Market Feedback and Team Commitment in Radical Product Innovation Process

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ABSTRACT AND KEYWORDS	
Abstract	Previous research has considered how exploratory market learning processes moderate market and technological uncertainty in radical product development. Scholars argue that new product development (NPD) teams may increase the chances of success of radically new projects by acquiring, assimilating and implementing new information from market feedback. However, research has not tackled how information is assimilated by the NPD team and to what extent the process of information implementation occurs. In this article, we begin to fill the need for such research by investigating the interaction between internal team values (beliefs and possibly ideology) and external market feedback / information in radical projects. Via the lens of a 2-year longitudinal participant-observation study, we suggest that information assimilation is not automatic, but rather influenced in interesting ways by internal team values. The findings imply that shared team values act as a selective assimilation mechanism determining whether a development team will act on user feedback. Furthermore, the type of information (e.g., functional vs. conceptual feedback) processed by the development team acts as a moderating factor on the relationship between the team values and information processing.
Free Keywords	radical products, market feedback, team values, new product development, technological uncertainty, market learning
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ABSTRACT

Previous research has considered how exploratory market learning processes moderate market and technological uncertainty in radical product development. Scholars argue that new product development (NPD) teams may increase the chances of success of radically new projects by acquiring, assimilating and implementing new information from market feedback. However, research has not tackled how information is assimilated by the NPD team and to what extent the process of information implementation occurs. In this article, we begin to fill the need for such research by investigating the interaction between internal team values (beliefs and possibly ideology) and external market feedback / information in radical projects. Via the lens of a 2-year longitudinal participant-observation study, we suggest that information assimilation is not automatic, but rather influenced in interesting ways by internal team values. The findings imply that shared team values act as a selective assimilation mechanism determining whether a development team will act on user feedback. Furthermore, the type of information (e.g., functional vs. conceptual feedback) processed by the development team acts as a moderating factor on the relationship between the team values and information processing.

INTRODUCTION

Radical innovation is thought to be an uncertain process because radical projects entail new concerns and unclear performance criteria upon which managers must base their decisions (March, 1991). To reduce market and technological uncertainty, scholars advocate exploratory learning and market orientation processes because they help managers better understand latent customer needs (Slater & Narver, 1995) while experimenting with new technologies (Yli-Renko, Autio, & Sapienza, 2001). *Exploratory* learning processes entail collecting and using new information that departs from the firm's skills and knowledge, while *exploitative* learning builds on the firm's current knowledge (Atuahene-Gima & Murray, 2007; March, 1991).

Scholars have predicted that the search and acquisition of this new information and other practices related to exploratory learning process increase the speed and the chances of success of new product development (NPD) projects (Lynn, Morone, & Paulson, 1996; Lynn, Skov, & Abel, 1999). They argue that by acquiring, disseminating, and implementing the new information (Kohli & Jaworski, 1990; Sinkula, 1994; Slater et al., 1995), managers and NPD teams are able to learn faster and more efficiently with positive implications for project performance (Lynn et al., 1996).

However, in spite of the extensive research on exploratory learning processes, current theories overlook two important issues. First, existing theories assume that the ability to maximize learning by managers and NPD teams depends largely on the quality and quantity of information acquired. When the information is acquired, disseminated and assimilated, the NPD team will implement it, with beneficial effects for the NPD project. This "deterministic" perspective omits the possibility that the process of information acquisition, dissemination, assimilation and implementation may work in different and distinctive ways, where much of the information acquired may not necessarily be disseminated or implemented. In other words, what is missing in extant research is an investigation on why certain information is

assimilated by the organization and to what extent the process of information implementation occurs.

Second, existing research overlooks the role of team values, commitment, and indeed ideology as moderating factors in the process of information assimilation. For the sake of simplicity, we refer to the above as *team values* throughout this article. The extent to which managers and project teams benefit from new market and technology information depends not only on their competences in collecting, integrating and assimilating the information acquired along the NPD project, but also their values. Few studies have investigated the interaction between internal team values and external market feedback and information in radical projects.

The aim of this paper is to address these very issues in discussing how the exploratory market learning process occurs and evolves by disentangling three distinct pieces of a market learning framework (i.e., acquisition, dissemination, and implementation). Here "exploratory market learning" is defined as the process through which new information about latent customer needs and technological changes affecting those needs are acquired and assimilated during NPD projects (O'Connor, 1998). The unit of analysis is a radically new product project, where team members acquire, share and implement new information for the NPD project. This unit of analysis is extremely relevant for market learning, because it captures the particularities of exploratory market learning processes. As our focus is on the project and team level, our exploratory market learning framework assumes that the team members fully share and disseminate every piece of information acquired. Therefore, our analysis on exploratory market learning focuses mainly on information acquisition and information implementation.

Consistent with the area of inquiry, this research employs a participant-observation approach to examine one NPD project, the Mitka project, in which a Dutch consortium

developed a new human- and electric-propelled three-wheeled vehicle. The Mitka case study is illuminating. The project team was strongly motivated to develop and implement a radically new, environmentally friendly vehicle as a substitute for the car for commuters in the Netherlands. They believed that only acquiring and collecting new information through sophisticated market techniques — such as scenario building with what they called "lead users" and experts — could lead to understanding latent customer needs and technological challenges. Contrary to generally accepted predictions of theory in this area, despite the rich amount of information acquired and the practices implemented, often the NPD team decided not to assimilate market feedback and not to implement that feedback in the project solutions. Indeed, the Mitka development was a story of contradictions reflecting the idiosyncrasy of the exploratory market learning process.

To explore these contradictions, we begin by reviewing the most relevant literature on exploratory market learning and market information processing in radical product definition. Then, we discuss challenges that NPD teams face when pursuing exploratory market learning. After our exploration of how the Mitka team coped with these challenges, we propose some insights on exploratory market learning processes.

LITERATURE REVIEW

The development of new business and product lines based on radical innovation is critical for the renewal of an organization's competitive position (McDermott & O'Connor, 2002) and for its long-term survival (March, 1991). Undertaking a radical innovation process means that the organization copes with a new and unfamiliar domain (Downs & Mohr, 1976), where different technical and business skills are required.

Previous research has studied radical innovation focusing on two levels of analysis: organizational and project. At the organizational level, scholars emphasize how important it

is for firms to undertake radical innovation projects together with regular, incremental innovation projects (March, 1991). Other researchers have focused on the organizational structure required for undertaking radical innovation (Dougherty, 1990), the way firms organize their activities for new products (Leifer, O'Connor, & Rice, 2001; O'Connor & Veryzer, 2001), strategy (McDermott et al., 2002), market orientation (Atuahene-Gima, 1995) as well as the extent to which organizational structure may become a barrier for an effective venture (Dougherty, 1992).

At the project level, scholars have examined radical innovation processes and differences between incremental and radical innovation. In general, radical innovation processes involve a higher degree of technological uncertainty (Schon, 1967), longer development time (Schoonhoven, Eisenhardt, & Lyman, 1990), 'unconventional' progression of activities (Veryzer, 1998: 317), and different market practices (O'Connor, 1998). Other authors combine the two levels, emphasizing how radical project development should proceed by having an external and internal mix of information, organizational structure and (human) resources (Atuahene-Gima, 2003; Sheremata, 2000).

Although research stresses the uncertainty that managers face performing radical innovation, it seems that few studies have examined how managers make use of information at hand about the market and technology in the radical product definition stage. This is a particularly difficult task, as what is known as "market orientation" (see below) is less effective for radical innovation (Atuahene-Gima, 1995). In the two next sections we investigate the process of information processing from two complementary perspectives: exploratory market learning and market orientation.

The exploratory market learning perspective

To better understand market and technological uncertainty, new ventures employ *exploratory market learning* as a process of market information processing (Atuahene-Gima et al., 2007). Exploratory market learning is defined as the process of acquiring new information and knowledge about customers and technology that departs from current skills and knowledge. It focuses on finding out and addressing latent customer needs and new technological opportunities (Slater et al., 1995). In this study, our concept of *exploratory market learning* is based on prior research in which learning involves a three-stage process that includes information acquisition; information dissemination; shared interpretation and implementation (Kohli et al., 1990; Sinkula, 1994; Slater et al., 1995). Let us discuss the market learning concept specifically related to exploratory market learning.

