

# **The influence of mental model differences between external designers and their clients on new product development outcomes**

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## **Abstract**

Prior research indicated that external designers are often hired by their clients to bring new knowledge into their organization. To assure that an external designer's knowledge is implemented in the organization of the client, managing the relationship between the two is essential. It seems to be particularly important that the external designer and the client are compatible. However, there is no study that examined the impact of compatibility on NPD outcomes. We fill a part of this gap by examining the mental model differences between external designers and clients, and their impact on the degree of project exploration, project exploitation and project performance. We study 100 innovation projects and we survey the external designer and the client for each project. The results of this research contribute to the literature by showing how mental model differences influence project exploration, project exploitation and project performance.

**Keywords:** Mental models, dyadic relations, NPD outcomes, designers, clients

## 1. Problem statement

Design has increasingly been recognized as an important factor for new product performance (Czarnitzki & Thorwarth, 2012) and firm performance (Gemser & Leenders, 2001; Hertenstein, Platt, & Brown, 2001; Hertenstein, Platt, & Veryzer, 2005). This is, in part, evident in the growth of the number of design consultancies used for new product development (Utterback, et al., 2006). These consultancies are often hired to help clients innovate (Abecassis-Moedas & Benghozi, 2012; Bruce & Morris, 1994) and to bring new knowledge into the organization (Dell'Era & Verganti, 2010).

To ensure that the expertise and knowledge of the external designers can be efficiently and effectively integrated in the NPD process of their clients, managing the relationships between the two is essential (Chiva & Alegre, 2009). Based on case study research, Bruce and Morris (1994) suggest that for successful collaboration, it is important that design consultancies and clients are compatible – where compatibility refers to the situation where the personal characteristics of the design consultant match those of the client. Another often mentioned antecedent for successful collaboration between the designer and the client is the need for a personal, long term relationship between the two, often characterized by respect and trust (Bruce & Docherty, 1993; Bruce & Morris, 1994). Interestingly, there are also studies suggesting that clients aiming to innovate should strive for diversity and short-term relationships with external designers (e.g. Dell'Era & Verganti, 2010). This research addresses these relationships between external designers and their clients, and investigates whether, for NPD success, there is indeed a need for designers and clients to be ‘compatible’ or whether diversity between the two may result in higher project performance.

## 2. Conceptual development

The theoretical framework that we test in this dissertation is presented in Figure 1. Our study focuses on the impact of so-called ‘mental model’ differences between external designers and their clients on the degree of project exploration (i.e., the amount of new firm knowledge that was generated) and project exploitation (i.e., the amount of current firm knowledge that was improved). Moreover, we study the influence of project exploration and project exploitation on performance.

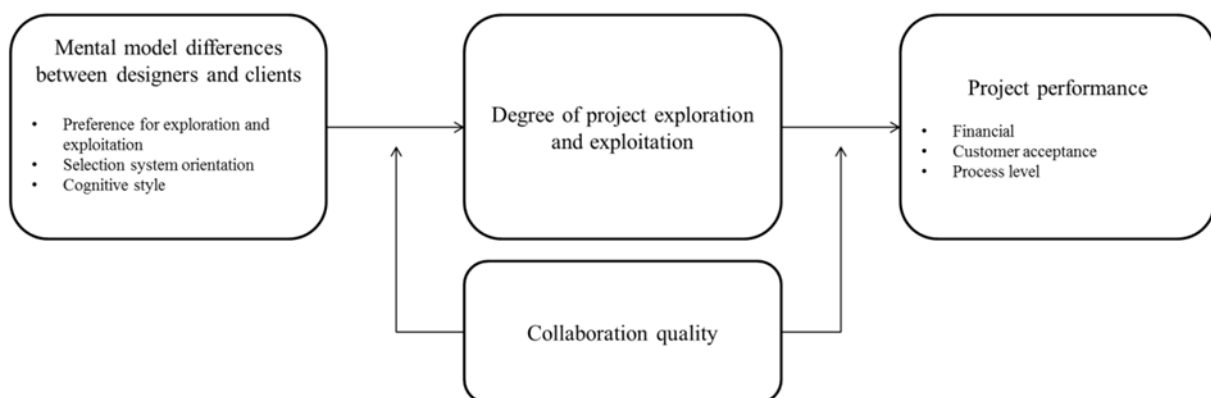


Figure 1: Influence of mental model differences between designers and clients on NPD exploration/exploitation and project performance

We define mental model differences as the (dis)similarities in people’s ‘simplified knowledge structure or cognitive representation of the environment’ (Gary & Wood, 2011). We study three determinants of individuals’ mental models, and the differences between

external designers and their clients in terms of these determinants: preference for exploration and exploitation, selection system orientation and cognitive style.

