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Adapting to the changing needs of managing innovative projects

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1 Introduction

Innovative projects pose challenges on the project manager, involving a variety of parallel, competing and conflicting simultaneous processes (Buijs, 2007). Characterized by uncertainty (Lenfle and Loch, 2010; Collyer and Warren, 2009), the needs of the project change as the innovation process evolves (Kim and Wilemon, 2002b; Koen, *et al.,* 2001). The responsibility for managing both the innovation process and the people in the team is usually in the hands of the project manager (Elkins and Keller, 2003). The role of the project manager seems to be crucial in the context of innovations, leading the professionals, guiding the development team through the iterative and chaotic front-end phase, and managing the process in the development phase (Valle and Avella, 2003).

The task of leading innovative teams is hardly an easy one, with the managers of innovative teams needing to balance between different approaches and behaviors (Amabile *et al.* 2004; McDonough III and Barckzak, 1991; Valle and Avella, 2003). As noted by Lewis *et al.* (2002), project managers must cope with multiple, often conflicting and fluctuating, contingencies as they seek to foster innovation and efficiency. Indeed, managing innovative projects brings forth contradicting and challenging demands for the manager. First of all, since the problems present novel, ill-defined tasks with no inherent direction, the leader must be capable of producing structure and direction to the work (Mumford *et al.*, 2002; Buijs, 2007; Kim *et al.*, 1999; Amabile 1997), as well as have a high tolerance for ambiguity (Buijs, 2007). Further, creative efforts of individuals and the team need to be fostered and channeled by the project manager (Simon, 2006), for example by encouraging exploration (Mumford, Scott, Gaddis and Strange, 2002; Hohn, 2000), acting as a role model (Amabile 1997; Farson and Keyes, 2002), encouraging intellectual stimulation (Waldman and Bass, 1991), providing autonomy (Amabile *et al.* 2002) and establishing a climate supporting innovative pursuits (Amabile and Khaire 2008; Barckzak and Wilemon, 2001; Edmonson, 1999).

In addition, individual innovative projects often span across the significant inherent disparities between different phases within the innovation process (Koen *et al.*, 2001; Kastelle and Steen, 2011), most notably between the early "fuzzy" front-end phases and the later, more structured development phases (Koen *et al.*, 2001). As innovation is marked by periods of stability and clarity and by bursts of creativity and ambiguity, the key question then is how managers respond to such fluctuations (Dougherty, 1996). However, even though many of the management approaches applicable in the early front-end phase might not be applicable in later development phases and vice versa, management studies rarely differentiate between phases of innovative projects in their prescription of appropriate approaches (Luukkonen and Björklund, 2011). Further, as noted by de Jong and Den Hartog (2007), much of the behavioural research on individual innovation has focused on creativity, i.e. on how leaders can stimulate idea generation, rather than how these ideas are being implemented, leaving a crucial part of the innovation process under-researched. Understanding innovation to consist of different phases requiring different kind of skills and behavior, both from the employee and the leader, is called for (West *et al.*, 2006; de Jong and Den Hartog, 2007; Kastelle and Steel, 2011).

This study adds to the knowledge on the implications of the different innovation phases on managerial approaches and requirements by examining project managers' concerns (i.e. activities and challenges) during the front-end and development phases in innovative projects in real time, as retrospective studies may offer limited, or inaccurate, insights into the uses of managerial activities (Lewis *et al.*, 2002). In order to investigate how project managers adapt to the changing requirements of innovative projects and what are the managerial concerns at different phases of innovation process, this study adopted a qualitative, longitudinal research design based on six new product development (NPD) projects. These six NPD projects were followed in in-depth interviews in three different phases of the project over a period of eight months. The data reveal the dynamism of managerial concerns faced by project managers as the innovation projects proceed, highlighting the importance of longitudinal studies as transitioning between phases was challenging and issues tended to accumulate as the projects proceeded.

2 Background

2.1 Managing innovative projects

Innovative work is often described to involve the solving of complex, ill-defined problems requiring the generation of novel, useful solutions (Ford, 2000), including not only idea generation, but the evaluation and implementation of ideas, as well (Mumford *et al.,* 2002). As studies have rarely differentiated between the different innovation phases, the terms innovativeness and creativity are used interchangeably in this study, even though innovations

require both creativity in the form of generating new ideas and the implementation of the outcomes of that creativity, i.e. ideas (e.g. Amabile *et al.*, 1996, Woodman *et al.*, 1993). By directing and evaluating the work, providing access or impeding it to resources and information, being involved in employees' engagement with tasks and other people (Amabile *et al.*, 2004), and facilitating idea production, experimentation, and the implementation of these ideas into new products (Mumford *et al.*, 2002), immediate leaders, or project managers, play a significant part in providing a work context where creative performance can be nourished (Amabile *et al.*, 2004; Mumford *et al.*, 2002; Shalley and Gilson, 2004).