The first stage is *information acquisition*. During a radical NPD project, the team is able to collect, record, review, and file new information as a first stage of the market learning process (Lynn et al., 1999). This stage involves several practices and activities that allow firms to observe and even work together with lead users using sophisticated market methods, such as scenario building, experimenting with new technologies, and information acquisition from key customers (Yli-Renko et al., 2001). The second stage is *information dissemination*, where each piece of information is disseminated throughout the team and the organization, which might use it or iteratively develop questions (Glazer, 1991). Most scholars in this domain have focused on how to effectively share and assimilate the information flow and how to encourage information sharing in the development process. The emphasis is on the information flow that, if shared effectively, will increase the quality of the information gathered (Slater et al., 1995).

The final stage of the market learning process is the *shared interpretation of the information* where the consensus of the meaning of the information is shared within the organization, while minimizing conflicts. The information then is implemented and used in

the NPD process. It is believed that the quality of the information shared by the team members would be a critical step toward the success of NPD partnerships (Mohr & Spekman, 1994).

In the NPD literature, much research focuses on information acquisition and, eventually, its relation with performance. For example, O'Connor (1998) studies to what extent practices are different in exploratory and exploitative market learning. She finds that, among others, multifunctional teams, working with customers as development partners, and "visioning" processes are practices that promote market learning (O'Connor, 1998). Examining team learning patterns in 13 case studies, Lynn (1998) argues that the most effective team learning in radical NPD occurs with the formation of an autonomous group with adequate authority and resources. The team members need to have relevant technical backgrounds and perspectives and able to interact intensively with lead users.

Empirical evidence shows that exploratory market learning influences NPD performance. By analyzing new technology ventures in China, Athuatene-Gima (Attuahene-Gima, 2005) finds that under conditions of technological uncertainty, exploratory market learning is positively related to firm performance. Within the market learning framework, Lynn, Reilly and Akgun (2000), by studying 281 NPD projects, find that information acquisition and information implementation positively influence NPD performance. Other studies show that various market learning practices and information implementation influence NPD performance (Akgun, Lynn, & Yilmaz, 2006; Lynn et al., 1999) and the speed of NPD projects (Lynn et al., 1999). One aspect of this research stream that so far has remained underexplored is why only some stages of market learning influence NPD, while others do not seem to be significant. For example, some of the above-mentioned studies do not find evidence of the effects of information acquisition (Lynn et al., 1999) and information dissemination (Akgun et al., 2006) on NPD performance. Nevertheless, Akgun *et al*. (2006)

suggest that information acquisition and assimilation indirectly influence NPD performance through the mediating role of information implementation. In other words, they argue that NPD team members reduce project uncertainty by implementing market information after being acquired and assimilated during the project. In this way, the team achieves better decisions, thereby increasing NPD success.

The market orientation perspective

Together with the market learning literature, the *market orientation* literature has a rich tradition in understanding what market information needs to be acquired and finally implemented during the NPD process. These two bodies of literature share many elements (Sinkula, 1994). Like the exploratory market learning approach, market orientation involves three steps: market information (or market intelligence) generation, dissemination, and information use (Kohli et al., 1990; Sinkula, 1994), which are closely related to information acquisition, dissemination, and shared interpretation as discussed above. Unlike the exploratory market learning approach, the use of information acquired has had a great deal of scholarly attention. Deshpande and Zaltman (1982, 1984) focus on the extent to which managers use market research that has been solicited. They find that the quality of the report and the confirmatory research purpose is associated with an increased use of market information. They do not, however, investigate whether the information included in the report is fully or partially used. In a conceptual article, Menon and Veradarajan (1992) suggest that the likelihood of using market information depends on the manager's prior disposition toward new information. They suggest that "managers that are negatively predisposed toward a study are likely to use the information in an incongruous action-oriented manner" (p. 67). Their study focuses on the type of market research study rather than on a specific "piece" of market information. Later works seem to test this proposition in an indirect way. For example,

Jaworski and Kohli (1993) find that when top managers place a great deal of importance on market information they are more likely to acquire and use it. Maltz and Kohli (1996) take this a step further and focus on the extent to which managers use pieces of market information and consequentially make and implement decisions upon it. They find that the use of information acquired depends on the quality of the information perceived by the manager.

A more recent work by Veldhuizen et al. (2006) attempts to cast light on the relationship between market information processes and NPD performance. They analyze the three phases of market information processing (acquisition, dissemination and usage) in different stages of the NPD process. They find that different types of information are acquired in different phases of the process (e.g., acquisition of customer information is associated with increased use in the development phase only, while dissemination of market information is associated with increased use in the pre-development and commercialization phases). Their findings suggest that there is a selective dissemination and use of the information acquired, although their paper does not investigate the circumstances under which the information filtering occurs. The authors seem also to imply that the information, whether acquired and disseminated through the organization or directly acquired by the team, is fully transferred and used.

To summarize, existing theory assumes that a mixture of market practices affect market information use and finally NPD performance. Figure 1 depicts a market learning model adapted from previous work (Lynn et al., 1999; Slater et al., 1995). There are, however, elements missing from both research streams. From the exploratory market learning perspective, few studies explore the extent to which new information "acquired" is used and implemented. From the market orientation perspective, although some work contemplates a

selective assimilation of market information, they are not able to explain the circumstances under which this phenomenon occurs. One reason could be that with the exception of Veldhuizen's work, prior research often relies on survey data and usually focuses on incremental rather than radical innovation.

***** Please put Figure 1 about here *****

We advance prior work by exploring why and how market information processing may be plausibly and purposively filtered and only partially used for concept development. For the purposes of terminology, in the remainder of the paper, we use the term "employing (or using) an exploratory market learning process." We assume that firms with high market orientation use exploratory market learning processes more frequently than firms with low market orientation.

Market information feedback and internal team values

The radical innovation literature suggests that new radical projects or technologies often emphasize performance criteria the value of which is poorly understood by potential customers (Balachandra & Friar, 1997). Customers may thus misunderstand the value of a new product. Therefore, even exploratory market information may be of little help, because feedback based on this misunderstanding may harm the development process of a radical product. Incorporating negative feedback may jeopardize the project by divesting it of the potential added value given by its radicality. The product could be stripped of its innovative qualities or prematurely terminated.

Therefore, managers willing to explore radical concepts need to have a strong commitment to reap future profits and critically evaluate the information acquired from exploratory market learning processes. Since the benefits that consumers can derive from radical new products are unclear, the evaluation of exploratory market feedback becomes difficult and it may turn out to be the manifestation of a team's beliefs. Managers facing

situations characterized by high levels of uncertainty (Gilbert, Mcnulty, Giuliano, & Benson, 1992) and time pressure (Fiske & Taylor, 1984) can and may bias information processing, as they are locked into previously held beliefs and preferences (Biyalogorsky, Boulding, & Staelin, 2006; Gilbert et al., 1992). Based on experiments, Schmidt and Calantone (1998) find that individuals inflate their perceptions of the chances for new product success for radical products compared with incremental ones, causing individuals to become more psychologically committed. Therefore, managers may dismiss negative market feedback and consider only feedback that confirms their beliefs. Their values and beliefs may "buffer" information assimilation and implementation.

Consequently, understanding how an NPD team assesses market information through market learning practices and how this may lead to its dissemination, assimilation and implementation or rejection is important to gain a deeper insight into the exploratory market learning process.

Our paper attempts to contribute to the market information literature by providing an empirical exploration of a longitudinal case study in which market information was requested, recorded, reviewed, assimilated or rejected. We examine the case of "Mitka" to gain a finer appreciation of market learning processes through feedback assimilation and team values.

METHOD AND RESEARCH DESIGN

This research project utilizes the longitudinal case study research strategy. The underlying rationale is based on some key features well-suited for the purpose of this research study. First, it allows investigation of how product innovation unfolds in a real-world environment in which decisions actually take place (Yin, 1994). Second, the case study method is well-

suited for studying the overall picture of the research object as a whole and allows the researchers to deeply understand and fully describe the context of the phenomenon under study (Dyer & Wilkins, 1991). Other methods, such as survey methods, may get a less nuanced picture: survey respondents or interviewed managers may be less accurate, referring to a generic rather than particular project. In such a situation, the final picture would reflect an "average" of project characteristics (Kessler & Chakrabarti, 1996). Moreover, when asked to refer to a particular project, respondents are likely to pick successful projects, resulting in a sample biased toward successful ones (Golden, 1992).

