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INTRODUCTION

Innovation project selection is a decision of prime relevance to marketers (Hauser, Tellis, and Griffin 2006). Marketers are typically part of committees of innovation decision-makers who make project selection decisions (Ernst, Hoyer, and Rubsaamen 2010). For this reason, marketers play an important role in innovation project selection decisions.

In their pitches to innovation decision-makers, innovation project teams[1] invariably include financial projections, such as expected cumulative cash flows. Project teams may also present best- and worst-case scenarios (Bolton 2003; Schoemaker 1993). Presenting best- and worst-case scenarios allows project teams to bound the range of outcomes within which the innovation project is likely to evolve (Schoemaker 1995). The range can vary from small to large depending on the difference between the cash flows in the best- and worst-case scenarios (Du et al. 2011) which reflects the differences in the level of information about the market and the technology that the project team has.

However, the usefulness of scenario presentation for project selection decisions remains contested (Graham and Harvey 2001; Koller, Lovallo, and Williams 2012; Roxburgh 2009). On the one hand, innovation decision-makers may feel that presentation of scenarios improves their ability to understand and manage project risk (Koller, Lovallo, and Williams 2012). On the other hand, innovation decision-makers may perceive scenario presentation as an “abdication of leadership” that casts doubt on the project team’s capability to successfully execute the proposed project (Roxburgh 2009).

[1] We use the term *innovation project team* to refer to the team requesting funding for an innovation project. For brevity, in the remainder of the paper, we use the shorter term *project team*.

These conflicting views suggest that the effects of scenario presentation on project selection decisions are complex and possibly contingent on the type of innovation. Specifically, practitioners we interviewed suggested that for core innovation projects that target existing markets with products that are similar to the firm's current offerings, scenario presentation was seen as useful. However, for transformational innovation projects that target new markets with products that are different from the firm's current offerings, there was a concern that project teams could "shoot themselves in the foot". The reason for this was that, while transformational innovations may promise higher returns, they may also lead to much worse, more extreme outcomes (e.g., negative cumulative cash flow), as compared to core innovations. Therefore, presenting a worst-case scenario may backfire more for transformational than for core innovations leading the former to be more systematically rejected.

The scholarly literature to date does not provide guidance on whether or not project teams should present scenarios.[2] It does not document the channels through which presentation of best- and worst-case scenarios affects project selection decisions. Our paper aims to address this gap. Thereby, it aims to contribute to prior research that examines how the presentation of information in funding requests (e.g., Herzenstein, Sonenshein, and Dholakia 2011) and in innovation proposals (e.g., Kirsch, Goldfarb, and Gera 2009; Reitzig and Sorenson 2013) influences project selection decisions, none of which examines specifically the effects of scenario presentation. By examining how differences in the presentation of financial information affect project selection decisions, our paper also fits the recent interest in the marketing-

[2] Note that the literature does address the value of *engaging* in scenario analysis during the new product development process (e.g., Bolton 2003), but is silent on whether scenarios should be *presented* to decision-makers who make project selection decisions.

accounting and marketing-finance interfaces (e.g., Hanssens, Rust, and Srivastava 2009; Kimbrough and McAlister 2009).

We propose that scenario presentation influences project selection through two constructs: (1) the perceived project team expertise and (2) the perceived risk of the project. Further, we propose that such influence is contingent upon the type of innovation (core versus transformational innovation), the method of scenario development (intuitive versus analytical) and the strategic merit of the innovation (i.e., its benefits beyond its direct financial payoff).

We test our theoretical framework across two studies. The first study is a choice-based conjoint experiment among 745 managers where we: (1) *manipulate* scenario presentation and type of innovation; (2) *measure* the perceived project team expertise and project risk, and (3) *observe* project selection decisions. The second study is a choice-based conjoint experiment among 1,680 managers where, beyond replicating Study 1, we extend our model by *manipulating* two additional factors that can play a role in project selection decisions: (1) the method that project teams use to develop scenarios and (2) the strategic merit of the innovation project. To make our experiments as realistic as possible, we calibrate our experimental stimuli from 31 real-life innovation proposals from Alcatel-Lucent Bell Labs (today Nokia)[3] and conduct extensive pre-testing.

We derive three key findings from Study 1, which Study 2 also replicates. First, we find that scenario presentation increases perceived team expertise and reduces perceived risk if the project team sets small-range bounds on the scenarios it presents (in short, small-range scenarios). However, if the bounds on the scenarios show a large range (in short, large-range scenarios), scenario presentation increases the perceived risk, while its effect on the perceived

[3] Nokia acquired Alcatel-Lucent Bell Labs in November 2016.

team expertise is inconclusive (i.e., we cannot demonstrate that this effect is robust across our two studies). Second, we find that the effect of scenario presentation on perceived team expertise is more positive for transformational than for core innovations. Moreover, the effect of scenario presentation on the perceived risk is more negative (for small-range scenarios) or less positive (for large-range scenarios) for transformational than for core innovations. Third, we find that perceived team expertise positively affects and perceived risk negatively affects the likelihood of project selection.

From a substantive managerial perspective, we can summarize the three findings that Study 1 yields, and Study 2 replicates, as follows. First, when pitching transformational innovations, presenting small-range scenarios outperforms no scenario presentation, because it increases the perceived team expertise and decreases the perceived project risk, thereby increasing the probability of the project being selected, all as compared to core innovations. Second, presenting large-range scenarios on transformational innovations, however, underperforms no scenario presentation, because it increases the perceived project risk, thereby decreasing the probability of being selected. Third, overall, the beneficial effects of small-range scenarios are more pronounced, and the detrimental effects of large-range scenarios are less pronounced, for transformational than for core innovations.

Beyond replication of these key insights, Study 2 intends to examine whether scenario presentation influences the likelihood that decision-makers make better project selection decisions in terms of expected return. Study 2 also enriches our insights on the decision-making context in which the innovation project selection decision is taken by exploring two additional factors that can play a role in project selection decisions. The first relates to the method that is used to develop scenarios. We find that in firms where project teams use intuition to develop scenarios, perceived team expertise affects the likelihood of project selection more positively than in firms where project teams develop scenarios analytically.

The second relates to the strategic merit of innovation projects. Innovation projects have a high strategic merit when, for instance, they have spillover effects on other products, a bigger impact on top line sales, or improve the firm's relationships with customers. Innovation projects have low strategic merit when their attractiveness depends mainly on their direct financial merit. We find that perceived team expertise affects the likelihood of project selection less positively for innovation projects that have a high strategic merit rather than a low strategic merit.

BACKGROUND

The marketing literature defines several stages of the new product development process (e.g., Golder, Shacham, and Mitra 2009). The process starts with concept development, a stage where project teams think about solutions to customer needs or opportunities to use new technologies (Ernst, Hoyer, and Rubsaamen 2010; see Figure 1 – Figures and Tables follow Reference throughout). Promising ideas are selected to receive funding and proceed to the product development stage, where ideas turn into tangible projects. The most promising ones are selected to move into the implementation stage, during which the new product or service is launched. Our focus is on project selection decisions after the concept development stage.

To address innovation project uncertainty, project teams often perform scenario analysis (Bolton 2003; Schoemaker 1993). In scenario analysis, project teams estimate the cumulative cash flows (CCFs) of the innovation project for plausible outcomes, including best- and worst-case. Specifically, project teams bound the range of outcomes within which the innovation project is likely to evolve. While some authors argue that decision-makers may prefer small-range scenarios because they perceive them as more precise than large-range scenarios (Du and Budescu 2005), others suggest that decision-makers may prefer large-range scenarios because they fear that small-range scenarios can induce a false sense of security (Roxburgh 2009).

Project teams may, but do not always, include scenarios in their proposals to enable innovation decision-makers to better understand the risk of the innovation project and to infer the expertise of the project team. Perceived risk refers to the variance in possible outcomes of the proposed innovation as perceived by the decision-maker (Weber and Hsee 1998). Perceived team expertise refers to the amount of the project team's knowledge related to the proposed innovation as perceived by the decision-maker (Chandy et al. 2006).

Our paper is not about whether or not project teams should engage in scenario analysis. Prior research suggests that scenario analysis improves judgments and may reduce overconfidence of those who engage in scenario analysis (Schoemaker 1993). Practitioners also believe that scenario analysis "expands thinking" and helps to uncover unexpected outcomes (Roxburgh 2009). Rather, this paper examines what influence scenarios have when they are *presented* to innovation decision-makers.

We suggest that the effect of scenario presentation on innovation decision-makers' project selection decisions is contingent on the type of innovation. We adopt Day's (2007) framework to distinguish between core and transformational innovation projects. Core innovations are incremental changes to a firm's current products to better serve its existing customers. Transformational innovations are new offerings targeting new customers with new products. While Day's framework also contains adjacent innovation as a "middle" category which "can share characteristics with core and transformational innovations" (Nagji and Tuff 2012, p. 69), we only focus on the extremes of this typology in our contingency framework.

We adopt Day's framework for two reasons. First, it follows a long tradition in the innovation literature of categorizing innovations according to the novelty of the target market and product (Rosenkopf and McGrath 2011). Second, managers frequently use this or closely related frameworks (Day 2007; Nagji and Tuff 2012; Rosenkopf and McGrath 2011), which enhances task realism.

We propose that the effects of decision-makers' judgments on project selection decisions are contingent on (1) the method that project teams use to develop scenarios and (2) the degree to which an innovation project has strategic merit. The method that project teams use to develop scenarios can be intuitive or analytical. The distinction is grounded in dual processing theories of decision-making (Dane and Pratt 2007; Kahneman 2003) and managerial practice (Schoemaker 1995). Project teams who use intuition rely on affectively charged judgments, often derived from personal experiences, to develop scenarios (Dane and Pratt 2007). Project teams who use analysis rely on rule-based procedures, often derived from objective data and thorough analyses, to develop scenarios (Sloman 1996). An innovation project has high strategic merit if it offers benefits beyond its direct financial merit, helping the firm compete more effectively in the marketplace (Ernst, Hoyer, and Rubsaamen 2010; Noordhoff et al. 2011). Such benefits include (i) increasing the sales of other products in the firm's assortment, (ii) improving customer relationships, and (iii) developing employee talent.

HYPOTHESES

Figure 2 depicts our conceptual framework. We posit that scenario presentation influences the innovation decision-makers' perceptions about the project team *expertise* and the project *risk* which, in turn, influence decision-makers' project selection decisions. Literature on innovation decision-making argues that there is information asymmetry between project teams and innovation decision-makers about the expertise of the project team and the likely outcomes of the innovation project (Chen, Yao, and Kotha 2009; Kirsch, Goldfarb, and Gera 2009). Specifically, the literature suggests that the presentation of scenarios acts as a signal for innovation decision-makers about project team expertise (e.g., Chen, Yao, and Kotha 2009). Because scenarios represent possible outcomes of the proposed innovation, scenario presentation also influences the risk of the project as perceived by the decision-maker (March and Shapira 1987).

Scenario Presentation and Perceived Team Expertise

Based on two-sided persuasion theory (Crowley and Hoyer 1994), one would predict that presentation of two-sided scenarios enhances the perceived team expertise. We refer to this as the two-sided *persuasion effect*. Voluntary inclusion of negative information increases the persuasiveness of a message and the perceived expertise of the message source (Pechmann 1992). In contrast, when only one-sided information is shown (i.e., only the normal-case scenario), decision-makers tend to assume that an unfavorable outcome (i.e., a worst-case scenario) may also occur but is not included in the information set, which reflects negatively on the perceived expertise of the message source.

However, presentation of two-sided scenarios may also signal a lack of confidence by the project team in the innovation project, causing the project team to be perceived as having lower expertise. We refer to this as *irresolution effect*. Unlike a single scenario (i.e., the normal-case scenario), alternative scenarios may signal that the project team does not have sufficient information or expertise to insist on a precise outcome of its innovation project. Irresolution effect has a parallel in the accounting literature: a range forecast of earnings may signal to investors that management lacks the information on which to base a point forecast (e.g., Bamber and Cheon 1998).

We theorize that, ceteris paribus, the two-sided persuasion effect is stronger for transformational innovations than for core innovations. Recall that transformational innovations target new customers with products that are new to the firm, while core innovations optimize existing products for existing customers (Day 2007). Therefore, unfavorable outcomes of transformational innovations are more likely than unfavorable outcomes of core innovations (Day 2007). Crowley and Hoyer (1994) argue that in situations where unfavorable outcomes are more likely, messages that do not include such unfavorable information are perceived to come from a less expert source than messages that do include the unfavorable information. Thus, when project teams do not present unfavorable outcomes as scenarios, the decision-maker is more likely to infer a low expertise in the case of transformational innovation projects than in the case of core innovation projects.

We theorize that the irresolution effect is weaker for transformational than for core innovations. As discussed above, the probability of failure is much higher for transformational innovations than for core innovations. Thus, innovation decision-makers know that while project teams proposing core innovations have access to sufficient information on which to base their financial projections, project teams proposing transformational innovations may need to rely on scarce and imprecise information to build their financial projections. Consequently, presenting scenarios that depict alternative plausible futures is more congruent with the expectations of innovation decision-makers - and thus less likely to signal irresolution of the project team - in the case of transformational than in the case of core innovations. This is consistent with research in accounting, which shows that investors perceive the expertise of managers who issue point (versus range) earnings forecasts to be low in situations where such forecasts are based on imprecise information (Du et al. 2011). Hence, we expect the effect of scenario presentation on the perceived team expertise to be more positive (i.e., a positive effect to be more positive or a negative effect to be less negative) for transformational than for core innovations.

> **H_1**. The effect of scenario presentation on the perceived project team expertise of transformational innovation projects is more positive than its effect on the perceived project team expertise of core innovation projects.

Notice that in this hypothesis the phenomenon of interest is the moderating effect of type of innovation on the effect of scenario presentation on perceived team expertise. Prior studies suggest that the persuasion and irresolution effects of scenario presentation may have different magnitudes depending on the range between scenarios (Du et al. 2011; Schoemaker 1993). However, we expect our theoretical arguments regarding the moderating effect of type of innovation in H_1 to hold irrespective of the range between scenarios, which we will test empirically by distinguishing small-range and large-range scenario presentation.