Several leadership behaviors have been identified to affect people's willingness to engage in innovative efforts and the likelihood to succeed in them. Mumford *et al.* (2002) have suggested successful leaders of innovative work to apply two-fold influence tactics: leading people and leading the work. The former refers to concerns aiming to integrate activities and ensure timely production, whereas the latter is about stimulating and supporting creative efforts. Also Amabile *et al.* (2004) has noted, that leader behaviors supporting creative efforts require both task (or instrumental) and people (or relationship) –oriented actions. In the current paper this classic distinction between task- and people-oriented leadership behaviors (Fleishman, 1953) has been adopted as a basis for classifying different types of managerial concerns during the innovation process.

Task-oriented managerial activities target the problem at hand rather than the satisfactions of the group members, and include activities such as defining task roles and role relationships among group members, planning and coordinating group members' actions, determining standards of task performance, clarifying, monitoring, and providing evaluative feedback (Derue *et al.*, 2011; Forsyth, 1990). Amongst task-oriented activities, previous research on managing innovation has highlighted the need to develop and remind of a vision and strategic goals to cope with uncertainty and improve focus (Keller 1992; Kotter 2001; McDonough III and Barczak, 1991; Bass 1988; West and Richter, 2008). Another central activity is encouraging the exploration of new ideas, needs, and opportunities (see e.g. Bass 1988; Waldman and Bass 1991; Kim *et al.,* 1999; Hohn 2000; Amabile and Khaire 2008), by explicitly requesting creative and innovative solutions (Waldman and Bass, 1991; Mumford *et al.*, 2002; Amabile and Khaire, 2008), stimulating team members to consider and conceptualize problems in new ways (Waldman and Bass, 1991; Hohn, 2000), offering complex and demanding tasks (Shalley and Gilson, 2004), and acting as a role model (Amabile, 1997; Mouly and Sankaran, 1999; Barckzak and Wilemon, 2001). Autonomy in the process and day-to-day conduct of the work (Amabile, *et al.*, 1996; Amabile, 1998), as well as providing sufficient resources for pursuing the generation and implementation of different solutions (Mumford, *et al.*, 2002) have also been

highlighted. Especially time seems to be a crucial resource, with creative work requiring time to explore different perspectives and play with ideas (Amabile, *et al.,* 2002). Finally, in order to successfully conduct the task-oriented managerial activities, previous research has emphasized the importance of technical expertise in the domain of the project manager in development projects (Barckzak and Wilemon, 1989; Clark and Wheelwright, 1992; Howell and Higgins, 1990; Kim, *et al.,* 1999), suggesting that leaders should be able to contribute towards generating and recognizing feasible ideas, finding and defining significant problems, and providing technical stimulation to gather various ideas and solutions into a framework that can be used as a basis for further development (Roberts and Fusfeld, 1982; Howell and Higgins 1990; Kim, *et al.,* 1999). However, domain expertise might entice the project manager to go too deep into the role of a technical expert, at the expense of more fundamental leadership behaviors (Valle and Avella, 2003).

People-oriented managerial activities, on the other hand, address the feelings, attitudes and dissatisfaction of the group members, and include boosting morale, increasing cohesiveness, reducing interpersonal conflict, establishing leader/follower rapport and illustrating one's concerns and consideration for group members (Forsyth, 1990). Amongst these, in turn, previous research on creativity and innovation has emphasized fostering an open and safe team climate to support sharing ideas and taking initiative and risks (Kim *et al.,* 1999; McDonough III, 2000; Barckzak and Wilemon, 2001; Amabile 1996; Edmondson, 1999; Baer and Frese, 2003), and the project manager has noted to play an important role in establishing a climate that supports innovative pursuits (e.g. Fisher, 2010; Lee-Kelley and Loong, 2003). As failure has been recognized to be a prerequisite to invention (Farson and Keyes, 2002; Amabile, 2008), leaders should minimize the fear of failure and explicitly encourage intelligent risk taking (Farson and Keyes, 2002). As Amabile (2008; p. 107) has put it, "the managerial reactions that speak loudest to creative workers are reactions to failure". Without encouraging risk taking and learning from subsequent mistakes, a company cannot come up with breakthrough products, services or processes (ibid). Furthermore, when individuals feel positive, they tend to connect and integrate divergent knowledge and stimulus materials (West and Richter, 2008) and build future capacity by promoting future persistence in the case of setbacks (Fredrickson, 2001), thus increasing the likelihood of successful development results. Leaders should also provide social support (Mumford *et al* 2002), by recognizing the value of individuals' contribution, provide constructive feedback, and show confidence in the work group (Amabile, 1997). Since innovative project groups are typically composed of individuals with different backgrounds, perspectives, problems and needs, individual consideration is needed, showing concern for followers unique problems and approaches to work and providing developmental opportunities according to individuals' needs and desires (Bass, 1988; Keller, 1992).

