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**VALIDATING AND REFLECTING ON MARKET INFORMATION PROCESSING  
IN REALLY NEW PRODUCT DEVELOPMENT:  
WHEN TO USE WHAT OUTBOUND TEAM STRATEGY.**

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**ABSTRACT**

New product development (NPD) teams enhance their chance of success when they process rich and diverse market information. However, processing market information in really new NPD is subject to high levels of uncertainty and often conducted under high levels of team-autonomy. Prior research focused on intra-team factors, such as cross-functional integration, affecting market information processing in really new NPD and largely overlooked the role of crossing team boundaries and reaching out to the wider organization in which NPD teams are embedded (i.e. outbound strategies). Since management research shows that teams may differ in their outbound strategies and that these influence team performance, this is surprising, and therefore presents a significant gap in our knowledge on market-oriented NPD. Against this backdrop we present a detailed comparative longitudinal case-study of two new product trajectories, Shield and Anti-resist, in one chemical firm, ChemCo. Based on in-depth-interviews and archival data we explore how and when reaching out to other parts of the organization plays a role in market information processing in really new NPD. We find that project members in Anti-resist processed a larger variety of market information when compared to the ones in Shield, especially in the early phases of the project. In due course this led to the Anti-resist team being able to introduce the product into the market while Shield was put on hold. Case findings suggest that lack of market information processing in Shield was rooted in differences in outbound strategies between the two projects and was not due to intra-team factors. Project members in Shield, in comparison to the ones in Anti-resist, were less reflective on their own market information processing by reaching out to other parts of ChemCo, such as a general NPD protocol, senior management, and other marketing/sales groups. While the literature has praised decentralization for enhancing information processing and creativity, we conclude that this comes with the responsibility of individual NPD teams to proactively reflect on their own marketing actions along the way in really new NPD. This implies that managers better recognize team behavior and adapt their control mechanisms to incorporate outbound team strategies.

## INTRODUCTION

Market information processing (MIP) reduces the risk that new products fail because they do not meet evolving customer needs (Brown and Eisenhardt, 1995, Kirca et al., 2005). And in contrast to earlier claims by Christensen and Bower (1996) and Berthon Hulbert, and Pitt (1999), research has demonstrated that MIP enhances both incremental *and* really new product development performance (Baker and Sinkula, 2007, Kyriakopoulos and Moorman, 2004, Narver et al., 2004).

Yet, processing market information in the practice of ‘really new’ new product development (NPD) is complex. Because NPD teams face high levels of market uncertainty it is often unsure what market information will be beneficial and whether or not customer-specific queries are representative for the whole market (Moore, 2002, Slater and Narver, 1998). Also, customers often have difficulties expressing latent needs (Slater and Narver, 1998) and if customers are powerful, there is little room for suppliers to control the path of technological progress (Christensen and Bower, 1996). On top of that, really new NPD teams frequently face additional uncertainties with regard to technology and resources (Leifer et al., 2000). Consequently, NPD teams are challenged to process market information for really new NPD decision-making. Therefore, it is not surprising that many really new NPD teams fall short of sufficiently generating, disseminating and using market information (Adams et al., 1998, Kok and Biemans, 2009).

Investigating how MIP in really new NPD can be managed, controlled and improved, researchers in the product innovation and marketing field have mainly focused on firm level factors (Adams, et al., 1998, Atuahene-Gima et al., 2005, Kirca, et al., 2005) and *intra*-team factors. Intra-team factors such as cross-functional integration and the level of priority team members give to the project, for instance, have been found to have a large impact on market information acquiring and dissemination (Griffin and Hauser, 1996, Ottum and Moore, 1997, Veldhuizen et al., 2006). These researchers have largely overlooked the ‘external perspective’ rooted in the general management literature (Ancona, 1990). The external perspective focuses on the way team members cross team boundaries and reach out to other parts in the organization, such as senior management, for task coordination and political reasons. These outbound activities significantly impact team information processing and performance (Ancona et al., 2002, Ancona, 1990, Ancona and Caldwell, 1992). For instance, a lack of outbound activities can result in teams becoming overly cohesive and so internally focused that they neglect valuable signals from their wider organizational network. The external perspective could potentially complement current research on intra-team level factors that influence MIP and extend our understanding of market-oriented product innovation.

This study’s purpose is to explore how and when reaching out to other parts of the organization plays a role in market information processing in really new NPD, thereby extending current thinking on market-oriented product innovation. To that end we conducted an in-depth longitudinal case study of two really new NPD trajectories, *Shield* and *Anti-resist*, in one single chemical firm (ChemCo) using qualitative research procedures. While for both teams firm level and intra-team factors were very much comparable, they used highly contrasting outbound strategies resulting in distinct market information processing patterns and, eventually, NPD performance.

This study contributes to the literature on market-oriented product innovation by exploring the role of boundary spanning activities in the course of the NPD trajectory, an area that has largely been understudied. We develop an empirically grounded overview of two contrasting outbound strategies, *informing* and *reflecting*, and detail underlying activities and relationships with MIP along the NPD trajectory. Our study also contributes to the literature on control in the context of really new product innovation management. Previous research often has taken a senior management perspective and found that in really new NPD

decentralization and pushing down some level of control to the NPD team is necessary to secure creativity and flexibility, and consequently NPD performance (Bonner et al., 2002, Griffin, 1997, Olson et al., 1995). This literature, however, often ignores what this larger responsibility means for teams. For instance, how and when should teams implement self-control and reflection mechanisms to prevent falling into the trap of too much cohesiveness?

Our research helps project and team managers to understand the importance of reflection on own MIP activities aimed at developing really new products and how to execute this reflection. Until now, practical advice to support market-oriented product innovation has been largely focused on best practices in using market research methods (e.g. Barczak et al., 2009) and general organizational arrangements (e.g. Adams, et al., 1998). MIP reflection mechanisms have had far less attention.

This paper proceeds with a theoretical background that is used as a starting-point in our exploratory case research, integrating research on market-oriented product innovation and the external perspective on temporal organizational teams. After the methods the findings are presented. The paper closes with theoretical and managerial implications, opportunities for further research, and concluding remarks.

## **THEORETICAL BACKGROUND**

Early product innovation research has identified that processing market information in the course of the product innovation process is one of the controllable factors that contributed to new product success (Cooper, 1983). This finding has been largely confirmed by later studies (Brown and Eisenhardt, 1995, Montoya-Weiss and Calantone, 1994).

