Pre-development activities, such as new product idea screening, are considered to play an important role in innovation success. At the screening stage, a management team evaluates new product and service ideas and makes a first go/no-go decision under high levels of uncertainty and ambiguity. Paying more attention to the decision-making process in the screening stage appears important because too rigorous a use of rigid evaluation criteria and inflexible methods have been shown to have an adverse effect on market performance of novel products. The present study proposes and tests a model of team-level antecedents and consequences of reflexivity—the explicit evaluation and discussion of working methods, tools, and criteria within a team. Recently, researchers have proposed that cognitive style and leadership style are major antecedents of decision-making performance. This study posits that reflexivity offers an explanation of how transformational leadership and cognitive style can eventually affect decision-making performance in the context of new product idea screening. Results of a survey among 126 top managers from large international firms show that the positive effects of transformational leadership and procedural rationality on the effectiveness and efficiency of screening decision making are largely mediated by reflexivity at the team level. This suggests that screening teams can improve their decision making in the following ways: committee chairs are advised to stimulate openness, develop a stop-and-think attitude among screening committee members, and support argument-based discussion in order to adapt available decision tools, models, and checklists whenever needed. The paper concludes with implications, limitations of the study, and suggestions for further research.

Changes in customer requirements, the speed of technological progress, and hyper competition make firms’ product offerings rapidly obsolete and thus vulnerable (D’Aveni, 1994, 1995; Tidd and Pavitt, 2001). To sustain profitability, rapid development and introduction of successful new products is crucial. Innovation failure rates, however, reach levels between 60% and 85% (Andrew and King, 2003), while investments in new product development and launches are often substantial. As a result, an urgent need exists to improve innovation success rates—for example, by making improvements in the various stages of the innovation process.

In this study, the focus is on decision making in the new product idea screening stage. Screening is generally performed by a cross-functional senior management team or committee (Cooper, 1994), occurs at the first important project review point (Schmidt, Montoya-Weiss, and Massey, 2001; Schmidt, Sarangee, and Montoya, 2009), and coincides with the first investment decisions in the innovation process (Leonard and Sensiper, 1998). Decision-making effectiveness at this point is considered to play an important role in innovation success (Alam, 2003). Screening aims at evaluating new product ideas in order to eliminate those ideas that will probably not lead to successful new products and select ideas for further development that will have a substantial chance at success. Therefore, the screening stage generally leads to a go/no-go decision. Ideas that pass the decision gate will typically be further developed into a business case or a prototype. Based on a second evaluation, a new product development project is then planned and executed. Various studies have focused on the identification of evaluation criteria at this stage (Carbonell-Fouliquié, Munuera-Alemán, and Rodriguez-Escudero, 2004; Hart, Hultink, Tzokas, and Commandeur, 2003; Tzokas, Hultink, and Hart, 2004). The screening process, however, has received less attention in research.

Paying more attention to the decision-making process in the screening stage appears important because too rigorous a use of rigid evaluation criteria and inflexible methods have been shown to have an adverse effect on learning and market performance of novel products (Sethi and Iqbal, 2008). In his article about
third generation new product processes, Cooper (1994) also points out this risk and discusses the idea of fuzzy gates. Fuzzy gates are less rigid and definitive than traditional go/no-go decision gates, as they allow decisions to be made conditional upon information that becomes available in the future. This idea of less absolute gates makes much sense at the screening stage because new product ideas are evaluated for feasibility, risk, market potential, and other dimensions on the basis of a relatively vague concept and under relatively high levels of uncertainty. The vagueness of the concept and the level of uncertainty vary with the tangibility of the product and its degree of innovativeness, as well as the stage of development of the idea, but screening decision making generally suffers from much uncertainty, especially compared with later decision gates. To further increase new product idea screening decision-making performance, it appears necessary to look for approaches that make the process less rigid, to allow for a more flexible adaptation of evaluation methods, tools, and criteria for the unique situation at hand.

The design or choice of appropriate screening methods, tools, and criteria must be made in light of many considerations (Cooper, 1985; De Brentani and Dröge, 1988). To explicitly consider, evaluate, and discuss the appropriateness of the screening methods and tools in use increases flexibility and learning. It might help the screening committee become more aware of presently and previously used procedures and criteria, as well as their limitations, and thus trigger the development of better adapted approaches (Carter and West, 1998). Evaluating and discussing the suitability of procedures and tools in a team is captured by the concept of group reflexivity, which is defined as “the extent to which group members overtly reflect upon, and communicate about the group’s objectives, strategies (e.g., decision making) and processes (e.g., communication) and adapt them to current or anticipated circumstances” (West, Garod, and Carletta, 1997, p. 296).

Reflexivity points to a second-order reflection, which is the opposite of blindly accepting and applying a given method. It positively affects team performance by helping teams to become aware of limitations to their approach and make adjustments as needed (West, 1996). An explicit reflection on formal and informal screening criteria and tools might lead the team to adapt their methods for volatile environments and requirements. This increase in flexibility might improve the ability of the team to assess new product ideas (Sethi and Iqbal, 2008).

Therefore, reflexivity might play an important role in improving screening performance, but reflexivity, its antecedents, and its outcomes, have so far received limited attention in an innovation context (Carter and West, 1998; Hoegl and Parmbeteah, 2006). In addition, Hoegl and Parmbeteah (2006) outlined the possibility of stage-specific effects and called for more research on the effects of reflexivity in the early stages of innovation projects.

In a recent study, McNally, Durmusoglu, Calantone, and Harmancioglu (2009) put forward a number of propositions relating managers’ dispositional traits to the decision-making process in a new product idea screening context. Specifically, cognitive style and leadership style were identified as important factors affecting decision-making performance in a project selection setting. However, the mechanisms of how cognitive style and leadership style influence the team process and, in turn, facilitate decision-making performance were not considered. In previous research, reflexivity has been modeled as a mediator of organizational antecedents of team outcomes (Schippers,
Den Hartog, Koopman, and Wienk, 2003). Therefore, in this study it is suggested that reflexivity performs a mediating role between decision-making outcomes and their antecedents.