2.2   Differences within the innovation process

Although research on leadership behaviors that support innovativeness are somewhat plentiful, these studies rarely differentiate between the different phases of the innovation process, lumping them all under the general pursuit of innovativeness. Nevertheless, clear differences exist within the innovation process. Defined as a process of turning opportunities into new ideas, which are turned into practice and disseminated (Tidd *et al.*, 2005), or "coming up with something new, implementing it and successfully introducing it into the marketplace" (Buijs, 2003), innovations include such activities as invention, design, manufacturing, marketing, distribution and product support (Smith, 2006). While the "*innovation process is a set of different, parallel, competing and conflicting processes which all occur at the same time*" (Buijs, 2007: 204), a distinction can be drawn between three general phases: the front-end phase, development phase, and commercialization phase (see e.g. Buckler, 1997, Koen *et al.,* 2001).

The first two of these, the front-end phase (or front-end of innovation, FEI) and the development phase (or new product development, NPD), are focused on the development of the idea itself. The FEI is considered as the first stage of the innovation process, and it can roughly be described as the period from the idea generation to its approval for development or termination (Murphy and Kumar, 1997). Marked by "fuzziness", uncertainty and unpredictability (Koen *et al.*, 2001; Zhang and Doll, 2001; Zien and Buckler, 1997), ideas are developed into concepts in the FEI (Nobelius and Trygg, 2002), whereas the NPD phase focuses on developing these concepts into final products (Koen *et al.*, 2001). NPD is usually described as a series of stages through which an idea is processed and evaluated (Koen *et al.,* 2001), during which a full development team is working on the project (Kim and Wilemon, 2002a). It is characterized by high-levels of formality and routine working (Kim and Wilemon, 2002a), and speed and timing issues play an important role in this phase. Further, Koen *et al.* (2001) note that compared to the uncertain and unpredictable front-end phase, the development phase is more structured and linear and the nature of working is disciplined and goal-oriented. Indeed, the FEI and NPD phases differ in several aspects (see Table 1).

Table 1 General characteristics of FEI and NPD phases

Due to these inherent differences in the nature of different innovation process phases, different managerial approaches are clearly required within innovative projects (see e.g. McDonough III and Barckzak, 1991; Buijs, 2007; Kim *et al.,* 1999). Many of the managerial approaches applicable to NPD may not be applicable to FEI, and vice versa (Buckler, 1997; Koen *et al.,*

2001; Luukkonen and Björklund, 2011). For example, West (2002) has noted that creativity might be a central factor for the development of a solution, but less significant when putting those solutions into practice, and the research emphasis on idea generation has come at the expense of studying idea implementation. Furthermore, transitioning between these different phases has received little attention. In order to address these limitations in our current understanding of managing innovative projects, the present study proceeds to investigate how project managers adapt to the changing requirements of the innovation process.

3 Methodology

3.1 Data collection

In order to investigate how project managers adapt to the changing requirements of the innovative projects and what are the managerial concerns at different phases of innovation process, this study adopted a qualitative, longitudinal research design based on six new product development (NPD) projects. Data were collected from a graduate level product development course at [name of University anonymized], during the semester of 2010-2011 by one researcher. The structure of the course provided a setting where one could approximately predict the timing of different phases of innovation, providing an opportunity to simultaneously explore several projects of the population with similar external environments and constraints (Eisenhardt, 1989). Out of the 15 projects in the course, six were chosen for the present study, aiming to maximize the heterogeneity of the projects in terms of the project briefs, sponsors, team composition and managerial backgrounds in order to improve the validity and reliability of the obtained results (see Table 2). The project managers of these six projects were followed throughout the NPD project and interviewed at three different phases by one researcher.

In the course, each project team is given a unique industry-provided design brief to which an industry sponsor provides a 10 000 euro budget for the development work for the duration of the eight-month course. Thus the students work for a real customer throughout the project. The course requires the teams to produce a functional prototype as a result and the course ends with a Gala day, which is open to the public and where the teams present their end product and have the functional prototype to test in their fair booth. Students are selected to the course based on student applications, and project managers need to separately apply for the position – hence each of the interviewees were willing to take the duty of managing the project. The project managers were in their mid-twenties, and had educational backgrounds either in business, industrial design, product development or work psychology. Most of the project managers had several years of working experience in their field, although accrued in various summer and part time jobs. The sizes of the interdisciplinary student teams varied between nine to eleven team

members, and half of the teams had also remote team members in a foreign partner university (referred to as off-site team members in Table 2).