Market orientation and market learning researchers have identified different stages of market information processing in NPD (Adams, et al., 1998, Baker and Sinkula, 1999, Moorman, 1995). For instance, Adams et al. (1998) describe MIP using Kohli and Jaworski's (1990: 6) three behavioral activities: "The organizationwide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organizationwide responsiveness to it". Others have added stages that reflect the importance of learning elements in MIP such as information interpretation, evaluation and organizational memory (Day, 1994, Sinkula, 1994, Sinkula et al., 1997).

Research also found that market information processing for developing really new products differs from developing incrementally new products. In contrast to incremental NPD, really new NPD explores new market segments (Hamel and Prahalad, 1994) and aims to uncover latent customer needs (Slater and Narver, 1998). In these cases, organizations should apply MIP that fits a proactive rather than a responsive market orientation, in which they actively drive the market (Atuahene-Gima, et al., 2005, Jaworski et al., 2000).

Other research has focused on different types of market information useful in new product decision-making such as the distinction between segment and needs information. Segment information refers to information on market segment size, growth rate, and stakeholder behavior (other than customer behavior) that may influence customer preferences such as competitor moves and activities of distributors and governments (Adams, et al., 1998, Smits et al., 2011, Veldhuizen, et al., 2006). Needs information is about understanding customer needs and wants in relationship with particular product applications (Adams, et al., 1998, Veldhuizen, et al., 2006).

### *NPD team level factors affecting MIP*

In contrast to firm level factors such as top management emphasis, compartmentalized thinking and market-based rewards systems (Adams, et al., 1998, Atuahene-Gima, et al., 2005, Kirca, et al., 2005), NPD team level factors are likely to make a difference when it

comes to *within* firm differences in MIP among NPD projects. Relevant team level factors previously discussed in the literature include cross-functional integration, project priority setting, and the market research methods in use.

Cross-functional integration is relatively more important in really new product innovation when compared to incremental product updates (Atuahene-Gima, 2005, Olson, et al., 1995). When a firm focuses on unfamiliar market segments, applications, or customers, and there is little experience with the new product concept, functional tasks are more challenging than in situations of a more straightforward modification of an existing product. As the difficulty of product innovation increases, so does the interdependence of different functional specialists involved in the project. The result is a greater need for cross-functional dissemination of market information.

The priority team members give to an NPD project is positively related to both generating market information and disseminating it across the team (Ottum and Moore, 1997, Veldhuizen, et al., 2006). A high level of priority of a project will lead to more effort being put into the generation and dissemination of information about market segments and customer needs.

Using different market research methods in product innovation results in different market information being generated (Deszca et al., 1999, Janssen and Dankbaar, 2008, O'Connor, 1998). For instance, in situations of incremental NPD, it is proposed that product developers update their current understanding of a market segment, using market research techniques such as competitor analysis (Atuahene-Gima, 2005, Noble et al., 2002) or focus groups and surveys (Leonard, 1995, Slater and Narver, 1998). For really new NPD, tools for exploring the future include extrapolating trends, science and technology mapping, and scenario analysis (Leonard, 1995, Schoemaker, 1995), whereas tools for uncovering latent customer needs include experiential market research techniques such as the lead user approach (von Hippel, 1986), emphatic design (Leonard, 1995), and customer visits (Slater and Mohr, 2006). By using these methods, project members can get to know customers' working practices so well that they become able to anticipate unspoken, or latent, needs.

Concluding, while previous research described various NPD team level factors in relation to MIP in really new NPD, the main focus has been on intra-team aspects.

### *The external perspective*

The management literature on temporal organizational teams describes the external perspective (Allen, 1984, Ancona, 1990, Tushman, 1977). The external perspective acknowledges that teams do not act in isolation, often have external demands, and that team behavior such as information processing and learning is not fully represented by looking at internal activities (Edmondson and Nembhard, 2009). Team members may also be proactive in spanning team boundaries, seeking information and resources from the environment, and molding external opinions (Ancona, 1990). Here, 'environment' refers to the organization that the team belongs to. The external perspective does not ignore internal team behavior but "the interest of those taking such a perspective is in the internal processes that influence and are influenced by people in the environment, rather than decision making or roles per se." (Ancona and Caldwell, 1992: 336).

Research has mapped a variety of external team member roles, activities, and strategies. For instance Tushman (1977) and Allen (1984) have identified 'boundary spanners', 'stars', and 'gatekeepers' when analyzing importing technical information from outside the team. Furthermore, Ancona and Caldwell (1992) have distinguished 'ambassadorial activities' that refer to vertical communication with top management to protect the team from outside pressure and lobby for resources, from 'task coordinator activities', which include horizontal communication inside the organization to coordinate

work and obtain feedback. They also found that teams adopted distinct strategies of approaching their environment and found evidence that not just the amount of external communication but also the type of external communication affected performance. For instance, teams that focused on a combination of ambassadorial and task coordination activities had a higher performance than teams that focused on ambassadorial activities alone. Similarly, investigating a state-run service, Ancona (1990) found a link between team-context interactions of five consulting teams and performance.

Adopting a longitudinal approach, researchers have investigated when boundary spanning activities occur in the course of team task execution. Gersick (1988), for instance, has found that groups responded to feedback and information from their environment only at certain points in their life cycles and dealt with internal and external requirements sequentially. Additionally, Ancona and Caldwell (1992) suggest that if teams enter cycles of external activity they do so early on, that these cycles are reinforcing, and that they determine team outcomes. For example, for teams that prioritize ambassadorial activities this cycle would start with favorable senior management evaluations that give the team confidence and increases cohesiveness. In turn, however, this cohesiveness may cause that teams lessen their external activities later in the process which may lead to too little feedback seeking and therefore inferior outcomes.

In sum, while previous research on NPD has mainly focused on intra-team factors affecting MIP behavior, the external perspective on temporal teams suggests that MIP might additionally be shaped by how teams reach out to the wider organization in which they are embedded. This might particularly be the case when teams face high levels of uncertainty and autonomy, as in many really new NPD projects. These circumstances increase the risk of teams becoming overly cohesive (Man and Lam, 2003) and MIP being too much influenced by pre-existing team values and emotional commitments (Berchicci and Tucci, 2010). However, the mechanisms through which MIP in really new NPD and outbound strategies are related deserve further exploration. Also, if boundary spanning activities are vital in the context of MIP, what external activities become important at what stage in the really new NPD process?

