

WHAT IS YOUR EXPERIENCE? A STUDY ON COLLABORATING NPD PROFESSIONALS AND THE EFFECTS OF THEIR DISSIMILAR EXPERIENCES ON NPD OUTCOMES

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Abstract

Prior research suggests that combining exploration and exploitation can ensure firms' long term performance. However, balancing the two is challenging because of their fundamentally different nature. Collaboration with other companies can be a means to successfully combine exploration and exploitation. Studies on collaboration and its effects on exploration and exploitation tend to adopt an organizational point of view. In this paper, we examine the relationship at a lower aggregation level, studying collaboration between key NPD professionals, representing different firms, in the context of an inter-organizational NPD project. Key NPD professionals are those who have a large influence on the course of an NPD project and can strongly influence its degree of NPD exploration and NPD exploitation. We focus on a particular dyadic collaboration, namely, the collaboration between an external professional designer, hired by the company to assist in a particular NPD project, and the internal NPD project manager. External professional designers normally contribute to clients' NPD by means of idea generation and/or translating these ideas into actual product concepts. We investigate the similarities and dissimilarities of professional designers and NPD project managers, in particular in terms of their experience in exploration and exploitation. We study how these similarities and dissimilarities influence NPD outcomes by means of a quantitative study of 44 NPD projects. Our results indicate that dissimilarity in exploration experience of designers and NPD managers positively influences NPD exploration; dissimilarity in exploitation experience positively influences NPD exploitation. These results provide management insight into how to construct effective NPD dyads for NPD exploitation and NPD exploration.

Keywords: dyadic relations, NPD, similarities, dissimilarities, exploration, exploitation.

INTRODUCTION

Prior research suggests that firms should explore new possibilities and exploit their current business to stay profitable (March, 1991). March (1991) states that exploration includes "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation" (March, 1991, p. 71) while exploitation can be characterized by terms as 'refinement, choice, production, efficiency, selection, implementation and execution' (March, 1991, p. 71). Exploration enables firms to gather new knowledge and helps them to adjust to the changing environment around them, while exploitation on the other hand enables firms to improve their current knowledge and to enhance their match with the present reality (Levinthal and March, 1993, March, 1991). Since exploration and exploitation are fundamentally different, they in general require different organizational structures, organizational contexts and leadership styles (Gibson and Birkinshaw, 2004, Gupta et al., 2006, Tushman and O'Reilly III, 1996).

Prior research suggests that collaboration with other companies can help firms to pursue both exploration and exploitation (e.g. Grant and Baden-Fuller, 2004, Holmqvist, 2004, Lavie and Rosenkopf, 2006). The majority of these studies examine collaboration and its effects at the firm level. However, it is at the individual level where exploration and exploitation actually occur (cf. Raisch et al., 2009). In particular employees engaged in new product development explore new knowledge and/or exploit existing knowledge for a firm (Danneels, 2002). This research investigates dyadic collaboration between key NPD professionals in the context of an inter-organizational new product development (NPD) project. Key NPD professionals are those who are 'hands-on' involved in an NPD project, have a large influence on the course of an NPD project, and determine, in large part, the NPD project's degree of exploration and exploitation. While a CEO, or other upper echelon manager, can have a large influence on the course of a NPD project by assigning for example, resources or deciding on its start or continuation, he or she is in general not hands-on involved. The current research explores the similarities and dissimilarities that exist between the key professionals that are involved in an inter-organizational NPD project. In particular, we investigate how similarities and dissimilarities in these key NPD professionals' experience in exploration and exploitation influence the extent that the projects they collaborate in will be exploitative or explorative.

This rest of this paper is structured as following. First, we discuss the theoretical background of this study, presenting our conceptual model and hypotheses. Next, we discuss our method and finally, we provide insights in the contributions to theory and practice.

THEORY, CONCEPTUAL MODEL AND HYPOTHESES

Dyadic NPD partners

In our research, we study one specific type of dyadic collaboration, namely, the collaboration between external professional designers and internal NPD project managers during a specific NPD project. External professional designers are often hired to help clients innovate (Abecassis-Moedas and Benghozi, 2012, Bruce and Morris, 1994) and to bring new knowledge into the organization (Dell'Era and Verganti, 2010). They contribute to clients' new product development by means of idea generation and/or translating these ideas into actual product concepts (Perks et al., 2005).