An important antecedent of decision-making performance in a new product idea screening context is cognitive style (cf. McNally et al., 2009). Specifically, procedural rationality, i.e., the tendency of team members to follow rational procedures, positively affects their ability to deal with complexity and facilitates the creation of a balance in the portfolio by allowing them to consider multiple criteria of new projects at the same time (McNally et al., 2009).

With respect to leadership style, in the context of innovation and team decision making, transformational leadership in particular has been identified as an antecedent of performance. Transformational leadership captures leaders’ charisma, their ability to inspire team members to go beyond self-interest (Bass, 1985; Yukl, 1999), and ability to provide intellectual stimulation (Dvir, Eden, Avolio, and Shamir, 2002). Transformational leadership brings about a shared vision within a team that enhances the team’s ability to collectively reflect (Schippers, Den Hartog, Koopman, and Van Knippenberg, 2008).

In the present study, it is empirically investigated to what extent transformational leadership and procedural rationality influence decision-making performance. In addition, the mediating role of reflexivity is investigated. The study is guided by the following research questions:

What are the team-level antecedents and consequences of reflexivity in new product idea screening?

More precisely:

1. How does reflexivity affect screening committee decision-making performance?
2. How does procedural rationality of committee members affect reflexivity?
3. How does transformational leadership affect reflexivity?
4. To what extent are the effects of procedural rationality and transformational leadership on screening decision-making performance mediated by reflexivity?

By providing answers to these questions, the study contributes to our theoretical understanding of the role of reflexivity in the unique context of new product idea screening. The aim is to provide clarity regarding the mediating role of reflexivity between team-level antecedents and decision-making outcomes, in a context of relative uncertainty, risk, and fuzziness surrounding innovation activities in general, and at the screening stage in particular (Reid and De Brentani, 2004; Veldhuizen, Hultink, and Griffin, 2006).

The paper is structured as follows. First the concept of reflexivity and its potential antecedents and consequences in a screening context are analyzed. Hypotheses about these interrelationships are developed and all hypothesized relationships are integrated into a structural model. Subsequently, the model is validated in a field study. The findings are presented and implications for theory and managerial practice are provided. Finally, the limitations of the study are discussed and suggestions for further research are provided.

**Literature Review**

**New Product Idea Screening Decision Making**

Screening leads to a first go/no-go decision, in which human and financial resources are allocated to the further development of selected new product ideas. This is the first part of the New Product Process, which is defined as “a formal blueprint, roadmap, template or thought process for driving a new product from the idea stage through to market launch and beyond” (Cooper, 1994, p. 3). The objective of the screening process is to ensure that scarce firm resources are allocated to those ideas that best fit the firm’s strategic objectives and are most likely to be a (commercial) success (De Brentani and Dröge, 1988). It is typically associated with a range of trade-offs and risks. The decision to invest in the development of one product, and not in another, can have important consequences for the deployment of the firm’s resources and the development of key competencies (Barney, 1991).

A senior management team or committee generally carries out the screening process. The individual members of this committee are held accountable for the decision outcomes and the process. Screening committees often use a mix of formal and informal procedures and selection methods (Cooper, 1985). Although companies often use “ad hoc” selection methods, or select projects based on senior management’s “gut feelings,” the use of formal selection procedures, or screening models, has been proposed to increase uniformity, to ensure that all projects are evaluated according to similar criteria, and to facilitate communication about the projects and their prioritization (Boag and Rinholm, 1989). Nonetheless, too rigorous a use of rigid criteria and inflexible methods might adversely affect organizational learning and
market performance of novel products (Sethi and Iqbal, 2008). In a similar vein, Cooper (1994) proposed the use of fuzzy gates, which are flexible in the sense that they allow decisions to be made conditional upon information that becomes available in the future.

Many scholars confirm the importance of improving the innovation process (Johne and Storey, 1998), which can be divided into three global phases (Lievens, De Ruyter, and Lemmink, 1999; Menor, Tatikonda, and Sampson, 2002): (1) the screening and project planning (or pre-development) phase; (2) the new product development phase, including testing activities; and (3) the launch phase, consisting of pre-launch and launch activities. Research exploring the different stages of the process is scarce (Langerak, Hultink, and Robben, 2004). However, existing studies have confirmed the relevance of predevelopment activities for innovation success (Cooper, 1983, 1988; Feldman and Page, 1984; Krishnan, Eppinger, and Whitney, 1997; Langerak et al., 2004; Parry and Song, 1994; Pavia, 1991). These studies also emphasize how difficult the evaluation and selection of new product ideas is, because of the relatively high levels of complexity and uncertainty that characterize the screening stage (Froehle, Roth, and Voss, 2000).

**Screening Effectiveness**

Screening decision-making effectiveness can be defined as the extent to which the outcome of the screening stage meets expectations established by senior management regarding (1) outcome quality, in terms of an optimization of resource allocation, and (2) strategic fit of the innovation with the internal and external environment (Dean and Sharfman, 1996; Hoegl and Parboteeah, 2006). Effectiveness concerns the relationship between outputs and objectives, as suggested by Anthony and Govindarajan (2003). Formally, screening effectiveness depends on the minimization of two types of potential errors: Type I errors, which occur when the company’s scarce resources are spent on inappropriate projects (De Brentani and Dröge, 1988), and Type II errors, which occur when ideas that might be successful are neglected (Baker and Albaum, 1986). Effective screening decision making should minimize the risks of making both types of errors (Cooper, 1985).

**Screening Efficiency**

Efficiency can be defined as the ratio between process input and output (Anthony and Govindarajan, 2003; Charnes, Cooper, and Rhodes, 1978). An efficient screening process is executed in such a way that the activities use fewer resources while maintaining the same output quality, or yield a better output quality with the same level of input. In the case of screening decision making, the process input can be conceptualized in terms of the time, effort, and cost needed to reach a consensus and to make a screening decision (Baker and Albaum, 1986). An efficient screening process is expected to lead rapidly to a consensus and to generate higher levels of commitment to the decision (Baker and Albaum, 1986; De Brentani, 1986).