## **METHODS**

### *Research method*

We chose a comparative longitudinal case-study strategy using qualitative research procedures for the following reasons. First, they fit investigating under-researched phenomena and the purpose of extending existing theory (Bluhm et al., 2011, Edmondson and McManus, 2007). Second, such procedures are well suited for researching processes and identifying how and when events happen (Langley, 1999). Finally, they allow for using multiple, complementary data sources which are needed when developing a comprehensive account (Yin, 1994).

### *Research setting*

The research setting for this study is ChemCo, an innovative Dutch chemical firm. For reasons of confidentiality ChemCo is a fictitious name. It is part of a global multinational, but acts relatively independently as a separate legal entity with its own annual report. It develops and manufactures a high performance fiber in product forms such as powder, pulp, and filament yarn. Important end markets are the automotive and defense industries. Headquarters, R&D, and production sites are located in the Netherlands; global coverage is achieved through several sales offices and a few dozen sales agents around the world. In the period under study (2003 - early 2008), ChemCo showed steady growth with €298 million

annual sales and 965 people employed in 2003 and €434 million annual sales and 1,171 employees early 2008. Its strategy was aimed at achieving sustainable and profitable business activities, ambitious growth and further globalization, partly through high quality product development in close consultation with customers. The average R&D/sales ratio for this period was 4.4%. ChemCo operates its own research institute that employs around 100 researchers in total and organizes eight globally operating marketing/sales groups (m/s-group from this point onwards). Each of these groups employs around 7 marketing/sales people on average and targets a specific market segment including tires, communication cables, friction and sealing, and ballistics.

### *Case selection*

Case selection started when selecting several NPD projects of different organizations as cases for a more broadly defined research project. Inspired by Lewis and colleagues (2002), the selected projects were judged by firm contacts as promising, allowing for significant firm renewal, but also presenting significant market uncertainty. In terms of Garcia and Calantone (2002) these were ‘really new’ NPD projects. Additionally, the innovation projects progressed beyond the front end of innovation but were not yet introduced into the market. In contrast to studying long finished projects this latter criterion allowed us to study critical events, such as project completion or project termination in the development phase, in real time and increased the chances of finding respondents that could remember details of earlier project phases. The two projects on which we report were quite similar on aspects such as project size, intra-team factors, and starting time, but differed in terms of MIP and project success. Hence, we made use of this rare situation and used a theoretical replication strategy (Yin, 1994) in selecting cases for presentation. This way emerging conceptual findings from one case could be confirmed or disconfirmed by the comparative evidence from the other case, similar to the approach taken by Rindova and Kotha (2001). Table 1 presents an overview of the project characteristics of the two cases: Shield and Anti-resist.

Table 1: Project characteristics of the two cases

	<b>Shield</b>	<b>Anti-resist</b>
<b>Project objective</b>	Developing a new product to protect optical fibers in communication cables.	Developing a new product to reduce rolling resistance of tires.
<b>Project size</b>	Core team: 5 employees Investment level: medium; research had to take place but no major plant adaptations were necessary.	Core team: 7 employees Investments level: medium; research had to take place but no major plant adaptations were necessary. However, major investments in a plant to manufacture the new product on a larger scale starting at the end of 2008 were planned for at the end of 2007.
<b>Main ChemCo departments involved in the project</b>	M/s-group focusing on the communication cables market segment, in which ChemCo’s products were already used as reinforcement material, and ChemCo’s research institute.	M/s-group focusing on the tires market segment, in which ChemCo’s products were already sold as reinforcement material of cap plies, and ChemCo’s research institute.
<b>Project status early 2008</b>	History of approximately 5 years, product still under development.	History of approximately 3 years, project’s output was introduced into the market in 2007.

### *Data collection*

We started data collection early 2006, when both projects were still under development. Data collection finished in 2008. Data were collected by interviewing project team members and ChemCo employees who were closely related to these teams (see Table 2). Including ChemCo employees that had not been project members was instrumental in investigating the validation of the external activities of the product development teams. Informants included members from the m/s-groups, other functional specialists, and senior managers. The use of multiple informants with various backgrounds allowed information to be checked, thus providing the opportunity to control for potential biases of individual respondents (Golden, 1992). Some informants were interviewed multiple times. The first author was in contact with informants and had several site visits over a total period of, at least, two years which allowed for tracking some developments in real time.

The interviews contained both general and more specific questions. For non-project members the interviews focused on how product development was done in the company, what knowledge the respondents had of the projects, and which relationship they had with the projects. Project members were asked to elaborate upon the main process story including specific dates, (marketing) practices, milestones, events, and outcomes. Since there was no document list of people involved in the projects under study, the selection of respondents was based on information provided by other respondents. We finished interviewing until we experienced saturation: additional interviews resulted in limited additional understanding (Glaser and Strauss, 1967, Lee, 1999).

All interviews were carried out on-site and were held by the first author and a research assistant. Interviews lasted between 50 minutes and 2.5 hours. Notes were taken and all interviews were taped and transcribed verbatim and were followed up with clarifying e-mails and telephone calls when needed. Interview data were supplemented with archival data such as new product proposals, process protocols, product announcements, a recent 90 page anniversary book published by ChemCo, presentations, patents, and business press articles for triangulation purposes and diminishing potential retrospective bias of the interviews.

Table 2: Interviews and additional data sources

	<b>Shield</b> (Core team)	<b>Anti-resist</b> (Core team)	<b>ChemCo</b> (General)
<b>Interviews</b> (job title, # of interviews)	Sales manager, 1 Sales manager, 2 Researcher, 1	Business manager, 2 Sales manager, 1 Project manager, 1 Researcher, 1	Innovation manager, 1 Innovation manager, 2 R&D director, 1 Research manager, 1 Researcher, 1 Business manager, 2 Business manager, 1 Purchasing director, 1 Sales director, 1 Marketing manager, 1
<b>Additional data sources</b> (#)	Academic articles (4) Technical papers (3) Company magazine (1) Conference presentation (1) Website potential customer (1) Website owner potential customer (1)	Academic articles (2) Press articles (5) Company magazines (2) Conference presentations (4) Websites customers (4) Innovation protocol (1) Market research report (1) Patent file (1) Press release (1)	Company website (1) Annual reports (5) CSR reports (2) Book (1) Dozens of archived press releases Analyst reports (2)

### *Data analysis*



Mainly relying on approaches suggested by Eisenhardt (1989) and Miles and Huberman (1994), our data analysis started with examining data and developing case summaries of the individual cases. The aim was to get familiar with the case as a stand-alone entity. After finishing data collection, these summaries were sent back for review by several respondents. Then we turned to detailed coding by dividing data into meaningful fragments. These fragments were labeled with a few words to indicate the meaning of the fragment. As starting point, we coded processing segment and needs information, which are the two market information types often found in the literature. Based on prior literature we also coded intra-team factors that were found to influence MIP. Subsequently we turned to open coding (Strauss and Corbin, 1998) with regard to boundary spanning activities. Depending on the activities' persistence across multiple observations, recurrent data incidents emerged into categories and dimensions. As second step in data analysis we aimed at discovering relationships between internal and external team factors and MIP as well as how these relationships unfold over time. Subsequently these 'relational concepts' (Locke, 2001) were refined by using a cross case comparison in which we focused on similarities and differences between the two cases.