Managing the relationships between the two is essential (Chiva and Alegre, 2009) to ensure that the expertise and knowledge of the external designers can be efficiently and effectively integrated in the NPD process of their clients. Based on case study research, Bruce and Morris (1994) suggest that for successful collaboration, it is important that the external designers and their clients are compatible – where compatibility refers to the situation where the personal characteristics of the designer 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 and Docherty, 1993, Bruce and 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 and Verganti, 2010).

We are particularly interested in how the collaboration between the external designer and the client's NPD project manager influences NPD outcomes in terms of the degree of NPD exploration and NPD exploitation. The information processing perspective of group work suggests that diversity between members of a team, rather than compatibility, strongly influences their ability to successfully complete tasks (Van Knippenberg et al., 2004). In the

information processing perspective, diversity in team members' job-related characteristics like experience or functional background is of particular relevance (Van Knippenberg, De Dreu and Homan, 2004). According to the authors, work-groups which are diverse in terms of their job-related characteristics possess a broader range of job-relevant knowledge and are therefore able to complete tasks more effectively, which is less so for groups which are diverse in terms of more readily observable characteristics like age or sex. In this paper, we examine diversity in terms of the key NPD professionals' experience in exploration and exploitation. Considering that both external designers and NPD project managers are NPD professionals who are hands-on involved in NPD, they will have gained experience in exploration and exploitation activities. These experiences will most probably differ, where external designers may perhaps be more experienced in exploration considering client's tendency to hire external designers above all for innovation purposes rather than for optimization purposes (Abecassis-Moedas and Benghozi, 2012). An NPD project in which these two key professionals collaborate is thus considered to be an excellent empirical setting for studying diversity in their exploitation and exploration experience and its effect on the innovative outcome.

Defining key concepts

We are interested in the influence of diversity on achieving NPD outcomes, in particular the degree of NPD exploration and NPD exploitation. We define **diversity** as the dissimilarities in the key NPD professionals' experience in exploration and exploitation, which is our first focal construct. Similarity in exploration and exploitation experience in turn indicates that the two professionals have the same degree of experience in exploration or exploitation. **Exploration experience** refers to the extent to which the key NPD professional was engaged in activities in the past year that can be characterized as 'searching for, discovering, creating, and experimenting with new opportunities' (Mom et al., 2007, p. 910). **Exploitation experience** refers to the extent to which the key NPD professionals were engaged in activities in the past year that can be characterized by 'selecting, implementing, improving and refining existing certainties' (Mom, Van den Bosch and Volberda, 2007, p. 910). Dyads which are dissimilar in terms of their exploration (exploitation) experience consist out of one NPD professional who has much experience in exploration (exploitation), and one NPD professional who has little experience in exploration (exploitation). **NPD exploration** refers to the extent to which the activities that were undertaken in the project were focussed at exploring new opportunities for the client, while **NPD exploitation** refers to the extent to which the activities undertaken in the project were related to refining existing practices of the client (cf. Danneels, 2002).