Scenario Presentation and Perceived Risk

Two opposing logics underlie the effect of scenario presentation on innovation decision-makers' risk perceptions. On the one hand, prior research suggests that decision-makers prefer alternatives they know more about to alternatives they consider ambiguous (Camerer and Weber 1992). When evaluating an innovation proposal without scenarios, innovation decision-makers do not know the best- and worst-case outcomes for the proposed project, which may lead them to perceive the project as ambiguous (Hogarth and Kunreuther 1995). There is a strong direct link between perceived ambiguity and perceived risk. Scenario presentation places bounds on the project's expected outcomes, which may lead decision-makers to perceive the innovation project as less ambiguous and thereby reduce its perceived risk (Ho, Keller, and Keltyka 2002). Thus, scenario presentation may reduce the perceived risk through a *disambiguity effect*.

On the other hand, scenario presentation complements the normal-case scenario with a best-case scenario (typically, a desirable outcome) and a worst-case scenario (typically, an undesirable outcome). Research on *negativity bias* shows that undesirable outcomes seem psychologically stronger to the decision-maker than desirable outcomes of similar magnitude (Baumeister et al. 2001). Hence, negativity bias suggests that scenario presentation may lead innovation decision-makers to put more weight on the worst-case scenario than on the best-case scenario, which may, in turn, increase the perceived project risk.

We propose that, ceteris paribus, the disambiguity effect of scenario presentation on perceived risk is higher for transformational than for core innovations. As argued above, transformational innovations are riskier than core innovations (Day 2007). Prior research shows that risk alerts decision-makers to be concerned with missing information (Hsu et al. 2005). For core innovations, which are less risky, it is easier for decision-makers to conjecture the possible outcomes of the innovation project relying on their own experience. Thus, decision-makers are more likely to be concerned with missing information in transformational innovation projects presented without scenarios than in core innovation projects presented without scenarios, which increases the potential for scenario presentation to reduce their perceived risk through a disambiguity effect. Therefore, scenario presentation is likely to decrease the perceived risk more, or increase the perceived risk less, for transformational than for core innovations.

H_2. The effect of scenario presentation on the perceived risk of transformational innovation projects is more negative than its effect on the perceived risk of core innovation projects.

Two points are noteworthy here. First, one could conjecture that negativity bias is more likely to occur with transformational than with core innovation projects, given the extremity of their worst-case scenarios. The negativity bias literature, however, does not support such logic. Baumeister et al. (2001), for example, suggest that negativity bias is a nearly-universal principle that can be found in a broad range of psychological phenomena with varying degrees of extremity in terms of their consequences for the decision-maker. Second, we again expect our theoretical arguments regarding the moderating effect of type of innovation on the effect of perceived risk on project selection likelihood to hold irrespective of the range between scenarios. But to empirically verify this, we test our hypothesis H_2 both for small-range and large-range scenario presentation.

Perceived Team Expertise, Perceived Risk and Project Selection

Prior literature suggests that both perceived team expertise and project risk are crucial for project selection decisions (Kaplan and Strömberg 2004). We expect perceived team expertise to increase and perceived risk to decrease project selection likelihood (March and Shapira 1987).

H_{3a}. The greater the perceived team expertise, the higher the likelihood that a decision-maker funds the proposed innovation project.

H_{3b}. The greater the perceived project risk, the lower the likelihood that a decision-maker funds the proposed innovation project.

Method of Scenario Development and Project Selection

We draw on dual processing theories of decision-making to distinguish between analytical and intuitive scenario development (Dane and Pratt 2007; Kahneman 2003). Project teams that develop scenarios analytically are likely to rely more on objective information about the market and product to derive scenarios than project teams that develop scenarios intuitively (Dane, Rockmann, and Pratt 2012). For instance, project teams that develop scenarios analytically are more likely to gather historical data on prior launches of similar products and past applications of similar technologies than project teams that develop scenarios intuitively. Decision-makers can rely on such objective information to substitute at least to some extent for project team's knowledge about the market and product arising from their expertise (De Luca and Atuahene-Gima 2007). Hence, low perceived project team expertise is less damaging in firms where project teams develop scenarios analytically than in firms where project teams develop scenarios intuitively. Thus:

> **H_{4a}**. The effect of perceived team expertise on the likelihood that a decision-maker funds the proposed innovation project is more positive in firms where project teams develop scenarios intuitively than in firms where they develop scenarios analytically.

Given that analytical scenarios rely on objective information rather than intuition, decision-makers are likely to perceive analytical scenarios as more reliable and externally validated than intuitive scenarios (Dane and Pratt 2007; Schoemaker and Russo 1993). Consequently, decision-makers may perceive intuitive scenarios as more ambiguous than analytical scenarios (Ho, Keller, and Keltyka 2002). Higher ambiguity, in turn, may accentuate decision-makers' sensitivity to perceived project risk (Kahn and Sarin 1988). Hence:

> **H_{4b}**. The effect of perceived project risk on the likelihood that a decision-maker funds the proposed innovation project is more negative in firms where project teams develop scenarios intuitively than in firms where they develop scenarios analytically.

Strategic Merit of the Project and Project Selection

We propose that the effect of perceived team expertise on project selection likelihood is weaker when decision-makers evaluate projects with high rather than low strategic merit. In new product development, the initial team – i.e., the project team that generates the idea during concept development (see Figure 1) – does not always remain in charge of the project after project selection. Specifically, firms may ask the initial team to handover the project execution to a new team. However, there are costs of making such changes to project teams (Wright and Snell 1998). The higher the strategic merit of an innovation project, the more willing the firm should be to incur such costs. Moreover, projects with high strategic merit, as compared to those with low strategic merit, are inevitably perceived as more meaningful (Kirkman and Rosen 1999) and, therefore, as more attractive for new teams (Seibert, Silver, and Randolph 2004; Zhang and Bartol 2010). Thus, firms may find new team members with the right competences more easily for projects with high rather than low strategic merit. Hence:

> **H_{5a}**. The effect of perceived team expertise on the likelihood that a decision-maker funds the proposed innovation project is less positive for projects with high strategic merit than for projects with low strategic merit.

We also argue that the effect of perceived risk on project selection likelihood is less negative when decision-makers evaluate projects with high rather than low strategic merit. When evaluating an innovation project in terms of its risk, decision-makers take into account the project's financial and strategic impact on the firm (Kaplan and Strömberg 2004). Decision-makers are more likely to undertake a high-risk decision if such decision promises to deliver a high financial and strategic return (March and Shapira 1987). Hence, all else equal, decision-makers may accept a higher risk when a project has high rather than low strategic merit:

H_{5b}. The effect of perceived project risk on the likelihood that a decision-maker funds the proposed innovation project is less negative for projects with high strategic merit than for projects with low strategic merit.

Other Variables

We control for several additional variables. First, we control for the age, gender and education of the innovation decision-maker (Chen, Yao, and Kotha 2009). Second, in line with research in marketing and finance, we control for decision-makers' (1) familiarity with financial concepts, (2) knowledge in investing, (3) quantitative background, and (4) training in metrics (Hoffmann and Broekhuizen 2010; Mintz and Currim 2013). Third, prior research suggests that investment decisions may be influenced by the decision-maker's risk attitude (Weber, Blais, and Betz 2002) and depth of elaboration (Nenkov et al. 2009), and thus we also control for these variables in our analyses. Fourth, we control for the complexity of the project evaluation task (Lee and Shavitt 2009). Finally, we control for the interaction between perceived project team expertise and perceived project risk in project selection models.

STUDY 1

Field Interviews with Multinational Companies and Pretest

In this study, we test our hypotheses H_1-H_3 using an online choice-based conjoint experiment with experienced managers as subjects. Prior studies have employed conjoint experiments to study investment decisions of managers (e.g., Shepherd 1999). We went through several steps to ensure the practical relevance of our experiment and the realism of our experimental stimuli. Specifically, we conducted several interviews at four multinational companies to validate the importance of scenario presentation on innovation project selection decisions (see Appendix A). We pretested our measures and experimental stimuli on a sample of 251 undergraduate students attending degree programs at one of our universities to verify the clarity of our experimental task. To further ensure the realism of the operationalization of our factors, we calibrated our experimental stimuli based on 31 actual innovation proposals and on the advice from two senior innovation executives from Alcatel-Lucent Bell Labs.

Subjects

We contracted Instantly,[4] a global market research company headquartered in Los Angeles, to recruit and incentivize participants to our conjoint experiment from its online executive panel in the US. Subjects were considered eligible for our study if they (1) were sufficiently knowledgeable about innovation within their firm (at least 6 on a 10-point scale), (2) worked for a firm with 500 employees or more, and (3) did not work in financial institutions, insurance or consulting. Out of 1,215 potential respondents who clicked on the link of our study and started the experiment, 373 (30.7%) were considered ineligible and 69 (5.7%) exited the study early (independently of passing the screening criteria), leaving us with 773 participants. We then conducted additional checks and removed 28 multivariate outliers from our data[5] (see Appendix B for details on our data cleaning procedure).

Our final sample consists of 745 managers with an average age of 39.7 years, 40.5% female, 91.5% holding a bachelor's degree or higher, and an average tenure at their firm of 11.5 years. The sample participants were highly knowledgeable about innovation within their firm (an

[4] Prior to February 2015, the company was known as uSamp.
[5] We examined the fit of our models with and without these outliers based on Schwarz's Bayesian Information Criterion (BIC). Excluding outliers increased model fit in all models in both of our studies. If we do not remove these outliers, our significant results still hold (although sometimes at different levels of significance).

average of 8.7 on a 10-point scale) and reported high knowledge and experience of investing in general, 5.3 and 5.2, respectively, on a 7-point scale.

Experimental Procedures

At the start of our experiment, subjects read a vignette depicting a hypothetical situation in which they worked for a leading global telecommunications equipment supplier and had to select which innovation projects to fund (see Appendix C). To ensure the truthfulness of participants' project selection decisions, we informed participants that the best performing participant would earn a reward of $250 (see Appendix C for our reward mechanism).

Next, we administered our choice-based conjoint task. We created six unique innovation projects (or profiles, in conjoint terminology) based on our experimental manipulation of two factors: *type of innovation* (core versus transformational) and *scenario presentation* (no scenarios, small-range, and large-range scenarios). We constructed all possible pairs of these six projects (Louviere and Woodworth 1983), resulting in 15 choice tasks (see Appendix C6). In each choice task, the participant had to evaluate two innovation projects described by their financial projections and by a description of the type of project (core versus transformational). Next, she had to select which of the two innovation projects she would fund. Our pretests revealed that 15 choice tasks did not constitute an inordinate cognitive burden on participants. To rule out order effects, we randomized the order of pairs for each participant and the order of profiles within each pair.

We manipulated *type of innovation* by varying the extent to which the proposed innovation targets new markets with a new product. We ensured that transformational innovations, as compared to core innovations, had (1) a higher CCF in the normal-case scenario and (2) a lower probability of occurrence of the normal-case scenario.[6] Specifically, following Day (2007), we designed the CCF in the normal-case scenario for transformational innovations to be $30M after five years with a low probability of occurrence (20%), whereas for core innovations, we designed the CCF in the normal-case scenario to be $7.5M after five years with a high probability of occurrence (80%). We based this value on the CCFs of the transformational projects among the Alcatel-Lucent Bell Labs' projects we examined (which we identified with the help of an innovation project manager at Alcatel-Lucent Bell Labs). Finally, we also based the required investment and target return of each project on the projects from Alcatel-Lucent Bell Labs (see all conjoint profiles in Appendix C).

To manipulate *scenario presentation*, we again used Alcatel-Lucent Bell Labs' innovation projects. About 40% of the projects we examined contained scenarios. In the "no scenarios" level, we presented CCFs only in the normal-case scenario without any mention of best- or worst-case scenarios. To determine the range of scenarios in the "small-range scenarios" and "large-range scenarios" levels, we proceeded as follows. We first defined scenario range as the difference between the CCFs in the best- and worst-case scenarios. We then used the Alcatel-Lucent Bell Labs' projects with below-median scenario range to construct the "small-range scenarios" level. The resulting "small-range scenarios" level is equal to 4/3 of the CCFs in the normal-case scenario. For the "large-range scenarios" level, a similar procedure resulted in a range that is four times larger than the range in the "small-range scenarios" level (i.e., 16/3 of the CCFs in the normal-scenario case).

[6] Note that our operationalization of the type of innovation factor encompasses (i) the extent to which the proposed innovation targets new markets with a new product, (ii) the CCF in the normal-case scenario, and (iii) the probability of the normal-case scenario. This operationalization follows prior literature (e.g., Day 2007; Rosenkopf and McGrath 2011). Thus, manipulating type of innovation orthogonally to the probability of normal-case scenario is infeasible. As such, our intent is not to test separate effects of each of these components of type of innovation.

Measures

After the 15 pairwise project selection decisions, we presented again the six unique projects, one at a time and in a random order, and measured the perceived team expertise and the perceived risk of each project (see Appendix C3). We used three items (i.e., expert, experienced, and knowledgeable) to measure the perceived team expertise on seven-point scales (adapted from Ohanian 1990 to an innovation project selection context), and a numerical rating scale ranging from 0 (“not at all risky”) to 100 (“extremely risky”) to measure perceived project risk (Weber and Hsee 1998).

After conducting our experimental task and measuring expertise and risk perceptions, we administered the rest of our measures (we provide all measures, their respective sources, and their reliabilities in Appendix F). We adopted scales widely used in prior research for all our constructs. To ensure truthfulness and reduce inattentive or careless responses, we used different scale formats and guaranteed respondents full anonymity (Podsakoff et al. 2003).