To further sharpen our findings we subjected our initial analysis to member checks (Lincoln and Guba, 1985) through an interactive workshop with 12 ChemCo employees in order to further validate our findings and revise them where necessary. Iterating back and forth between data, validation, and theory resulted in a robust understanding of how MIP progressed in the course of the innovation projects and how and when both internal and external team activities played a role in this process.

In presenting our findings, we decompose the NPD process in different phases. Using such a 'temporal bracketing' (Langley, 1999) approach enables explicit analysis of how action of one period, leads to changes in the context of the next period. Based on prior literature (Woodman et al., 1993, Zaltman et al., 1973) and our data analysis we chose initiation and implementation as main phases, because these were most distinctive in their activities. During the initiation phase new product ideas are generated, developed and evaluated (Khurana and Rosenthal, 1998). In the implementation phase, product ideas are further developed into physical products and introduced into the market.

## **RESULTS**

### *Different market information processing patterns*

Based on the distinction between segment information and needs information and our analysis we found different MIP patterns when comparing the two cases. While the Shield team predominately focused on processing needs information of a single customer, the Anti-resist team processed both segment and needs information.

In the initiation phase of Shield, which ran from 2002 until early 2005, team members predominately generated and used needs information of one single customer, an innovative communication cables producer. From early 2005 onwards, when prototype testing started and the Shield team was focused on implementing the project, MIP continued. With regard to MIP in the period 2005 – 2007, the Shield team updated needs information by testing prototype products together with the innovative cables producer. Additionally, the Shield team gained a broader perspective on developments in the communication cables market segment when it started processing segment information from November 2006 onwards after presenting a paper on the new product at an industry conference. This resulted in the segment information that, generally, cables producers were not very interested in the new product because they had existing solutions in place that worked out fine and were cheaper than ChemCo's new product. This insight was gained relatively accidentally and late in the

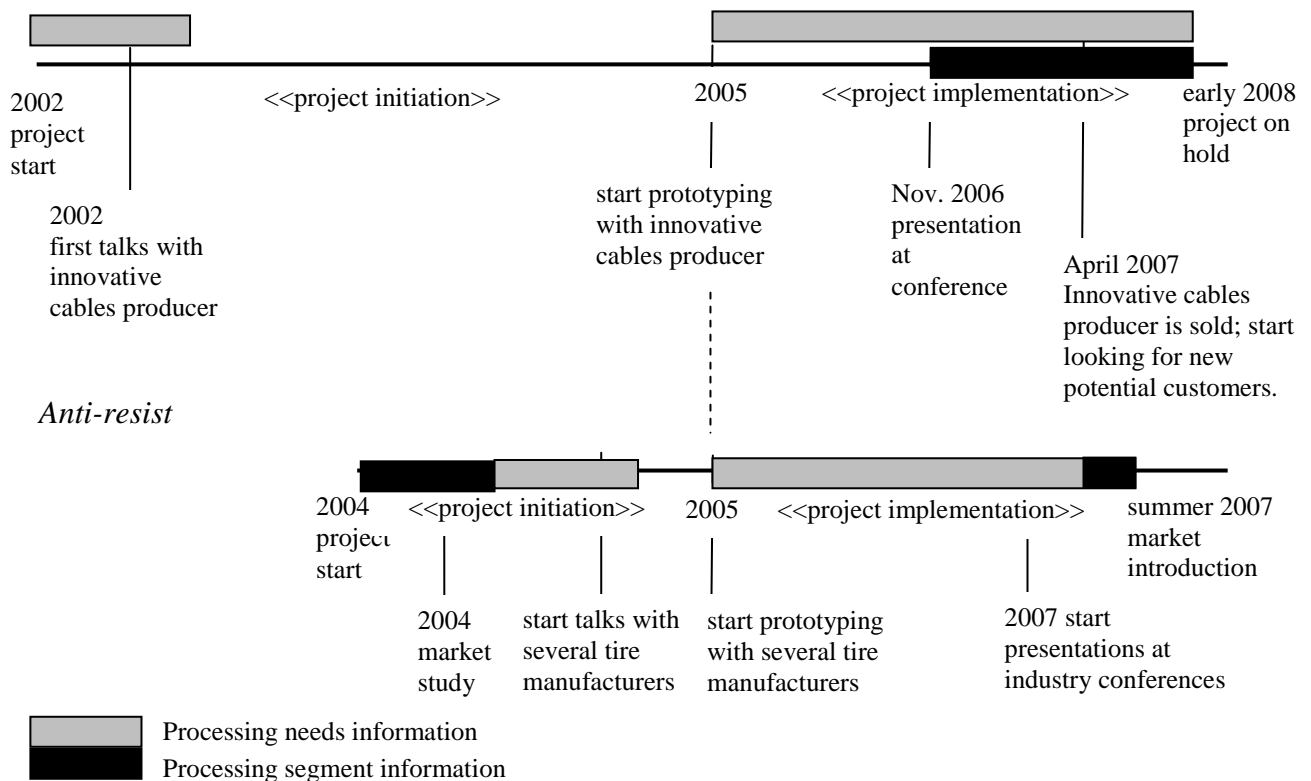
process after investments were going on for several years. As the sales manager involved in Shield explained:

“The most striking part of [Shield] has been that our commercial approach had not been right. What I explained before: we did not keep track of the broader market. We did not use a helicopter view to see if this was the way to go. This understanding actually began to emerge in November 2006 when our customer, together with us, presented the new concept at a conference for the cables industry. The response of the audience was that they already had their solutions in place. They asked us to elaborate on the benefits in comparison to these solutions. We absolutely did not have an answer to that. You can say that was the biggest challenge, the biggest shock. This was the wake-up call in the project. In this project we have been so focused on this one customer, that we lost the overall scope. Actually it is quite bizarre.”  
 - Sales manager, interview 2007

After Shield’s proposed launching customer was sold to a party with other priorities in April 2007, the Shield team started looking for new launching customers. This resulted in the segment information that the communication cables industry already had their solutions in place and was neither impressed nor interested in ChemCo’s new offer. As a result the project was put on hold in the beginning of 2008.