**Reflexivity**

In the introduction, team reflexivity was defined according to West et al. (1997). Rather than one specific activity, team reflexivity is seen as a set of behaviors. It “includes behaviors such as questioning, planning, exploratory learning, analysis, diverse exploration, making use of knowledge explicitly, learning at a meta-level, and reviewing past events with self-awareness” (West, 2000, p. 559). In the context of screening, the willingness to take into account changes and trends in the firm’s environment (internal and external), to discuss or question causal relationships, and to adapt procedures appears important for an accurate evaluation and selection of new product ideas.

Most studies associate reflexivity with learning and investigate its relationships with various outcome variables (e.g., effectiveness or performance, efficiency). Reflection on the accuracy, usefulness, and relevance of screening tools, criteria, and methods might be considered a condition for learning (Argyris and Schön, 1996). This appears important in the context of screening. A more reflexive screening committee would more rapidly recognize whether their procedures are inadequate as a result of changes in the firm’s environment. Reflexivity may also trigger unlearning of inadequate routines and a search for new alternatives (Gupta, Smith, and Shalley, 2006). Carter and West (1998) found that reflexivity largely explained the effectiveness of BBC TV production teams, while Schippers et al. (2003) demonstrated the mediating effect of reflexivity on the relationship between diversity and team performance in school management teams. Hoegl and Parboteeah (2006), in turn, were interested in the effects of reflexivity on performance in new product development teams. They found that reflexivity in these teams is positively related to team effectiveness, but not significantly.

**Reflexivity**

In the introduction, team reflexivity was defined according to West et al. (1997). Rather than one specific activity, team reflexivity is seen as a set of behaviors. It “includes behaviors such as questioning, planning, exploratory learning, analysis, diverse exploration, making use of knowledge explicitly, learning at a meta-level, and reviewing past events with self-awareness” (West, 2000, p. 559). In the context of screening, the willingness to take into account changes and trends in the firm’s environment (internal and external), to discuss or question causal relationships, and to adapt procedures appears important for an accurate evaluation and selection of new product ideas.

Most studies associate reflexivity with learning and investigate its relationships with various outcome variables (e.g., effectiveness or performance, efficiency). Reflection on the accuracy, usefulness, and relevance of screening tools, criteria, and methods might be considered a condition for learning (Argyris and Schön, 1996). This appears important in the context of screening. A more reflexive screening committee would more rapidly recognize whether their procedures are inadequate as a result of changes in the firm’s environment. Reflexivity may also trigger unlearning of inadequate routines and a search for new alternatives (Gupta, Smith, and Shalley, 2006). Carter and West (1998) found that reflexivity largely explained the effectiveness of BBC TV production teams, while Schippers et al. (2003) demonstrated the mediating effect of reflexivity on the relationship between diversity and team performance in school management teams. Hoegl and Parboteeah (2006), in turn, were interested in the effects of reflexivity on performance in new product development teams. They found that reflexivity in these teams is positively related to team effectiveness, but not significantly.
related to efficiency. Finally, De Dreu (2002) does not find significant direct effects, but emphasizes a positive moderating effect of reflexivity on the relationships between minority dissent ("a minority in a team publicly opposing the beliefs, ideas, procedures, and policies" p. 285) and team innovativeness and effectiveness. Results showed that higher levels of innovativeness and effectiveness were associated with high levels of minority dissent, but only when there was a high level of reflexivity. Higher levels of reflexivity in groups have also been found to be related to higher levels of team innovativeness and organizational citizenship behavior in China (Tjosvold, Tang, and West, 2004). In general, though not unequivocally, reflexivity is associated with better team performance.

Theoretical Framework

Figure 1 presents the theoretical framework. Screening committee performance is conceptualized as decision-making effectiveness and efficiency. Furthermore, leadership style and procedural rationality are considered as antecedents of decision-making performance, the effects of which are mediated by reflexivity.

The Effects of Reflexivity on Screening Effectiveness

Screening committees use a range of evaluation criteria, which have been previously identified and prioritized, to assess the fit of a new product idea with organizational goals, culture, industry trends, consumer requirements, competition, and other factors. Reflecting on how these criteria and evaluation procedures have performed so far—in terms of explicit strengths and weaknesses—allows the committee to identify possible improvements and to implement changes, if needed (Hoegl and Parboteah, 2006; Kolb, Boyatzis, and Mainemelis, 2000). Conceptually, reflexivity includes committee members’ cognitions. Such a retrospective attitude is expected to encourage a proactive approach, reducing the fuzziness of the screening task (Alam, 2006).

The cognitive elements of reflexivity described in the previous paragraph are likely to be present at all times and lead to actions whenever deemed necessary, similar to awareness or skepticism at the individual level. The moderate/deep part of reflexivity contains behavioral elements. It increases openness regarding alternative screening methods and provokes an open dialogue. Reflexivity in the screening stage allows teams to learn from previous experiences (Alam, 2006; Morgan and Brockman, 2003), errors (Tjosvold, Yu, and Hui, 2004) and to assess and adapt their methods and procedures. Discussing evaluation tools and criteria is advantageous for a screening committee with a complex task, as it may trigger more in-depth information processing and sharing between members (De Dreu, 2007). However, discussion of processes at a team level and possible adaptations of evaluation methods in use are not likely to take place separately, for each idea because it would

![Figure 1. Conceptual Model](https://example.com/f1.png)

*Note: H5 refers to the mediating role of reflexivity on the relations from both antecedents to both outcome variables.*
be very time-consuming and committee members will probably not feel the urge to discuss or revise the methods for each screened idea separately. Rather, the committee members are more likely to cluster ideas and reflect on the appropriateness of selection tools and methods during a screening exercise that evaluates, e.g., several ideas for a certain broad project or market scenario. These processes allow the team to make complex issues explicit, articulate doubts, and develop a multifaceted understanding of the decision-making problem, and thus better choose between alternatives (Gurtner, Tschan, Semmer, and Nägele, 2007). This openness would also reassure decision makers with respect to their accountability because decisions are based more on explicit agreement (De Dreu, 2007). Reflexivity is thus expected to reduce the risk of screening errors (Hoegl and Parboteeah, 2006). Therefore:

\[ H1: \textit{Reflexivity in the screening stage is positively associated with decision-making effectiveness.} \]

The Role of Reflexivity in Screening Efficiency

Reflexivity increases team members’ awareness of the team’s functioning and improves the understanding and development of new methods as a response to emerging conditions and challenges (Carter and West, 1998). As argued in the previous section, this can increase the effectiveness of team decision making. However, reflexivity can also improve efficiency of the decision-making process.

