

US and Norwegian Comparison of the Influence of Senior Manager Characteristics on New Product Development

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Abstract

Many studies on new product development (NPD) find that senior managers are crucial in achieving NPD efficiency and effectiveness. Our understanding of the factors that lead senior managers to support one project over another, however, is still incomplete. This study attempts to fill this gap. We draw on the upper echelon and NPD literatures to present a conceptual model of how senior managers' cognitive bases and risk taking propensities influence both their assessments of market attractiveness and organizational and strategic fit for a new project, as well as the support they provide project teams. We test this model with a survey of senior managers in U.S. and Norway. The results indicate that the risk taking propensities of senior managers and, to some extent, their cognitive bases influence the support they provide project teams across different country and industry contexts.

INTRODUCTION

Many studies on new product development (NPD) find that senior managers play a crucial role in achieving NPD efficiency and effectiveness (e.g., Clark and Fujimoto, 1991; Cooper and Kleinschmidt, 1987; Zirger and Maidique, 1990). These studies find that senior managers provide vision, and the financial and political resources that enable projects to succeed (Imai, Ikujiro, and Takeuchi, 1985; Cooper and Kleinschmidt, 1987; Gupta and Wilemon, 1990; Zirger and Maidique, 1990). Other studies examine how senior managers control a NPD project (Bonner, Ruckert, and Walker, 2002), or decide which aspects of the NPD process deserve strategic emphasis (Calantone, Vickery, and Droge, 1995). Our understanding of the influence

of senior manager characteristics on the NPD process, however, is still incomplete in that we have yet to explain why senior managers support one project over another (Brown and Eisenhardt, 1995).

This study attempts to fill this gap. We address the following research question: What factors influence senior managers' assessments of and support for NPD projects? We draw on the upper echelon and NPD literatures to present a conceptual model that links senior managers' cognitive bases and risk taking propensities with NPD project assessments and support. We then test this model in a field survey of senior managers in multiple organizations in the U.S. and Norway. The results of this study represent a first step toward increasing our understanding of the effect of senior managers' characteristics on their organization's NPD process. Senior managers make crucial strategic choices about their organizations' NPD (Ramanujam and Mensch, 1985). Linking senior managers with NPD project support may help clarify why managers make certain strategic choices, thus potentially increasing our understanding of why some organizations are better at NPD than others.

In addition to contributing to our understanding of the role of senior manager characteristics, our study examines the influence of senior manager cognitive bases and risk taking propensities on NPD across different country contexts. Golder (2000) reports that very few investigations examine NPD in an international context, with most studies investigating only U.S. firms. We intend to make progress in this area by analyzing data from the U.S. and Norway. These countries are similar in that they possess universal education, social welfare systems, and institutions dominated by Judeo-Christian thinking (Aukrust and Snow, 1998). They share similar diffusion rates of information and communication technology, have expert users of these technologies (Bauer, Berne and Maitland, 2002; Sornes et al., 2004), and more than half of the population of both countries uses the internet daily (Lundby, 2002). Similarities in national culture and advancements in information and communication technologies thus allow for a comparative assessment of senior manager characteristics, and increase the generalizability of the results of this study to organizations in different country and industry contexts.

THE MODEL

The term "senior managers", as used in this study, refers to managers who make critical decisions about NPD projects in their organizations (such as whether to withdraw resources from the project or support it with more resources), determine the importance of the project to their organizations, and are responsible for the developmental aspects of new projects. These managers typically head the division or business unit managing the NPD projects under consideration.

In this study, we examine how the cognitive bases and risk taking propensities of senior managers influence their assessments of the market attractiveness and strategic and organizational fit of new projects, as well as the support they provide project teams. We focus on assessments of market attractiveness and fit since several NPD studies identify these as fundamental factors influencing NPD success (e.g. Danneels and Kleinschmidt, 2001; de Brentani, 2001; Zirger and Maidique, 1990). We draw on previous NPD research (Chakrabarti, 1974; Cooper and Kleinschmidt, 1987; Hage and Dewar, 1973; Ramanujam and Mensch, 1985),

to identify three categories of senior managers' support for NPD projects: a) portfolio management decisions that support the projects, b) support during the development process, and c) involvement in the management of the cross-functional project team. Figure 1 presents the model tested in this study and draws on the upper echelon perspective as well as on previous empirical studies on NPD.