Third, the case study method is an appropriate strategy for enriching or extending theory, yet also accommodating existing theories through an iterative process (Yin, 1994). The theoretical and the empirical inquiries are not addressed sequentially, but via an iterative process that exists between existing theories and data where incongruities are resolved in the subsequent iteration (Eisenhardt, 1989). Finally, the method allows the incorporation of a variety of different sources of evidence, including archival documents and interviews (Yin, 1994).

The unit of analysis at the project level is the most relevant for market learning, because managers and teams learn from projects. Moreover, variables that are appropriate to explain the differences in organizational abilities in driving exploratory market learning may not be suitable for explaining why the level of market learning is higher in one project than in another (Kessler et al., 1996).

Case selection

Qualitative sampling, unlike quantitative sampling, tends to be purposive rather than random. The choice of informants, episodes and interactions are usually driven by a conceptual question (Miles & Huberman, 1994). In this particular case, one of the authors had the

opportunity to step into a project started in The Netherlands in which the objective was to design and to develop a new three-wheeled human-powered vehicle, the Mitka (Mitka is a Dutch abbreviation that, translated, stands for "Mobility solution for individual transportation over short distances"). The main motivation to start the project was to provide *a radical, new, environmentally friendly mobility solution* for individual transportation over short distances. Although it started as an R&D experiment, the design team and project management soon realized that the Mitka could be an attractive product for the market. Therefore, the Mitka project was considered an interesting case study for a number of reasons.

The first was the context of "environmentally-friendly" product development projects. Looking specifically at environmental projects allows us to examine how new concerns are integrated into new products and balanced with more traditional ones, such as cost and quality. Environmental projects are particularly interesting to analyze because they entail environmental concerns that are ill-defined and often difficult to trade off (Berchicci & Bodewes, 2005; Chen, 2001). The extent to which environmental concerns should be acknowledged in the development of new products given the different perceptions of consumers, producers, and governments (Kleiner, 1991) is not clear. The emphasis on environmental considerations often creates design challenges in product development. The second reason the project is interesting is that the developers in this case believed from the outset that only radical solutions were able to substantially improve the natural environment. A third reason is that, from the outset, the Mitka developers decided to use, and had access to, relatively sophisticated techniques for soliciting market feedback and acquiring greater information to be used in the NPD process.

Data Sources

Data collection involved two waves. First, a retrospective approach (following Miller et al. (1997) was used to familiarize ourselves with the initial part of the Mitka project when the

concept took shape from 1999 to 2000. To avoid distortion of past facts, written reports were confronted with the outcome of interviews. Since 2000, the second wave of data collection consisted of longitudinal research in *real time*, meaning that the researcher lives with an organization over time or carries out periodic interviews (Pettigrew, 1990). In a period of more than two years, real-time data were gathered through observation, archival documents, meetings, and interviews with key informants. It is important to clarify that one of the authors was actively involved in the project when data was collected through market research on the Mitka concept and the Mitka vehicle. Therefore, each unit of market information through formal market research (focus groups and interviews with lead users, surveys and test trials) has been recorded in real time by one of the authors.[1]

Participant observation. During the period 2001-2003, one of the authors had the opportunity to observe the product development of the Mitka project. The researcher engaged in 17 formal but unstructured discussions and many more informal conversations with the team members regarding technical development as well as market research. Moreover, the same author participated in five high-level meetings with the institutional stakeholders in which important decisions on product development were made.

Interviews. Members of the Mitka coalition and other relevant key informants were interviewed. 30 semi-structured interviews were performed and lasted from 1.5 to three hours. The initial interviews were kept broad in scope in an effort to expose a wide range of motivations, decisions and competences. As the research project progressed and the theory was refined, interview questions became more focused in an effort to ascribe more details to the emerging patterns.

Archival documents and press releases. The interview data were supplemented with information from archival documents and press releases enabling us to crosscheck findings

[1] Data is available upon request.
[2] For the final category, the acceptance of market feedback, inter-rater reliability was not calculated as it was not

(triangulation). More than 500 documents such as internal reports, archival information, emails, newspaper and magazine articles, etc., were used to confirm the reliability of the interviewees' responses and permitted directed and detailed probing in the interviews.

Data Analysis

The data analysis employed here uses approaches common to qualitative, inductive research studies (i.e. Miles and Huberman, 1984; Eisenhardt, 1989). We classified each unit of market information and distinct time periods in the Mitka development process. Following the method of Cardinal et al. (Cardinal, Sitkin, & Long, 2004), the data analysis consisted of six steps. In step 1, a detailed written case history and timeline was prepared along with a schematic representation of the main phases and events (as also used, for example, by Van de Ven, Polley, Garud, & Venkataraman, 1999). We used a descriptive *time-oriented* display arranging a series of concrete events by chronological time periods in product definition and testing, considering the NPD process as a "deliberate business process involving hundreds of decisions" (Krishnan & Ulrich, 2001). The case itself was much richer than the events portrayed here. We attempt to give a purposeful yet partial picture of the Mitka case that is suitable to analyze the phenomenon under study.

In step 2, we inductively identified the unit of market information that the team asked for, acquired, and evaluated. For example, during a group discussion, a team member solicited potential users' impressions of the Mitka concept. The piece of information received (i.e. "the design is cool") was classified as a unit of information. In step 3, each unit of information was classified according to which product attribute it referred to – whether (1) product functionality (e.g., the maneuverability of the steering wheels) or (2) product concept (e.g., design) and potential usage. In step 4, we classified each unit of information according to the potential user's desirability of the product attribute. Product attributes were considered desirable (i.e. "the child seat is very convenient"), undesirable (i.e. "the rain protection does

not work properly ") and we coded them as positive or negative feedback respectively. In Step 5 we classified the unit of information according to their fit into each of the team's core values. As explained below, the team emphasized two core values: innovation-driven value and environmental awareness-driven. Each unit of information was coded as fitting, clashing or substantially being *neutral* with each team core value. For example, from a questionnaire at a bicycle fair (February 2001) the design of the Mitka was perceived as innovative and "cool," while during a group discussion (March 2001) several users expressed a preference for a two-wheel design. The former unit of information fit with the innovation driven value of the team, while the latter clashed with it (explained below). Finally, in step 6 we classified each unit of information according to its acceptance by the team, whether the team (1) ignored or rejected the information, (2) used and implemented in the concept development or (3) kept the unit of information "on-hold" waiting for further information.

Two coders identified all units of information and classified them according to this procedure. The Perrault and Leigh (1989) index was used to estimate inter-rater reliability. The estimates show high reliability for three categories coded: product attribute (0.89), desirability (0.92), environmental awareness-driven value (0.94), and innovation-driven value (0.80). The first three are excellent, and the latter is not bad, given the fact that for exploratory work such as this one, inter-rater reliability is considered low for values under 0.70 (Perreault et al., 1989).[2]

Although many decisions were made with the support of all the partners, strictly technical decisions were made by the design team while the management team's focus was mainly on business and market development. The management team comprised representatives from a Dutch research institute (TNO, who claimed leadership of the project), a Director of the Gazelle Company (a bicycle manufacturing company), a group from the

[2] For the final category, the acceptance of market feedback, inter-rater reliability was not calculated as it was not subject to coders' interpretation.

Delft University of Technology (TU-Delft), and a manager from Nike (the athletic apparel company). The design team comprised a well-known bicycle designer (Van de Veer Designers), the TNO team, an engineering company (Freewiel Techniek), and TU-Delft students. In the case developed below, the identity of the actors is kept anonymous and only their function within the organization is given for reasons of protecting privacy and as a condition of access.

THE CASE OF THE MITKA

The Mitka was a weather-protected, three-wheeled, human-powered vehicle with an electric engine that doubled human pedaling power. It had a maximum speed of 40 km (25 mi) per hour and automatically tilted during steering. It was intended as an alternative to a car for commutes up to 25 kilometers, as 80% of the car trips made in the Netherlands were for trips between 5 and 20 kilometers (Joore, 2000b). The Mitka concept was based on the assumption that people would use the Mitka instead of the car and thus would use less energy in regular (commuting, shopping, or visiting) transportation.