The first determinant we research is the difference between external designers' and their clients' preference for exploration and exploitation. Exploitation is characterized by terms like "refine, choice, production, efficiency, selection, implementation, and execution" (March, 1991, p. 71). Walrave (2012) indicates that exploitation may help firms to become more efficient and to increase their profits on the short run. Additionally, exploitation most probably enables firms to adjust to their current reality and incrementally improve their knowledge base (Walrave, 2012). Exploration on the other hand is characterized by activities like "search, variation, risk-taking, experimentation, play, flexibility, discovery, and innovation" (March, 1991, p. 71). According to Walrave (2012), exploration may enable firms to gather knowledge that is different from their current knowledge base and help them to adjust to the changing environment around them. Individuals that have a preference for exploration (exploitation) will most probably have a representation of the environment in which exploration (exploitation) is important, and they might more often recognize opportunities in this environment which trigger exploration (exploitation).

Next, the present research investigates differences between external designers and their clients in terms of their selection system orientation. Selection system orientation refers to the extent to which the evaluations of different kinds of selectors drive an individual's behaviour. In selection system theory, selectors determine the outcomes of competitive processes by evaluating outcomes (Gemser, Leenders, & Wijnberg, 2008; Wijnberg & Gemser, 2000). Three types of selectors are distinguished: market selectors, peer selectors and expert selectors. When consumers base their buying decisions on their own opinions or fellow consumers' opinions, market selection is present. When consumers are strongly influenced by the opinions of experts (i.e. individuals who are neither consumers nor producers and who possess specialized knowledge about the product), expert selection is present. Finally, when peers (i.e. producers operating in one and the same industry) determine who wins and who loses, peer selection is present. An example can be found in academia in which peers in general determine which papers will be published and which academics will obtain funds for research. Individuals that have a strong market orientation will most probably have a representation of the world in which the market is important, and they might more often view the environment from the market's viewpoint.

Finally, we study the differences in cognitive style between external designers and their clients. 'Cognitive style refers to person's preferred way of gathering, processing, and evaluating information' (Hayes & Allinson, 1998, p. 850) and includes aspects like creativity, conformity and attention to detail. The mental model of external designers and their clients might be influenced by their cognitive style. For example, individuals who have a creative cognitive style might consider creativity important in the representation of their environment, and they might more often identify opportunities in their environment that trigger their creativity.

Prior research indicates that diversity positively influences the variety of knowledge that is integrated in an NPD project, and this variety of knowledge has a positive influence on new product performance (Moenaert, Souder, De Meyer, & Deschoolmeester, 1994). Therefore, we expect that the mental model differences between designers and clients have a positive effect on project exploration and a negative effect on project exploitation. Project exploration and exploitation will, in turn, influence project performance. Prior research suggests that exploration and exploitation may have different effects on dimensions of new product performance, including financial, customer acceptance and process metrics. We expect that

project exploration has a positive influence on financial performance (De Jong & De Ruyter, 2004; Jasmand, Blazevic, & De Ruyter, 2012), while project exploitation has a positive influence on customer acceptance (De Jong and De Ruyter, 2004, Jasmand et al., 2012). Additionally, we expect that project exploitation has a positive influence on process outcomes (whether the project stayed on time, on budget and had a short time to market), while project exploration has a negative influence on process outcomes (c.f. March, 1991). Following Bruce and Docherty (1993) and Bruce and Morris (1994), we will also assess how the quality of the collaboration between external designers and clients during the NPD process moderates several relationships in our model. For instance, Souder (1988) found that when R&D and marketing are ‘too good friends’, these actors do not challenge each other’s assumptions and refrain from candid judgments. We therefore expect that a good collaboration negatively moderates the impact of mental model differences on the degree of project exploration, because for such projects, exploring diverse options and having different views is essential (Atuahene-Gima, 2005). A good collaboration can also ensure that existing firm knowledge is effectively synthesized, integrated and applied within innovation projects (Henderson & Cockburn, 1994). For example, Gatignon and Xuereb (1997) found that a good collaboration enables a firm to use its resources to achieve desired innovation outcomes. Therefore, we expect that a good collaboration positively moderates the influence of the mental model differences on project exploitation (and the influence of project exploration and exploitation on project performance).

### **3. Method**

The type of question we are trying to answer by means of this research is a so-called ‘what’-question: in particular what are the effects of mental model differences between designers and clients on NPD performance outcomes. To answer such a question, a large-scale survey on innovation projects is most appropriate, also considering that there is prior empirical literature available on the basis of which specific hypotheses could be formulated. The data collection process started on the 1th of November 2012.