In essence, the upper echelon perspective states that senior managers screen potential environmental and organizational stimuli through their cognitive bases and values. Managers then selectively perceive and interpret stimuli, and use their resulting perceptions to make strategic choices for the organization (Hambrick and Mason, 1984). Experiments conducted with M.B.A. and E.M.B.A students by Ettlé (2002, 2007) find that managers' professional backgrounds are an important consideration in the management of new products.

We apply the upper echelon perspective to an NPD context and argue that senior managers' cognitive bases will influence their assessments of market attractiveness and fit for new projects. Senior managers responsible for a firm's portfolio of projects identify environmental opportunities and challenges, interpret and communicate relevant information to organizational members, consider firm capabilities, and direct strategic change. The nature and depth of managers' cognitive bases (Cyert and March, 1963) should positively influence these decisions and evaluations, in particular, those related to assessments of market attractiveness and fit for a new product. Experienced senior managers, for instance, will probably have diverse and deep cognitive bases as a result of having managed multiple new and existing projects in their organizations over the course of their careers. This should allow them to evaluate and implement varied approaches and novel solutions and may positively influence their openness toward, and therefore, their assessments of the attractiveness of new projects. Some studies (e.g., Bantel and Jackson, 1989; Kimberly and Evanisko, 1981) provide some support for this argument. We hypothesize that

Hypothesis 1a: Ceteris paribus, senior managers' cognitive bases will positively influence their assessments of market attractiveness for a new project.

Hypothesis 2a: Ceteris paribus, senior managers' cognitive bases will positively influence their assessments of fit for a new project.

In addition to cognitive bases, we also examine how senior managers' risk taking propensities influence their assessments of market attractiveness and fit for new projects. Strategic management researchers generally define risk as unpredictability or down-side unpredictability of business outcome variables (see Bromiley, Miller, and Rau, 2001, for a review). This definition of risk conforms to managers' conceptualization of risk in terms of potential losses (March and Shapira, 1987). We follow these conceptualizations and define risk taking propensity by senior managers as the extent to which they are willing to accept potential losses as a result of their decisions.

A fundamental assumption of many studies in the strategic management literature on risk is that managerial risk preferences influence strategic choices. That is, managers evaluate alternatives based on their personal risk preferences (March and Shapira, 1987). We extend this premise to NPD and argue that risk taking propensity by senior managers positively influences their assessments of market attractiveness and organizational fit of new projects. NPD is

inherently risky in that managers cannot accurately predict the performance of a new project. Managers with a greater propensity for risk taking should assess new projects more positively than managers with a lesser propensity for risk taking, possibly because risk propensity is positively related to the confidence managers' have about the success of a new product introduction (Simon and Houghton, 2003). We hypothesize that

Hypothesis 1b: Ceteris paribus, senior managers' risk taking propensity will positively influence their assessments of market attractiveness for a new project.

Hypothesis 2b: Ceteris paribus, senior managers' risk taking propensity will positively influence their assessments of fit for a new projects.

Senior managers are important in NPD because they also provide concrete support to NPD teams such as portfolio management, NPD process support, and cross-functional team management. We propose that senior managers' cognitive bases and risk taking propensities will influence the support they provide to project teams in each of these categories. We examine the relations between senior managers' cognitive bases and risk taking propensities and each of these support categories in more detail below.

Portfolio management is a dynamic decision-making process in which managers continually rank existing and new projects, and allocate resources based on the fit between firm resources, capabilities and marketplace dynamics. Portfolio management is especially critical at the international level, since international NPD requires attention to product and communication variations across countries (Henard and Szymanski, 2001). We reason that senior managers' will try to attain cognitive consistency by aligning their portfolio management decisions with their assessments of market attractiveness and fit. Cooper and colleagues (1999) find that companies with effective portfolio management techniques have very high value projects that are aligned with the companies' strategy. The alignment between portfolio management decisions and assessments of market attractiveness and fit, in turn, implies that the same characteristics of senior managers that influence assessments will also influence portfolio management decisions. In other words, managers will prioritize and allocate resources to projects that they rate highly, and these ratings will depend on the cognitive bases and risk taking propensities of senior managers. We hypothesize that

Hypothesis 3a: Senior managers' cognitive bases will positively influence portfolio management decisions that support the project team.