It can be argued that, in hindsight, Shield failed because the absorption of segment information by the NPD team came too late in the project. From the start, team members were quite customer focused, processing needs information on the innovative cables producer all they could. However, to be fully market-oriented this information had to be augmented with segment information. Segment information was only processed relatively late in the implementation phase of the NPD process (figure 1). Only then it became clear it would be hard to bring the new product to the market and sell it to a wide variety of cables producers. Collecting segment information at an earlier stage might have led to different decisions being made.

Figure 1: Market information processing in Shield and Anti-resist  
*Shield*



For Anti-resist we found that team members paid attention to both types of market information in both NPD phases. We found team members processing segment and needs information in the initiation phase of Anti-resist, which ran from 2004 until late 2005. Segment information was processed at the start of the project when a market study was executed which led to the new product idea. To further develop this idea, processing segment information was complemented by processing more specific needs information of several individual tire manufacturers in the early phases, as illustrated by a quote of Anti-resist's project manager:

“Product specifications were hard to pin down because this product was also new to the customers. But they had certain expectation which they shared with us. We used these data in setting research targets ..... this was very early in the project.” - Project manager, interview 2006

Market information was also processed during the project's implementation phase which ran from 2005 until market introduction in the summer of 2007. The project team tested prototypes with several potential customers by which they updated their needs information until the new product was introduced into the market. Additionally the team presented their product and test results at several tire conferences to attract additional customers and to update segment information from 2007 onwards (Figure 1).

In comparison to the Shield team, the Anti-resist team followed a different MIP pattern. In Anti-resist, segment information was also processed at a much earlier stage, resulting in a product innovation process much smoother than for Shield. To analyze potential causes for this difference we now first compare intra-team characteristics across projects and then look into outbound team strategies.

#### *Intra-team characteristics*

The two cases were very similar with respect to the intra-team factors cross-functional integration, project priority setting, and the market research methods in use, of which previous literature has found that they have significant impact on MIP. In both cases within team characteristics facilitated MIP.

It appeared from our analyses that within both Shield and Anti-Resist there was sufficient cross-functional integration to secure market information dissemination and use. Hence market information was not hampered due to lack of collaboration or interaction between different functions within the team. Good collaboration and limited cross-functional conflict within the two teams mainly resulted from the mutual respect and understanding between the researchers from ChemCo's research institute and the marketers from the m/s-groups. In Shield, for instance, a sales manager had previously worked in the research department and knew the researchers very well. Also, in both projects sufficient cross-functional interaction was established by means of cross-functional meetings to disseminate market information across the team.

With regard to project priority setting we found limited differences between the two projects in the course of the innovation process. Specifically, project priority setting was very similar in the period before the second half of 2007, when Shield team members found out that other potential customers besides their prospected launching customer were less interested, and this launching customer was sold to a party with other priorities. Comparing several aspects of the projects led to this conclusion. First, we analyzed overall organizational tasks and responsibilities of team members. Throughout the development trajectory project members involved in Shield as well as the ones in Anti-resist also had to spend time on other projects and tasks. Hence, neither Shield nor Anti-resist had full-time project members. Second, with respect to expectations related to project outcomes, a noteworthy difference in expectations between projects might have led to differences in project priority of project

members. If expectations are high, for instance based on promising technology, high sales expectations, or customer interest to test early prototypes, it can be argued that project priority in relationship to other tasks and responsibilities would also be high. In contrast, lower expectations would probably result in matching priority. Expectations on project outcomes were comparable across both projects. Across settings, project members had high hopes. They expected that the project would lead to an advanced type of fiber that could be added to existing product lines and was beneficial to customers. These expectations were mainly based on information from customers in the initiation phase and their willingness to test early prototypes.

Finally, with respect to market research methods, team members from both projects used experiential techniques which suited the non-incremental nature of the two projects. In both Shield and Anti-resist, project members used their experience to conduct market research by visiting customers and testing prototypes. These techniques are specifically suited for non-incremental innovation and were used to uncover and refine latent customer needs. In Shield's initiation phase, project members visited a cables producer and by means of interviews and observations proactively identified the need for better cable protection. Using this information as research target Shield's researchers came up with a new product, which was subsequently prototyped in the project's implementation phase. In Anti-resist, visiting tire manufacturers and having conversations with them when initiating the project led to the insight that these parties were in need of material solutions that could reduce rolling resistance. Within ChemCo, this insight triggered a research effort and the resulting prototype products were then tested together with several tire manufacturers.