Table 2 Characteristics of respondents and projects

The six project managers were interviewed thrice during the project lifespan, resulting in 18 interviews. The first interviews took place when the projects had been running for approximately six weeks, regarded as the front-end phase, the second interviews in the early development phase at four months, and the final interviews in the late development phase at seven months, approximately three weeks before the end of the project. Since it was assumable that clear differences, e.g. regarding the nature of work, would exist between the beginning of the development phase (early development phase) when the project teams had just started working on the physical prototype and the end of the development phase (late development phase) when the project teams should be finalizing the functional prototype, the authors decided to conduct interviews in both phases of the development phase. However, as the design briefs of the teams varied in their scope (see e.g. project briefs in interviewee 1 and 3 in Table 2), the nature of work in the same phases of different projects could differ somewhat.

The face-to-face interviews were semi-structured and interview questions were formed based on identified central themes in the existing literature on managing innovative projects. The interviewees were for example asked to reflect on their activities, their principal roles and challenges in the project. Open questions were formulated on these themes, asking for significant, successful or problematic experiences on the topic. For example role reflections were prompted by *"What do you see as your most important role as the project manager?"* and *"Where do you see that you have succeeded well as the project manager?",* and challenges by questions such as *"What are the biggest challenges in managing the project at the moment?"* and *"Can you give some concrete examples on what has been your approach in challenging situations?"*. The aim was to gain an improved understanding about the project managers' managerial activities and challenges i.e. what had they done in practice and why, as well as what kinds of challenges had they met in managing the project. The core questions were same for all interviewees in all of the three interview rounds but the order of them varied depending on the flow of the interview, and additional prompting questions were utilized to encourage further clarification. The resulting 18 interviews lasted between 31 and 57 minutes, averaging at 44 minutes. The interviews were audio recorded and transcribed for analysis. In addition, comprehensive notes were taken in each of the interviews, which were then transcribed into an interview memo, right after the interviews.

3.2   Data analysis

The interviews transcripts were studied thoroughly in order to find common themes. The initial coding was done by the same researcher who conducted the interviews, identifying managerial activities, and challenges described by the project managers. Managerial activities were defined to consist of actions pursued or being considered by the manager, whereas managerial challenges included difficulties expressed or problems reported to a specific theme by the project manager. For example, the following quotation was labelled as an activity.

"I am prioritizing tasks and checking what needs to be done and by when and also to recognize the ones we don't have time to."

The following quotation, in turn, is an example of a segment labelled as a managerial challenge:

"They provide very little any feedback. If I am present, everyone is acting very correctively. It would of course be nice to know if there is something on their mind as now I am living in the illusion that everything is just fine."

This initial coding resulted in 856 segments. The identified segments were then grouped into categories based on the thematic similarity of their content by two researchers. The content of each category was thoroughly discussed and reflected by the researchers. Existing literature on leadership supporting creativity and innovativeness was used as a basis for data analysis and for developing categories further. Hence, information from both existing literature and insights emerging from the interviews were used to come up with potential new categories. A segment could belong into more than one category, for example the following segment was classified to both the category of *providing autonomy* and the category of *clarifying roles and setting goals*:

"I am the one who is telling what to do and when to do, sometimes also how to do. Even though I aim to give people freedom in doing their tasks, for some it doesn't work and you need to guide them more closely."

After the first categorization round, there were altogether 16 categories. These were grouped together into classes based on the target of the category activities and challenges: general project management, responsibility and ownership, providing a suitable context for development work, and providing support within the project group. After forming the initial categories and classes, all the categories were revisited in order to see the critical elements in the data. During this phase, the final categories and classes were formed. Some of the classes remained the same while others were modified. Further, one totally new class, establishing a climate of trust, was created and few categories (creating an open and trustful atmosphere and minimizing the fear of failure) from the class of providing a suitable context for development work were moved to the new class. Hence, the final categories consisted of 19 categories (see

Tables 3 and 4) grouped together into five classes. These classes were again divided as task-oriented (general project management, responsibility and ownership, and providing a suitable context for development work), or people-oriented (establishing a climate of trust and support within the project group) based on the classic behavioural approach of leadership (Fleishman, 1953). Further, the occurrence of mentioned managerial activities and challenges was counted throughout the process in order to indicate how notable the managers regarded the different activities and challenges at different phases of the project (see Table 5). Finally, the occurrence and content of each category were compared between the three different phases front-end, early development phase, and late development phase to see possible tendencies among the phases.