Hypothesis 3b: Senior managers' risk taking propensity will positively influence portfolio management decisions that support the project team.

Senior managers in many firms communicate their assessments of project focus and progression to the project teams at critical NPD process decision points (Cooper 1985, 1990). Senior managers thus transfer their knowledge to cross-functional units, resulting in increased information utilization and better decision-making. NPD teams integrate the information and knowledge they receive from senior managers with the skills of their members to develop a marketable product or service.

We propose that senior managers' cognitive bases and risk taking propensities that influence their assessments of market attractiveness and fit will also positively influence the NPD process support they provide to project teams. Again following the cognitive consistency

argument, senior managers will provide more process support (such as providing the team with a strong vision, human capital, appropriate incentives and rewards, and funding) for projects that they assess highly in terms of market attractiveness and organizational and strategic fit. This support should lead to exemplar outcomes (Lynn and Akgun, 2001; Hoegl and Gemueden, 2001; Sarin and Mahajan, 2001). We hypothesize that

Hypothesis 4a: Senior managers' cognitive bases will positively influence new product development process support.

Hypothesis 4b: Senior managers' risk taking propensity will positively influence new product development process support.

In addition, senior managers arm CFTs with essential tangible and intangible resources (Hoegl and Gemueden, 2001; Sarin and Mahajan, 2001; Lynn and Akgun, 2001). Their support legitimizes CFTs' product development efforts (Dougherty and Heller, 1994) and sets the expectations that the focus and progress of their projects will match organizational and marketplace requirements. Senior managers' assessments propel cross-functional team members to work in ways that are in the best interest of the organization.

Previous research attests to such behaviors. The effectiveness of senior managers' CFT management influences the fulfillment of stated project premise (McDonough, 2000), the speed of new product development (Guan, Liu, and Peng, 2002), and increases marketplace performance (Larson and Gobeli, 1988; Griffin, 1997). Jelink and Schoohover (1990) suggest that senior managers of innovative firms are more likely to be involved in team encouragement, idea generation, information sharing, and project integration. In the context on international NPD, resource sufficiency leads to enhanced creativity and superior marketing (Adler, Riggs, and Wheelwright, 1989; Brunner 2001; Kuczarski, 1998) with funding extending across departmental units and throughout the NPD process. Resource commitment includes the time, money, and facilities required to execute a well-thought through program.

We propose that since CFTs are so crucial for developing innovative and successful new products, senior managers' cognitive bases and risk propensities that positively influence their assessments of market attractiveness and fit for a project will also positively influence their involvement in CFT management.

Hypothesis 5a: Senior managers' cognitive bases will positively influence their involvement in the management of a cross-functional NPD team.

Hypothesis 5b: Senior managers' risk taking propensity will positively influence their involvement in the management of a cross-functional NPD team.

METHODOLOGY

A structured questionnaire was developed over several stages. First, a review of the literature uncovered theoretical models and previously used scale items depicting senior manager characteristics: cognitive base, risk propensity, assessments of market attractiveness and strategic and organizational fit, and project team support. The questionnaire was pre-tested with academics familiar with the NPD and top echelon literatures.

The sampling units were selected from Product Development and Management Association's member companies, the authors' contacts, and a list of Norwegian firms. The lists were prescreened for managers responsible for their firm's portfolio management. Senior managers were contacted by telephone and requested to participate in a 20 minute mail survey. Respondents were assured of complete anonymity in their responses. A summary report of results was offered to encourage interest and participation. A total of 110 questionnaires were returned, with sixty eight responses from U.S. senior managers and 42 responses from Norwegian senior managers. Senior managers were well represented across functional areas which included design, engineering, marketing, and research and development, thus making informants knowledgeable about NPD portfolio, process, and cross functional team management. In addition, these senior managers belonged to firms from multiple industries such as chemicals, computer equipment, electronics, food and packaging, metal working, and telecommunications, making the sample representative of all firms that conduct NPD projects. Survey respondents were responsible for their firms' portfolio management activities and were well acquainted with NPD process and cross functional team management. Senior managers held titles such as Director or VP of New Product Development, Marketing, and Market Development.