The Mitka was seen by most of the participants as neither a bike nor an electric car, but rather as a one-of-a-kind means of transport (Figure 2). It was not only the vehicle that made the Mitka unique, but also the specially designed services around it. Maintenance, call-a-car, and leasing services were considered an integral part of the Mitka and made it a completely new mobility solution.

***** Please insert Figure 2 about here *****

The team and team values

Before embarking on a chronological description and analysis of the Mitka's development, it is important to describe the Mitka team values. Sharing values within a team is extremely

important because it allows the team to make decisions and to lead to common commitment and action. The Mitka team was heterogeneous, formed by individuals from different organizations. Nevertheless, with the exception of Nike, those organizations and often the same people within them had participated and worked together in previous projects. The design company TNO and TU-Delft ran many projects together (although smaller than the Mitka) creating a strong bond among the individuals. Therefore, when the Mitka concept took shape in late 90s, the same group of people was formed around it. What was important for the Mitka team? What drove the team in the Mitka's quest was a mix of strong belief in technology and innovation as a way to solve social and environmental problems. Put simply, we can identify two core values of the team. These values were mentioned frequently in written documents and spoken statements, far more frequently than other potential values.

1) Innovation. The value assigned within the team to technological innovation was given great emphasis. The team believed strongly that technological development could create new opportunities beneficial to business and society. Their technological skills reflected accumulated behaviors and their technological knowledge and expertise were embodied in each team member. Knowledge about vehicle construction was embedded in the team. Moreover, the TNO team was able to find individuals with skills specifically suitable for the project within the organization. Innovation-driven values were formalized in internal reports and often mentioned in discussions within the team.
2) Environmental awareness. Values can be very deep and emotional. The team was concerned about the natural environment and believed strongly that technological innovation was needed to solve environmental problems. They saw environmental issues as opportunities for innovation and value creation. This core value pushed part of the team to formalize their belief. In 1997 a formal cooperative agreement was

established between TU Delft and the TNO team, the Kathalys Program, where innovation for the natural environment was the clear mission.

The innovation-driven and the environmental awareness-driven values led to a strong belief that incremental solutions were not enough to solve environmental problems and a dramatic environmental improvement could be achieved only through innovative breakthrough or radical solutions. This meant also to enlarge the innovation space from products to services and infrastructure. As further explained by the project leader:

The present mobility-system based upon the car with [a] combustion engine is strongly interwoven with society. Designing only a new vehicle probably will not yield a solution that is attractive enough to supersede the car. Moreover, if a solution is sought in new products only, in this example [the Mitka concept], these should comply with the current means of infrastructure. The innovation space for sustainable solutions then would be unnecessary small, and hence the environmental gains possibly lower than could be. Therefore the innovation space was enlarged, to include the surrounding system of (infra) structures, (organisational) arrangements and services.(Luiten, Knot, & Horst, 2001: 4)

There were also formalized methods and guidelines to help business managers to create innovative solutions while addressing environmental concerns. Their drive for radical innovation and concern for the natural environment did not however mean that the team would ignore customer needs. They were very concerned about trend-setter needs and lead users.[3] As members of the team said:

> *Not only assessing consumers' acceptance is necessary, but [so is] consumer involvement in generating solution ideas. Their expertise on the daily practice and underlying values is indispensable for developing appropriate and valuable alternatives for fulfilling needs. …[they] should be the first lead users of the new [Mitka] system.*

The new vehicle needed to be developed according to the needs of these "lead users" (Luiten et al., 2001). The focus on lead users was evident through their constant use of market

[3] The team often used the term "lead user" referring to those individuals, e.g., Nike employees, who could generate ideas, be involved in the development of the project and finally be the target group of the Mitka. Therefore, it does not correspond exactly to the term often used by scholars (Von Hippel, 1986).

research techniques — some of them sophisticated — to generate and improve the concept. The team members shared other values such as passion, for instance, however these did not significantly interact with market information processing.

In a heterogeneous team such as the one for the Mitka development, values follow the "imprint" of the team leaders (Kimberly, 1987). These core values were embedded in the team leaders and shared within the team.[4] How did these values influence exploratory market learning? In the next section we present the case.

Chronological history

Initiation period: vision and coalition building

The idea for a new concept in transportation was created over a 3-year period (1998-2000) where TNO managers, designers, and scholars discussed the opportunity to develop a mobility system for daily commuting that would radically differ from the perceived unsustainable dependence on the automobile. This phase encompassed all the ideas and research studies that led both to the Mitka coalition and to its first concept design, often called by scholars the front-end phase (e.g. Khurana & Rosenthal, 1998).

In 1997, a manager from TNO came up with an idea to have a new bicycle concept for longer distances than generally covered by normal bike use. The key characteristics of the new vehicle, selected by the initial participants through several creativity "visioning" workshops, included a speed higher than a regular bicycle (which travels about 18 km/hr), power assistance, youthful athletic appearance, resembling a bicycle yet innovative, safe, comfortable, and with low environmental impact (Oskam, 1999). Electric power assistance was needed to reach speeds of around 30-40 km/hr.

[4] During the development of the Mitka, there was a change of project leader. When the second project leader was in place, the former one acted as an adviser.

Simultaneously, at the Delft University of Technology, several student projects were focusing on sustainable solutions for replacing the car for short distance travel. In particular, one student project (described in Maas (1998)) used the VIP approach (Hekkert, 1997) to develop a new concept for short distance travel in 2005 (this was a method designed for lead users to generate ideas). Moreover, to get a first impression of the acceptance of these ideas, a concept test was carried out. Abstract sketches were presented to potential future users following the Future Conditioning technique (Urban, Weinberg, & Hauser, 1996). The concepts encompassed rain-protected bikes as well as three-wheeled vehicles with child seats. The final concepts resembled the "ideal" bike: comfortable in all weather conditions for distances ranging from 5 to 20 km with a luggage unit or a child seat incorporated.

Early development: product definition

To understand the technological, economic and ecological potential of a new mobility vehicle, TNO performed two market studies at the European Nike headquarters in Hilversum. The first study consisted of several tests lasting for a couple of weeks with different bicycle concepts, from regular safety bikes to electric ones and recumbent bikes (bicycles in which the rider rides in an almost horizontal position) and three-wheeled vehicles as well. The reason was to get feedback and comments on the different bicycles' aspects and characteristics (Joore, 2000a). The results highlighted that poor marketing and the bad image of electric vehicles were the main reasons why these vehicles had limited diffusion. The second study was an Internet-based questionnaire given to Nike employees. They were able to build their concept with different configurations and product attributes. After those studies the team decided to build a 1:3 scale model of a three-wheeled Mitka, with 2 wheels in front, which was presented on September 20, 2000, at the Nike European head office in Hilversum. At the symposium, the Mitka model attracted the curiosity of many people including journalists who reacted very positively to it. In the days following, intense press coverage

enthusiastically described the futuristic vehicle. The enthusiasm was contagious. The coalition was resolute to explore the promising Mitka trajectory. The euphoria boosted the Mitka project, which was expected to result in a marketable product in less than three years.

This proactive attitude translated into a new set of objectives for the following phases: the development and test of a vehicle prototype, and later the production of a pre-series of 50-100 vehicles with dedicated services for a new market (Joore, 2000b p. 7). The main idea for the business plan was to sell an attractive package of "sustainable mobility solutions" to employers of large and medium corporations. The goal was to reach 1% of the bicycle market, which meant 10,000 units per year. The suggested price for the Mitka was fixed around €3000. The design team focused on building a working model and a mock-up model. The former was meant to understand the technical feasibility of the three-wheeled vehicle, while the latter was to be shown as a "concept car" for feedback from group discussions and in-depth interviews with Nike employees and from the general public at bike fairs. The feedback was heterogeneous spanning from concept and design to product functionalities. The degree of desirability ranged from very enthusiastic to rather skeptical.

Late development period: prototype stage

This phase started just as the previous one, with great enthusiasm. The team had great hopes for bringing the Mitka to market. While the design team was working hard during the summer of 2001, the perceived increasing value of the Mitka concept raised the stakes for all the participants. The general feeling was clearly expressed by the business developer: "*the world stands still without the Mitka."*

The decision to develop such a brand new, environmentally friendly vehicle presented both technical challenges for the team and business and market risk for the entire coalition. All the work packages entailed completely new design and development techniques, with

very few standard parts. The team had difficulty coordinating their single developments and the whole product architecture. The team's limited experience with some of the new components and the lack of priority among the product components and their developments increased the complexity of the concept. Significant technical problems emerged at the end of 2001. Resources previously allocated to market research activities were transferred to strictly technical product development activities.