Model Specification and Estimation

Let us denote each project by j = 1,…,6 and each choice set by k = 1,...,15. We denote project j appearing in choice set k by j(k). We estimate two hierarchical linear models to test hypotheses H_1 and H_2, which pertain to the effects of scenario presentation ($SCENARIOS_j$), innovation type ($INNOV\_TYPE_j$) and their interaction on perceived project team expertise (Equation 1) and on perceived project risk (Equation 2). We control for several subject-specific control variables ($\mathbf{Controls_i}$). We include subject- and project-specific error terms in the model ($\varepsilon_{ij,E}$ and $\varepsilon_{ij,R}$, for the expertise and risk equations, respectively), which we assume to be independently normally distributed with mean zero. To capture unobserved heterogeneity among subjects, we model the parameters capturing the effects of our conjoint factors as random coefficients with their own error terms ($\boldsymbol{\upsilon_{i,E}}$ for expertise and $\boldsymbol{\upsilon_{i,R}}$ for risk). We assume that these error terms are independently and normally distributed with mean zero and are independent of the residuals ($\varepsilon_{ij,E}$ and $\varepsilon_{ij,R}$). We estimate these models using restricted maximum likelihood.

(1) $$EXPERTISE_{ij} = (\beta_{0,E} + \upsilon_{0i,E}) + (\beta_{1,E} + \beta_{2,E} \times INNOV\_TYPE_j + \upsilon_{1i,E}) \times SCENARIOS_j + (\beta_{3,E} + \upsilon_{2i,E}) \times INNOV\_TYPE_j + \boldsymbol{\beta_{4,E}} \times \mathbf{Controls_i} + \varepsilon_{ij,E},$$

(2) $$RISK_{ij} = (\beta_{0,R} + \upsilon_{0i,R}) + (\beta_{1,R} + \beta_{2,R} \times INNOV\_TYPE_j + \upsilon_{1i,R}) \times SCENARIOS_j + (\beta_{3,R} + \upsilon_{2i,R}) \times INNOV\_TYPE_j + \boldsymbol{\beta_{4,R}} \times \mathbf{Controls_i} + \varepsilon_{ij,R.}$$

To model managers' project selection decisions, we use a mixed logit specification with repeated choices (Revelt and Train 1998). The mixed logit model circumvents several limitations of the standard logit model by allowing for random taste variation, unrestricted substitution patterns, and correlation in unobserved factors over choice sets and does not impose the independence from irrelevant alternatives assumption (Train 2009).

Let us denote the utility that manager i obtains from selecting project j appearing in choice set k by $U_{ij(k)}$. To test H_{3a} and H_{3b}, we express $U_{ij(k)}$ as a function of manager i's perceptions regarding project j's team expertise ($EXPERTISE_{ij(k)}$) and risk ($RISK_{ij(k)}$), the interaction between expertise and risk and an unobserved individual, project and choice set specific error term ($\varepsilon_{ij(k)}$) that captures unexplained variance in managers' preferences for different innovation projects (Equation 3). To allow for heterogeneity in managers' preferences for observable project characteristics, we model the parameters ($\boldsymbol{\beta}$) in our model as random coefficients with their own error terms ($\boldsymbol{\upsilon_i}$). We allow for different variances for these error terms and assume that they are independently and normally distributed. We assume that the error terms ($\varepsilon_{ij(k)}$) are iid extreme value, independent of observed variables and coefficients.

(3) $$U_{ij(k)} = \beta_0 + (\beta_1 + \upsilon_{1i}) \times EXPERTISE_{ij(k)} + (\beta_2 + \beta_3 \times EXPERTISE_{ij(k)} + \upsilon_{2i}) \times RISK_{ij(k)} + \varepsilon_{ij(k)}.$$

Equation 4, in turn, tests the same relationship while including scenario presentation, type of innovation and their interaction in the model, allowing us to explore whether scenario presentation influences innovation project selection decisions beyond its influence through our proposed mediators:

(4) $$U_{ij(k)} = \beta_0 + (\beta_1 + \upsilon_{1i}) \times EXPERTISE_{ij(k)} + (\beta_2 + \beta_3 \times EXPERTISE_{ij(k)} + \upsilon_{2i}) \times RISK_{ij(k)} + (\beta_4 + \upsilon_{3i}) \times INNOV\_TYPE_{j(k)} + (\beta_5 + \beta_6 \times INNOV\_TYPE_{j(k)} + \upsilon_{4i}) \times SCENARIOS_{j(k)} + \varepsilon_{ij(k)}.$$

To estimate the model parameters in Equations 3 and 4, we assume that decision-makers make utility-maximizing project selection decisions. We use the utility functions specified in Equations 3 and 4 to derive, using the conditional logit formula, the probability that manager i chooses to fund project j in choice set k. We estimate our models using simulated maximum likelihood. The resulting log likelihood does not have a closed form solution. Hence, we implement the procedure proposed by Revelt and Train (1998) to simulate the likelihood function value. We use 50 Halton draws in our simulations.

Results

Table 1 presents the estimation results for Study 1. Unless otherwise mentioned, we use effects coding for the *type of innovation* factor and dummy coding for the *scenario presentation* factor. For this and subsequent analyses, we compute variance inflation factors (VIFs) for all independent variables. The maximum VIF is 3.2, indicating that multicollinearity is not a threat.

Scenario Presentation and Perceived Expertise. Columns 2 and 3 of Table 1 present the results of our perceived expertise model (Equation 1). We find that the model has a better fit (see Table 1; AIC = 12,795; BIC = 12,833) compared to a model without random coefficients. In line with H_1, we find that the effect of scenario presentation on the perceived team expertise is more positive for transformational than for core innovation projects both for small-range scenario presentation ($\beta = .07$, $p < .05$) and large-range scenario presentation ($\beta = .06$, $p < .05$).

Additional findings deserve mention. First, we find that small-range scenario presentation increases the perceived expertise ($\beta = .16$, $p < .01$) but large-range scenario presentation decreases the perceived expertise ($\beta = -.11$, $p < .01$).

Second, to identify the marginal effects of small- and large-range scenarios on perceived expertise for core and transformational innovations, we dummy code the type of innovation (i.e., the focal level of type of innovation is coded as 0 and the other level is coded as 1) and then re-estimate Equation 1. We find that, for core innovations, small-range scenarios increase ($\beta = .09$, $p < .05$), whereas large-range scenarios decrease the perceived expertise ($\beta = -.17$, $p < .01$). For transformational innovations, however, while small-range scenarios increase the perceived expertise ($\beta = .23$, $p < .01$), the effect of large-range scenarios on the perceived expertise is not significant ($\beta = -.05$, $p > .10$).

Third, because we use a dummy coding for the scenarios presentation variables, the coefficient for type of innovation is a marginal effect of this variable on the perceived expertise of innovation projects *without scenarios*. Accordingly, we find that, when no scenarios are presented, innovation decision-makers perceive the project teams of transformational innovations as less expert than those of core innovations ($\beta = -.22$, $p < .01$).

Fourth, for the control variables, we find that decision-makers' depth of elaboration on potential outcomes ($\beta = .14$, $p < .01$) and risk attitude[7] ($\beta = .38$, $p < .01$) have a positive influence, whereas decision-makers' age has a negative influence ($\beta = -.01$, $p < .01$) on the

[7] A high score in this scale is indicative of a risk-seeking attitude (Weber, Blais, and Betz 2002).

perceived team expertise. Finally, decision-makers' general knowledge in investing (β = .10, $p <$ .05), quantitative background (β = .05, $p < .05$) and level of training in metrics (β = .11, $p < .01$) all have a positive influence on perceptions of expertise.

Scenario Presentation and Perceived Risk. Columns 5 and 6 of Table 1 present the results of our perceived risk model (Equation 2). We find that the model has a better fit (see Table 1; AIC = 40,378; BIC = 40,416) compared to a model without random coefficients. Supporting H_2, we find that the effect of scenario presentation on the perceived risk is more negative (for small-range scenarios; β = -2.53, $p < .01$) and less positive (for large-range scenarios; β = -1.27, $p < .05$) for transformational than for core innovations.

Additional findings deserve mention. First, we find that small-range scenarios decrease (β = -1.55, $p < .05$), while large-range scenarios increase the perceived project risk (β = 14.39, $p <$ .01). Second, through marginal effect analysis, we find that, for core innovations, the effect of small-range scenario presentation on the perceived risk is not significant (β = .97, $p > .10$) and only large-range scenario presentation increases the perceived risk (β = 15.65, $p < .01$). For transformational innovations, we find that small-range scenarios decrease (β = -4.08, $p < .01$), whereas large-range scenarios increase the perceived risk (β = 13.10, $p < .01$). Third, we find that transformational innovations are perceived as riskier than core innovations (β = 9.30, $p < .01$). Fourth, in terms of the control variables, we find that decision-makers with higher (vs. lower) depth of elaboration on potential future outcomes (β = -1.89, $p < .05$), older (vs. younger) decision-makers (β = -.16, $p < .05$) and male (vs. female) decision-makers (β = -2.00, $p < .10$) tend to perceive innovation projects as less risky. In contrast, risk attitude (β = 2.80, $p < .01$), innovation decision-makers' education (β = .74, $p < .05$), general knowledge in investing (β = 1.86, $p < .05$), quantitative background (β = 1.26, $p < .05$), and level of training in metrics (β =

2.00, $p < .05$) all tend to increase decision-makers' risk perceptions. Perceived task complexity ($\beta = 1.61$, $p < .01$) also has a positive effect on decision-makers' risk perceptions.

Project Selection Decisions. Columns 2 and 3 of Table 2 present the parameter estimates of the model described in Equation 3. Supporting H_{3a} and H_{3b}, we find that perceived expertise increases ($\beta = .18$, $p < .01$), while perceived risk decreases ($\beta = -.02$, $p < .01$), the likelihood of innovation project selection. The coefficient for the interaction between the perceived expertise and the perceived risk is positive and significant ($\beta = .002$, $p < .05$). However, note that due to the nonlinearity in logit specifications, the sign and significance of the interaction coefficient may not indicate the true direction and true statistical significance of the interaction effect (Hoetker 2007). Hence, we examine the interaction effects in Table 2 using the simulation-based approach suggested by Zelner (2009), which we explain in detail in Appendix E. We confirm that the perceived expertise has a positive and significant moderating effect on the effect of a project's perceived risk on its likelihood of being selected.

Columns 5 and 6 of Table 2 present the results of the model described in Equation 4. We find that the full model, which includes the effects of scenario presentation, type of innovation and an interaction term between these variables, has the best fit (see Table 2; AIC_{FULL} = 12,558 vs. $AIC_{BASELINE}$ = 14,299; BIC_{FULL} = 12,663 vs. $BIC_{BASELINE}$ = 14,339). The full model also has the best predictive validity using a hold-out sample (hit rate of 67.2% for the full model and 61.2% for the baseline model, both of which compare favorably to chance, which is 50%).[8]

In line with H_{3a} and H_{3b}, the effect of perceived expertise on project selection likelihood remains positive and significant ($\beta = .10$, $p < .01$) and the effect of perceived risk on project

[8] To compute these hit rates, we re-estimate our baseline and full models on a calibration sample of respondents' first thirteen choice decisions and predict their remaining two choice decisions.

selection likelihood remains negative and significant (β = -.01, $p < .01$). The moderating effect of perceived expertise on the effect of perceived risk on project selection likelihood remains positive and significant (β = .001, $p < .10$). The simulation-based approach proposed by Zelner (2009) again shows that this result is not driven by the nonlinearity of the logit specification.

STUDY 2

While in Study 1 we manipulated the innovation projects to have the same expected return, in Study 2, we examine whether scenario presentation influences the likelihood that decision-makers make *better* project selection decisions in terms of expected return. We do so by ensuring that transformational innovations have higher expected return than core innovations. Study 2 also extends Study 1 by accounting for (i) the method that project teams use to develop scenarios and (ii) the strategic merit of innovation projects as hypothesized in H_4 and H_5.

Subjects and Experimental Procedures

Similar to Study 1, we used a large-scale online conjoint experiment with experienced innovation decision-makers to test our hypotheses. We pretested our measures and experimental stimuli on a sample of 192 managers. We contracted ResearchNow, headquartered in Plano, Texas, to run the fieldwork of the pretest and the full experiment among innovation managers from its online executive panel in the US.

We used the same sampling, screening and data cleaning criteria as in Study 1. This resulted in a final sample of 1,680 managers who were 42.1 years of age on average, 31% female, 92.7% holding a bachelor's degree or higher, and an average tenure at their firm of 12.9 years. Participants were highly knowledgeable about innovation in their firm (8.4 on a 10-point scale). They also reported high knowledge and experience of investing in general, 5.3 and 5.2, respectively, and high knowledge of investing in innovation projects, 5.0, on a seven-point scale.

In Study 2, we employed the same experimental procedures as in Study 1 with the following exceptions. First, in Study 1, we deliberately manipulated the type of innovation in a way that core and transformational innovations had the same expected return after five years in the normal-case scenario. In Study 2, we relaxed this assumption as follows. The normal-case scenario of a transformational innovation project had a 25% (rather than 20%) probability of occurring. Consequently, in this study, the expected return of transformational innovations (25% × $30M) was higher than that of core innovations (80% × $7.5M). Our scenario presentation factors followed the same manipulation as in Study 1 with the exception that we explicitly stated that the worst- and best-case scenarios were equally likely to occur.

Second, we modified our instruction vignette to inform subjects that Telforce would accept that its entire innovation budget might be lost because of investments in projects that were not successful (see Appendix D). Moreover, to ensure truthful responses, we informed that the experimental projects were disguised real innovation projects. We further informed subjects that Telforce's CTO, who oversaw all incubator funds, and a senior innovation manager had ranked the same projects in terms of their attractiveness to Telforce, and that we would compare their project selection decisions with this ranking to determine the best performing subject. The best performing subject would be the one whose project selection decisions were closest to those of the two managers, and we would reward her or him with a $250 Amazon gift card.