Reflexivity can keep the team focused on the most important and relevant issues and thereby improve efficiency (Tjosvold et al., 2004). A reflexive attitude may trigger conflict, productive dissent, and disagreement among the screening committee members about the relative importance of evaluation criteria and the screening method (De Dreu, 2002). Once adaptations are made to screening procedures and the most important criteria are agreed upon, the evaluation of innovation project proposals should become easier and faster. In contrast, less reflexive teams are more likely to deny or hide difficulties and postpone their resolution (Moreland and Levine, 1992). Less reflexive project teams are therefore more likely to look for solutions to irrelevant or less urgent issues and proceed in a less efficient manner (Hoegl and Parboteeah, 2006). Moreover, surfacing potential conflicts early in the process can improve members’ involvement. As a consequence, the decision makers are expected to be less hesitant and more committed to their decisions. Hence:

\[ H2: \textit{Reflexivity during the screening task is positively associated with decision-making efficiency.} \]

Antecedents of Reflexivity

Several studies point at the positive effects of reflexivity on team outcomes (Schippers et al., 2003; West, 1996). More recently, researchers started investigating antecedents of team reflexivity. For instance, Hoegl and Parboteeah (2006) found that social skills and project management skills positively influence reflexivity. McNally et al. (2009) proposed cognitive style and leadership style as major antecedents of decision-making performance in a project selection setting. The effects of leadership style, specifically transformational leadership, and cognitive style on decision-making performance are arguably—at least partially—mediated by reflexivity. For example, a more rational decision-making style is likely to trigger questioning of existing screening methods and a thoughtful consideration of whether or not existing screening procedures have to be adapted, while this increased reflexivity may lead to better team performance.

Reflexivity has also been found to be promoted by the presence of cooperative goals among team members (Tjosvold et al., 2004). Transformational leadership reinforces the creation of a common vision among team members and thus cooperative goals. Via this mechanism, a transformational leadership style positively affects team reflexivity, i.e., thinking about and discussing these goals (Schippers et al., 2008).

Procedural Rationality

Procedural rationality is a cognitive style relevant to screening. It is defined as the extent to which the decision-making process involves the explicit gathering of information relevant to the decision and reliance upon an explicit analysis of this information (Dean and Sharfman, 1993, 1996). Rational decision makers are said to be more effective at taking environmental changes and constraints into account (Dean and Sharfman, 1996). Rational decision makers are also known to be less impulsive, due to their preoccupation with the consequences of their decisions. They base their decisions on extensive information collection and knowledge stocks. Furthermore, they are expected to be more conscious of, and responsive to, environmental constraints (Dean and Sharfman, 1993).
Screening committees, whose evaluation and decision-making behaviors are characterized by rational procedures, e.g., by the collection of information necessary to form expectations about the various alternatives, and by the use of this information in the final decision (Bourgeois and Eisenhardt, 1988; Mintzberg, Raisinghani, and Théoret, 1976; Simon, 1978), apply what is called procedural rationality. These committees are more likely to explicitly discuss work-related issues, to consider alternative methods, and to process information more systematically (De Dreu, 2007).

When committees engage in a more rational decision-making style, they are expected to rely on more elaborate and argument-based evaluations of the proposal and of the screening tools and methods in use. Therefore:

H3: Procedural rationality is positively associated with reflexivity.

Transformational Leadership

Previous research on team learning and reflexivity recognizes the crucial role of the team leader and leadership style in the creation of an appropriate team climate (Edmondson, Roberto, and Watkins, 2003; Schippers et al., 2008). At a senior management level, where screening committees operate, conflict is highly consequential. An appropriate leadership style contributes to constructive conflict management and to the moderation of discussions, and is therefore likely to influence group processes and output (Chen, Liu, and Tjosvold, 2005).

Leadership is defined as “influence exercised in a work situation toward the attainment of a specified goal” (Tannenbaum and Massarick, 1957, p. 3). The element of influencing others towards the achievement of a specific objective is emphasized. It has been shown that specific leadership styles either facilitate or weaken reflexivity at the group level (Hirst and Mann, 2004; Schippers, 2003). The stimulation of reflexive behaviors and the encouragement of a reassessment of procedures appear to be closely associated with an open, inspirational and intellectually stimulating type of leadership (Bass and Avolio, 1990; Hirst and Mann, 2004), i.e., transformational leadership.

Transformational leaders, defined as “leaders who exhibit charismatic behavior, arouse inspirational motivation, provide intellectual stimulation and treat followers with individualized consideration” (Dvir et al., 2002, p. 736), are thus expected to create an appropriate atmosphere for enhanced communication, and to trigger discussion. Through intellectual stimulation, they are expected to arouse committee members’ awareness of past screening errors (Bono and Judge, 2004), to encourage screening committees to be critical of their procedures, and to be innovative and creative in the exploration of new methods in order to achieve better performance (Piccolo and Colquitt, 2006). Screening teams with a transformational leader are expected to be more empowered and entrusted to rethink and openly discuss their methods of screening without the fear of being judged (Bass and Avolio, 1990; Bono and Judge, 2004; Judge and Bono, 2000; Keller, 1992). Consistent with this rationale:

H4: Transformational leadership is positively associated with reflexivity.

Mediating Role of Reflexivity

Aside from the hypothesized effects of procedural rationality and transformational leadership on reflexivity, recent studies have either proposed or confirmed direct effects of these variables on team performance. Lim and Ployhart (2004) and Schippers et al. (2008) found effects of transformational leadership on team performance, and Jung and Sosik (2002) and Sosik, Avolio, and Kahai (1997) on group effectiveness, while McNally et al. (2009) proposed a positive relationship between a more analytic cognitive style and evaluation performance. Considering these results and in light of the previous discussion, the effects of procedural rationality and transformational leadership on decision-making performance are likely to be at least partially mediated by reflexivity. Following Schippers et al. (2008), a mediating role of reflexivity is hypothesized.