4   Results

Tables 3 and 4 present all of the categories of managerial concerns with example quotations (including activities and challenges related to a particular theme) that were brought up by the interviewees. Further, in Table 5, the number of reported managerial concerns (i.e. activities and challenges) in each phase is presented. The results are grouped into two types of managerial concerns; task-oriented and people-oriented (Fleischman, 1953) where *task-oriented managerial activities* target the problem at hand and *people-oriented managerial activities* the satisfactions of the group members. Task-oriented managerial concerns (activities and challenges) were dominant in all three phases and in all, they were reported approximately three times as much as the people-oriented concerns; the managers described altogether 382 task-oriented activities in comparison to only 146 people-oriented ones (see Table 5). Interestingly, the reported activities decreased as the projects proceeded while at the same time the reported challenges increased. A total of 218 task-oriented challenges were recognized compared to 110 people-oriented ones. In both, most challenges were faced in the late development phase and project managers reported almost as much challenges as they did activities (see Table 5).

Table 3 Overview of task-oriented managerial concerns

Table 4 Overview of people-oriented managerial concerns

4.1 Front-end phase (FEI)

During the front-end phase, as in all three phases, *clarifying roles and setting goals, and coordinating the whole*, were the largest and second largest category of activities (see Table 5). During the start of the project, the managers were emphasizing creating a common vision and understanding of the project (category: *clarifying roles and setting goals)*. Regarding coordinating the whole, in the earlier phases of the project activities such as sharing information between subgroups and making sure everyone was heading to the same direction were perceived as important whereas in the later phases, emphasis was more on assuring the allocation and schedule of resources. *Encouraging team member participation, encouraging exploration* as well as *creating an open and trustful atmosphere* were other activities that marked the front-end phase. Further, *minimizing the fear of failure* and *establishing ways of working* were mainly emphasized in the front-end phase. The managers were encouraging exploration mainly in the front-end phase by explicitly requesting the team members to produce several solution alternatives to problems, encouraging team members to take on multiple perspectives, and avoiding providing any ready solutions. This was also seen to be most challenging in the front-end phase as the managers were still searching for the best way to interact with their teams. In order to foster open and trustful atmosphere, managers encouraged team members to give feedback, acted openly and relaxed themselves, and aimed not to dominate the meetings. Further, managers brought up the importance of getting to know team members. *Providing autonomy*, similarly, was most numerous in the front-end phase, and correspondingly reporting manager-made decisions was least common in the first of the three phases. On the other hand, all of the managers had a central role also in the *hands-on participation*, related e.g. to market studies or ideation, in the front-end phase.

In terms of challenges, *time-management, encouraging team member participation,* and *accommodating for diversity* were amongst the most numerous challenges in all three phases. Challenges were reported in the front-end phase with team members being reluctant to spend time and participate actively in team meetings or informal gatherings. These challenges increased as the project proceeded. However, *encouraging team member participation* and *clarifying roles and setting goals* were clearly least problematic in the front-end phase compared to the challenges reported in subsequent phases. In encouraging team member participation, difficulties were reported mainly in getting all team members to voice their

opinion as team meetings were held in English, the mother tongue of none of the members, and in getting engineers to participate actively in tasks outside their field of know-how. However, the managers reported that finding roles for every team member was challenging throughout the entire project, especially for the less active team members. Further, in some of the cases defining separate roles for all members when there were many representatives from the same discipline was difficult. Diversity challenges (category: *accommodating to diversity*) in the front-end phase were mainly related to integrating the different approaches of the interdisciplinary team to idea generation.

> **Proposition 1a:** Task-oriented activities related to developing a shared sense of direction and role expectations are emphasized in FEI, ensuring that team skills are utilized fully.

> **Proposition 1b:** Establishing behavioral norms is a key task in FEI, setting the tone for the rest of the project.

> **Proposition 1c:** Integrating heterogeneous team members to the project is a characteristic challenge in FEI.

4.2 *Early development phase (EDP)*

The most frequent activities reported in the early development phase remained largely the same than in the front-end phase, with *clarifying roles and setting goals, coordinating the whole, encouraging team member participation and establishing ways of working* remaining the most numerous categories. The methods of encouraging participation remained similar through the project phases, including actively asking for opinions, explicitly encouraging participation in tasks, dividing the team into smaller subgroups and contacting quieter team members individually to prompt for their view. Achieving active participation in team meetings was still a challenge in the early development phase as in the front-end, for example due to technical challenges with the participation of off-site members. However, *hands-on participation* was split between the managers: three reported much more hands-on activities, whereas three were no longer involved in the hands-on work of the project. Where in the front-end these activities were related to concept creation and ideation, in the early development and late development phases they were related mainly to building the physical product prototypes and managers having domain expertise in the project were taking stronger role in this. The managers kept *monitoring the work*, by checking the situation in weekly team meetings or enquiring on progress by phone or email. By the early development phase the managers were more familiar

with their teams, and reported that the work of some team members needed to be monitored more closely than others. On the other hand, the reported amounts of *dispersed decision-making and providing autonomy* were approximately halved from the front-end phase, and *manager-centric decisions* more than doubled. Several activities were least numerous in the early development phase, including *minimizing fear of failure, being available and present,* and *monitoring work and documentation.* Clearly, most of the managers had to rethink their roles after the front-end phase.