Third, besides manipulating *scenario presentation* (no scenarios, small-range, and large-range scenarios) and *type of innovation* (core versus transformational) to replicate our tests for hypotheses H_1 to H_3, we manipulated two additional factors to test hypotheses H_4 and H_5: *the* *method of scenario development* and *strategic merit*. We manipulated scenario presentation and type of innovation within subjects, as in Study 1. We manipulated the strategic merit and the method of scenario development between subjects. In other words, each participant was randomly assigned to one of the four conditions based on our 2 × 2 between-subject manipulation of the method of scenario development (intuitive versus analytical) and strategic merit (high versus low), and then had to make project selection decisions among combinations of the six innovation project profiles.

To manipulate the method of scenario development, we provided information whether project teams used their intuition ("intuitive") or conducted a thorough analysis of the different scenarios they presented ("analytical" - Dane and Pratt 2007; Schoemaker 1995). To manipulate strategic merit, we varied the extent to which the proposed innovations generated benefits for the firm beyond their financial merit (Ernst, Hoyer, and Rubsaamen 2010; Noordhoff et al. 2011). Specifically, in a "high" ("low") strategic merit level, all projects generated a high (low) increase in the sales of other products in the firm's assortment, improvement of current customer relationships, and development of employee talent (see Appendix D).

Fourth, in the choice tasks of Study 1, we did not allow a no-choice option. One may argue, however, that in practice decision-makers may sometimes not be willing to fund any project during project selection decisions. To account for this, we allowed a no-choice option in our second study. In order to ensure design efficiency, we used the JMP software (SAS Institute, Cary, NC, USA) to generate Bayesian D-optimal choice design (Sandor and Wedel 2001) suited for estimating the main effects of our manipulated within-subject factors and their interaction. This resulted in 11 choice tasks consisting of three possible choice options in each set: two innovation projects and a no-choice option (see Appendix D). We randomized the order of choice sets for each participant.

Measures

We used the same measurement approach as in Study 1, with the following two exceptions. First, we measured perceived team expertise and project risk *before* project selection decisions. For each of the 11 choice tasks, we measured participants' perceptions regarding the team expertise and the risk of the two innovation projects in a choice task. Hence, for each participant, we obtained 22 evaluations of perceived expertise and risk. Second, we measured these two variables using a 10-point scale (see Appendix D). After measuring perceived expertise and risk and obtaining participants' project selection decisions, we inventoried the same control variables as those obtained in Study 1.

Model Specification and Estimation

We follow the same general model specification and estimation procedures as in Study 1 with the exceptions that we account (i) for the method of scenario development and strategic merit manipulations in all our models and (ii) for the presence of a no-choice alternative in our project selection models (see Appendix D for details).

Results

Replication Tests of H_1 and H_2. Columns 2 and 3 and columns 5 and 6 of Table 3 present the results of our perceived expertise and risk models. We again find that our perceived expertise and risk models fit the data well (see Table 3; AIC_E = 142,040 and BIC_E = 142,091; AIC_R =

152,060 and BIC_R = 152,111) compared to models without random coefficients. The results in Table 3 replicate Study 1 and are consistent with our hypotheses H_1 and H_2 both for small- and large-range scenario presentation. One difference, as compared with Study 1, is the effect of large-range scenarios on the perceived team expertise which is positive ($\beta = .65$, $p < .01$).

Replication Tests of H_3. Columns 2 and 3 and columns 5 and 6 of Table 4 present the parameter estimates of the baseline and full project selection models. We again find that the full model has the best fit (see Table 4; AIC_{FULL} = 29,318 vs. $AIC_{BASELINE}$ = 29,769; BIC_{FULL} = 29,443 vs. $BIC_{BASELINE}$ = 29,814) and also the best predictive validity, again using the last two choices as a holdout sample (hit rate of 68.4% for the full and 67.1% for the baseline models, both of which compare favorably to chance, which is 33.33%).

The results in Table 4 replicate H_{3a} and H_{3b}. One difference, as compared to Study 1, is the coefficient for the interaction between the perceived team expertise and the perceived project risk, which is positive but not significant in both the baseline and full project selection models.

Method of Scenario Development and Project Selection. In support of H_{4a}, we find that the effect of perceived expertise on project selection likelihood is more positive when project teams develop scenarios intuitively than when they develop scenarios analytically ($\beta = .04$, $p < .05$; see columns 5 and 6 in Table 4). We check the interpretation of this interaction effect using the simulation-based approach proposed by Zelner (2009) and find that the result holds (see Appendix E). We do not find a significant moderating effect of the method of scenario development on the effect of perceived project risk on project selection likelihood ($\beta = -.02$, $p > .10$). Hence, we do not find support for $H_{4b.}$

Strategic Merit and Project Selection. Supporting H_{5a}, we find that the effect of perceived expertise on project selection likelihood is less positive for projects that have a high strategic merit than for projects that have a low strategic merit (β = -.06, $p < .01$). We again check the interpretation of this interaction effect using the simulation-based approach and find that the result holds. However, strategic merit does not significantly moderate the effect of perceived risk on project selection likelihood (β = -.02, $p > .10$). Hence, we do not find support for H_{5b}.

ROBUSTNESS CHECKS AND FURTHER ANALYSES

One may conceive that the perceived expertise of an innovation project team influences innovation decision-makers' risk perceptions (see, e.g., Kaplan and Strömberg 2004). To account for this possibility, we include the perceived team expertise as a control variable in our perceived risk models and re-estimate them (see Appendix G). Our focal results remain robust with the following exceptions. In Study 1, the effect of small-range scenarios on perceived risk (which was significant at the 5% level) becomes insignificant ($p = .11$). The interaction effect between type of innovation and large-range scenarios is significant only at the 10% rather than 5% level. In Study 2, the interaction effect between type of innovation and small-range scenarios becomes significant at the 5% rather than 10% level. We also find that the effect of perceived expertise on perceived risk is inconclusive across our two studies, that is, negative in Study 1 (β = -2.66, $p < .01$) and positive in Study 2 (β = .03, $p < .01$).

We also compare the proposed models with different model specifications. First, we run our project selection models without controlling for the interaction term between perceived expertise and risk in project selection models. All our results hold. Second, we run all models without random coefficients and find that our focal results remain robust with the following exceptions. In Study 1, the interaction term between innovation type and large-range scenario presentation becomes insignificant both in the perceived expertise and in the perceived risk models. In Study 2, the interaction terms between innovation type and small-range scenario presentation and between innovation type and large-range scenario presentation become insignificant in the perceived risk model. The interaction term between perceived expertise and the method of scenario development is positive but not significant in the full project selection model. Yet, we again find that our proposed models with random coefficients outperform models without random coefficients in terms of model fit, based on both the AIC and BIC.

MANAGERIAL IMPLICATIONS

In order to corroborate our findings and extract rich managerial implications, we conducted follow-up interviews with senior executives at five multinational companies, all of whom had extensive experience in project selection committees (see Appendix H). Our findings from two experiments among managers highly knowledgeable about innovation, complemented with the follow-up interviews, lead to four substantive implications for managers.

First, our findings suggest that firms should help project teams develop small- rather than large-range scenarios. Small-range scenario presentation increases perceived team expertise and reduces perceived risk of an innovation project (both studies). Large-range scenario presentation increases the perceived project risk (both studies), whereas its effect on perceived team expertise is inconclusive (it is negative in Study 1 and positive in Study 2). Indeed, as some of our interviewees highlighted, project teams who present small-range scenarios signal that they "have done their homework" by iterating and validating the assumptions of their project to reach a narrower range. In contrast, large-range scenarios may signal that the project team "is dreaming" and lead decision-makers to "fixate on the downside and ignore the upside". We learned from the follow-up interviews that firms can offer tools and coaching to help project teams develop small-range scenarios. For instance, firms may coach project teams to validate the assumptions driving scenarios beforehand and, thus, narrow down the range.

Second, our study suggests that firms willing to promote transformational innovation should make the presentation of small-range scenarios a hard requirement for an innovation proposal to be presented to a project selection committee. Scenario presentation increases the probability that decision-makers select transformational instead of core innovation projects. This is true both when decision-makers face a forced choice among core and transformational projects (Study 1), and when they do not face such a forced choice but transformational innovation projects are, from a normative standpoint, superior to core innovation projects (Study 2). This has an important implication for firms. In practice, decision-makers cannot fund all projects they evaluate due to budget constraints and often need to choose between alternative projects. Moreover, the majority of our respondents (79%; Study 2) indicate that senior management at their firms would like to select more transformational than core innovation projects to strengthen their innovation pipeline. Yet, at present, only about half of the project teams at their firms always or almost always present scenarios. Several of our interviewees indeed recognized that scenarios are important to allow managers to "learn about the risk of the project" and "discover the expertise of the project team." They also believe that these goals are especially useful for transformational rather than core innovations, because in core innovation projects both project teams and managers "know what they are doing, i.e., they know the context, the cost structure, etc."

Third, we find that projects with an expert team have a higher likelihood to be selected than projects with a less expert team (both studies). One of our interviewees corroborated this assertion. He mentioned that a project team with high expertise "knows what it is doing" as "they have expertise and experience under their belt" which leads decision-makers to "trust their projects almost blindly." As project teams have less expertise, we find that they should increasingly use analytical scenario development to help increase project selection likelihood (Study 2). As one of the interviewees stated, for teams that lack critical expertise "analytical tools can indeed become handy as they give project teams a better view of their project."

Fourth, as project teams have less expertise, we find that it is increasingly important to convey the project's strategic merit to decision-makers to help increase project selection likelihood (Study 2). One of our interviewees indicated that this happens because projects with high strategic merit have "intangible benefits, which will materialize anyway because they depend on others also doing their work." Thus, decision-makers may fund a project with high strategic merit even if the project team lacks expertise because they are willing and able to re-staff the team or enlist other collaborators to help the team succeed.

LIMITATIONS AND FURTHER RESEARCH

Our study has limitations, some of which offer pertinent opportunities for future research. First, in our experimental manipulations, we assumed that the CCFs in the normal-case scenario are at the midpoint of the CCFs in the best- and worst-case scenarios. Even though this is a standard practice in decision-making studies (e.g., Ho, Keller, and Keltyka 2002), a minority of cases among Alcatel-Lucent projects we examined have positively skewed scenarios. It would be worthwhile to focus on the role of skewed scenarios in innovation project selection decisions.

Second, one may ask whether some project teams may interpret the guidance of presenting small- versus large-range scenarios as an excuse to withhold information about their project's true uncertainty. However, managers we interviewed suggested that such practice would be frowned upon and detrimental for project team reputation, making the practice unsustainable over time. In addition, it is not the purpose of our research to delve into the moral or ethical implications of such practices; we merely discuss the implications of presenting small- or large-range scenarios. Further research and scholarly discourse should address such relevant issues.

Finally, although we deemed an experiment to be the best possible method given the objectives of our study, it would be interesting to test if the effects of scenario presentation on project selection decisions hold in a retrospective study. However, it is difficult to conceive of a method to make this feasible at sufficient levels of reliability and validity.

Overall, we offer this study as a new look into the often-hidden world of innovation project selection. By studying the effect of scenario presentation on innovation project selection decisions, our work offers new insights but many interesting and important research questions remain. Marketing scholars would be remiss to neglect the role of different types of information that project teams present at different stages of new product development process.

The Role of Scenario Presentation in the Selection of Innovation Projects

Appendices

Overview

APPENDIX A – EXPLORATORY FIELD INTERVIEWS WITH MULTINATIONAL COMPANIES

Before formally testing our hypotheses, we conducted several interviews at Alcatel-Lucent Bell Labs and three additional multinational companies to whom we promised anonymity: a German pharmaceutical firm, a Middle Eastern chemical firm, and a Swedish engineering firm. At each firm, we interviewed managers knowledgeable about innovation project selection decisions, such as a chief controller or CFO, a high-level representative of the CTO office, and two innovation program managers. Through these interviews, we validated the importance of scenario presentation on project selection decisions at these companies.

The interviewees expressed that whether or not project teams should present scenarios to the selection committee, had been, and was, subject to debate. They also confirmed that the effect of scenario presentation may depend on (1) the type of innovation and (2) the range of scenarios (e.g., concerns that "innovators could shoot themselves in the foot" by presenting large-range scenarios).

Next, we ensured that our manipulations of the financial projections of core and transformational innovation projects resembled the financial projections of real innovation projects in the telecommunications industry. Before administering the main experiment, we examined 31 innovation project proposals submitted for funding approval by project teams at Alcatel-Lucent Bell Labs. These proposals were evaluated by innovation decision-makers throughout a period of three years, and some were selected to receive funding.

About 40% of these projects contained scenarios. The scenarios were generated through a training that innovation project teams received for several days. During the training, project team members were asked to think of possible events that might happen to their innovation projects and influence the cumulative cash flows. They were also asked to challenge the assumptions underlying the cumulative cash flows in a normal-case scenario. Project teams typically used excel sheets to work out the worst-case and best-case scenarios. The scenarios were then challenged by an innovation program manager and subsequently revised by the project teams before they presented the innovation proposals to the innovation project selection committee. We developed our experimental stimuli based on the analysis of these proposals and on the advice from two senior innovation executives at Alcatel-Lucent Bell Labs.

APPENDIX B – DATA CLEANING PROCEDURE

To identify multivariate outliers, we computed the Mahalanobis distance (D^2) using key multi-item scales in our studies, namely the scales for *elaboration on potential outcomes* and *risk attitude*. Mahalanobis D^2 uses a participant's pattern of responses across items to identify extreme observations. It computes a generalized distance between each respondent and the average respondent, taking into account correlations between the different items. This distance follows a chi-square distribution with degrees of freedom equal to the number of variables included in the calculation. This procedure has been shown to be effective in recognizing careless respondents through identification of nomologically implausible response patterns (Meade and Craig 2012). We removed all respondents (28 in Study 1 and 83 in Study 2) identified by this procedure as a multivariate outlier; i.e., those with an unusual D^2 ($p < .001$).