H5a: Reflexivity (partially) mediates the relationship between transformational leadership and decision-making outcomes.

H5b: Reflexivity (partially) mediates the relationship between procedural rationality and decision-making outcomes.

Research Design

Sample and Data Collection

Data were collected by means of an online questionnaire. As part of the purposive sampling strategy, an
invitation to participate in the study, including a short motivation, was sent to a sample of approximately 800 senior executives of companies active in technology-based service sectors worldwide. This sample was obtained from the databases of the Belgian, Dutch, and Luxembourgish Chapters of the Project Management Institute (PMI), and several industrial databases. Companies in technology-based service sectors were targeted because they deliver complex, knowledge-intensive products and depend heavily on innovation for continued growth. Each respondent received an e-mail stating the purpose and relevance of the study, including a hyperlink directing the participant to the survey.

Approximately two weeks after the publication of the questionnaire, executives were contacted by phone, to remind them of the importance of their participation. In case of unavailability, they were asked to forward the questionnaire to another member of the committee. As an incentive to participate, the participants were offered a summary of the results. After three weeks, a third reminder was sent to non-respondents by e-mail. A total of 126 questionnaires were received, resulting in a 15.75% response rate. This response rate is comparable to other recent web-based studies (Barczak, Sultan, and Hultink, 2007; Lawson, Petersen, Cousins, and Handfield, 2009). After elimination of incomplete surveys, a total of 96 questionnaires were usable for the analyses. Table 1 provides an overview of the sample characteristics.

Nonresponse bias was assessed by comparing early respondents (20% of the sample) with late respondents (20% of the sample), as recommended by Armstrong and Overton (1977). A comparison of the two groups did not reveal any significant differences in averages for the used constructs (p<.05). Moreover, to control for respondent bias related to functional backgrounds, industries, and countries, responses were compared. No significant differences emerged (p<.05), which confirms the absence of these biases.

**Questionnaire Design**

Since no external data sources of screening decision-making effectiveness and efficiency were available, both the independent and the dependent variables were measured based upon responses from single informants. To control for common method variance (CMV) bias, a range of procedures was followed. First, the items were formulated as clearly, concisely, and specifically as possible, mostly based on previously validated scales. A pre-test was conducted to identify and eliminate any overly complex or ambiguous items. The draft questionnaire was reviewed by five senior managers, who identified some issues regarding the wording of the items. Changes were made to the survey instrument based on the comments of these experts. This procedure is considered to reduce CMV bias produced by item characteristics (Spector, 1994).

Second, by not using face-to-face interviews, the probability of a social desirability bias was reduced (Podsakoff, MacKenzie, Lee, and Podsakoff, 2003). In addition, in the cover letter of the questionnaire respondents were asked to focus on the last screening decision, regardless of the outcome (i.e., go or no-go decision). Furthermore, it was pointed out that there were no right or wrong answers, and that respondents should indicate answers that best described their specific experiences.

Finally, the design of the web-based survey instrument made it impossible for respondents to retrieve their answers to earlier questions. This feature made it more difficult for them to artificially maintain consistency between answers, or to search for patterns in the questions, and helped to control for both the consistency motif and social desirability bias (Podsakoff et al., 2003).

Harman’s one-factor test was used to test for common method bias (Podsakoff and Organ, 1986). A principal component factor analysis of the dependent and independent variables was conducted. It yielded five factors with Eigenvalues higher than 1.0, while the first factor explained less than 20% of the total variance.

<table>
<thead>
<tr>
<th>Project innovativeness</th>
<th>Industry</th>
<th>Function</th>
<th>Gender</th>
<th>Age</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low 44%</td>
<td>Financial Services 31.6%</td>
<td>CEO 24%</td>
<td>Male 81.2%</td>
<td>&lt;31</td>
<td>6% Europe 50%</td>
</tr>
<tr>
<td>High 56%</td>
<td>IT 6.5%</td>
<td>CFO 4.2%</td>
<td>Female 10.2%</td>
<td>31–40</td>
<td>40% USA 30%</td>
</tr>
<tr>
<td></td>
<td>Telecoms 20%</td>
<td>COO 22%</td>
<td>Unknown 8.6%</td>
<td>41–45</td>
<td>23.5% Japan 18%</td>
</tr>
<tr>
<td></td>
<td>Other 41.9%</td>
<td>VP of Marketing 3.2%</td>
<td>46–55</td>
<td>19.4% Other 2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other 8.4%</td>
<td></td>
<td>&gt;56</td>
<td>3.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown 9.4%</td>
<td></td>
<td>Unknown 8%</td>
<td></td>
</tr>
</tbody>
</table>
The test showed the absence of one major factor (Podsakoff and Organ, 1986) and indicated that common method bias is not a serious problem in the data.

**Measures**

All items in the study were measured on seven-point Likert-type scales. Most items were adapted from existing literature to suit the specific context, while a few new items had to be developed specifically for the purpose of this study. Existing scales were identified through a review of prior studies in the domains of innovation, leadership, and organizational behavior. Each of the scales is discussed below.

**Reflexivity.** Building on Schippers, Den Hartog, and Koopman (2007), the scale for reflexivity included six items best representing evaluation and discussion of processes. Three items for adaptation were added because implementing adjustments is an important component of reflexivity (West, 2000). These items capture the extent to which the screening committee actually made the adaptations and modifications agreed upon during the evaluation and discussion phases. One of the three newly formulated items did not correlate well with the rest of the items tapping reflexivity; therefore the final scale consists of eight items.

**Decision-making process efficiency.** According to Anthony and Govindarajan (2003), efficiency refers to the amount of input needed to perform an activity or process. The efficiency of decision making is directly related to the time and effort needed to make the go/no-go decision (De Brentani, 1986), i.e., the time and effort needed to reach a consensus. This construct was measured with three items formulated according to these definitions and the scale was adapted to new product idea screening.