It took eight more months (May 2002), to be able to ride the first Mitka prototype and 13 months (October 2002) to be able to test the only prototype. The unexpected technical problems did not undermine the confidence of the team, although in a memo for the management meeting of February 2002, the project leader admitted that the cost to develop the first prototype was higher than expected. Moreover, the electric motor was not functioning properly and the weather protection was not yet ready.

Finally, on October 22 the test started with the new Mitka vehicle. During the test, insufficient lighting, poor visibility and poor maneuverability forced the two drivers to drive off-peak hours to avoid other bikes along the path. On the other hand, the sleek appearance was highly appreciated by neighbors and relatives of the drivers.

On December 5, 2002, the test was stopped prematurely and serious questions regarding safety remained unanswered. There was hope that with an effective public presentation of the Mitka, the team would be able to raise the capital needed to produce 50 Mitka vehicles. The occasion for the press conference and the search for potential partners and business people occurred on December 12, 2002 where anyone could test the three-wheeled Mitka on Nike's sport track in Hilversum. This event also created a great deal of publicity with TV reports and newspaper articles praising the new vehicle as an alternative to the car. Nevertheless, the three-wheeled Mitka project lost some momentum. After three

years of product development and about €1,150,000 invested, the Mitka project prematurely terminated with what could be argued was a barely functioning prototype.

Despite the cancellation of the project, one spin-off of the Mitka concept, with two wheels, was launched in the market in 2003: the Easy Glider, produced by only one member of the Mitka consortium (Gazelle). The knowledge of the body and the sitting position of the three-wheeled Mitka were transferred to the 2-wheeled vehicle. This bicycle concept, with no electric motor, was commercialized and presented to the FIETSRAI in March 2003; it was nominated for the "the best bicycle of the year 2003" award, for innovative design and a revolutionary relaxing sitting position. The reaction to Gazelle's conduct from the other coalitions' members was mixed. On one hand, the spin-off of the Mitka project indicated the added value of the concept. On the other hand, the behavior was considered opportunistic, "betraying" the idea behind the Mitka project: an environmentally friendly alternative for car drivers. The Easy Glider was considered a rather small step toward a better sustainable society.

FINDINGS

Our case study research provides a context for examining the extent to which market information is assimilated and used in radical NPD projects. Figure 3 illustrates the degree of compatibility between the unit of information acquired and team values, and the final level of acceptance. As shown in the figure, some information units fully fit or clashed with the team's core values. Some of these information units were rejected regardless of the potential user's estimate of desirability whereas others were fully accepted.

Figures 3 and 4 illustrate a slightly different result by introducing the type of information unit. As shown in these figures, feedback concerning with product concept and potential usage are more likely to strongly fit or clash with core team values. Moreover,

information about product functionality is more likely to be taken into account by the team regardless of the level of the potential user's perception of desirability.

***** Please insert Figures 3 and 4 about here *****

These results suggests that (1) team values influence the way market information acquired is used and implemented, although not so strictly (or simple) as rejecting clashes and accepting fit; (2) the use of information depends on the compatibility between the information received and team values; and (3) the use of information depends also on the type of information and the compatibility with team values. Let us now examine the qualitative results more closely.

Fit-fit

When the unit of information fit with both of the core team values (the upper-left corner, Figure 3), the team fully assimilated it. The users' feedback concerned concept attributes or potential use of the vehicle. Moreover, it was positive and consistent with team values. For example, in workshops, group discussions, or interviews with potential lead users (e.g. Nike employees), the unit of information received concerned the innovative design of the vehicle and its potential use. In events such as the public presentation of Mitka models the positive reaction of the public and press influenced the enthusiasm of the team, increasing its willingness to proceed in exploring the promising Mitka trajectory. The team interpreted these pieces of information as a confirmation of the value of the concept both for its innovativeness as well as for its environmental potential. Using the Mitka meant replacing car use with positive environmental effects. The positive feedback also reinforced their belief that to fully exploit the Mitka, more radical infrastructure changes around the concept would be needed. The project leader affirmed:

> *"Thinking from existing solutions is not sufficient to reach radical changes. There is a need for creative new thinking to generate ideas for fulfilling needs in an alternative way. Solutions that are sustainable often go beyond one product or one service."* (Luiten et al., 2001: 1).

However, the full assimilation of feedback created solutions that included conflicting product attributes. For example, the propulsion system was highly appreciated by Nike employees and staff. The problem was its propulsion power: more speed meant more power that in turn required the user to wear a helmet, which was seen as a negative feature as clearly expressed by a Nike team member:

The logo of Nike is "doing the right thing", and it looks like Mitka is about environment and mobility… The Mitka should be very attractive and fun to ride (and it is). The speed should be around 40 km/h without a helmet: this is important because the image of Nike is sporty, fast, cool, fancy and trendy. If the Mitka needs to be on the road for that reason, it is acceptable, but not with the helmet, please"

The problem was solved by introducing two speed modes under the dashboard: a bicycle mode, riding under 25 km/hr and a moped mode with the possibility to ride up to 40 km/hr. This solution was seen as a compromise, although it clashed with legal regulations when riding in moped mode without a helmet, as occurred during the test. From this perspective, the team tried to accomplish both goals simultaneously. It was felt that any downgrading from the original design would have negatively affected the sleek appearance and the environmental intrinsic value of the Mitka. The team members' commitments escalated, requiring them to work extra hours and over weekends. The team was emotionally involved in the project, both for the innovativeness of the project and for the feeling of "doing the right thing" for the natural environment.

Clash-clash

At the other end of the table (the lower-right corner) market feedback clashed with both core team values. The team rejected the feedback regardless of the potential user's estimate of

desirability. Moreover, the type of information concerned, as seen in the previous section, dealt with concept and potential usage only.

An example may make this clearer. During the pre-development phase, in March 2000, an Internet-based questionnaire was given to Nike employees. The respondents were asked to describe their current mobility situation and to "build" on a computer screen, out of individual components, a vehicle that would meet the general set of specifications defined earlier by the Mitka coalition and their own preferences as future Mitka users. The respondents were able to construct their own ideal product / service system by combining elements, like two or three wheels, a rain protection shield, a luggage unit or a child seat. One of the central findings from this exercise was the potential users' (Nike employees that included both bicycle and automobile commuters) preference for a two-wheeled vehicle (66%) over a three-wheeled version (33%). Despite these results, in May 2000, the coalition decided to develop a three-wheeled Mitka for two reasons. The first one was the appeal of the sleek innovative appearance. The three-wheeled concept was considered more innovative than the two-wheeled one. The challenging task stimulated the design team as well as the management. Moreover, the team was confident that the choice for the two-wheeled concept was explained by the conservative attitude of the respondents. The second reason was because it was "better for the natural environment." The new vehicle needed to be attractive for car drivers rather than bicyclists. The coalition felt that developing a two-wheeled version meant likely attracting cyclists with unwanted consequences for the natural environment. As explained by the project leader: *"in this way [the three wheeled vehicle] is hoped to encourage car users to switch to the Mitka."* Moreover, there was the belief that the three-wheeled vehicle might encourage a major change in car drivers' conservative behavior (switching modes of transport). As the designer explained:

> "*Making a two-wheeled version meant another recumbent bike, therefore nothing new. On the other hand, a completely new mobility solution was*

> *needed, something really new. It was much more interesting for us as designers to make a completely new kind of vehicle than to redesign hundreds of bikes".*

Why did the coalition choose a direction contrary to the information available to them about what consumers actually wanted? Given the uniqueness of the three-wheeled vehicle, as they argued, lead users may not have fully understood the potential of such a concept because it was demanding and sometimes prohibitive for them to detach themselves from the current transport system. The lead user evaluation contrasted with their internal team values, whereas a futuristic three-wheeled vehicle was seen as a forthcoming solution for commuting needs with great environmental benefits. The prospect and the high expectations of having a radical and environmentally-friendly concept in the market may explain their strong commitment to the design. The team ignored this feedback because it was not aligned with their core values.