Coordinating the whole was reported as least challenging during the early development phase compared to the beginning and end of the project. On the other hand, challenges reported regarding *clarifying the roles and setting goals*, as well as regarding *team member participation* approximately doubled compared to the front-end phase. The most *manager-centric decision* challenges were reported in the early development phase. This reflected the project manager having a strong role in decision-making and making the final decisions in situations where no clear decisions could be made with the team. *Time management* and *accommodating to diversity* remained as key challenges.

> **Proposition 2a:** Transitioning to EDP requires managers to rethink their roles. For example, while all managers engaged in hands-on participation in the FEI, transitioning to EDP necessited changes in the degree of involvement.

> **Proposition 2b**: Managerial approaches become less democratic as ambiguity is reduced in EDP.

> **Proposition 2c**: Challenges increase in the EDP, due to both changing managerial roles and difficulties in addressing accumulating problems.

4.3   Late development phase (LDP)

Clarifying roles and setting goals, coordinating the whole, and *hands-on participation* were the most numerous activity categories in the late development phase. *Encouraging team member participation* dropped markedly. At this point, the focus was mainly on getting all team members to participate in the best possible way for the rest of the project, and the managers seemed somewhat resigned in their ability to influence problematic situations. Activities related to *establishing ways of working, time management*, and *acting as an interface* were least numerous in the late development phase, whereas *providing positive feedback and recognition,* and *solving interpersonal issues and acting as a mediator* were most numerous in this phase.

While in the front-end phase feedback was given mainly after accomplishments, in the two development phases frequent positive feedback and small gestures of appreciation such as bringing refreshments and snacks to work sessions were utilized to counterbalance long work hours and setbacks (category: *providing positive feedback and recognition*).

In general, the amount of reported challenges increased in the late development phase. *Time management* challenges dominated the challenges reported in the late development phase, the amount being more than double of that in the previous project phases. Especially the completion of the different sub-task of the project lagged, and some of the managers were overburdened with tasks as well. However, only few attempts were reported to address these issues. Also challenges related to *creating an open and trustful atmosphere*, *accommodating to diversity*, and *monitoring work and documentation* increased somewhat. Incorporating off-site team members (category: *encouraging team member participation*) to the process was the main diversity challenge in the late development phase, with difficulties for example in keeping off-site members in the fast-paced decision-making loop. Challenges related to *coordinating the whole* were also most numerous in the late development phase, where the *hands-on participating* managers felt their degree of involvement in the execution of the project backfired.

> **Proposition 3a:** Managerial approaches shift from exploration to execution in LDP, focusing on making do with the existing resources to ensure timely production.

> **Proposition 3b:** Activities related to on-going challenges decrease as time pressure increases, managers ceasing further attempts to influence accumulated problems such as involving team members.

> **Proposition 3c:** Due to a lack of time and attention, problems accumulate fast, especially with managers involved in hands-on activities.

Table 5 Occurrence of managerial concerns in each phase

5   Discussion

Although there is a widespread agreement that the various phases in the innovation process have different natures and requirements (e.g. Kastelle and Steen 2011; de Jong and Den Hartog, 2007; Koen *et al.* 2001), management research largely ignores phase differences in its recommendations for appropriate managerial approaches in the context of innovative projects. The present study provides further support to the view that project managers of innovative

projects need to be able to adapt and respond to the variations between the periods of stability and clarity, and creativity and ambiguity (e.g. Dougherty 1996; Lewis *et al*. 2002). This study addresses the gap in knowledge by exploring changes in managerial concerns (i.e. activities and challenges) in the front-end and development phases of the innovation process. The results reveal that project managers do indeed report different types of activities and challenges in different phases of innovative projects, and that the transition between phases is somewhat problematic. Five contributions to management literature are discussed in more detail, after which implications for practitioners are presented.