**Decision-making process effectiveness.** No validated scales of decision-making effectiveness were found in the literature. Many studies measured the effectiveness of a process based on its outcome (success or failure). Others measured innovation project selection process effectiveness as the ability to predict success or failure of selected projects (Baker and Albbaum, 1986; Cooper, 1985; Griffin and Page, 1996). Commercial and financial success at the project level is often used as an indicator of effectiveness (Cooper and Kleinschmidt, 1987). Although project outcomes (commercial success or failure) are highly relevant for evaluating the success of the innovation process as a whole, they are insufficiently explained by the quality of the screening process. A go decision at the screening stage is only one of a range of decisions in an innovation project. Much can happen during the project (between the first go/no-go decision and the new product launch) that can contribute to the possible failure or success of the project, regardless of the quality of screening decision making. Considering the definition of effectiveness as the relationship between outputs and objectives, decision-making effectiveness was measured with three items, referring to (1) the quality of the decision in terms of the appropriateness of the allocation of resources, (2) the quality of the decision in terms of the appropriateness of its responsiveness to external and internal dynamics, and (3) an evaluation of the decision regarding established objectives.

**Transformational leadership.** Four items were used to measure transformational leadership behavior, based on research undertaken by Den Hartog, van Muijen, and Koopman (1997) and Schippers et al. (2008). Some of the items were adapted to fit the unique context of decision making in new product idea screening.

**Procedural rationality.** Procedural rationality was measured using a scale proposed by Dean and Sharfman (1996). Items included the degree to which the screening committee explicitly collected and analyzed information and used quantitative analytical techniques.

**Data Analysis and Results**

The convergent validity of the scales was assessed. Coefficients of all indicators were significant ($t > 1.96$). The average variance extracted (AVE), which measures the variance captured by the indicators relative to the measurement error, largely exceeded 0.50 (Hair et al., 2007). Cronbach’s alpha of most of the factors was substantially higher than the recommended minimum value of 0.70 (Nunnally and Bernstein, 1994). The composite reliability of all factors is reported in Table 2, as this measure is more commonly used to validate internal consistency. To assess one-dimensionality within each multi-item scale, item loadings were calculated. Items for which inter-item correlations were not significant ($p < .01$) were eliminated. Table 2
provides an overview of the items used in the analysis, their descriptive statistics, and an overview of factor loadings, composite reliabilities, and t-values.

Discriminant validity across the scales was also assessed. Correlations between each pair of constructs were found to be lower than the square root of the AVE (Fornell and Larcker, 1981). The means, standard deviations, the square root of AVE, and correlations between constructs are presented in Table 3.

The conceptual model was tested with structural equation modeling (SEM). Partial least squares (PLS) regression was used (White, Varadarajan, and Dacin, 2003), as implemented in SmartPLS (Ringle, Wende, and Will, 2005). PLS generates estimates of standardized regression coefficients (beta values) for the model’s paths and factor loadings for the measurement items. PLS does not make assumptions about (a) the data distribution to estimate model parameters (Fornell and Larcker, 1981), (b) the independence of observations, or (c) variable metrics (Barclay, Higgins, and Thompson, 1995). Compared to traditional covariance-based SEM techniques, PLS is considered a more appropriate technique for testing models when the sample size is relatively small (Cassel, Hackl, and Westlund, 2000). PLS is robust in dealing with complex models, due to its iterative algorithm, or bootstrapping (Henseler, Ringle, and Sinkovics, 2009). In addition, PLS is a prediction-oriented, variance-based approach, which aims to maximize the amount of variance explained in the dependent variables. Therefore, it is most appropriate for prediction (Chin, 1998) of the hypothesized relationships.

### Hypothesis Testing

The PLS analyses revealed a significant (p < .05) positive relationship of reflexivity with screening effectiveness and efficiency. Therefore, the results support H1 and H2.
The relationships between reflexivity and its antecedents are, as predicted, significant and positive. The PLS results show strong positive relationships between procedural rationality and the reflexivity construct. Strong effects of transformational leadership on reflexivity were also found. Therefore, the data support H3 and H4. In Figure 2, the estimated model is presented. Regression coefficients of the PLS analysis, as well as t-values and R-squares, are reported in the figure.

Testing Mediated Effects

Reflexivity was hypothesized to mediate the effects of the two team-level variables on decision-making outcomes. The mediation effects were tested in two ways. In the first place, the method recommended by Shrout and Bolger (2002) was followed. A bootstrapping approach in SmartPLS was used, as suggested by Efron and Tibshirani (1993): while keeping the rest of the model unchanged, first it was investigated whether there was a significant direct effect of an independent variable (IV) on a dependent variable (DV), without including a mediating variable (MV). Then the MV was included and the significance of the mediation was calculated by bootstrapping the product of the IV → MV and MV → DV effects. If the direct effect of the IV on DV became non-significant when the MV was included, while mediation was found to be significant, we concluded there to be a full mediation. If all effects remained significant, the mediation was concluded to be partial. The mediation models are presented in Table 4.

In a second stage, the goodness-of-fit (GOF) of the research model (with mediated paths from leadership and procedural rationality to the decision-making outcomes) was compared with a competing model, incorporating direct links between constructs (see Figure 3).

The current version of SmartPLS does not provide a global indicator of fit, as only partial R-square values are calculated. However, Tenenhaus, Esposito Vinzi, Chatelin, and Lauro (2005) propose a rigorous method for calculating a global goodness-of-fit criterion of the complete path model that takes into...
### Table 4. Mediation Models

<table>
<thead>
<tr>
<th>Explored Mediations</th>
<th>T-Value 'c' (Without Mediator)</th>
<th>T-Value 'c' (With Mediator)</th>
<th>T-Value 'a*b'</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.40***</td>
<td>1.27</td>
<td>2.29</td>
<td>Full Mediation</td>
</tr>
<tr>
<td></td>
<td>2.43*</td>
<td>0.87</td>
<td>108.85***</td>
<td>Full Mediation</td>
</tr>
<tr>
<td></td>
<td>2.30*</td>
<td>0.76</td>
<td>75.82***</td>
<td>Full Mediation</td>
</tr>
<tr>
<td></td>
<td>3.34***</td>
<td>2.44*</td>
<td>93.65***</td>
<td>Partial Mediation</td>
</tr>
</tbody>
</table>