Measures: Independent variables

Senior managers' cognitive bases-Following previous research on upper echelons, the nature and depth of senior managers' cognitive bases was measured in terms of their primary functional area, years of experience in their industry, organization, and current position, years of education, and age (Bantel and Jackson, 1989; Smith et al., 1994). Respondents were asked to indicate their primary functional area (marketing, R&D, manufacturing, other). Responses were coded using three indicator variables. Since the measures of senior managers' characteristics were significantly correlated with each other, we used a principal components analysis (with varimax rotation) to condense these measures into a smaller number of measures. The analysis revealed three underlying components (age and experience, R&D functional area and education, and manufacturing functional area) that accounted for 64% of the total variance. The factor scores of these components were used in further analysis. Scale reliabilities ranged from .67 to .87. Previous studies suggest that the reliabilities of these scales are acceptable (Peter 1979, 1981). Risk taking propensities were measured with a six-item scale from Calantone, Garcia, and Droge (2003) anchored by "strongly disagree" and "strongly agree". The coefficient alpha of this scale was .86, indicating sufficient reliability.

Measures: Dependent variables

The dependent variables, assessments of market attractiveness, fit, portfolio management decisions, NPD process support, and involvement in cross-functional team management, were measured using previously established scales. Coefficient alpha were .68, .71, .80, .67, and .87 respectively.

Controls

The model controls for some environmental and organizational factors that may influence the assessments of market attractiveness and fit by senior managers and the support they provide project teams. These include country of operation, environmental turbulence, organization size, and degree of innovativeness of the project. The country of operation was coded as an indicator variable (1 = Norway, 0 = U.S.). Managers introducing new products in turbulent environments

operate under uncertainties (Mullins and Sutherland, 1998) that may influence their assessments of market attractiveness and fit. We measured turbulence with an eight item scale from Sarin and Mahajan (2001). The coefficient alpha of this scale was .75, indicating sufficient reliability. Organization size was measured in terms of the number of employees employed by the companies. We controlled for the degree of project innovativeness by asking managers to think of one new product they recently managed. Managers were asked to classify this product on a six point scale ranging from process modification (product being manufactured in a new way) to new-to-the-world product (product creates an entirely new market). Managers were asked to answer subsequent questions relating to fit, attractiveness, etc. with respect to this product.

Common method bias considerations

Using key informants to provide data on both the dependent and independent variables raises concerns about common method bias. We employed Harmon's single-factor test as a diagnostic for assessing the extent to which the dataset in this study is subject to common method bias (Podsakoff and Organ, 1986). Specifically, we subjected the items used to construct the scaled measures to an exploratory factor analysis. The unrotated factor solution extracted 17 factors, with the first factor accounting for 16% of the covariance among the items. This type of result, where multiple factors are extracted, and the first factor accounts for a minority of the covariance among the items, suggests that the dataset is not subject to a significant common method bias (Podsakoff and Organ, 1986).

RESULTS

Table 1 presents a comparison of senior manager characteristics and assessments between managers from the U.S. and Norway. While Norwegian and U.S. managers did not differ in their cognitive bases, they did differ in their risk taking propensities ($F = 6.889, p < .05$). Further, while Norwegian managers reported marginally higher assessments of strategic fit than U.S. managers ($F = 3.852, p < .10$), U.S. managers reported significantly higher assessments of market attractiveness ($F = 8.307, p < .01$) and reported working on more innovative projects than Norwegian managers ($F = 5.369, p < .05$). Managers from both countries did not, however, differ in the support they provided project teams. The Norwegian firms in this study were, on average, larger than U.S. firms ($F = 19.656, p < .01$). Managers of firms from the two countries did not differ in their assessments of environmental turbulence ($F = .137, p > .10$).

Hypotheses 1 through 5 examine the effects of senior managers' cognitive bases and risk taking propensities on assessments of market attractiveness, fit, extent to which managers made portfolio management decisions supporting NPD teams, supported the team during the development process, and were involved in the management of the cross-functional project team. These hypotheses were tested using multiple regression analyses. Table 2 presents the regression results.

The results do not support either Hypotheses 1a or 1b. Neither senior managers' cognitive bases nor their risk propensities influence their assessments of market attractiveness. Instead, environmental and project related factors (country of operation, $b = .548, p < .05$, environmental turbulence, $b = .512, p < .05$, and degree of innovativeness of the product, $b = .203, p < .01$) influence managers' assessments of market attractiveness. The results also do not

support Hypotheses 2a and 2b. While risk taking propensity exerts a marginal influence on assessments of organizational fit ($b = .130, p < .10$), the overall equation is not significant ($F = 1.326, p > .1$). Similarly, the overall equation with assessments of strategic fit is not significant ($F = .659, p > .10$).