APPENDIX C – SUPPLEMENTAL MATERIALS FOR STUDY 1

APPENDIX C1 – CHOICE TASK INSTRUCTIONS

TelForce Ltd, a leading global telecommunications equipment supplier (top 5 in the world, in terms of turnover), asked you to help in deciding which employee-generated innovation projects it should fund this year.

The company has shortlisted several innovation projects for your consideration, which you will now evaluate. The financial projections you will see have been prepared by different employee teams who may have different degrees of optimism and expertise. Thus, TelForce counts on your careful and critical assessment of the quality of each team's financial projections and of the attractiveness of each project to the company.

Reward for your performance. You will have to make 15 choices among different innovation projects. We will reward the best performer in this task as follows: we will randomly select one of your chosen innovation projects and determine your performance based on the difference between its realized financial outcome (which we obtain using a realistic investment simulation) and the target return (indicated in each project). The top investor (respondent), in terms of performance, will earn a bonus of **$250**.

APPENDIX C2 – CHOICE TASK STIMULI EXAMPLE

Please read the information about each of the two innovation projects below and choose the one you are willing to fund. Please balance risk and return when making your choices. Please make your decision as truthful as possible, as the findings of this study may influence TelForce's innovation funding decisions.

Project A

This innovation project **requires TelForce to stretch beyond its current business** (i.e. new intended market and new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**$10 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$50 Million**
Probability of Normal-Case Scenario	**20%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

Project B

This innovation project **is in line with TelForce's current business** (i.e. similar intended market and similar product) and thus the normal-case scenario has a high probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$7.5 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**$2.5 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$12.5 Million**
Probability of Normal-Case Scenario	**80%**
Required Investment	**$1.5 Million**
Target Return in 5 Years	**$6 Million**

APPENDIX C3 – MEASUREMENT OF DEPENDENT VARIABLES

Project A

This innovation project requires TelForce **to stretch beyond its current business** (i.e. new intended market and new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**$10 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$50 Million**
Probability of Normal-Case Scenario	**20%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

1. **Perceived Risk (Source: Weber and Hsee 1998)**

   Please judge the riskiness of this project using the rolling slider below:

   0 = Not at all risky ——————○—————————— 100 = Extremely risky

   30

2. **Perceived Expertise (Source: Adapted from Ohanian 1990; α = .94)**

   Judging from the financial projections of this project, please indicate whether you would consider the team who prepared these projections as:

   a. Not at all expert (1) … Highly expert (7)
   b. Not at all experienced (1) … Very experienced (7)
   c. Not at all knowledgeable (1) … Highly knowledgeable (7)

APPENDIX C4 - REWARD MECHANISM AND INCENTIVES OF STUDY 1

To motivate participants to make truthful project selection decisions, we informed them that, on top of their flat participation fee, the best performing participant would earn a reward of $250 (which we confirmed with Instantly to be a sufficient incentive for our target sample). We also informed participants that we would determine the best performing participant using a realistic investment simulator based on their project selection decisions (see choice task instructions of Study 1 in Appendix C1). We then selected the best performing participant as follows.

After the study was finished, we picked one innovation project per participant, randomly selected from their chosen projects in the 15 choice tasks. Next, we simulated the financial outcomes for each of these innovation projects. We realized the normal-case scenario with a probability equal to the 'probability of normal-case scenario' indicated in the stimuli. We realized the worst- and best-case scenarios with equal probabilities.[9] Among the participants who had chosen the project yielding the highest financial performance, we then randomly selected one participant as the winner of the $250 reward.

Our instructions and reward mechanism, in line with Ding et al. (2011), were designed to ensure that (i) the respondents believed it was in their best interest to think hard and reveal their true project evaluation; (ii) it was, as much as feasible, in their best interest to do so; and (iii) there was no obvious way for respondents to improve their payoff by "gaming the system".

We achieved the first two goals through our instructions. Research in psychometrics suggests that adequately wording the instructions of a study is a good strategy to motivate

[9] Take the project in Appendix C3, as an example. For this project, we realized the normal-case scenario (i.e., five-year CCFs of $30 million) with a 20% probability, and the worst- and best-case scenarios with equal probabilities (i.e., a 40% chance of five-year CCFs being $10 million and a 40% chance of five-year CCFs being $50 million).

subjects to think hard and provide accurate and truthful answers (Podsakoff, MacKenzie, and Podsakoff 2012). First, we told participants that they should exert a "careful and critical assessment of the quality of each team's financial projections and of the attractiveness of each project to the company" (see wording of our instructions in Appendix C1). Second, we informed participants to make "realistic decisions" by telling them that their performance would be calculated using a "realistic investment simulation." We achieved the third goal by deliberately not clarifying how the investment simulation worked. Other researchers have used purposefully vague statements to incentive-align respondents (e.g., Ding et al. 2011).

To validate that our incentive strategies worked, we examined the predictive validity of our data. We treated the last two choice decisions as a holdout sample and the first 13 choice decisions as our calibration sample. We estimated our project selection models in the calibration sample and used the estimated parameters to predict subjects' choices in the holdout sample. Our models showed high predictive validity. The hit rates of the baseline and full project selection models were 61.2% and 67.2%, respectively. These hit rates are significantly higher than the 50% hit rates that random choice would generate (Louviere, Hensher, and Swait 2000).

APPENDIX C5 – CONJOINT PROFILES OF STUDY 1

Profile 1. Transformational Innovation without Scenarios

This innovation project requires TelForce **to stretch beyond its current business** (i.e. new intended market and new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Probability of Normal-Case Scenario	**20%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

Profile 2. Transformational Innovation with Small-Range Scenario Presentation

This innovation project requires TelForce **to stretch beyond its current business** (i.e. new intended market and new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**$10 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$50 Million**
Probability of Normal-Case Scenario	**20%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

Profile 3. Transformational Innovation with Large-Range Scenario Presentation

This innovation project requires TelForce **to stretch beyond its current business** (i.e. new intended market and new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**- $50 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$110 Million**
Probability of Normal-Case Scenario	**20%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

Profile 4. Core Innovation without Scenarios

This innovation project **is in line with TelForce's current business** (i.e. similar intended market and similar product) and thus the normal-case scenario has a high probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$7.5 Million**
Probability of Normal-Case Scenario	**80%**
Required Investment	**$1.5 Million**
Target Return in 5 Years	**$6 Million**

Profile 5. Core Innovation with Small-Range Scenario Presentation

This innovation project **is in line with TelForce's current business** (i.e. similar intended market and similar product) and thus the normal-case scenario has a high probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$7.5 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**$2.5 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$12.5 Million**
Probability of Normal-Case Scenario	**80%**
Required Investment	**$1.5 Million**
Target Return in 5 Years	**$6 Million**

Profile 6. Core Innovation with Large-Range Scenario Presentation

This innovation project **is in line with TelForce's current business** (i.e. similar intended market and similar product) and thus the normal-case scenario has a high probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$7.5 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years	**- $12.5 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years	**$27.5 Million**
Probability of Normal-Case Scenario	**80%**
Required Investment	**$1.5 Million**
Target Return in 5 Years	**$6 Million**

APPENDIX C6 – EXPERIMENTAL DESIGN OF STUDY 1

This design was generated by constructing all possible pairs of six unique projects, resulting in 15 choice sets.

Choice Set	Project 1		Project 2	
	Type of Innovation	**Scenario Presentation**	**Type of Innovation**	**Scenario Presentation**
1	Transformational	No Scenarios	Transformational	Small-Range
2	Transformational	No Scenarios	Transformational	Large-Range
3	Transformational	No Scenarios	Core	No Scenarios
4	Transformational	No Scenarios	Core	Small-Range
5	Transformational	No Scenarios	Core	Large-Range
6	Transformational	Small-Range	Transformational	Large-Range
7	Transformational	Small-Range	Core	No Scenarios
8	Transformational	Small-Range	Core	Small-Range
9	Transformational	Small-Range	Core	Large-Range
10	Transformational	Large-Range	Core	No Scenarios
11	Transformational	Large-Range	Core	Small-Range
12	Transformational	Large-Range	Core	Large-Range
13	Core	No Scenarios	Core	Small-Range
14	Core	No Scenarios	Core	Large-Range
15	Core	Small-Range	Core	Large-Range

TABLE C1– DESCRIPTIVE STATISTICS (STUDY 1)

Constructs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Project Team Expertise	1											
2. Project Risk	-.04	1										
3. Depth of Elaboration on Potential Outcomes	.19	.00	1									
4. Risk Attitude in Investment Decisions	.32	.12	.25	1								
5. Age	-.10	-.07	.07	-.08	1							
6. Gender	.02	-.01	-.14	.04	.00	1						
7. Education	-.03	.03	-.05	-.01	.02	.00	1					
8. Familiarity to Financial Concepts	.26	.09	.35	.44	-.01	.13	-.08	1				
9. Knowledge in Investing	.30	.14	.28	.44	-.03	.14	-.11	.68	1			
10. Quantitative Background	.19	.13	.08	.23	-.05	.06	-.01	.29	.39	1		
11. Training in Metrics	.30	.15	.30	.41	-.09	.10	-.06	.69	.69	.45	1	
12. Task Complexity	-.06	.05	-.08	-.06	.06	.00	-.03	-.19	-.18	-.05	-.20	1
M	5.07	55.23	5.96	3.71	39.70	.59	2.75	5.41	5.27	5.02	5.11	4.16
SD	1.28	26.71	.81	.65	9.74	.49	1.50	1.18	1.24	1.31	1.22	1.33

APPENDIX D – SUPPLEMENTAL MATERIALS FOR STUDY 2

APPENDIX D1 – CHOICE TASK INSTRUCTIONS

TelForce Ltd, a leading global telecommunications equipment supplier (top 5 in the world, in terms of turnover), has allocated a budget in a separate incubator program to stimulate innovation. Telforce is willing to consider its budget completely as value at risk, meaning Telforce is accepting that the entire budget may be lost because of investment in projects that are not successful. Telforce does this to ensure that the incubator program embraces risk to bring promising innovations to market.

You belong to the investment committee of this Telforce incubator office. TelForce has shortlisted several innovation projects for your consideration, which you will now evaluate. The financial projections you will see have been prepared by different employee teams who may have different degrees of optimism and expertise. Thus, TelForce counts on your careful assessment of the quality of each team's financial projections and of the attractiveness of each project to the company.

Reward for your performance. You will have to make 11 funding decisions. In each decision, you will be shown two projects. You can fund one of the two innovation projects or neither of them. The projects you will see are disguised real innovation projects. The overseeing CTO of all incubator funds and one senior innovation manager at Telforce have ranked the same innovation projects you will now evaluate in terms of how attractive they are to Telforce. We will reward the best performer in this task as follows. We will select all the projects you funded in your 11 funding decisions. Each of your chosen projects will yield a score that depends on its position in this ranking. We will then determine your performance based on the overall score you achieve across your chosen projects. The top investor in terms of performance will earn a bonus of **$250**.

APPENDIX D2 – MEASUREMENT OF DEPENDENT VARIABLES

Please read the information about each of the two innovation projects below. Please make your decision as truthful as possible, as the findings of this study may influence TelForce's innovation funding decisions.

Project A

This innovation project **requires TelForce to stretch beyond its current business** (i.e. new intended market or new product) and thus the normal-case scenario has a low probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$30 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years*	**-$50 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years*	**$110 Million**
Probability of Normal-Case Scenario	**25%**
Required Investment	**$4 Million**
Target Return in 5 Years	**$25 Million**

* The worst- and best-case scenarios are equally likely to occur

1. Please rate the riskiness of this project:

Not all risky o o o o o o o o o o Extremely risky

2. Judging from the financial projections of this project, please rate the expertise of the team who prepared these projections:

Not all expert o o o o o o o o o o Extremely expert

Project B

This innovation project **is in line with TelForce's current business** (i.e. similar intended market and similar product) and thus the normal-case scenario has a high probability of happening.

Cumulative Cash Flows in Normal-Case Scenario in 5 Years	**$7.5 Million**
Cumulative Cash Flows in Worst-Case Scenario in 5 Years*	**$2.5 Million**
Cumulative Cash Flows in Best-Case Scenario in 5 Years*	**$12.5 Million**
Probability of Normal-Case Scenario	**80%**
Required Investment	**$1.5 Million**
Target Return in 5 Years	**$6 Million**

* The worst- and best-case scenarios are equally likely to occur

1. Please rate the riskiness of this project:

Not all risky o o o o o o o o o o Extremely risky

2. Judging from the financial projections of this project, please rate the expertise of the team who prepared these projections:

Not all expert o o o o o o o o o o Extremely expert

3. Please choose the project you are willing to fund:

Project A	*Project B*	*None*
O	O	O

APPENDIX D3 - BETWEEN-SUBJECT MANIPULATIONS OF THE METHOD OF SCENARIO DEVELOPMENT AND STRATEGIC MERIT

METHOD OF SCENARIO DEVELOPMENT

Intuitive Scenario Development:

Some of the projects that you will see have worst- and best-case scenarios that were developed as follows. The project teams identified the driving forces and uncertainties that influence the cumulative cash-flows (CCFs) of their innovation projects. The project teams then used their **intuition** to estimate CCFs in the worst- and best-case scenarios.

Analytical Scenario Development:

Some of the projects that you will see have worst- and best-case scenarios that were developed as follows. The project teams identified the driving forces and uncertainties that influence the cumulative cash-flows (CCFs) of their innovation projects. The project teams then **did a thorough analysis** of the different scenarios they presented and of the possible CCFs in these scenarios.

STRATEGIC MERIT OF INNOVATION PROJECTS

Low Strategic Merit:

All innovation projects you will see have a **low strategic merit** for TelForce (e.g., they generate a low increase in sales of other products in the firm's assortment, improvement of current customer relationships and development of existing talent).

High Strategic Merit:

All innovation projects you will see have a **high strategic merit** for TelForce (e.g., they generate a high increase in sales of other products in the firm's assortment, improvement of current customer relationships and development of existing talent).