Ref. = Reflexivity, Effect. = Effectiveness, Effic. = Efficiency
TL = Transformational Leadership, PR = Procedural Rationality
*** t-values > 3.29 are significant at the .001 level
** t-values > 2.58 are significant at the .01 level
* t-values > 1.96 are significant at the .05 level

---

**Figure 3. Model Without Mediator Variable**

$t$-values $> 1.96$ are significant at the .05 level, $t$-values $> 2.58$ are significant at the .01 level, $t$-values $> 3.29$ are significant at the .001 level.
account the quality of structural and measurement models, the GOF index. This global goodness-of-fit index is computed as follows:

$$GOF = \sqrt{\text{communality} \times R^2}$$ (1)

$R^2$ is the average of all $R$-square values in the full path model, whereas the term $\text{communality}$ is determined as follows:

$$\text{communality} = \frac{1}{p} \sum_{j=1}^{p} p_j\text{communality}_j$$ (2)

Using this method, the GOF value of the research model was found to be .65, which is higher than .47, the value calculated for the European Consumer Satisfaction Index (ECSI) model estimated by Tenenhaus et al. (2005), and therefore pointing to a good explanatory power.

With a GOF value of .65 the mediated model has a substantially better fit, compared to the .54 of the model without the mediating variable. The explained variance in both DVs ($R$-square) was also higher in the mediated model.

A sensitivity analysis was conducted by including a measure of “project innovativeness” as a control variable in the model. “Project innovativeness” was measured with two items adapted from Song and Parry (1997). The mean was 3.54 and standard deviation of this variable 1.79. This measure was not a significant predictor of reflexivity or of the decision-making outcomes. It was not possible to obtain a good estimate of the moderating effects of this variable in the PLS model due to multicollinearity issues (high correlations between the interaction term and main effect variables). Therefore an additional analysis of the moderating effects was conducted by splitting the sample and assessing the final model for “low project innovativeness” and “high project innovativeness.” In the subsample of “high project innovativeness” the resulting model is very similar to the model presented in Figure 2, and the effects of reflexivity on both outcome variables are very strong. However, in the subsample of “low project innovativeness” the effects of reflexivity on both outcome variables are weaker and the path from reflexivity to decision making effectiveness is not statistically significant. Taken together, these results suggest that reflexivity has a stronger mediating effect under conditions of high project innovativeness compared to low.

Discussion and Conclusion

Prior research suggested that reflexivity significantly influences team performance in a variety of contexts (Hoegl and Parboteeah, 2006; Schippers et al., 2007). Five hypotheses about how reflexivity would affect the new product idea screening process and about which organizational factors would affect reflexivity were formulated. Findings based on observations from 96 screening committees provide strong support for the expectation that reflexivity mediates the effects of team-level antecedents on both decision-making effectiveness and efficiency.

Reflexivity positively influences decision-making effectiveness. A reflexive committee considers and openly discusses issues closely related to the task and methods in use. The detection of flaws in these methods is facilitated by a variety of cognitive processes and behaviors taking place at a team level. The fewer tools, methods, and criteria are taken for granted, while taking the contextual circumstances into account in order to adapt the approach, the more effective the screening committee appears to be. In other words, flexible interpretation and application of evaluation criteria leads to a more effective decision-making outcome. Consistent with West (1996), a reflexive screening committee appears to be more likely to question itself and its methods, to tackle challenges produced by a dynamic new product development environment and the unique features of new product ideas at hand.

Reflexivity also positively influences decision-making efficiency. A reflexive screening committee ascertains whether the methods will be kept, adapted, or changed. Thereby, intentions are formulated, alternatives are generated, and assumptions are debated. Reflexivity includes committee members’ cognitions that are likely to be present at all times but lead to actions whenever deemed necessary, similarly to awareness or skepticism at the individual level. In addition to the critical evaluation, reflexivity also includes behavioral aspects—team processes that foster interaction; therefore it facilitates knowledge exchange and learning. This can result in committee members being more focused and flexible, possibly skipping certain steps and activities or flexibly interpreting their outcomes (cf. Cooper, 1994). In contrast to the present findings, Hoegl and Parboteeah (2006) proposed a positive effect of reflexivity on efficiency, but did not find a significant relationship. Their non-finding might be related to the fact that they investigated the effects of
reflexivity in software development teams that were in various stages of the new product development process. Similarly, Dayan and Basarir (2010) investigated reflexivity in the context of new product development teams (a later stage in the new product process compared to the present study) and found that reflexivity did not significantly influence speed to market (which appears associated with process efficiency). It seems that the positive effects of reflexivity on efficiency become visible only in the early stages of the new product process.

Findings in the present study suggest that reflexivity has a positive effect on efficiency in early stages of the new product process (i.e., in the predevelopment stages). It may actually delay the process in later stages: if team reflexivity results in new demands on the product to be developed, requiring re-work or additional features that need to be incorporated, this might increase effectiveness (product quality), but at the same time reduce efficiency (see the discussion in Hoegl and Parboteeah, 2006).

With respect to the positive effect of transformational leadership on reflexivity in a new product idea screening context, the hypothesis was strongly supported by the data. Transformational leaders are open to—and stimulate discussion and evaluation of—procedures, criteria, and tools in use. Through their inspirational character they can influence the decision-making committee and foster a reflexive culture. These results are in line with the findings of Schippers et al. (2007), who investigated the effects of transformational leadership in 32 work teams from nine different organizations. Findings suggest that a transformational leadership style is also an important antecedent of group processes at the senior team level, such as a screening committee, where mistakes can lead to very serious consequences. Transformational leadership may help to avoid automatic acceptance of decisions, it may instigate a debate, and evoke an assessment of previously used methods and tools. The effects of transformational leadership on both screening decision-making outcomes are fully mediated by reflexivity.