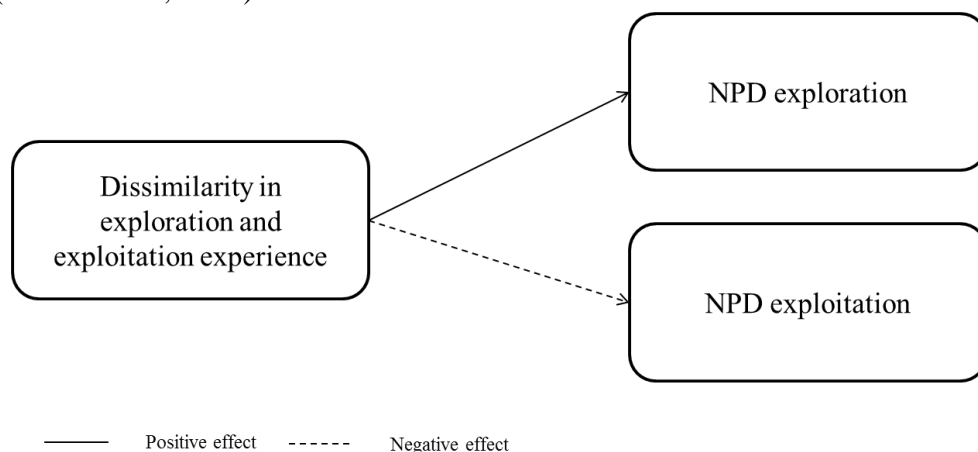


Figure 1: Conceptual model

The conceptual model in Figure 1 shows our predicted effects of the dissimilarities in the key NPD professionals' experience in exploration and exploitation and the outcomes of the projects they collaborate in. We expect that dissimilarity in the key NPD professionals' experience will have a positive influence on the extent to which the project in which they collaborate will be explorative, and that these dissimilarities will have a negative influence on the extent to which the project will be exploitative.

Beckman (2006) indicates that dissimilarity in professional background - in particular, members' prior company affiliations - in top management teams is beneficial for firms' exploration strategy, while similarity is beneficial for exploitation. This suggests that dissimilarity in exploration and exploitation experience will have a positive influence on NPD exploration, and a negative impact on NPD exploitation. Mom, Van den Bosch and Volberda (2007) examine how knowledge inflows influence the extent to which top managers pursue exploration and exploitation. The authors find that top-down knowledge inflows (inflows from higher management) stimulate the pursuit of exploitation, while bottom-up knowledge inflows (that is, inflows from lower level employees) and horizontal knowledge inflows (i.e., inflows from peer managers) positively influence exploration. The authors argue that bottom-up and horizontal knowledge inflows provide the managers with information that is dissimilar from their own (and thus enhancing exploration), while top-down knowledge inflows are oriented at refining knowledge that the managers already possess (and thus stimulating exploitation). The findings of Jansen et al. (2006) also point towards a positive influence of dissimilarity on NPD exploration, and a negative influence on NPD exploitation. The authors find that centralization of decision making, that is, the locus of authority and decision making and the extent to which decision making is concentrated in an organization, negatively influences explorative innovation. To explain this, the authors argue that centralization reduces the quality and quantity of ideas that are considered in problem solving, which in turn reduces exploration (Jansen, Bosch and Volberda, 2006). Jansen, Bosch and Volberda (2006) also find that formalization, that is, the extent to which rules are formalized and written down, has a positive influence on exploitation. Formalization ensures that employees do not deviate from prescribed practices.

The above discussed studies focus on top management (teams) and their influence on the degree of exploration and exploitation pursued by their firm. From an organizational point of view, top management is the most influential group considering that they determine strategy and allocate resources. However, when examining from a project level key NPD professionals can also influence the extent to which the project they are working on will be explorative and exploitative. We therefore posit:

H1a: The higher the degree of dissimilarity in exploration experience of key NPD professionals in the NPD project team, the more explorative the NPD outcome.

H1b: The higher the degree of dissimilarity in exploitation experience of key NPD professionals in the NPD project team, the more explorative the NPD outcome.

H2a: The higher the degree of dissimilarity in exploration experience of key NPD professionals in the NPD project team, the less exploitative the NPD outcome.

H2b: The higher the degree of dissimilarity in exploitation experience of key NPD professionals in the NPD project team, the less exploitative the NPD outcome.

A high degree of dissimilarity in key NPD professionals' exploration experience indicates a low similarity in their exploration experience. Since we expect higher degrees of dissimilarity (which are simultaneously lower degrees of similarity) in key NPD professionals' experience to result in more explorative projects, lower degrees of dissimilarity (which are simultaneously higher degrees of similarity) in their experience will result in less explorative projects. In a similar vein, higher degrees of dissimilarity (which are simultaneously lower degrees of similarity) in the key NPD professionals' experience will result in less exploitative outcomes, lower degrees of dissimilarity (which are simultaneously higher degrees of similarity) will result in more exploitative outcomes. Thus, we expect the effects of the similarities in the key NPD professionals' experience on the extent to which the project will be explorative or exploitative to be opposite to the influence of the dissimilarities.