APPENDIX D4 - BAYESIAN D-OPTIMAL EXPERIMENTAL DESIGN

The design was generated with the JMP software (SAS Institute) suited for estimating the main effects of type of innovation and scenario presentation and their interaction effect. We used parameter estimates of type of innovation and scenario presentation from Study 1 as priors for design generation (Sandor and Wedel 2001). Each choice set, in addition to two projects, includes a 'no-choice' alternative.

Choice Set	**Project 1**		**Project 2**	
	Type of Innovation	**Scenario Presentation**	**Type of Innovation**	**Scenario Presentation**
1	Core	No Scenarios	Transformational	No Scenarios
2	Core	Large-Range	Core	No Scenarios
3	Transformational	Small-Range	Core	Small-Range
4	Transformational	Small-Range	Transformational	No Scenarios
5	Core	Large-Range	Transformational	No Scenarios
6	Core	Large-Range	Core	Small-Range
7	Transformational	Large-Range	Core	Large-Range
8	Transformational	Large-Range	Core	Small-Range
9	Transformational	Large-Range	Transformational	No Scenarios
10	Core	No Scenarios	Transformational	Large-Range
11	Transformational	Small-Range	Transformational	Large-Range

APPENDIX D5 – MODEL SPECIFICATION OF STUDY 2

Our model specification and estimation procedures follow those in Study 1 with the following exceptions. First, we account for our between-subject manipulations of the method of scenario development and strategic merit of innovation projects in our models. Second, we account for the presence of a no-choice alternative in our project selection models.

Recall that for each of the 11 choice tasks, we measured participants' perceptions regarding the team expertise and the risk of two innovation projects. Hence, for each participant, we obtained 22 evaluations of perceived team expertise and perceived project risk. We follow the same specification and estimation procedure of perceived expertise and risk models as in Study 1 (Equations 1 and 2, respectively) with the exception that we add two dummy variables to account for the method of scenario development and the strategic merit of the projects.

We model managers' project selection decisions with a mixed logit specification. However, we specify the utility $U_{ij(k)}$ that manager i obtains from selecting an alternative j from each choice set k differently than in Study 1 in order to account for the presence of a no-choice alternative. In the baseline project selection model, we express the utility as a function of manager's perceptions regarding project team expertise and risk, their interaction and an unobserved individual, alternative and choice set specific error term ($\varepsilon_{ij(k)}$) which is iid extreme value, independent of observed variables and coefficients. For the no-choice alternative, in line with Haaijer, Kamakura, and Wedel (2001), we code the perceived expertise and the perceived risk levels as zero. In addition, we add a no-choice constant ($NO\_CHOICE_{ij(k)}$) to the utility function that takes one for the no-choice alternative in the choice set k and zero otherwise. We model the parameter of the no-choice constant as a random coefficient with its own error term

(υ_{1i}) to account for the unobserved correlation among utilities for projects that each decision-maker evaluates across the 11 choice tasks (see Train 2009), yielding:

(WD1)
$$U_{ij(k)} = \beta_0 + \beta_1 \times EXPERTISE_{ij(k)} + (\beta_2 + \beta_3 \times EXPERTISE_{ij(k)}) \times RISK_{ij(k)} + (\beta_4 + \upsilon_{1i}) \times NO\_CHOICE_{ij(k)} + \varepsilon_{ij(k)}.$$

In the full project selection model, and in line with our approach in Study 1, we extend the utility in Equation WD1 by including a main effect of the scenario presentation and innovation type, as well as an interaction term between these variables. Following Haaijer, Kamakura, and Wedel (2001), we use effects coding for the type of innovation and the scenario presentation factors. For the no-choice alternative, we code the levels of these factors as zero. In addition, we add interaction terms of perceived team expertise and project risk with the method of scenario development ($METHOD_i$) and strategic merit ($MERIT_i$), yielding:

(WD2)
$$U_{ij(k)} = \beta_0 + (\beta_1 + \beta_2 \times METHOD_i + \beta_3 \times MERIT_i) \times EXPERTISE_{ij(k)} + (\beta_4 + \beta_5 \times EXPERTISE_{ij(k)} + \beta_6 \times METHOD_i + \beta_7 \times MERIT_i) \times RISK_{ij(k)} + \beta_8 \times INNOV\_TYPE_{j(k)} + (\beta_9 + \beta_{10} \times INNOV\_TYPE_{j(k)}) \times SCENARIOS_{j(k)} + (\beta_{11} + \upsilon_{1i}) \times NO\_CHOICE_{ij(k)} + \varepsilon_{ij(k)}.$$

Note that we do not include main effects of the method of scenario development and strategic merit of innovation project because these are between-subjects factors and are constant across projects and choice tasks (hence, their effects on project selection decisions are not identified). We follow the same model estimation procedure as that for project selection models in Study 1.

TABLE D1– DESCRIPTIVE STATISTICS (STUDY 2)

Constructs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Project Team Expertise	1											
2. Project Risk	.22	1										
3. Depth of Elaboration on Potential Outcomes	.24	.15	1									
4. Risk Attitude in Investment Decisions	.33	.24	.38	1								
5. Age	-.21	-.15	-.04	-.27	1							
6. Gender	-.12	-.04	-.03	-.14	.43	1						
7. Education	-.01	-.02	-.03	-.02	.03	-.01	1					
8. Familiarity to Financial Concepts	.27	.19	.46	.54	-.16	-.10	-.09	1				
9. Knowledge in Investing	.28	.20	.35	.51	-.16	-.13	-.05	.62	1			
10. Quantitative Background	.25	.20	.26	.39	-.17	-.09	-.03	.42	.44	1		
11. Training in Metrics	.29	.21	.42	.51	-.23	-.13	-.05	.67	.62	.50	1	
12. Task Complexity	-.06	.01	-.12	-.12	.18	.19	-.01	-.18	-.19	-.03	-.16	1
M	6.66	6.49	5.71	3.76	42.10	.69	2.74	5.53	5.17	5.06	5.16	3.98
SD	2.17	2.45	1.00	.71	1.67	.46	1.62	1.21	1.33	1.32	1.22	1.50

APPENDIX E – INTERPRETATION OF MARGINAL EFFECTS IN PROJECT SELECTION (MIXED LOGIT) MODELS

Given the nonlinearity in logit specifications, the sign and significance of interaction coefficients may not indicate the true direction and true statistical significance of the interaction effect in our mixed logit models (Hoetker 2007). For this reason, Hoetker (2007) suggests that one should interpret marginal effects (i.e., the derivative of the probability that Y=1 with respect to a certain independent variable, X), rather than coefficient estimates. Yet, the interpretation of marginal effects of interaction terms is non-trivial as it requires one to assess the impact of a change in X on choice probabilities both through the interaction term and through the main effect and across different levels of a second independent variable Z.

Following Zelner (2009), we examine the interaction term between perceived expertise and risk in Equations 3 and 4 by calculating the difference in predicted probabilities at different levels of perceived project team expertise and project risk. We start by predicting the probability that a project with a low level of perceived team expertise and a low level of risk ($\pi_{E(L),R(L)}$) is chosen, when compared with an average project. We define "low" levels of expertise and risk as being one standard deviation below their respective sample means. We then use these values, and the parameter estimates in Table 2, to compute the latent utility of a project with a low level of team expertise and a low level of risk (Equations 3 and 4). We compute the latent utility of an average project by setting all variables at their sample mean. We then use the conditional logit formula in Equation WE1 to compute the predicted probability $\pi_{E(L),R(L)}$:

(WE1) $$P_{ij(k)} = \exp(V_{ij(k)}) / [\exp(V_{ij(k)}) + \exp(V_{ih(k)})],$$

where $P_{ij(k)}$ is the probability that manager i, when selecting which innovation project to fund, chooses project j in choice set k instead of the alternative project presented in choice set k (which we denote by h(k)), and $V_{ij(k)}$ is the deterministic component of the utilities in Equations 3 and 4.

Next, we set team expertise to a "high" level (i.e., one standard deviation above its sample mean) while keeping project risk at a "low" level, and repeat the same process to obtain $\pi_{E(H),R(L)}$. We then do the opposite combination ("low" expertise and "high" risk), yielding $\pi_{E(L),R(H)}$ and finally set both expertise and risk to a "high" level, obtaining $\pi_{E(H),R(H)}$.

Having computed the four predicted probabilities for all combinations of high versus low expertise and risk, we obtain the impact of the interaction between expertise and risk as follows. We first calculate the effect of a joint increase in project team expertise and project risk on the probability that the project is selected (i.e., $\pi_{E(H),R(H)} - \pi_{E(L),R(L)}$). Afterwards, we account for the effect of increasing any of the two variables (expertise and risk) in isolation by subtracting these individual effects from the joint effect above. That is, we compute the following quantity:

(WE2) $$\Delta\pi_{E\times R} = (\pi_{E(H),R(H)} - \pi_{E(L),R(L)}) - [(\pi_{E(H),R(L)} - \pi_{E(L),R(L)}) + (\pi_{E(L),R(H)} - \pi_{E(L),R(L)})].$$

The expression in Equation WE2 allows us to test the null hypothesis that the effect of simultaneously increasing expertise and risk ($\pi_{E(H),R(H)} - \pi_{E(L),R(L)}$) is not greater than the sum of the separate effects of increasing either expertise ($\pi_{E(H),R(L)} - \pi_{E(L),R(L)}$) or risk ($\pi_{E(L),R(H)} - \pi_{E(L),R(L)}$) in isolation. Hence, the expression in Equation WE2 is similar in spirit to a cross-partial derivative, and thus captures the effect of an interaction term.

In order to assess statistical significance of this interaction, we proceed as follows. Note that we need to take into account (1) parameter uncertainty embodied in the estimates in Table 2 and (2) the unobserved heterogeneity captured in our random coefficients distributions. We follow the simulation-based approach described by Zelner (2009) to draw sound statistical conclusions about the significance of the interaction effect in our project selection models. In line with Zelner (2009) we conducted this simulation as follows:

1. We draw 1,000 (population) coefficient vectors from a multivariate normal distribution with mean equal to the estimated (population) coefficients (in Table 2) and variance equal to the estimated variance-covariance matrix. This step captures parameter uncertainty.
2. For each of these 1,000 coefficient vectors, we simulate 1,000 (individual) coefficient vectors from the random coefficients' distribution. This step captures the unobserved heterogeneity in our random coefficients distributions.
3. For each set of simulated (individual) coefficients, we calculate the predicted π probabilities described above.
4. For each of the 1,000 (population) coefficient vectors, we average the 1,000 predicted probabilities (for each of the following: $\pi_{E(L),R(L)}$, $\pi_{E(L),R(H)}$, $\pi_{E(H),R(L)}$ and $\pi_{E(H),R(H)}$) obtained using the 1,000 (individual) coefficient vectors drawn from the random coefficients distributions. We then use such average predicted probabilities to calculate $\Delta\pi_{E\times R}$ according to the expression in Equation WE2.
5. We then construct a 95% confidence interval for $\Delta\pi_{E\times R}$ using the 1,000 values for the $\Delta\pi_{E\times R}$ obtained in step 4.

The resulting two-tailed 95% confidence interval for the interaction term in the model in Equation 3 is (.006, .082), and thus does not contain zero. In the case of the model in Equation 4, the two-tailed 90% confidence interval for the interaction term is (.001, .075), which also does not contain zero. Thus, in both cases, the null hypothesis is rejected. This result confirms that our interaction term is positive and statistically significant.

For Study 2, we follow similar procedures to examine the interaction terms in our project selection models. For instance, we examine the interaction term between perceived expertise and the method of scenario development (see Equation WD2) by calculating the difference in predicted probabilities at different levels of perceived team expertise for the cases of analytical and intuitive methods of scenario development. Recall that in Study 2 each project is paired with another project and a no-choice option. We start by predicting the probability that a project with a low level of perceived team expertise is chosen in the level of analytical scenario development ($\pi_{E(L),METHOD(A)}$), when compared with a project with a low level of perceived team expertise and a no-choice option. We define "low" or "high" levels of expertise as being one standard deviation below or above its sample mean. Next, we set expertise to a "high" level while keeping the level of scenario development as "analytical", and obtain $\pi_{E(H),METHOD(A)}$. We then do the same process for the "intuitive" scenario development, yielding $\pi_{E(L),METHOD(I)}$ and $\pi_{E(H),METHOD(I)}$.

Having computed the four predicted probabilities, we obtain the impact of the interaction between perceived expertise and the method of scenario development as follows:

$$\Delta\pi_{E\times METHOD} = (\pi_{E(H),METHOD(A)} - \pi_{E(L),METHOD(I)}) - [(\pi_{E(H),METHOD(I)} - \pi_{E(L),METHOD(I)}) + (\pi_{E(L),METHOD(A)} - \pi_{E(L),METHOD(I)})]. \quad \text{(WE3)}$$

In order to assess statistical significance of this interaction, we again follow steps 1 to 5 explained above. We follow the same procedure to obtain the interaction between perceived expertise and the strategic merit (see Equation WD2) and follow the same steps to assess its statistical significance.

The resulting two-tailed 95% confidence interval for the interaction term between perceived team expertise and the method of scenario development is (.001, .013), and thus does not contain zero. The two-tailed 95% confidence interval for the interaction term between expertise and the strategic merit is (-.016, -.004), which also does not contain zero.