Finally, procedural rationality is found to lead to higher levels of reflexivity, and the effect of procedural rationality on decision-making effectiveness is partially mediated by reflexivity while its effect on efficiency is fully mediated. Teams engaging in systematic information gathering and processing are more inclined to reconsider their methods and criteria in light of new information, and to check their relevance, accuracy, and usefulness. Individual committee members with a more rational attitude are also expected to engage in a more structured and explicit reflection before making their evaluation (Dean and Sharfman, 1993). The strong positive effect of procedural rationality on decision-making outcomes may seem surprising in light of the findings of a study by Hart et al. (2003). These authors found that intuition plays a major role in the idea screening stage: over half of the companies in their Dutch and U.K. sample used intuition (as opposed to or in addition to) other structured methods of evaluation. On the contrary, in a recent exploratory study McNally et al. (2009) outlined the importance of analytic cognitive style, suggesting that it leads to more balance in a product portfolio. In comparison to this study, the present study broader implications of procedural rationality were found, affecting both effectiveness and efficiency of the screening decision making. In addition, the mechanisms of how these effects come about were investigated. It appears that most of the positive effects of procedural rationality on decision making outcomes can be attributed to higher reflexivity.

The discussion above suggests several contributions to the literature on innovation, senior management teams, and reflexivity. Theoretical arguments were provided for the mediating role of reflexivity, as well as empirical evidence in a context of screening teams. Reflexivity is shown to play an important role in the performance of such senior management teams. The effects of reflexivity had already been explored in work of professional teams, but the investigation of its effects on a functioning of a senior management team and in a decision-making context has shed further light on the underlying mechanisms.

**Managerial Implications**

The present study shows that reflexivity has significant positive effects on screening outcomes. Increasing stop-and-think behavior in screening committees appears to be a useful tool for genuinely improving the effects of transformational leadership and procedural rationality on the effectiveness and efficiency of their decision-making processes. Reflexivity helps selection committees to more explicitly understand and adapt the “what and how” of their actions. A reflection on the evaluation process and selection criteria, their accuracy, relevance, and usefulness also contributes to the effectiveness of the screening process.
The challenge for practitioners, specifically the leaders or chairs of screening committees, will be to create the appropriate conditions to foster a reflexive attitude and behaviors and thus increase decision-making performance. The present research suggests that the team leader plays a very important role through his or her leadership style, and stimulation of a rational analytic approach. Transformational leadership might foster reflexivity through inspiration and intellectual stimulation of the screening committee members and by creating the appropriate atmosphere conducive to learning. Committee members should feel trusted and be encouraged to interact and openly discuss the appropriateness of evaluation tools and selection criteria. A rational attitude towards decision making also triggers reflexivity and ensures that a discussion of tools, criteria, and methods takes place based on arguments, rather than solely on intuitions and gut feelings. Finally, without allowing for the exploration of alternative options relating to the uniqueness of each proposal, and without considering the dynamics of the environment, the idea screening process is more likely to be inefficient and ineffective.

**Limitations and Further Research**

Several limitations of this study should be considered when interpreting these results. In the first place, single informants were used as a source of information. Although various measures were taken to limit common method bias, it can never be completely excluded when one source is used for measuring both independent and dependent variables. One key informant per project was used. A research design involving the input of more than one member per committee might increase representativeness and further reduce the risk of CMV bias.

Furthermore, only two team-level antecedents of reflexivity were considered. While procedural rationality and transformational leadership indeed proved to be triggers of reflexivity at the level of new product idea evaluation committees, the role of other individual, team, and organizational determinants, e.g., ambiguity tolerance, organizational climate, and culture, should be explored.

It is likely that the mediating effects of reflexivity are stronger under high levels of uncertainty and complexity in the decision situation. In the current study this expectation was captured by limiting the research focus to the screening stage as opposed to considering later stages of the new product process. Future research may find it fruitful to investigate the effects of reflexivity under varying situational and environmental conditions. For instance, Dayan and Basarir (2010) find that a turbulent environment (market and technical conditions) moderates the effect of reflexivity on product success in new product development projects. By incorporating characteristics of a decision situation, such as the level of market dynamism, uncertainty, or novelty of the new product in the research design, more complex models can be tested and potentially provide insights in boundary conditions of the effects of reflexivity on decision-making outcomes.

Supposing that the effects of antecedents on reflexivity may differ as a function of a moderator, future research may focus on identifying moderators of the first paths in the model. Testing moderated mediation effects may further advance our understanding of reflexivity, its antecedents and consequences. It appears important to investigate the positive effects of transformational leadership and procedural rationality, as mediated by team reflexivity, under varying conditions, and for various levels of innovativeness of the new product idea.

Finally, a direct path from procedural rationality to effectiveness was found that cannot be fully explained by reflexivity. To complement this study’s focus on reflexivity as an important mediator leading to the decision-making outcomes, future research could inform us about how reflexivity influences specific aspects of an evaluation process. For instance, it may be interesting to explore how reflexivity relates to the three evaluative dimensions of a decision process (balance, strategic fit, and relative weights) identified by McNally et al. (2009). Perhaps a combination of qualitative and quantitative research can provide a more complete explanation.

**Concluding Remarks**

In this article the role of reflexivity in screening decision-making performance was investigated, as well as its antecedents. Strong empirical support was found for the hypotheses and specific recommendations were provided for further research. Overall, the main research implication is that considering group processes as an explanatory or mediating variable in the context of new product process deserves more attention. Based on the findings, a strong message to screening
committee chairs is: allow team members to stop and think—at least from time to time. Use models and checklists, but do not accept routines to completely dominate the screening meeting. Let committee members play the devil’s advocate and let them be critical. Stimulate openness and argument-based discussion, and avoid tacit consent.

**References**


Henseler, J., C. M. Ringle, and R. R. Sinkovics. 2009. The use of
Leonard, D., and S. Sensiper. 1998. The role of tacit knowledge in
Keller, R. T. 1992. Transformational leadership and the performance
Hoegl, M., and P. Parboteeah. 2006. Team reflexivity in innovative
Keller, R. T. 1992. Transformational leadership and the performance
Langerak, F., E. J. Hultink, and H. S. J. Robben. 2004. The impact of
Leonard, D., and S. Sensiper. 1998. The role of tacit knowledge in