METHOD

We examine the effects of similarities and dissimilarities in experience in exploration and exploitation between two key NPD professionals who work in two different firms, and collaborate in the context of a NPD project on NPD exploitation and NPD exploration. We do so by means of a survey sent to these professionals. The following section describes the method that we follow in this study. First we describe our sample, followed by a description of our measures and analysis.

Sample

The unit of analysis for this study is the NPD project. We are interested in projects which were completed not longer than three years before the start of our survey research and in which an industrial design consultancy firm was hired to contribute to the innovation project. We made a list of industrial design consultancies in The Netherlands and subsequently contacted them for willingness to participate in our survey. Our list contained 175 design consultancies of which 34 agreed to participate, 66 declined, and we are still awaiting the final answer of 75 design consultancies. If the consultancies were willing to participate, we asked them for the contact information of the key NPD professionals per project. These key NPD professionals were the professional designer who had been most actively involved in the specific NPD project and the client's NPD project manager who was responsible for, among other things, the progress of the project and NPD budget and planning. The surveys were sent out to the respondents in the period of the 1st of November up till present. Each respondent was contacted over the phone to confirm his/her participation and received an email with a personalized link to the survey. We gathered information on 69 projects. Of these projects, nine were not suitable for our research for various reasons (i.e., the project was not completed yet, client retracted from participation, no clear designer-client relation). Of the 60 remaining projects, we were able to collect data from both the designer and the NPD project manager for 44 projects.

VARIABLES AND MEASURES

The survey uses multi-item reflective scales to measure the constructs. The scales we use were adapted from Mom, Van den Bosch and Volberda (2007). The adjusted scales were checked with knowledgeable academics and experts from practice to assure their validity. Appendix 1 shows the Cronbachs α and items for each construct.

Independent variables

Experience in exploration is a five-item scale that proves uni-dimensional with a Cronbachs α = 0.87. Experience in exploitation is also a five-item scale that proves to be uni-dimensional. The Cronbach α for this scale is 0.92. From the experience in exploration and experience in

exploitation scales we construct the dissimilarity in experience scales. We subtract the designers' scores on their experience in exploration (exploitation) from the managers' scores on exploration (exploitation). By so doing, we take into account that it is important who of the key NPD professionals has a higher score on exploration (exploitation) experience. A negative score indicates that the designer has a higher score on exploration (exploitation) experience, while a positive score indicates that the managers has a higher score on exploration (exploitation) experience. This measure is common in research on dyads Kenny et al. (2006).

Dependent variable

We received information about the degree of NDP exploration and NDP exploitation from both the external designer and the NDP project manager. We used the answers of the NDP manager in our analysis because this person is most aware of the degree of NDP exploration and NDP exploitation of the project for his or her firm. NDP exploration is a uni-dimensional five-item scale with a Cronbachs $\alpha = 0.86$. NDP exploitation (five-item scale) is also uni-dimensional and the Cronbachs $\alpha = 0.92$.

RESULTS

To test out hypotheses several analyses were conducted. Table 1 shows the correlation matrix. Dissimilarity in the key NPD professionals' exploration experience correlates positively with NDP exploration ($r=0.60$, $p<0.01$) but dissimilarity in their exploitation experience does not ($r=-0.23$, $p=0.07$). Dissimilarity in the key NPD professionals' exploration experience has no significantly relation with NDP exploitation ($r=-0.04$, $p=0.41$) and dissimilarity in their exploitation experience has a positive relation with NDP exploitation ($r=0.32$, $p<0.05$).

We conducted two independent t-tests to examine the extent to which the designer and the NDP project manager differed in terms of their experience in exploration and exploitation. NDP project managers ($M=4.14$) had more experience in exploitation than designers ($M=3.43$). This difference was significant ($p<0.05$). Designers on average had more experience in exploration ($M=5.27$) than NDP managers ($M=4.90$). However, this difference was not significant ($p=0.08$).

To test Hypothesis 1 and 2 we ran three regression models. Table 2 shows the results from our analyses. Model 1 shows that dissimilarity in the key NPD professionals' exploration experience is positively related to NDP exploration ($\beta=0.58$, $p<0.01$). Dissimilarity in exploitation experience is not related to NDP exploration ($\beta=-0.15$, $p>0.05$).