The results support Hypotheses 3b but not Hypothesis 3a. The risk taking propensity of senior managers positively influences the extent to which they make portfolio management decisions that support the project team ($b = .134, p < .05$). Senior manager cognitive bases (measured in terms of functional background, experience, and so on) do not significantly influence the portfolio management decisions made by these managers. Instead, organizational size, a control variable, positively influences portfolio management decisions ($b = .132, p < .01$).

The results partially Hypothesis 4a. Managers with a manufacturing background are more likely to provide NPD process support ($b = .182, p < .10$), while managers from R&D and greater educational experience are less likely to do so ($b = -.282, p < .05$). Contrary to Hypothesis 4b, the risk taking propensity of senior managers negatively influences the extent to which they provide NPD process support ($b = -.233, p < .05$).

The results support Hypotheses 5a and 5b. Consistent with Hypothesis 5a, managers with a manufacturing background are more likely to be involved in cross-functional team management ($b = .169, p < .01$). Consistent with Hypotheses 5b, the risk taking propensity of senior managers positively influences the extent to which they are involved in cross-functional team management ($b = .282, p < .01$).

DISCUSSION

This study presents and tests a model relating senior managers' cognitive bases and risk taking propensities to their assessments of market attractiveness and organizational and strategic fit of projects, and the support they provide to project teams in the areas of portfolio management, development process support, and involvement in cross-functional team management. The results of this study find that senior managers' risk taking propensities influence the support they provide to project teams. The influence of risk taking propensity on senior manager support to project teams is particularly striking since it significantly influences all the different categories of support provided by senior managers. Interestingly, risk taking propensity positively influences both portfolio management decisions in support of the NPD team as well as senior manager involvement in cross-functional team management, but negatively influences NPD process support. One reason for this pattern of findings may be that, consistent with their personal risk taking propensities, risk positive managers may be more likely not only to let NPD teams pursue their projects, but also to let them "sink or swim", i.e., develop their own vision for their project and seek organizational resources on their own. The results also find that one element of senior managers' cognitive bases, namely, their functional background, and especially, a manufacturing background, is critical in influencing senior manager actions supporting NPD.

Examining the influence of senior managers on NPD is important because, as Hambrick and Mason (1984) note, managers at the top influence firm profitability and growth through their strategic choices. This study represents a first step toward developing a comprehensive

understanding of the largely unexplored role of senior managers in NPD. This study finds that senior managers matter in NPD and fleshes out exactly how they matter: senior managers with a manufacturing background, and more generally, all senior managers who have a propensity to take risks, are more likely to support NPD teams. We speculate that, at an organizational level, a multiplicity of risk taking managers, and / or a predominance of the manufacturing function, may lead to an organization that consistently develops more new products (albeit with more failures) than an organization whose managers are more risk averse or has a manufacturing function that is less prominent. An added strength of this study is that it examines senior managers from two countries. The lack of a significant country effect suggests that the results from this study are robust across managers operating in different national contexts and industries.

The study results indicate senior managers' cognitive bases (and more specifically, functional background) and risk taking propensity, matter in NPD. One way to ensure that senior managers have the requisite background needed to support NPD teams is obviously to rotate managers through the different functions (particularly, manufacturing) of the firm. Risk taking propensity is a relatively stable attribute; research on executive compensation, however, suggests that it can be increased by providing the right incentives and aligning them with the goals of the firm (Milgrom and Roberts, 1992).

As with all research, this study has some limitations. The senior managers in this study represent an available sample. Further, survey research presents a cross-sectional portrait of the relationship between senior manager characteristics and assessments and support, and does not capture the dynamic nature of this relationship (e.g., managers' support and positive assessments lead to exemplar outcomes that further develop the managers' cognitive bases). Also, the upper echelon research finds that teams of senior managers, not individual managers, make the critical, long term decisions for firms (Hambrick and Mason, 1984). We utilized U.S. and Norway as two countries with similar profiles (Sornes et al., 2004). Future studies may compare results on senior manager characteristics on NPD across countries that vary on these dimensions.