#### *Outbound team strategies and MIP*

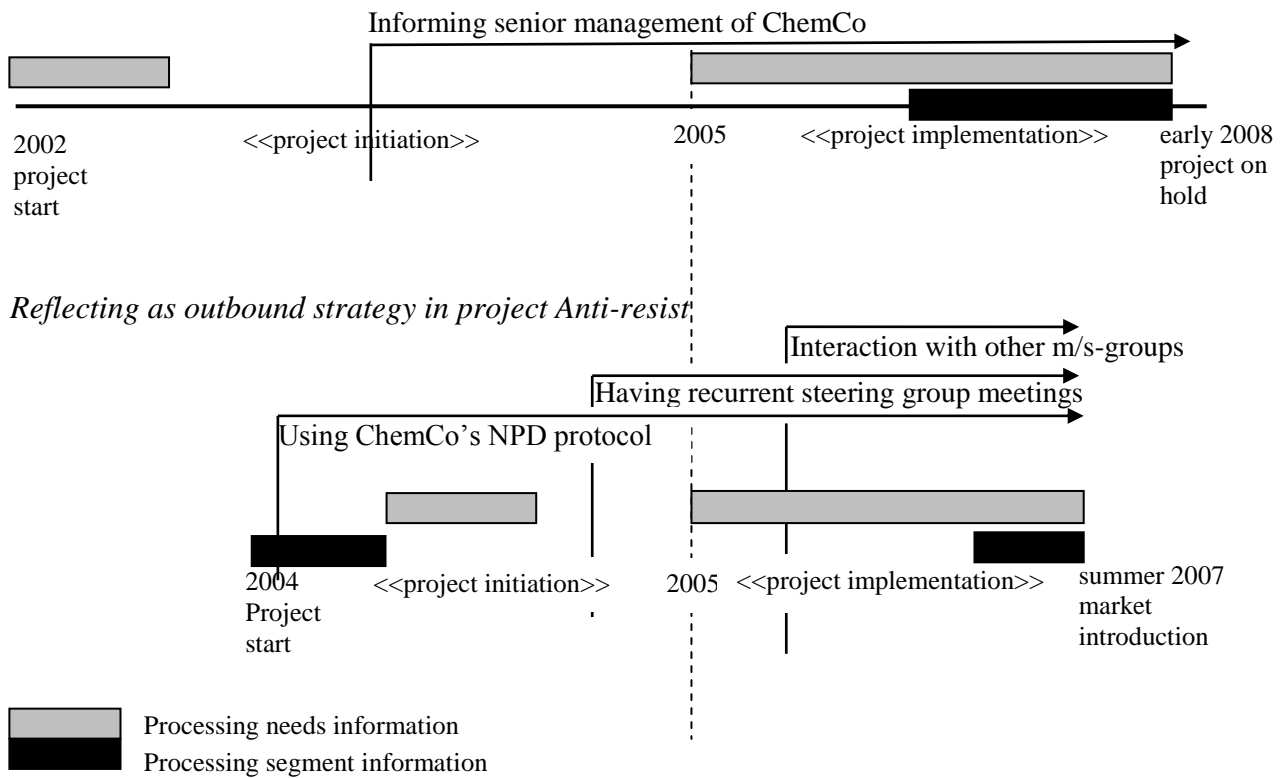
How and when did the teams reach out to other parts of ChemCo with respect to MIP? In contrast to intra-team factors, we found clear differences between the two projects on this aspect. While project members in Shield mainly reached out by using an *informing* strategy, project members in Anti-resist relied on a *reflecting* strategy. This latter strategy allowed for more engagement of ChemCo employees outside the team in the course of the innovation trajectory, which stimulated reflection on ways of working with regard to MIP.

In Shield, project members mainly spanned the team boundary by informing ChemCo's senior management, including the CEO and several functional directors, on activities they performed to generate market information, the nature of the information generated, and project progress. In doing so, project members used quarterly reports written by the communications cables m/s-group which provided an overview of all m/s-group projects. This type of communication with senior management could be described as one way vertical communication about MIP behavior from project members to senior management. The main motivation for informing senior management was showing them the m/s-group was making progress with market-oriented innovation activities and thereby complying with ChemCo's overall strategy. Informing senior management started early 2003, when the m/s-group started investing in Shield as a research project. It continued on a regular basis until the project was put on hold early 2008 (Figure 2).

Only when the project team was in need of additional funds for testing a prototype product with their proposed launching customer that the m/s-group could not provide for in 2005, two-way communication was sought with ChemCo's senior management. However, this interaction was aimed at raising funds, brief, non-recurrent, and only included Shield project members and the R&D director. It did not involve the CEO or commercial director, which both had extensive experience in marketing and sales of new high-tech products:

“The Shield team needed additional funds to conduct prototype tests together with a university. I was approached with a request from their side. We had a meeting in which they presented their plans and business case. After a discussion I granted the resources to conduct the tests which they did last year.” - R&D director ChemCo, interview 2006

Figure 2: Outbound strategies in Shield and Anti-resist  
*Informing as outbound strategy in project Shield*



By using a strategy of informing, Shield team members only created limited opportunities to engage outsiders and seek feedback on their way of MIP. The team was quite isolated from the rest of ChemCo and therefore created limited openings to proactively reflect and challenge the team norm that, MIP-wise, they were on the right track. Limited boundary spanning increasingly led to cohesion among team members and the incorrect belief that they processed enough market information to conclude that a wide range of communication cables producers was interested in their new product. The project members put limited effort in deliberately seeking ways to challenge their ways of interacting with the market, playing the devil’s advocate, or enriching the project by bringing a fresh perspective along the way:

“For [Shield] we were focused on this one customer and not on the market as a whole. We did not use an overall view. When working on [Shield] I must say we were not fully aware of this critical fact. We were too internally focused and did not put effort in discussing our way of market research with outsiders. We did not search for critical comments and did not validate our way of connecting with the market. This understanding actually came to light at the end of 2006 when we gave a presentation at a conference.” - Sales manager, interview 2008

In comparison to Shield, the project members that worked on Anti-resist used another outbound strategy. The Anti-resist project members deliberately decided to reflect on their MIP behavior by reaching out to other parts of ChemCo. We uncovered three main practices used by Anti-Resist project members to reflect on MIP behavior: 1) using a structured NPD protocol available within ChemCo, 2) having recurrent steering group meetings, 3) and interaction with other ChemCo m/s-groups (Figure 2).

Anti-resist project members first reached beyond their team with regard to assessing MIP behavior by searching and using *a formal NPD-protocol* available within ChemCo. In their search for reflecting on their activities, Anti-resist team members looked for ways to compare their own way of MIP with best practices. Within ChemCo they found and adopted an NPD-protocol that several other m/s-groups had used in product innovation and had received positive evaluations. The adoption of this protocol happened early 2004, when the project had just started. This protocol included several process stages and gates with checkpoints regarding market and customer analyses. It brought structure to project activities and it was used by the team to establish their own MIP activities, benchmark, and reflect on ways of working. In contrast, using a formal NPD-protocol for reflection purposes was something that was clearly lacking in project Shield:

“The point is we used a relatively ad-hoc approach in [Shield]. There were not really moments you had to meet a milestone or reflect on your way of working. After its start-up we just did the project besides our other duties. We did not think of using the formal project protocol with all the different stages and activities that is available within the organization to reflect on our activities. We used a rather unstructured way of working.” – Sales manager, interview 2008

At the end of 2004, when early prototype products looked promising, the Anti-resist team felt the need for further reflection on their way of working. Furthermore, they also wanted to engage outsiders and gain organizational support for the project because investments were coming up. In a response to these needs, the Anti-resist project manager approached ChemCo’s executive team to discuss the idea of a *steering group of senior managers* to recurrently discuss project issues, specifically the ones related to commercializing the new product. This way, the team thought, it could create a sounding board and install a means to interact and reflect on their way of MIP. At the same time, such a sounding board provided the opportunity to persuade senior managers that Anti-resist was important, and provided a means to secure resources. The Anti-resist project manager succeeded in setting up this steering group, involving several of ChemCo’s senior managers among which the commercial director and the R&D director. The steering group regularly met with representatives from the Anti-resist team, discussed project progress and resource needs, and challenged Anti-resists’ assumption with regard to marketing decisions:

“The [Anti-resist] project manager came to us proposing to initiate a steering group to guide this project from a further distance than day-to-day routines. They convinced us the project was important. We saw the project’s potential and agreed this was the way to go. Now, we meet regularly and we discuss project progress. We try to play the critical outsider as much as possible and challenge the team on their assumptions both in the field of technology as well as in marketing.” - R&D director, interview 2006

The third activity within the reflecting strategy was *interaction with other ChemCo m/s-groups*. This activity started the second half of 2005 when the Anti-resist team was testing prototypes. The project team felt they could learn from other m/s-groups within ChemCo of how they tested new product concepts and discuss their thoughts on prototyping. Together with ChemCo’s overall marketing manager the team initiated several presentations at organization-wide marketing and sales meetings. Additionally, the business manager involved in Anti-resist had meetings with business managers of other m/s-groups in which he discussed the project. Inputs from these external interactions were used when testing prototypes. Although the main reason for Anti-resist team members to get involved in horizontal communication with other m/s-groups was reflecting on current ways of MIP, an additional reason was to improve Anti-resist project awareness of other m/s-groups and sense their attitude towards the project. The business manager foresaw that if the new product could be successfully introduced into the market the next step was investing in a new

manufacturing facility to scale up production, which would be a large investment for ChemCo. By discussing and promoting the Anti-resist project with other m/s-groups from the second half of 2005 onwards, the business manager also wanted to create a positive attitude toward the project from organizational members. Such an attitude, the business manager thought, would benefit securing resources for investing in manufacturing facilities, which would be a company-wide affair.

In sum, project members in Shield adopted the outbound strategy of informing. By using this strategy they reached out to ChemCo's senior management by informing them on their MIP activities. Although the strategy of informing offered the possibility to show senior management that the m/s-group was progressing with market-oriented innovation activities it resulted in limited reflection on the team's MIP activities. This led to processing limited segment information, and, eventually, to a situation in which Shield was put on hold. Project members in Anti-resist, in contrast, adopted a reflecting strategy by which they purposefully searched for possibilities to mirror their MIP behavior in order to refine it. This strategy clearly supported a more complete MIP pattern, which in turn led to a successful product introduction. Table 3 summarizes our findings.

Table 3: Overview outbound strategies used in Shield and Anti-resist

	<b>Outbound strategy</b>	<b>Position of NPD team in the organization</b>	<b>Main practices used by the NPD team</b>	<b>Purpose of practices</b>	<b>Timing of practices</b>
<b>Shield</b>	Informing	Isolated	Filing progress reports (one way vertical communication)	To show progress in MIP	From late in the initiation phase onwards
<b>Anti-resist</b>	Reflecting	Integrated	Using NPD protocol	To benchmark and so reflect on ways of MIP	From early in the initiation phase onwards
			Having recurrent steering group meetings (two way vertical communication)	To reflect on ways of MIP, but also to promote the project and secure resources	From late in the initiation phase onwards
			Interactions with other m/s-groups (two way horizontal communication)	To reflect on ways of MIP, but also to promote the project	From early in the implementation phase onwards

## DISCUSSION AND CONCLUSION

The aim of this research was to explore the relationship between outbound strategies and MIP in really new NPD. Using qualitative research procedures and a longitudinal research setup, we analyzed the occurrence of relevant outbound team activities in the course of two really new NPD projects within the same firm in detail. Our study demonstrates that differences in outbound strategy can explain why teams differ in processing market information.

Our work contributes to research on what team factors determine MIP patterns in really new product development, thereby extending the literature on market-oriented NPD. It suggests that the external perspective complements current team level analyses on

antecedents of market information processing. While current studies have mainly focused on intra-team factors, such as cross-functional integration, project priority setting, and the market research methods in use (e.g. De Luca and Atuahene-Gima, 2007, O'Connor, 1998, Ottum and Moore, 1997, Veldhuizen, et al., 2006), our research shows that the type of outbound strategy teams use seems to matter as well. Together the intra-team and external perspective represent more fully the wide range of activities team members actually do to ensure that information is processed and new products meet evolving market needs.

Additionally, our study revealed that outbound strategies can have different activity centers of gravity at different points in the NPD trajectory. Specifically for the reflection strategy we found these differences. In the early part of the NPD process, the Anti-resist team mainly relied on an NPD protocol as single means for reflection. This underlines the enabling effect of procedures to guide behavior for uncertain innovation activities (e.g. Cardinal, 2001). Additionally this finding is consistent with research that addressed the positive effect of formalization on MIP (Jaworski and Kohli, 1993, Kirca, et al., 2005) and market learning in NPD (Lynn et al., 1999). On a more speculative note, focusing on an NPD protocol as 'non-human' and single reflection mechanism in the early phases might be less disturbing for necessary team building then including additional 'human' mechanisms such as reaching out to ChemCo's senior management and other employees at that point. Opening up team boundaries may have some negative effects on internal processes. External activities, specifically interactions with other organizational members, consume a lot of time and bring divergent views into teams. This may hinder team building, which is particularly important in the early phases of team development (Wheelan and Hochberger, 1996). While the teams in Ancona's (1990) study surmounted this problem by strong leadership, the Anti-resist team overcame this by slowly building up external activities, starting with reaching out to relatively controllable artifacts such as an NPD protocol.

Later on in the NPD trajectory, the Anti-resist team complemented using an NPD protocol with human interactions. While the expansion of boundary spanning activities might be of better fit in later NPD stages given the importance of teambuilding in the early stages, other aspects seem of importance as well. Interaction with senior management, on top of using an NPD protocol was, for instance, not only used for reflection purposes but also to promote the project throughout ChemCo and secure resources for further investments. So in terms of Ancona and Caldwell (1992), with regard to external activities the Anti-resist team not only managed their 'workflow structure', (i.e. market information processing), but also invested in managing the 'power structure', (i.e. promoting the project and securing resources). This suggests that while non-human reflection mechanisms are mainly used for benchmarking, human reflection mechanisms can be used for multiple purposes.