5.1   *Contribution to existing knowledge on managing innovative projects*

Our research contributes to understanding of managing innovative projects in five ways. First, the importance of taking phase differences was further supported. The concerns brought up by project managers did not remain static, but varied between the different phases of the development projects surfaced, highlighting the complex and changing nature of the innovation process (Buijs, 2007; Koen et al., 2001; Waldman and Bass, 1991). For example, activities aiming to boost innovative working such as, encouraging exploration, minimizing the fear of failure and establishing ways of working, were highlighted mainly in the front-end phase whereas the allocation and scheduling of resources was emphasized in the latter phases. Hence, managerial approaches moved towards more traditional ones as the project proceeded.

Second, managerial concerns were strongly tilted towards task-oriented rather than people-oriented. This is interesting, as previous research on fostering innovativeness has emphasized the people-oriented managerial concerns, such as establishing a climate for psychological safety (Edmondson, 1999), minimizing the fear of failure (Farson and Keyes, 2002), and providing support (Mumford et al., 2002), among others. These themes, however, did not receive a lot of attention from the project managers in the present study. Interestingly, while all project managers emphasized the importance of having an open climate in the front-end, not all took tangible actions towards this goal.

Third, the accumulation of problems seemed to lead to eventual disregard, providing a possible explanation for the previously observed dominance of task-oriented activities for project managers (Mäkilouko, 2004). Challenges related to utilizing the diverse skills of the team in a rapidly changing project environment, such as finding suitable roles and establishing active participation, more than doubled as the projects proceeded. Simultaneously, reported activities decreased. There were multiple examples in which a manager reported a problem, but had not actively attempted to solve the problem in any manner. Selmer (2002) has suggested that project leaders, in response to stressful project problems, may choose mental avoidance as the their

strategy to cope with the situation which finally result in task-oriented (rather than people-oriented) approach. Indeed, in the present study there were several cases in where the project managers for example noted that they had not received any response from their teams to their repeated attempts to foster a more open atmosphere and thus eventually gave up their attempts. It seemed that once past a certain threshold, the managers shaped their role to emphasize those activities, which bared most fruit and abandoned (rather than continuing to reformulate) those that were unsuccessful.

Fourth, the study provides further support for the importance of the beginning of the project for establishing behavioural norms (Kloppenberg and Petrick, 1999). Our research showed front-end phase to be the fruitful place for establishing solid base for efficient teamwork. If the managers did not make an effort to create team's ways of working or build up the feel of togetherness in the front-end phase, the more likely it got that these issues were not be considered important in the later phases either. However, as previous research has recognized, people involved in innovative projects need to continually face complexity, uncertainty and unexpected events, especially during the explorative front-end phase (Oddane, 2015; Koen *et al.*, 1999) making creating certain supporting structure necessary for efficient working. Hence, managerial activities providing structure to the "fuzzy" front-end is called for, alongside with the granted autonomy recognized to be crucial in supporting creative efforts (Amabile, 1998).

Fifth, the early development phase emerged as a transitional phase between the ambiguous front-end of innovation to more structured development phases. This change in the nature seemed to require project managers to rethink their managerial roles and adjust their management approaches. Further, this transition phase was also a challenge for most of the project managers, as they were required to shift from fostering creation to fostering an execution kind of a approach. Given the emphasis that innovation literature tends to place on idea generation (e.g. de Jong and Den Hartog, 2007; Kastelle and Steen, 2011; Björklund *et al.*, 2013), the problematic experiences in transitioning from conceptualization to development and implementation highlight the need to study the entire innovation process, and differentiate between the different phases. One of the most marked differences in the transition phase emerged in the changing degree of managers' hand-on participation in the project. While all project managers had taken part in ideation activities in the front-end phase to encourage exploration, some began to take part in the actual design activities in the latter phases, whereas others distanced themselves from the hand-on working. However, diving deeper into the actual prototype building was often done at the expense of other managerial duties during the late development phase – a risk previously discussed by Valle and Avella (2003). Thus project managers that are unable to contribute to the technical execution might have more room also for

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people-oriented managerial approaches. On the other hand, the present study suggest that project managers without domain expertise need to be able to tolerate more uncertainty than the ones that do, as they were unable to predict or help to solve technical problems, or even estimate how long it would take to fix the situation. While previous research has emphasized the importance of the domain experience of the project manager (Kim et al., 1999; Valle and Avella, 2003), a closer look at the domain expertise of the project managers and its influence on the adopted managerial approach would be interesting, as it seemed to have a large effect in the transition phase in the present study.

Given the small amount of individuals in a single setting, the generalizability of the results is naturally somewhat limited, and similar studies should be repeated in a larger scale. Although the present study utilized relatively mature and experienced students working with a 10 000 euro budget for actual clients, naturally corporate projects should also be investigated. However, while the distribution and nature of activities and challenges may vary in different settings, the current longitudinal design avoided retrospective sense making of the phases, and was able to unearth several contradictions within the process. Indeed, the importance of longitudinal studies is highlighted by the findings. Future research should extend longitudinal designs to study the effect of different managerial activities on project performance and team member perceptions, connecting managerial concerns to output.