Fit-Neutral

In the case in which the unit of information fit with one core value and did not affect the other one, the responsiveness of the team to feedback was more nuanced (see the middle-left cell in Figure 3). In this case, feedback was predominantly consistent with the innovation-driven value. Most such feedback was positive concerning both product functionality and product concept, and accepted (see Figure 4). For example, the team chose the configuration of two wheels in front rather than in the back because most Nike employees evaluated the former as much more innovative and appealing:

> *It [Mitka] is related to the company's culture [Nike]… The Mitka is something new and it can be trendy, sporty and attractive for young people…. And the choice to have two wheels in front and one behind is definitely cooler"*

In another case, during the group interviews, Nike employees wished that the motor and batteries were hidden in the chassis for aesthetic reasons. The team agreed to have a fast

motor and “invisible” battery pack to emphasize the innovative look of the vehicle and avoid any analogy with “uncool” electric vehicles.

With regard to product functionality, the Nike employees often clearly indicated their preference for an electric motor that could function smoothly, rapidly assisting the pedaling. The team also worked on many of the services proposed by respondents, which were thought to be crucial for the success of the Mitka project. For example, the team considered as an important service a sort of “on call repair service” for the Mitka users.

Other reactions were negative, but addressed (accepted). For example, the maintenance of the vehicle was an important issue. Many interviewees felt that one of the common downsides of bikes, shared also by the Mitka vehicle, was how to keep the vehicle clean. As one of the respondents said:

> *It would be annoying to clean the Mitka, this one of the reasons why I do not bike in the winter, because both the bike and I easily get wet and dirty.*

In this case the team worked to reduce maintenance work in cleaning the Mitka by providing an innovative cover both for the chain and for the gear mechanism. In addition to that, driven by high respondent interest, the team wanted to introduce a maintenance service. One of the clear conclusions of the market research according to the market researcher team was:

> *From the interviews, surveys and target groups, it emerges that the Mitka must be offered including maintenance. The maintenance must be carried out …by a special maintenance service.*

This unit of feedback fit with their innovation-driven value while being unrelated to the environmental awareness-driven value, and therefore accepted. As the project leader said in September 2000:

> *“The three-wheel vehicle is comfortable in all weather types due to the various coverings, it is easy to maneuver and park and it has a modern aura about it. An electric motor doubles the pedaling power, so the driver always has 'a tailwind'.”*

Neutral- Neutral

When the units of information were neutral regarding the team core values, the results present the most heterogeneous responses from the team (see the central box in Figures 3 and 4). Regardless of the type of product information, positive and negative feedback was accepted, while others were kept on hold for further information. There is not a clear trend or significant relationship between the type of information or potential user's desirability assessment and team acceptance. For example, in the pre-development phase, a clear preference for a modular vehicle emerged during a workshop. The potential users' idea was to have a vehicle that could be easily transformed for different purposes, e.g., having a child seat or luggage unit. The team further investigated this solution, but decided not to choose this configuration because of technical difficulties and costs. As the designer and market research team discussed the topic:

> *The child seat is not a priority….What 63% of potential users wish is a closed spacious compartment [in the vehicle] in which to store valuable stuff… And we can include that.*

In case of negative feedback, the team tried to address it. When the first prototype was ready, the first feedback concerned the difficult maneuverability of the vehicle and the limited power of the electric engine. In the test, the lighting was not working properly. As one of the test drivers said:

> *"Driving in the dark was dangerous because the lights did not provide enough illumination on the road"….*About the maneuverability: "*You can feel all the bumps on your spine! Moreover you cannot lift your body like on the normal bike. It is unpleasant.*"

The team accepted these negative comments and worked hard to improve the functionality. The team also accepted suggestions about the design of specific elements. For example, they built a rigid rain protection, replacing the plastic cover, which was not appreciated by potential users. After the test, the above-mentioned remarks convinced the team to replace

the lighting system and introduce a shock absorption system. They also started to work on a better battery set after a failure: the promised 40 km battery charge did not hold as one of the test drivers painfully found out:

> *"As long as the power assistance was working, I was pleasantly surprised by the extraordinary speed (28 km max) the Mitka could reach; however, once the battery went off, I felt like a loser who was not able to pay for a real good vehicle for disabled people. I was as fast as a snail and on little hills I had to step out and push it."*

Neutral-Clash

Finally, when the unit of information was clashing with one of the team values, in this case innovation-driven value, the team was ready to listen to and often accepted negative feedback regarding product functionality, while often discarding negative concept feedback. Consider for example the challenge faced by the team in building a three-wheeled vehicle with an upright position. It meant a high center of gravity in combination with the tilting and steering mechanism of the two front wheels. With the help of computer simulation, computer modeling, and biomechanical models, the project team decided to have the two mechanisms of steering and tilting separately adopting a parallelogram construction, that is, the short sides of the parallelogram represented by the wheels able to bend (Van Gemert, 2001). The team considered this solution highly innovative and unquestionable. With this construction, the pedal system needed to be positioned between the wheels in the center of the parallelogram. A couple of problems, however, arose with this configuration, namely stability and maneuverability: the width had to be around 85 cm to have good maneuverability. Moreover, in riding conditions the real width would be wider due to the tilting mechanism.

As mentioned during the test trial, the vibrations of the fork created serious problems for the stability of the vehicle at high speeds. The team was aware of this problem and worked to stabilize it. Others, however, criticized the fundamental choice of this configuration. The width necessary for the tilting/steering mechanism soon presented a

practical problem: vehicles wider than 80 cm are unlikely to be stored in a house because it may not pass through doors, something emphasized by in-depth interviews with Nike employees. Moreover, the Mitka was perceived too large for the bicycle path:

> *"The Mitka should go on the bicycle path. But I foresee some problems; the bicycle path is not large enough. You may be a problem for other bikes and you cannot pass students that usually drive next to each other".*

After a couple of days testing the vehicle, the first test driver said:

> *"It is not easy to pass other bikes. It is heavy to steer and the steering is not precise; it was fighting all the way home!.....I have to leave home very early and come back at night to avoid other bikers…It is annoying if you are faster but you cannot overtake other bikes".*

Unsurprisingly, given the strong innovative value attached to this concept, these reactions were rejected. According to the team, this innovative configuration was the optimal technical solution and there was not much room for improvement.

The results show also a relationship between the type of information and the phase of product development. As one might expect, feedback about product functionality was more predominant in the later stages of development, while feedback about the concept was in the earlier ones.

DISCUSSION AND CONCLUSIONS

The case of the Mitka project gave us the opportunity to investigate the relation between the project team values and the way new information was acquired, assimilated and used by exploratory market learning processes.

The decision to start such a project was based on the assumption of combining user needs, an ideal mobility concept, with more general societal needs, the preservation of the natural environment. Nevertheless, crucial decisions during the process were only marginally influenced by users' preferences. Although the team had autonomy, close relations with

potential users, and was able to employ rich information acquisition practices, qualities suggested to foster market learning (Lynn, 1998; O'Connor, 1998), the team only partially or marginally assimilated market information. Feedback was selected and interpreted according to the core values of the project team. In some situations, the innovativeness of the project and by the feeling of "doing the right thing" for the natural environment shaped the team's decision making process.

Our interpretation is that the core team values influence the way in which new information is assimilated and used, as demonstrated by Figures 3 and 4. If there was marginal or no influence of team values we should not see much differences within those graphs. These findings reveal how under the surface of exploratory market learning and market orientation processes, the team's beliefs and its relation with the type of information assumes a great deal of importance in making decisions. On the other hand, if it were simply a case of "ideology" or "escalation of commitment," we would expect that positive feedback would be uniformly accepted and negative uniformly rejected.

Lynn (1998) acknowledges that market learning depends on team formation, although it was beyond the scope of his study whether team values influence the way information is assimilated and implemented. Given the uncertainty of exploratory innovation processes, managers' response to market feedback depends on the extent to which the team is able to balance their own values and beliefs with market information. Consistent with the work of Veldhuizen et al (2006), we find a selective use of the information acquired. What we add to their paper is one of the possible explanations on why this phenomenon occurs — mainly the shaping role of team core values.

The case illustrates the difficulty for the project team to reconcile feedback received with its own beliefs. The team's decisions could be explained as a result of a recurrent dilemma: If market learning processes entail information acquisition, dissemination,

assimilation and implementation, to what extent and under which circumstances should market feedback be ignored, embraced or assimilated? How should one manage one's beliefs under innovation uncertainty?