This study further highlights the opportunity to study a higher level of learning than commonly used by scholars investigating MIP in NPD. Most of these studies are using two levels of learning, for instance exploitation and exploration in market learning (e.g. Berchicci and Tucci, 2010, Kim and Atuahene-Gima, 2010, Slater and Narver, 1995). The lowest level is commonly used to indicate MIP pertaining to current product domains, market segments, expressed customer needs and incremental NPD, while the second level concurs with processing information on latent customer needs and new market segments in really new product innovation. Our study suggests that product innovation also benefits from reflection on market information processing similar to what others have called 'meta-learning' (Visser, 2007) or 'deutero-learning' (Sinkula, 1994). This higher level of learning refers to the inquiry into and the reflection on the processes of learning from the market. This 'meta-market learning' may be more important in uncertain situations like really new NPD projects because in these situations teams lack 'hard numbers' and are more likely to rely on beliefs and



ideology, which may not always be the best reflection of reality (e.g. Berchicci and Tucci, 2010).

Finally, our work contributes to the literature on control in the context of really new product innovation management. We highlight the importance of an NPD teams' own initiative in establishing NPD control. In the context of our study, some might argue that senior management is to blame for limited MIP in project Shield. Senior managers ought to know what is going on in the organization. It is their task to monitor NPD teams and proactively challenge them on their ways of working thereby increasing success. This argument can be grounded in research on NPD control, which often adopts a senior management viewpoint (e.g. Bonner, et al., 2002, Manz and Sims, 1987). Although too much senior management control may stifle new product team autonomy and innovation and, consequently, harm market information processing and new product performance, some level of senior management control is beneficial. It ensures that information and insights are not overlooked, processed at the right time, and assumptions of the product development team are validated by organizational members not directly involved (e.g. Brown and Eisenhardt, 1995). Specifically, research shows that when senior managers take the initiative to sit together with team members early in the project and discuss issues such as project goals and schedules project success will be enhanced (Bonner, et al., 2002). We add to this literature that the responsibility to establish this, so-called, interactive control is not only restricted to senior managers and that NPD teams can also make a difference. Employees on a lower hierarchical level have a responsibility in bringing their projects, ideas, and progression under the attention of senior management. They have to 'champion' the project to achieve senior management interest, commitment, and create room for interactive control. This seems specifically the case with respect to really new NPD. Here opportunities are often 'emergent' and flow 'bottom up' because specialists on a lower hierarchical level are better able to perceive new patterns and changes in the firms' environment than generalists operating at a higher organizational level (Burgelman and Sayles, 1986). Thus, lower positioned technological and marketing gatekeepers have to sell their ideas to senior management, particularly during the early phases of really new product development, prior to project formalization (Reid and de Brentani, 2004). Yet, project members also have to proactively interact with senior management in the later phases of an innovation project. Our research shows that promoting a project inside the company and improving its visibility alongside the NPD trajectory can improve its importance.

### *Management implications*

Our research helps managers to shape crossing team boundaries in the context of reflecting on MIP behavior. Really new NPD teams that exclusively focus on internal practices facilitating MIP may become overly cohesive resulting in becoming less market-oriented over time. Organizations may prevent this by developing a really new NPD protocol and encouraging teams to use it. Additionally senior management can take measures to enhance the changes that project managers and teams reflect on their MIP behavior together with outsiders. They can include these important practices in training programs, reflection sessions and coaching (Ruekert, 1992). Also they can include external MIP reflection as an aspect of control policies. Though implementing these policies should happen with care. If they become too rigorous they will not benefit overall MIP in really new NPD and can even harm this behavior (Sethi and Iqbal, 2008).

Crossing team boundaries to evaluate and discuss MIP behavior cannot be done without recognizing the importance of different types of market information and developing a typology of market information resources on which existing products are built. A pragmatic way to identify market information resources is to explicitly classify the market segments that

the firm already has constructed, customers that are targeted, and the customer applications in which products are used. Once a market knowledge typology has been developed it can be used for mapping the existing product portfolio as well as reviewing running NPD projects: What projects are behind in generating and using market information, and in what projects sufficient market information is integrated?

#### *Limitations and future research*

This section discusses several limitations that provide meaningful opportunities for further research. We analyzed data from two NPD projects in one firm. This is a logical choice, given the aim to conduct an in-depth longitudinal case study using data gathered from different sources such as in-depth interviews and a workshop. While a similar organizational context supported focusing on differences in team level factors between the projects, our findings might be rather idiosyncratic and only permit a certain level of analytical generalizability (Yin, 1994). Insights and generalizations drawn from this study may be rooted in the uniqueness of the organization. Further research may thus also want to test the theoretical insights that were obtained by our study on a larger scale. To what extent do our inductively derived strategies really matter in explaining successful market-oriented product innovation? As really new product development projects differ across industries and firms (O'Connor, 1998), researchers may also want to include different industries and types of firms. Our research specifically focused on really new NPD and suggested that outbound strategies would be specifically beneficial in this context. Additional research should look further into this by including product innovation projects with varying levels of innovativeness.

Also, because we mostly relied on scheduled in-depth interviews with ChemCo employees for collecting data, we gained limited insight into different stages of market information processing, specifically in the early phases of the projects. It might be, for instance, that in Shield some segment knowledge was generated and disseminated across the innovation team but not used in new product decision-making for some reason. Detailed participant-observation studies may open up market information processing and assess why some pieces of market information are used and other pieces are rejected.

#### *Concluding remarks*

Our study highlights that even if really new NPD project members process market information they may want to validate this process, because they can process too little market information or not process a particular type of market information at all. In a single NPD project, project members can therefore be customer oriented but, at the same time, losing sight of the overall market. By looking at a variety of different market information types, tracking market information processing over NPD trajectories, and discussing organizational practices that can influence market information processing, we aimed to add to research on market-oriented product innovation.

Although researchers have long highlighted the benefits of decentralization for information processing (Jaworski and Kohli, 1993, Kirca, et al., 2005), and creativity (Bonner et al., 2002) in the context of really new NPD our study illustrates that this comes with a certain responsibility for new product teams. These teams need not be too much inward focused, and have to 'externally' reflect on their MIP practices, for instance, by using formal protocols available within the organization or proactively start a dialogue with senior management. This 'outside' reflection may increase the team's market orientation and therefore its chance for success. It seems that the external perspective to team behavior offers meaningful opportunities for further explaining market-oriented product innovation. We ask our colleagues to join us on this research journey.

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