The results of the second model suggest that dissimilarity in key NPD professionals' exploration experience is not related to NDP exploitation ($\beta=0.01$, $p>0.05$). Dissimilarity in exploitation experience has a positive influence on NDP exploitation ($\beta=0.32$, $p<0.05$). The results suggest that both hypothesis 2a and 2b, in which we predicted negative effects of the dissimilarities in experience on NDP exploitation and NDP exploitation, are not confirmed. However, please note that the model proves to be not significant ($p>0.05$) which means that our model does not explain much of the variance in our data.

Finally, because the effect of dissimilarities in exploration had no significant effect on NDP exploitation in our second model, we excluded in from our analysis and ran a third model. This model is significant, and the results suggest that dissimilarities in the key NPD professionals' exploitation experience have a significant positive effect on NDP exploitation. These results disconfirms hypothesis 2b, where we predicted a positive effect of the key NPD professionals' dissimilarities in exploitation experience on NDP exploitation.

Table 1: Correlation Matrix and descriptives

Variables	M.	S.D.	1.	2.	3.
1. NPD exploration	5.13	1.31			
2. NPD exploitation	4.21	1.60	0.03		
3. Dissimilarities in exploration experience	-0.37	1.70	0.60 **	-0.04	
4. Dissimilarities in exploitation experience	0.71	1.91	-0.23	0.32 *	-0.14

*p<0.05, **p<0.01

Table 2: Effects of dissimilarity in experience on NPD exploration and NPD exploitation

Variable	Model 1 NPD exploration β	Model 2 NPD exploitation β	Model 3 NPD exploitation β
Constant	5.37 **	4.04 **	4.00 **
Dissimilarity in exploration experience	0.58 **	0.01	
Dissimilarity in exploitation experience	-0.15	0.32 *	0.32 *
R ²	0.38	0.10	0.10
Adjusted R ²	0.35	0.06	0.08
F	12.74 *	2.35	4.80 *

*p<0.05, **p<0.01

DISCUSSION

This research investigated whether key NPD professionals that collaborate in the context of an inter-organizational NPD project are dissimilar in experience and how this dissimilarity influences the extent to which the outcome of the NPD project will be explorative of exploitative. Prior research focussed at collaboration and its effects on exploration and exploitation at the organisational level. We, on the other hand, were interested in key NPD professionals' role in achieving exploration and exploitation on a project level. We expected the role of the key NPD professionals to be important for the extent of exploration or exploitation achieved on a project level because these individuals are hands-in involved in the project, have a large influence on its course and can therefore strongly influence its outcomes. Outcomes on a project level, in turn, will influence exploitation and exploration on an organizational level (Danneels, 2002).

Our research was carried out in the context of one particular dyadic collaboration, namely the collaboration between external design professionals, hired by their clients for one particular NPD project, and internal NPD project managers. In general, external design professionals are

hired by their clients for a variety of NPD related tasks, including concept generation and translation of ideas in final products. We built on the information processing perspective, which suggests that diversity - rather than compatibility - is important to achieve effective NPD outcomes. We defined diversity as the dissimilarity in the key NPD professionals' experience in exploration and exploitation, while similarity indicated that the professionals had the same degree of experience in exploration and exploitation. We explored to what extent dissimilarities exist in the key NPD professionals' experience, and how these dissimilarities influence NPD exploration and NPD exploitation.

Our results suggest that NPD project managers have significantly more experience in exploitation than designers, but that designers do not have significantly more experience in exploration than NPD project managers. This may be explained by the fact that, on average, external designers are less often hired for NPD projects that are exploitative in nature (cf. Abecassis-Moedas and Benghozi, 2012); these types of projects are in general performed in-house, since they build on and extend existing firm knowledge. Furthermore, many of the NPD project managers sampled work for firms that had a considerable set of explorative projects completed in the last year. 30 out of the 44 clients described themselves as a technological innovator in terms of how they develop products, which may be an indication of a tendency to pursue exploration.