Under market and technological uncertainty, scholars suggest that the NPD team needs to evaluate the information acquired (Kohli et al., 1990). There are two issues at stake: the ability to process information and the context in which it occurs. First, since decision makers are boundedly rational, they "*experience limits in processing (receiving, storing, retrieving, transmitting) information*" (Simon, 1977). Besides the manager's ability to process new information, managers may often purposely filter information. They may give different priority to new information received: when information is thought to be important, they are more likely to disseminate and use it.[5] When the information is unlikely to confirm one's beliefs, the piece of information is likely to be filtered and partially used. Second, in an uncertain environment, such as in radical projects, managers lack "hard" numbers in making decisions and consequently are more likely to rely more on intuition or rules of thumb. These heuristics are more likely to reflect one's beliefs, emotional commitments and ideology in a NPD project increasing the risk of buffering of new information.

However, this does not mean that there are *systematic* confirmation biases (Nickerson, 1998). Managers are neither systematically overlooking nor fully assimilating information. As the case shows, there is a degree of compatibility between team core values and the external feedback, rather than a mere consistency between information and prior beliefs as suggested by Menon and Varadarajan (1992).

The degree of compatibility is expressed by a threshold level above or below which the information is more likely to be biased by the team. Within these thresholds, managers evaluate and investigate the information at hand in an uncertain domain and may classify the

[5] Here we ignore the motivation of the manager to filter information for personal rather than organizational gain.

piece of information in terms of opportunity, costs, or future returns or other performance criteria. Below this threshold, the information is likely to be mainly inconsistent or incompatible with the team core values that drive the project. Thus the information is likely to be rejected regardless of the type of information or the potential user's desirability assessment. Above this threshold, the information is likely to be consistent with core team values and the team tends to fully assimilate the information acquired.

What influences the threshold level? Beside the strength of core values, the type of information has an important moderating role here. Core values are more likely to be "attached" to concept product attributes rather than product functionality attributes. The latter can be more easily modified and improved according to users' preferences. Moreover, in the later stage of product development, concept attributes are hard to modify and the team may reject any negative feedback to avoid costly changes in terms of time and money. The case highlights the importance of the type of information in market learning and market orientation processes and advances current theory, since the role of the different types of information has not been fully developed in previous research.

Figure 5 shows a modified model of exploratory learning processes where team values act as a buffer between information acquisition and information implementation. The filtering effect depends also on the moderating role of the type of information that affects the relation between the team values and the information assimilation. The nature of team values and beliefs, the type of information, the extent to which external feedback is solicited and the priority accorded it, play a crucial role in shaping decision strategies by information assimilation/implementation. Extensive explorative market learning practices may be necessary, but they certainly may not be sufficient to benefit NPD performance when team core values have strong constrained reasoning power.

***** Please insert Figure 5 about here *****

Managerial implications

Our findings suggest some tentative principles that may inform managerial action. These principles involve raising the awareness of the entire "chain" of information gathering from collection to assimilation. First, as radical product innovation implies dedicated approaches for managers in *gathering* market information, our results suggest that the information *assimilation* process requires conscious managerial attention in radical product development as well. Despite the sophisticated richness of the information acquired, managers may want to particularly challenge their assumptions about how information is ultimately screened, managed and assimilated by the development team during radically new product development. This implies greater managerial efforts not only on the upstream but also on the downstream of the market information processing.

Second, it may be important for managers to be aware of biases in the way information is processed and to realize that the existence of selective assimilation may lead to better product development outcomes. When managers become fully aware of the existence of these biases, they may try to investigate the relationship between a piece of information and the shared team values. They might be able then to recognize and distinguish when market information is fully compatible with their values (which they might have accepted *a priori*) or incompatible (which they might have rejected *a priori).* This may result in a "wake up call" for the team, pushing them to challenge their own beliefs and values when it comes to evaluate market information.

Third, our study highlights that the *type* rather than (or in addition to) the *richness* of market information may be a discriminating factor in the information assimilation phase. Thus managers may want to carefully and critically assess the type of information (such as conceptual vs. functional feedback in this particular case) acquired. Doing so, they might avoid unconsciously evaluating these different types of information in systematically different ways.

Finally, managers may want to be alert to the "ideological" basis of team decision-making, as those ideological values, although virtuous and well-meaning as in the case of environmental sustainability, could divert or cloud managerial attention from market information that may be necessary for the project to be a commercial success. We do not mean to imply that NPD teams should "sell out" out their values simply to achieve commercial success, but that it may be valuable to consider feedback that might at first glance appear to contradict the values but which actually may in the long run enable the firm to produce something that is both acceptable to the market and consistent with the values of the team.

Conclusion

Through an in-depth longitudinal case, our work provides evidence of how team values buffer new information acquired from being assimilated and used. It allows us to understand the extent to which the degree of compatibility between the core values and the new information produces different information acceptance outcomes. It also suggests how those acceptance levels are moderated by the type of information acquired. These findings provide advances toward a more nuanced picture of the processes involving new information and a more dynamic theory of market orientation and market learning.

Having highlighted its strengths does not mean that the paper is without its weaknesses. First, the use of only one case study may provide evidence of an idiosyncratic phenomenon. Conclusions and generalizations drawn from this study may thus stem from a very special case with unique characteristics. Needless to say, additional cases in different organizational settings or industries may strengthen the results. Second, the case selected illustrates a project that did not achieve its objectives. One may argue that unsuccessful projects are more likely to be influenced by team values. This assumption should be further

explored and tested with a larger sample of radical projects. Since a great number of projects fail (e.g. Crawford, 1977), the (negative) influence of core team values for the performance of a project should be seen as a further step toward understanding such project dynamics. Third, there were no cases in which an information unit fit with one core value, while clashing with another one. Such tension would raise additional questions on how to balance core values.

In conclusion, this paper has taken a first step in understanding the mechanisms by which information may be selectively assimilated and used in exploratory market learning or market orientation processes. The above limitations open several opportunities for scholars to study the topic of selective assimilation and use in exploratory market learning. The more nuanced description of how radical product development projects evolve is one step in that direction. Combined with the importance of radical new product development in organizations, we feel this research area will be a fruitful one in the future.

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Fig. 1 Traditional conceptualization of market learning

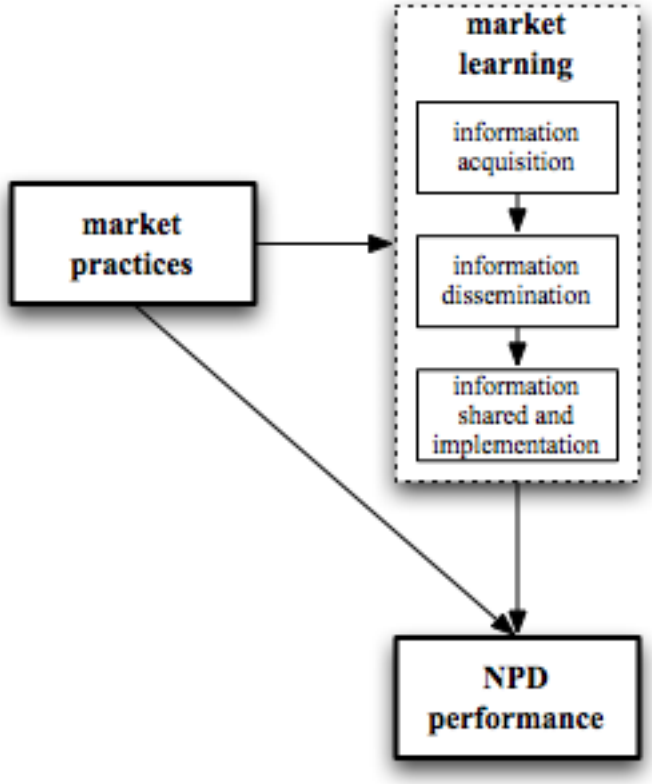


Figure 2: Mitka vehicle (October 2002)