APPENDIX F – MEASUREMENT SCALES

Construct (Cronbach's α_1 for Study 1 and α_2 for Study 2)	**Source / Response Scale**	**Item / Question**
Depth of Elaboration on Potential Outcomes		
Depth of Elaboration on Potential Outcomes (α_1 = .92, α_2 = .95)	Source: Nenkov et al. (2009) 1 = "Strongly disagree" 4 = "Neither agree nor disagree" 7 = "Strongly agree"	*Please indicate your agreement or disagreement with the following statements:* a. Before I act I consider what I will gain or lose in the future as a result of my actions. b. I try to anticipate as many consequences of my actions as I can. c. Before I make a decision I consider all possible outcomes. d. I always try to assess how important the potential consequences of my decisions might be. e. I try hard to predict how likely different consequences are. f. Usually I carefully estimate the risk of various outcomes occurring.
Risk Attitude in Investment Decisions		
Risk Attitude in Investment Decisions **(α_1 = .63, α_2 = .69)**	Source: Weber et al. (2002) 1 = "Very unlikely" 3 = "Not sure" 5 = "Very likely"	*For each of the following statements, please indicate the likelihood of engaging in each activity or behavior on a 5-point scale:* a. Investing 10% of your annual income in a moderate growth mutual fund. b. Investing 5% of your annual income in a very speculative stock. c. Investing 5% of your annual income in a dependable and conservative stock. d. Investing 10% of your annual income in a new business venture.
Demographics		
Age	Open question	*Please indicate your age.*
Gender	Open question (0 = Female; 1 = Male)	*Please indicate your gender.*
Education	a. Education up to age 18 b. Non-university Higher Education c. Undergraduate University Educ. d. Masters-level University Educ. e. Ph.D.-level University Education	*Which of the following best describes your highest level of education?*

Note: Cronbach's Alpha is shown only for reflective scales, as items in formative measures need not be correlated.

(Cronbach's α_1 for Study 1 and α_2 for Study 2)	Source / Response Scale	Item / Question
Financial Literacy & Knowledge		
Familiarity with financial concepts	1 = "Not familiar at all" 7 = "Extremely familiar"	*Please rate your familiarity with the following concepts on a 7-point scale:* a. … Net Present Value (NPV) b. … Internal Rate of Return (IRR) c. … Break-even analysis d. … Payback period e. …Weighted average cost of capital f. … Probability distribution function g. … Return on Investment
Knowledge in Investing (α_1 = .93, α_2 = .93)	Source: Hoffmann and Broekhuizen (2010) 1 = "Very little" 7 = "Very much"	*How would others characterize you with regard to the level of ...* a. knowledge you have about investing b. experience you have about investing
Knowledge in Investing in Innovation Projects (α_2 = .91)	Source: Nenkov et al. (2009) 1 = "Strongly disagree" 4 = "Neither agree nor disagree" 7 = "Strongly agree" Measured only in Study 2.	*Please indicate your agreement or disagreement with the following statements:* a. Compared to most people, I know a lot about investing in innovation projects. b. Others often ask me for advice about investing in innovation projects.
Metric Based Training		
Quantitative Background	Source: Mintz and Currim (2013) 1 = "Entirely qualitative" 7 = "Entirely quantitative"	*Please rate your qualitative/quantitative background:* a. Overall orientation b. Educational background c. Work experience background
Training in Metrics	Source: Mintz and Currim (2013) 1 = "Much less than average amount of training" 7 = "Much more than average amount of training"	*Please indicate your level of training with metrics (can be through work or educational experiences):* a. Overall metrics b. Marketing metrics c. Financial metrics
Task Complexity		
Task Complexity (α_1 = .81, α_2 = .87)	Source: Lee and Shavitt (2009)	*Please indicate whether you think that the task of innovation project evaluation was...* a. 1 = "easy", 7 = "difficult" b. 1 = "simple", 7 = "complicated" c. 1 = "not effortful", 7 = "effortful"
Additional Variable		
Use of Techniques	Source: Graham and Harvey (2001) 1 = "Never" 7 = "Always"	*How frequently does your firm use the following techniques when deciding which projects or acquisitions to pursue?* a. Net Present Value (NPV) b. Internal Rate of Return (IRR) c. Scenario Analysis (e.g., Worst-, Normal-, Best-Case) d. Payback Period e. Value-at-Risk f. Simulation Analysis g. Other

Note: Cronbach's Alpha is shown only for reflective scales, as items in formative measures need not be correlated.

APPENDIX G – PARAMETER ESTIMATES FOR THE PERCEIVED RISK MODEL CONTROLLING FOR PERCEIVED EXPERTISE

	Perceived Risk (Study 1)		**Perceived Risk (Study 2)**	
	Parameter	*SE* [a,b]	*Parameter*	*SE* [a,b]
Intercept	23.78	5.33***	2.84	.30***
Std. Dev. of Random Coefficient	12.66	3.77***	1.15	.21***
Conjoint Factors				
Innovation Type (Transformational = 1)	8.72	.53***	.50	.02***
Std. Dev. of Random Coefficient	7.40	.37***	.57	.01***
Small-Range Scenarios	-1.12	.71	-.63	.04***
Std. Dev. of Random Coefficient	9.23	.50***	1.25	.03***
Large-Range Scenarios	14.09	.74***	.68	.03***
Std. Dev. of Random Coefficient	10.73	.52***	.94	.02***
Small-Range Scenarios × Innovation Type	-2.35	.62***	-.05	.02**
Large-Range Scenarios × Innovation Type	-1.11	.64*	-.05	.02**
Between-Subject Factors				
Method of Scenario Development (Intuitive = 1)			-.04	.06
Strategic Merit (High = 1)			-.01	.06
Controlling for Perceived Expertise				
Perceived Expertise	-2.66	.32***	.03	.01***
Control Variables				
Depth of Elaboration on Potential Outcomes	-1.60	.76**	.13	.04***
Risk Attitude in Investment Decisions	3.90	.99***	.39	.06***
Age	-.19	.06***	-.03	.00***
Gender	-2.08	1.17*	.24	.08***
Education	.75	.37**	.00	.02
Familiarity to Financial Concepts	-.77	.74	.01	.04
Knowledge in Investing	2.17	.69**	.10	.03***
Quantitative Background	1.39	.48**	.15	.03***
Training in Metrics	2.29	.74**	.06	.04
Task Complexity	1.61	.43***	.09	.02***
N (number of observations)	4,470		36,960	
Akaike information criterion (AIC)	40,314		152,037	
Bayesian information criterion (BIC)	40,353		152,089	

Notes: We use effects coding for the *type of innovation* factor (where core = -1 and transformational = 1). We use dummy coding for the *scenario presentation* factor (i.e., small-range scenario = 1 if small-range scenarios are presented, 0 otherwise; large-range scenario = 1 if large-range scenarios are presented, 0 otherwise), *method of scenario development* (i.e., scenario development = 1 if scenarios are developed intuitively and 0 if scenarios are developed analytically), and *strategic merit* (i.e., strategic merit = 1 for the high level, 0 for the low level). We use dummy coding for *gender* (gender = 1 for males, 0 for females).

a. We computed the significance levels for the main parameters (i.e., the population means) from t-tests.
b. We computed the significance levels for the variances of the random coefficients from z-tests.

* $p < .10$, ** $p < .05$, *** $p < .01$.

APPENDIX H – FOLLOW-UP INTERVIEWS WITH SENIOR INNOVATION EXECUTIVES

Overview of Interviews

After obtaining the findings from our two choice-based conjoint experiments, we conducted follow-up interviews with senior innovation executives. The goal of the interviews was twofold. First, through in-depth interviews, we corroborated whether our interviewees observed our findings in their companies. Second, we learned about the practices the interviewees suggest to put in place to implement some of the managerial implications we provide.

We discussed topics related to scenario presentation and innovation project selection practices, such as:

(i) their experiences with scenario presentation and project selection decisions,
(ii) the scenario presentation practices and outcomes at their firms,
(iii) the steps project teams take to calibrate and narrow the range of scenarios,
(iv) the methods of scenario development at their firms.

Interviewees

We conducted five interviews in total. The interviewees were all senior innovation executives with extensive experience in innovation project selection decisions. All interviewees were, at some point in their career, responsible to lead innovation project selection committees in large multinational corporations. They had experience in a variety of industries and companies. Besides Alcatel-Lucent Bell Labs, the companies included a large Saudi Arabian chemical company, a global tire manufacturer based in Europe, a large American health care and medical devices company and a global communications, information technology and consumer electronics company. Our interviewees have diverse designations such as "Group Director for

Innovation", "VP Open Innovation and Global Operations / COO", "Head of Innovation Program Office", "Global Talent Acquisition Innovation" and "Senior Research Scientist".

Interview Design

We designed the interviews in accordance with recommendations by qualitative researchers. First, we followed the conditions for a focused interview proposed by Merton and Kendall (1946):

(i) We interviewed managers who have direct knowledge of scenario presentation practices of innovation project teams and innovation project selection decisions at their firms.
(ii) We grounded the questions of the interview on prior research on scenario development and innovation project selection as well as our hypotheses.
(iii) On the basis of prior literature review and our own hypotheses, we developed the interview questions, thereby ensuring that the inquiry was guided by theory-based hypotheses.
(iv) The interview itself was focused on the subjective experiences of the managers exposed to scenario presentation and innovation project selection practices.

Second, to enhance the validity of our interviews (Miller, Cardinal, and Glick 1997):

(i) We asked about simple facts or concrete events rather than past opinions or beliefs,
(ii) We focused on recent facts and events rather than those from distant past,
(iii) We motivated our interviewees to provide accurate information. To do so, we (i) ensured confidentiality, (ii) minimized the duration and inconvenience of data collection, and (iii) provided rich explanation of the usefulness of our research.

Interview Procedure

We conducted the interviews by phone. Each interview lasted between 45 and 60 minutes. Despite the semi-structured nature of the interviews, the interviewer shaped "the interview around the respondent” rather than conducting it rigidly according to a set of questions and ordering (Kincaid and Bright 1957). We tape recorded all interviews, except one where the interviewee did not grant her permission for the interview to be recorded. When recording was not possible, the interviewer took extensive notes and wrote detailed reports immediately after the interview to avoid any memory-related biases.

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TABLE 1 – STUDY 1: PARAMETER ESTIMATES FOR THE PERCEIVED EXPERTISE AND PERCEIVED RISK MODELS

	Perceived Expertise			**Perceived Risk**		
	Parameter	*SE* [a,b]	*Hyp.*	*Parameter*	*SE* [a,b]	*Hyp.*
Intercept	2.78	.28***		16.93	5.11***	
Std. Dev. of Random Coefficient	.75	.20***		12.03	3.61***	
Conjoint Factors						
Innovation Type (Transformational = 1)	-.22	.02***		9.30	.53***	
Std. Dev. of Random Coefficient	.28	.01***		7.71	.37***	
Small-Range Scenarios	.16	.03***		-1.55	.72**	
Std. Dev. of Random Coefficient	.10	.02		9.56	.51***	
Large-Range Scenarios	-.11	.04***		14.39	.74***	
Std. Dev. of Random Coefficient	.63	.03***		10.58	.52***	
Small-Range Scenarios × Innovation Type	.07	.03**	H_1 (+)	-2.53	.63***	H_2 (-)
Large-Range Scenarios × Innovation Type	.06	.03**	H_1 (+)	-1.27	.65**	H_2 (-)
Control Variables						
Depth of Elaboration on Potential Outcomes	.14	.04***		-1.89	.74**	
Risk Attitude in Investment Decisions	.38	.05***		2.80	.95***	
Age	-.01	.00***		-.16	.06**	
Gender (Male = 1)	-.02	.06		-2.00	1.14*	
Education	.00	.02		.74	.36**	
Familiarity to Financial Concepts	-.01	.04		-.75	.71	
Knowledge in Investing	.10	.04**		1.86	.67**	
Quantitative Background	.05	.03**		1.26	.47**	
Training in Metrics	.11	.04***		2.00	.71**	
Task Complexity	.00	.02		1.61	.42***	
N (number of observations)	4,470			4,470		
Akaike information criterion (AIC)	12,795			40,378		
Bayesian information criterion (BIC)	12,833			40,416		

Notes: We use effects coding for the *type of innovation* factor (where core = -1 and transformational = 1). We use dummy coding for the *scenario presentation* factors (i.e., small-range scenario = 1 if small-range scenarios are presented, 0 otherwise; large-range scenario = 1 if large-range scenarios are presented, 0 otherwise). We use dummy coding for *gender* (gender = 1 for males, 0 for females).

a. We computed the significance levels for the main parameters (i.e., the population means) from t-tests.
b. We computed the significance levels for the variances of the random coefficients from z-tests.
* $p < .10$, ** $p < .05$, *** $p < .01$.

TABLE 2 – STUDY 1: PARAMETER ESTIMATES FOR THE PROJECT SELECTION MODELS (MIXED LOGIT MODELS WITH REPEATED CHOICES)

	Baseline Project Selection Model **(Perceived Expertise and Risk)**			**Full Project Selection Model** **(incl. Scenario Presentation and Interactions)**		
	Parameter	*SE* [a]	*Hyp.*	*Parameter*	*SE* [a]	*Hyp.*
Expertise	.18	.03***	H_{3a} (+)	.10	.03***	H_{3a} (+)
Std. Dev. of Random Coefficient	.38	.04***		.02	.09	
Risk	-.02	.00***	H_{3b} (-)	-.01	.00***	H_{3b} (-)
Std. Dev. of Random Coefficient	.02	.00***		.01	.00***	
Expertise × Risk	.00	.00**		.00	.00*	
Conjoint Factors						
Innovation Type (Transformational = 1)				-.12	.03**	
Std. Dev. of Random Coefficient				.77	.03***	
Small-Range Scenarios				.78	.03***	
Std. Dev. of Random Coefficient				.40	.04***	
Large-Range Scenarios				-.51	.03***	
Std. Dev. of Random Coefficient				.62	.04***	
Small-Range Scenarios × Innovation Type				.11	.04**	
Large-Range Scenarios × Innovation Type				-.13	.02***	
N (number of observations)	22,350			22,350		
Akaike information criterion (AIC)	14,299			12,558		
Bayesian information criterion (BIC)	14,339			12,663		

Notes: The dependent variable is a binary choice variable indicating whether or not a participant decided to fund an innovation project. Given the nonlinearity in logit specifications, we center Expertise and Risk at the mean and use effects coding for the *type of innovation* (where core = -1 and transformational = 1) and the *scenario presentation* factors (i.e., small-range scenario = 1 if small-range scenarios are presented, 0 if large-range scenarios are presented, and -1 otherwise; large-range scenario = 1 if large-range scenarios are presented, 0 small-range scenarios are presented, and -1 otherwise).

a. We computed the significance levels from z-tests.
* $p < .10$, ** $p < .05$, *** $p < .01$.