Still, as we hypothesized, we found that dissimilarity in the key NPD professionals' exploration experience has a positive effect on NPD exploration. Contrary to our expectations, dissimilarity in the key NPD professionals' exploitation experience has a positive influence on NPD exploitation rather than a negative one. Even though exploitation requires common understanding between actors to collaborate successfully (Nooteboom et al., 2007), our findings suggest that some dissimilarity may still be necessary. Additionally, we found that dissimilarity in key NPD professionals' exploitation experience does not influence NPD exploration, although we expected a positive effect. Apparently dissimilarity in the key NPD professionals' exploitation experience is not important for NPD exploration. Rather, dissimilarities in key NPD professionals' exploitation experience only seem to stimulate the generation of exploitative projects. The key NPD professionals we sampled for this project are rather experienced in explorative projects. Based on our results we can conclude that dyads of key NPD professionals that are highly skilled in exploration have no influence over the degree of exploitation of a future project.

Based on these results, management should be able to construct effective dyads to pursue exploration and exploitation in NPD projects. Managers should use dyads of key NPD professionals who are strongly dissimilar in terms of their exploitation experience to develop exploitative projects. Additionally, they should keep in mind that dyads of key NPD professionals who are both experienced in exploration most probably will not be able to influence a project in terms of its exploitative characteristics. Based on our results, dyads of key NPD professionals who are dissimilar in terms of their exploration experience can develop explorative projects. Additionally, key NPD professionals who are dissimilar in terms of their exploitation experience will probably not influence the extent to which a future project is explorative.

In our research, we focus at the collaboration between external designers and internal NPD project managers. In this particular setting, a service buyer – service supplier relation exists. Our findings may not be generalizable to other types of dyads, for example internal designers and internal project managers or key NPD professionals who collaborate as equal partners in co-creation settings. Our data collection process also may have some limitations. When contacting the design consultancies, we did not specifically ask them to provide us with either explorative or exploitative projects for our research. We left the choice to them. Perhaps the design consultancies provided us above all with explorative projects in which innovative

solutions were developed as a way to show us their expertise. In addition, as mentioned before, external designers are in general hired more often for exploration than exploitation. Both aspects could indicate that most of our projects are explorative of nature, and consequently our findings on which dyads are most effective to contribute to exploitative project should be interpreted with care. Finally, the number of dyads studied is rather limited (n=44). This limits the generalizability of our findings.

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Appendix 1: Factor analyses for the dependent and independent variables

Construct	α	Items	Factors	
			1	2
Dissimilarity in exploration experience (adapted from Mom, Van den Bosch and Volberda (2007))	0.87	Indicate the extent to which you engaged in the following work-related activities in the past year:		
		- Activities that involved searching for new possibilities with respect to the products, processes or markets of my clients.	.76	
		- Activities in which the products or processes of my clients were strongly renewed.	.86	
		- Activities that required a degree of adaptability from my clients.	.82	
		- Activities that involved acquiring new knowledge or skills for my clients.	.85	
		- Activities that were not clearly existing company practice for my clients.	.76	
Dissimilarity in exploitation experience (adapted from Mom, Van den Bosch and Volberda (2007))	0.92	- Activities that could be carried out as routine by my clients.		.78
		- Activities in which my clients have accumulated a great deal of experience.		.90
		- Activities that my clients clearly knew how to conduct.		.89
		- Activities that could be properly conducted by using the present knowledge of my clients.		.91
		- Activities that clearly fitted into the existing company policy of my clients.		.88

Construct	α	Items	Factors	
			1	2
NPD exploration (adapted from Mom, Van den Bosch and Volberda (2007))	0.86	Indicate the extent to which the following work-related activities were completed in the project,		
		- Activities that involved searching for new possibilities with respect to the products, processes or markets of my clients.	.63	
		- Activities in which the products or processes of my clients were strongly renewed.	.90	
		- Activities that required a degree of adaptability from my clients.	.86	
		- Activities that involved acquiring new knowledge or skills for my clients.	.87	
		- Activities that were not clearly existing company practice for my clients.	.71	
NPD exploitation (adapted from Mom, Van den Bosch and Volberda (2007))	0.92	- Activities that could be carried out as routine by my clients.		.82
		- Activities in which my clients have accumulated a great deal of experience.		.90
		- Activities that my clients clearly knew how to conduct.		.91
		- Activities that could be properly conducted by using the present knowledge of my clients.		.93
		- Activities that clearly fitted into the existing company policy of my clients.		.75