Figure 3: the matrix of team core values

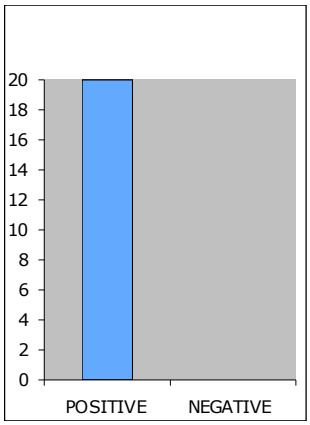
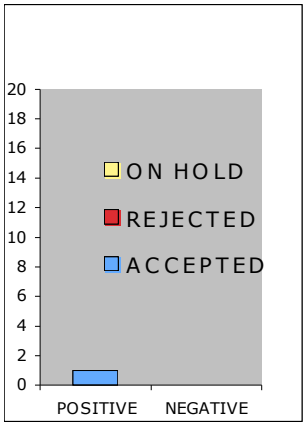
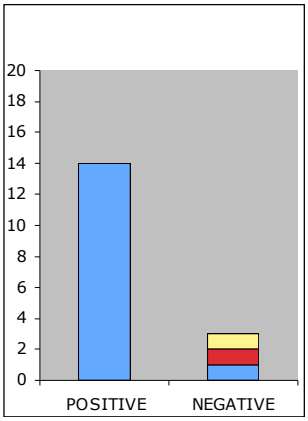
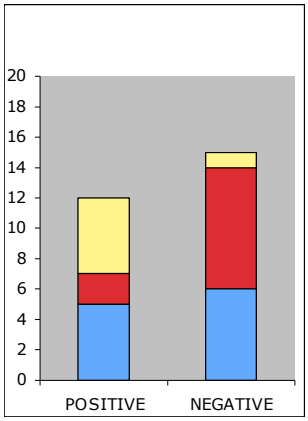
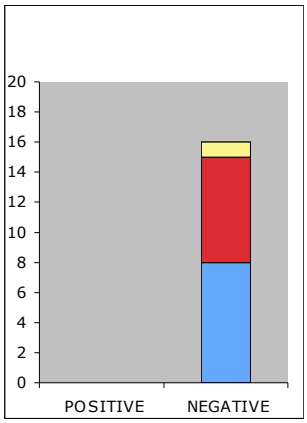
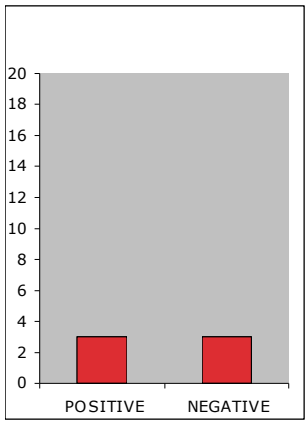
		Innovation-concern-driven		
		Fit	Neutral	Clash
	Fit			
Environmental -driven value	Neutral			
	Clash			

Figure 4: Type of information and its degree of compatibility with team core values

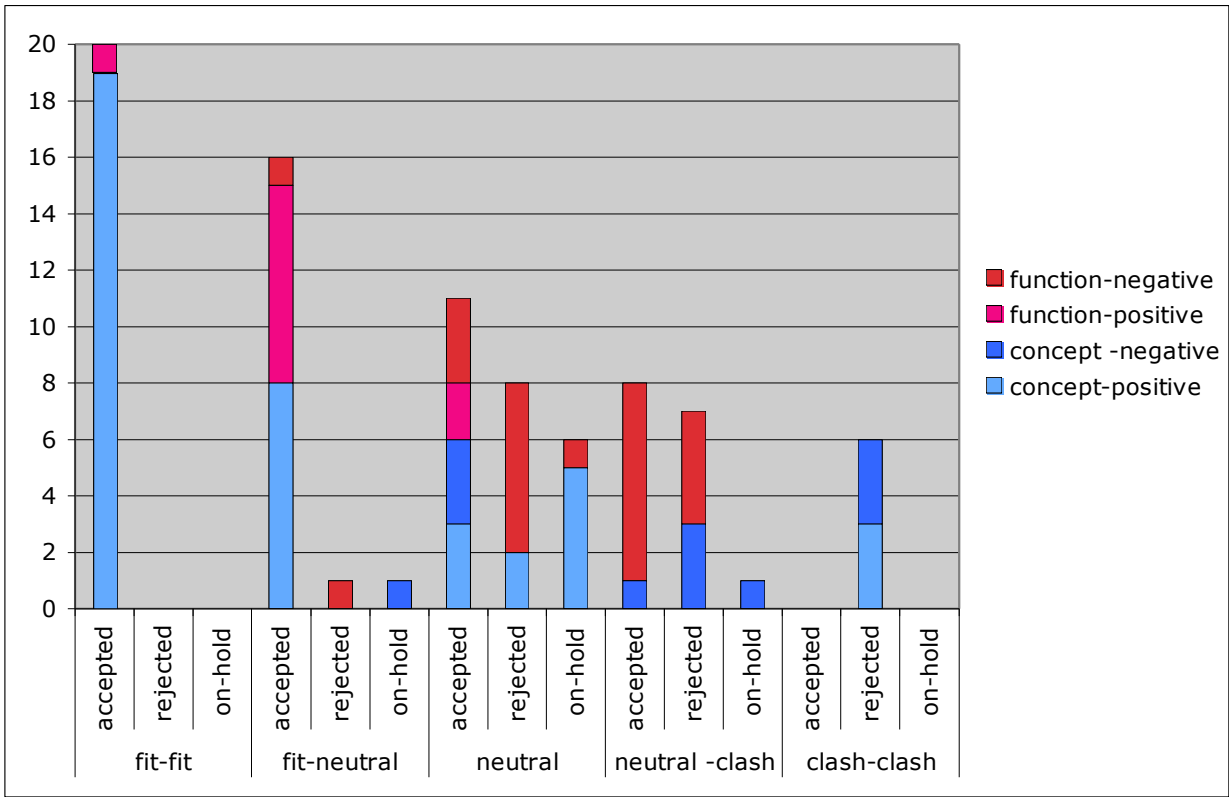
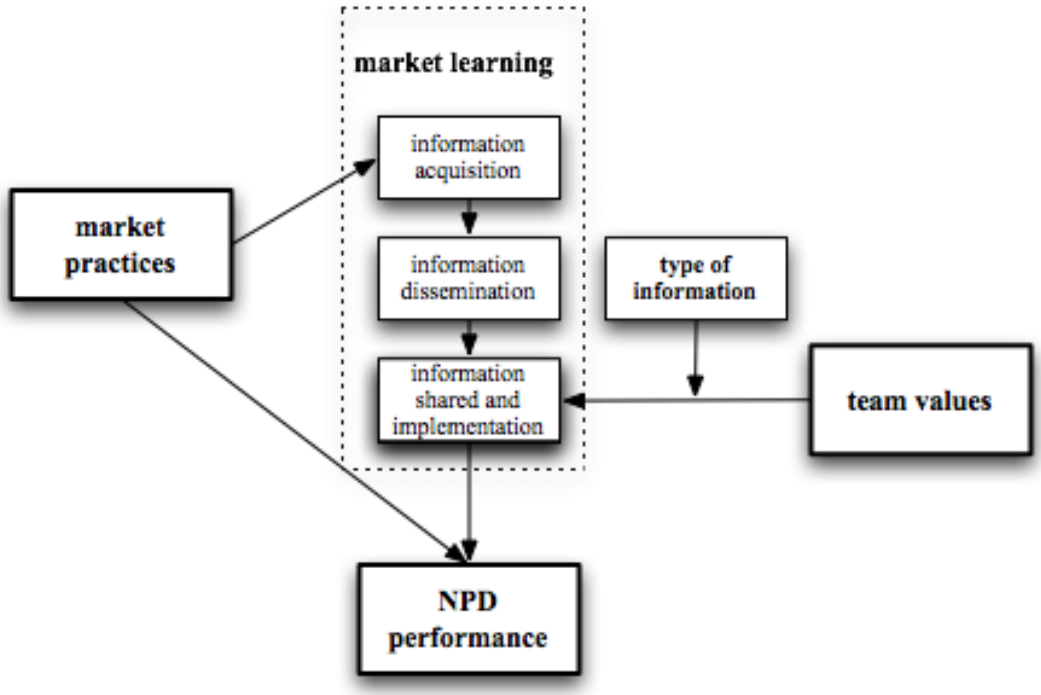


Figure 5: Revised model of the market learning process



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