5.2 Managerial implications

Several managerial implications to be taken into account in managing innovative projects were revealed by the study. First of all, the present study recognized a pronounced need for creating better understanding of the transition phase from the conceptualization (front-end) to the development (NPD) phase. As most of the project managers were required to rethink their roles after the front-end and struggling with moving the project from the "creation-mode" to the "execution-mode", recognizing supporting elements that promote the success of this transition phase is necessary. Projects managers can benefit from explicitly considering the need for changes in their role. Further, as the nature of work changes when moving from the front-end to the development phase, the transition may also require establishing different kinds of norms for working. Many of the project managers divided the team into sub-teams after the development phase, which could lead to a disunited team. Hence, we suggest that the project manager needs to update the norms for working agreed on in the front-end phase to ensure that the team continues working efficiently as a whole.

Second, the results suggest that putting effort in the front-end phase on practices that support creating and maintaining a desired atmosphere and ways of working in the team would benefit

the team throughout the project. Most of the managers highlighted the importance of establishing an open and trustful atmosphere at the beginning of the project, however not actively building practices (such as regular informal team gatherings, providing different methods for team building) to support this. As the project proceeded, team atmosphere-related activities seemed to be buried under concerns more concretely ensuring the progress of the project (such as setting goals and monitoring the work) while at the same time recognizing the importance and effects an atmosphere may have on team working. In order to achieve an atmosphere where people feel free to share their unique points of view without the fear of negative judgment, the project team clearly needed to spend longer periods of time together in the front-end phase. Hence, we argue that the project manager needs to put effort on arranging both common working sessions as well as informal gatherings where team members have the opportunity to get to know each other better, especially in the front-end phase. The further the project proceeds, the more difficult it can be to reserve time for e.g. informal gatherings. However, if the base for a united team has been built in the front-end phase, the feeling of togetherness can carry throughout the project.

Third, the early phases of the NPD project seem to be crucial also for utilizing all of the capabilities of the team. In the present study, the project managers were struggling with finding suitable roles for everyone, with the challenges only becoming more pronounced as the projects proceeded. Hence, the heightened ability of an interdisciplinary team to solve complex tasks through the broad array of expertise, skills and knowledge might be left unutilized if the project manager is not fully aware of all the skills, knowledge and capabilities of the team already in the front-end phase. The better the project manager is aware of them already at the front-end phase, the better the s/he is also able to define roles and delegate tasks and hence to utilize all team members also during the later phases of the project. Some of the managers in the present study made explicit efforts to increase both their own understanding and that of other team members on each members' skills, with for example by requesting small background presentations to be made for the entire team. Further, we propose that in order to be able to divide meaningful roles and set clear output expectations, the project manager should take the time to have one-on-one discussions with the team members for becoming aware of their talents and motivations.

Finally, the current study highlighted the need for establishing practices supporting open communication early on during the front-end of the project. The managers struggled with getting team members to share their unique point of views at different phases of the project. Further, as NPD projects usually require interdisciplinary teamwork, the project manager or team members may not be familiar with the field of others and it is the duty of each member to

make their skills, expertise and knowledge explicit at the early phase of the project. Hence, practices supporting the open communication among team members need to be purposefully established within the teams in the early phases of the project, in order for them to become natural, well-rooted ways of working within the teams and in order to fully utilize the diverse skills of interdisciplinary team. We argue that project managers could benefit from enforcing regular sessions for discussing how the team is doing as a team and how the project is proceeding. For example, providing both positive and constructive feedback on an individual as well as on a team-level can open up important discussions within the team.

5.3   Conclusions

Based on a longitudinal study of six new product development projects, the current study investigated the variation on managerial concerns in the different phases of the innovation process. Both reported challenges and reported activities changed greatly between phases. While task-oriented concerns dominated the project managers' approaches throughout the projects, some managerial efforts in for example time management were discontinued after prolonged challenges. The early development phase emerged as a transition phase between the exploration-focused, rather democratic, front-end of innovation and the manager-led late development phase focused on timely execution. While all project managers took part in ideation activities, domain expertise seemed to have a large impact on subsequent reformulation of roles in the early development phase, with problems related to both increasing and decreasing hands-on participation in the project. In general, problems seemed to accumulate throughout the process, and in the midst of the late development phase time pressure, the narrowest scope of managerial activities was reported. The results highlight the importance of research adopting longitudinal designs in order to better understand the dynamics of managing innovative projects, taking into account the different nature of different phases of the innovation process as well as the transition between them.

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