The unit of analysis for this study is the innovation project. We are interested in projects which were completed within a twelve-month time frame (to prevent memory loss) and in which a design consultancy firm was hired to contribute to the innovation project. We will select projects which were completed for clients operating in diverse industries. Data will be collected in the Netherlands. We are interested in the mental model differences between designers and their clients, so we collect data from both informants. We will select the individuals who were responsible for the project at the design consultancy (the lead designer) and the client (the project manager). Having multiple informants will also help us to collect valid data and prevent common method bias. We aim to study 100 innovation projects; thus we will collect data from 200 informants.

The survey uses multi-item reflective scales to measure the constructs. The scales we use are adapted from prior empirical studies. The adjusted scales were checked with knowledgeable academics and experts from practice to assure their validity. The final items for our research are presented in Table 1.

When analysing the data, we will first check the unidimensionality of our constructs; we will use Exploratory Factor Analysis (EFA). In addition, we will use Confirmatory Factor Analysis (CFA) to evaluate the reliability and discriminant validity of each of our constructs. Finally, we will use Structural Equation Modelling (SEM) to test the relationships in our model.

<b>Construct</b>	<b>Example of items</b>	<b>Number of items</b>	<b>Sources</b>
Preference for exploration and exploitation	<ul style="list-style-type: none"> <li>- Activities in which my clients have accumulated a great deal of experience.</li> <li>- Activities that could be carried out as routine by my clients.</li> <li>- Activities that involved searching for new possibilities with respects to the products, processes or markets of my clients.</li> <li>- Activities in which the products or processes of my clients were strongly renewed.</li> </ul>	10	Mom, Van den Bosch, and Volberda (2007)
Selection system orientation	<ul style="list-style-type: none"> <li>- I think that consumers are good judges of the quality of my designs.</li> <li>- I generally take the opinions of peers into account in the design decisions I make.</li> <li>- The opinions of experts are an important measure of the success of my designs.</li> </ul>	12	Bhansing, Leenders, and Wijnberg (2012)
Cognitive style	<ul style="list-style-type: none"> <li>- I have a lot of creative ideas.</li> <li>- I adapt myself to the organizational system.</li> <li>- I am thorough when solving problems.</li> </ul>	12	Miron, Erez, and Naveh (2004)
Degree of project exploration/exploitation	Same items as for 'Preference for exploration and exploitation' were used. Items were adapted to the project level.	10	Mom, et al. (2007)
Financial performance	<ul style="list-style-type: none"> <li>- The product attained its profitability goals.</li> <li>- The product attained its margin goals.</li> <li>- The product attained its ROI goals.</li> </ul>	3	Griffin and Page (1993)
Customer acceptance performance	<ul style="list-style-type: none"> <li>- The product attained its unit sales goals.</li> <li>- The product achieved a high level of customer satisfaction.</li> <li>- The product achieved a high level of customer acceptance.</li> </ul>	3	Griffin and Page (1993)
Process performance	<ul style="list-style-type: none"> <li>- The development costs of the product stayed within the budget.</li> <li>- The product was launched on time.</li> <li>- The product had a short time to market.</li> </ul>	3	Griffin and Page (1993)
Quality of the collaboration	<ul style="list-style-type: none"> <li>- A friendly attitude existed between the project manager and me.</li> <li>- The project manager and I blamed each other for failures.</li> <li>- If disagreements arose, the project manager and I were able to resolve them.</li> <li>- If was difficult for the project manager and me to contact each other.</li> </ul>	9	Leenders and Wierenga (2002)

Table1: Survey constructs and items

#### 4. Expected outcomes

As our data collection process started on the 1th of November 2012, we can't provide definite results yet. However, we expect that our contribution to theory is threefold. First, we will explore mental model differences between external designers and clients and examine to what extent these differences have a positive or negative impact on NPD outcomes. We study the influence of differences in preference for exploration and exploitation, difference in selection system orientation and differences in cognitive style. Moreover, we provide insights in the role of these difference for project exploration and exploitation. Secondly, we will show how project exploration and project exploitation influence several dimensions of performance. Finally, while current research mostly adopts an organizational or departmental level view when studying mental model differences, we will investigate these mental model differences at the level of the dyad, i.e. between the external designer and the client. With this information, firms can better choose an external designer in light of the desired outcomes of their innovation project. We look forward to presenting our final results at the PREBEM Conference.

#### 5. Acknowledgements

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