TABLE 3 – STUDY 2: PARAMETER ESTIMATES FOR THE PERCEIVED EXPERTISE AND PERCEIVED RISK MODELS

	Perceived Expertise			**Perceived Risk**		
	Parameter	*SE* [a,b]	*Hyp.*	*Parameter*	*SE* [a,b]	*Hyp.*
Intercept	2.56	.30***		2.93	.30***	
Std. Dev. of Random Coefficient	1.21	.21***		1.17	.21***	
Conjoint Factors						
Innovation Type (Transformational = 1)	-.15	.02***		.49	.02***	
Std. Dev. of Random Coefficient	.30	.01***		.57	.01***	
Small-Range Scenarios	.82	.03***		-.61	.04***	
Std. Dev. of Random Coefficient	1.04	.02***		1.23	.03***	
Large-Range Scenarios	.65	.03***		.70	.03***	
Std. Dev. of Random Coefficient	1.10	.02***		.94	.02***	
Small-Range Scenarios × Innovation Type	.15	.02***	H_1 (+)	-.04	.02*	H_2 (-)
Large-Range Scenarios × Innovation Type	.05	.02***	H_1 (+)	-.04	.02**	H_2 (-)
Between-Subject Factors						
Method of Scenario Devel. (Intuitive = 1)	.03	.06		-.04	.06	
Strategic Merit (High = 1)	-.07	.06		-.02	.06	
Control Variables						
Depth of Elaboration on Potential Outcomes	.08	.04**		.13	.04***	
Risk Attitude in Investment Decisions	.61	.06***		.42	.06***	
Age	-.03	.00***		-.03	.00***	
Gender (Male = 1)	-.22	.08**		.23	.08***	
Education	-.02	.02		.00	.02	
Familiarity to Financial Concepts	-.06	.04		.00	.04	
Knowledge in Investing	.20	.03***		.11	.03***	
Quantitative Background	.17	.03***		.16	.03***	
Training in Metrics	.13	.04***		.06	.04	
Task Complexity	.01	.02		.09	.02***	
N (number of observations)	36,960			36,960		
Akaike information criterion (AIC)	142,040			152,060		
Bayesian information criterion (BIC)	142,091			152,111		

Notes: We use effects coding for the *type of innovation* factor (where core = -1 and transformational = 1). We use dummy coding for the *scenario presentation* factor (i.e., small-range scenario = 1 if small-range scenarios are presented, 0 otherwise; large-range scenario = 1 if large-range scenarios are presented, 0 otherwise), *method of scenario development* (i.e., method of scenario development = 1 if scenarios are developed intuitively and 0 if scenarios are developed analytically), and *strategic merit* (i.e., strategic merit = 1 for the high level, 0 for the low level). We use dummy coding for *gender* (gender = 1 for males, 0 for females).

a. We computed the significance levels for the main parameters (i.e., the population means) from t-tests.
b. We computed the significance levels for the variances of the random coefficients from z-tests.
* $p < .10$, ** $p < .05$, *** $p < .01$.

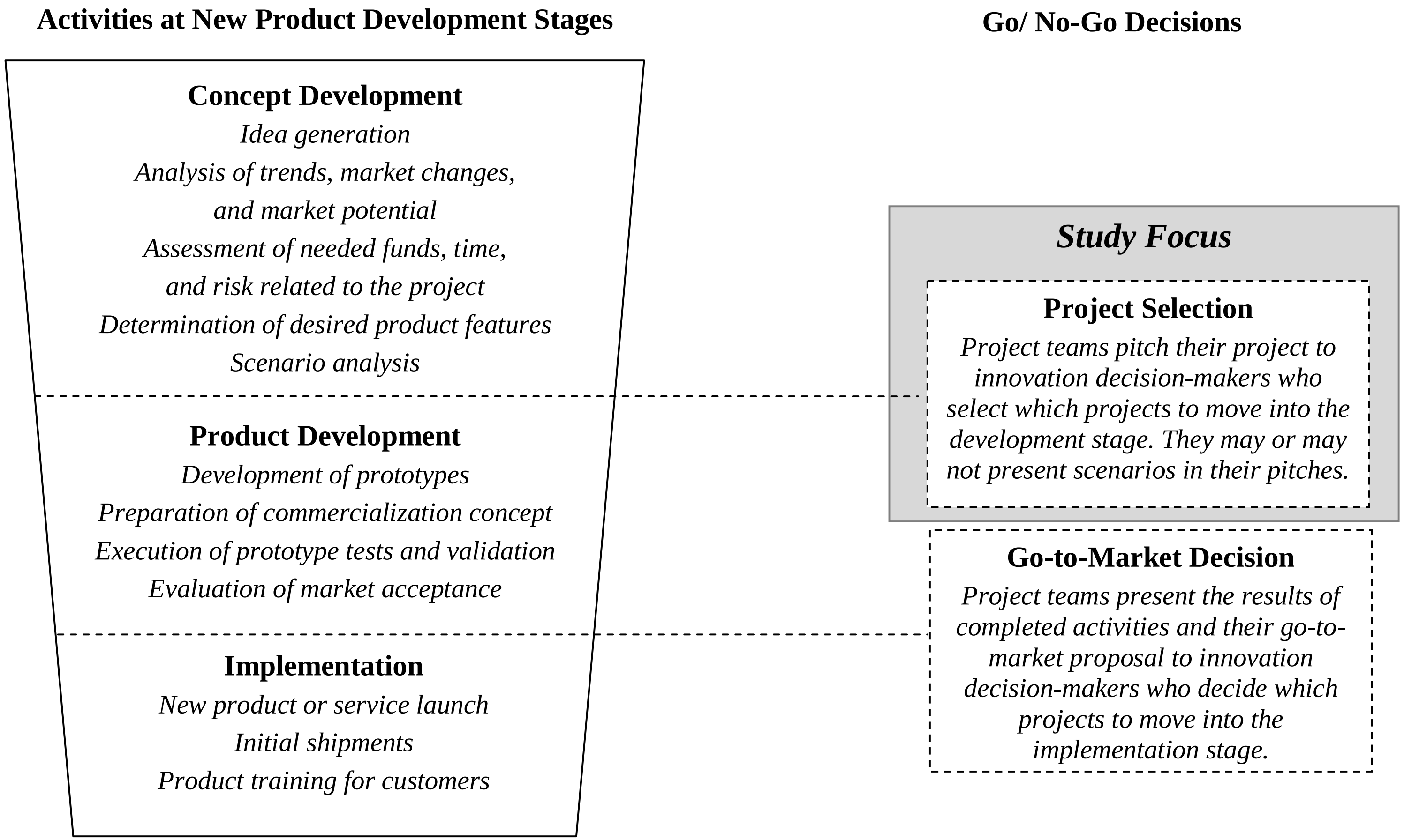
TABLE 4 – STUDY 2: PARAMETER ESTIMATES FOR THE PROJECT SELECTION MODELS (MIXED LOGIT MODELS WITH REPEATED CHOICES)

	Baseline Project Selection Model (Perceived Expertise and Risk)			**Full Project Selection Model (incl. Manipulated Factors)**		
	Parameter	*SE* [a]	*Hyp.*	*Parameter*	*SE* [a]	*Hyp.*
No-Choice Constant	-2.46	.09***		-2.49	.09***	
Std. Dev. of Random Coefficient	2.25	.08***		2.25	.08***	
Expertise	.31	.01***	H_{3a} (+)	.31	.01***	H_{3a} (+)
Risk	-.28	.01***	H_{3b} (-)	-.22	.01***	H_{3b} (-)
Expertise × Risk	.001	.003		.004	.003	
Conjoint Factors						
Innovation Type (Transformational = 1)				-.02	.01*	
Small-Range Scenarios				.38	.02***	
Large-Range Scenarios				-.20	.02***	
Small-Range Scenarios × Innovation Type				.03	.01**	
Large-Range Scenarios × Innovation Type				-.02	.01	
Interactions with Between-Subject Factors						
Expertise × Method of Scenario Devel. (Intuitive = 1)				.04	.02**	H_{4a} (+)
Risk × Method of Scenario Devel. (Intuitive = 1)				-.02	.01	H_{4b} (-)
Expertise × Strategic Merit (High = 1)				-.06	.02***	H_{5a} (-)
Risk × Strategic Merit (High = 1)				-.02	.01	H_{5b} (+)
N (number of observations)	55,440			55,440		
Akaike information criterion (AIC)	29,769			29,318		
Bayesian information criterion (BIC)	29,814			29,443		

Notes: We center Expertise and Risk at the mean. In line with Haaijer, Kamakura, and Wedel (2001), we account for the presence of no-choice alternative as follows: (i) we use effects coding for the *type of innovation* (where core = -1 and transformational = 1) and the *scenario presentation* factors (i.e., small-range scenario = 1 if small-range scenarios are presented, 0 if large-range scenarios are presented, and -1 otherwise; large-range scenario = 1 if large-range scenarios are presented, 0 if small-range scenarios are presented, and -1 otherwise); (ii) we code all attribute levels of no-choice alternative as 0; (iii) we add a no-choice constant that = 1 if an alternative is a no-choice option, and 0 otherwise. We use a random coefficient for the no-choice constant to account for the correlation among utilities for different alternatives that each decision maker evaluates (Train 2009). We use dummy coding for the *method of scenario development* (i.e., method of scenario development = 1 if scenarios are developed intuitively and 0 if scenarios are developed analytically) and *strategic merit* (i.e., strategic merit = 1 for the high level, 0 for the low level).

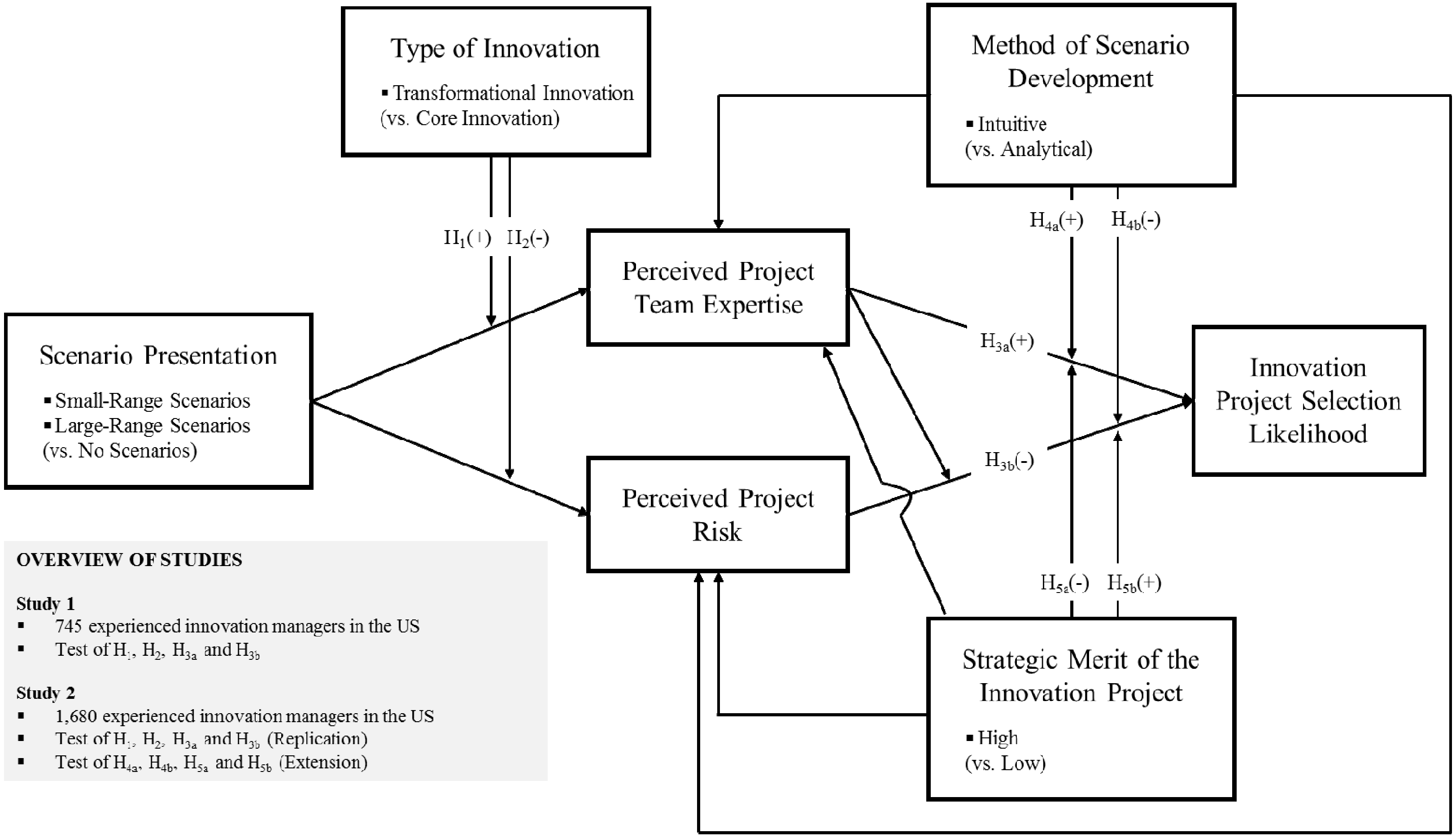
a. We computed the significance levels from z-tests.
* $p < .10$, ** $p < .05$, *** $p < .01$.

FIGURE 1 – NEW PRODUCT DEVELOPMENT STAGES



Note: Figure adapted from Ernst, Hoyer, and Rubsaamen (2010).

FIGURE 2 – CONCEPTUAL FRAMEWORK



Notes: We indicate our hypotheses next to the corresponding arrows followed by an indication, in parentheses, of their expected signs. For H_1, H_2, H_{3a}, H_{3b}, H_{4a} and H_{5a} we find empirical support. We do not find support for H_{4b} and H_{5b}.