performance as the outcome of an effective evaluation of comparison between initial concept development and perceived concept based on how the users appraise the final product.

5 DISCUSSION

This paper discusses how to link need assessment in product performance and idea selection in design thinking. Therefore, we analyzed evidence from interviews with design thinking professionals on idea identification and selection. First, we analyzed the contribution of design thinking to organizations according to the interviewees' definition of design thinking. The definitions investigated are consistent with Brown (2009) who also believes that design thinking is about using designer's sensibility and methods to match people's needs with what is technologically feasible and viable. The greatest contribution of design thinking is to support non-designers in developing the mind-set to perform problem-solving activities that normally only designers would do.

Second, we analyzed the interviewees' perception of how to find out about the user needs. Our findings follow other well-referenced studies (Dorst, 2011; Liedtka, 2015).

Third, we developed dimensions based on the analysis of concepts that teams use during idea selection. The dimensions are team motivation, requirements and type of innovation. The selection of an idea depends on the team's decision in terms of the type of innovation they want to create. From the interviews, there was a discrepancy regarding whether teams should consider wild ideas to decide the type of innovation. The different points of view create an opportunity for future research to discuss the relationship between design thinking and the types of innovation it creates.

Finally, we analyzed the dimensions for idea selection in order to identify relevant concepts that could be used to assess a product according to the user needs. In doing so, we considered two dimensions for need assessment: concept comparison and product usage. The dimension of concept comparison would allow organizations to compare user's feedback on the validation phase during the creative process to the user's feedback on the product in the market. Product usage compares the initial target group expected when the team developed the product concept with the users who are using the final product. We suggest that companies, when evaluating products, should consider those two dimensions to assess the product according to the user needs.

6 CONCLUSION

This paper aims at formulating propositions and identifying key insights on how to evaluate the performance of new products according to the user need as seen from a design thinking perspective. First, we established theoretically that concepts for idea selection used by design thinkers can be considered for product performance assessment. We then conducted in-depth interviews with design thinking professionals. Based on these interviews, we analyzed the value of design thinking for need

assessment and idea selection. Even though the interviewees are also involved in international projects, we only have considered two working environments (HPI and the large organization). This could imply that the findings are limited to the understanding of DT of these two organizations. In order to extend our findings, it would therefore be necessary to analyze other organizations' perspectives. This research concludes that companies should explore more fully the idea selection phase performed by design thinking teams in order to better understand the concepts used for need assessment. By performing this exploratory study, we suggest need assessment in product performance as the outcome of an effective evaluation of comparison between initial concept development and perceived concept based on how the users appraise the final product. These findings provide preliminary results of how to link need assessment in product performance and idea selection in design thinking. This research intends to contribute to the literature by advancing the discussions on need assessment in new product performance by adding new perspectives from design.

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APPENDIX A. INTERVIEW QUESTIONS

Questions about the participant's background

Can you tell me about your experience with design thinking?

Questions about the DT process

How do you define a successful design thinking process in terms of the outcome?

What criteria do you think it is important to use to determine whether or not to select an idea?

How would you define a successful product?

Questions about the customers' needs

How do you find out about the user needs?

What should a company take into consideration when assessing a product according to the user needs?