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FIGURE 1

Conceptual Model

US and Norwegian Comparison of the Influence of Senior Managers' Characteristics on NPD

Assessments and Project Team Support

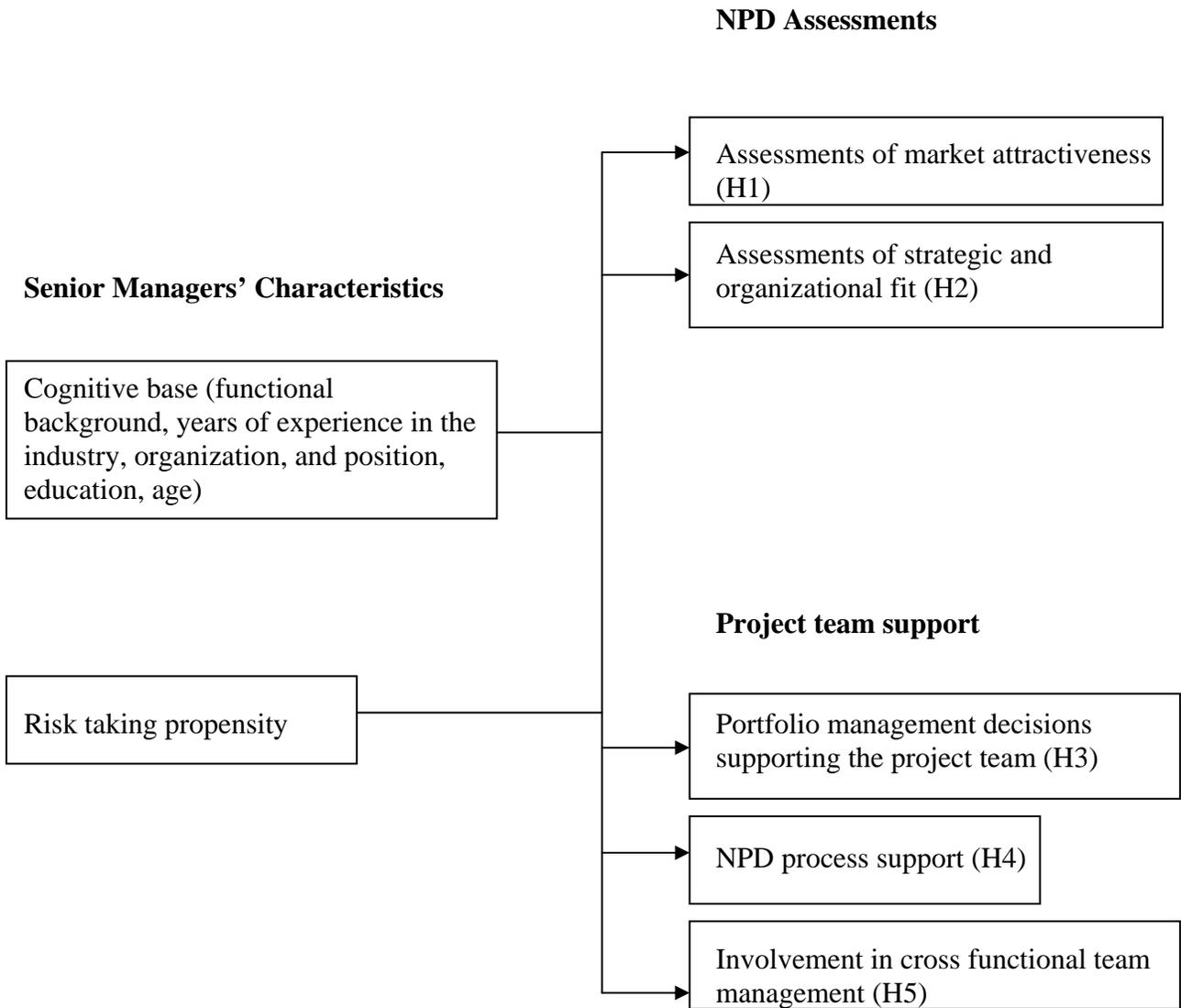


TABLE 1

One way Anova comparing senior manager characteristics and assessments between U.S. and Norway

		Mean	F	Significance
Manager characteristics Component 1 (Experience and age)	U.S. (N = 56) Norway (N = 35)	-.082 .131	.982	.324
Manager characteristics Component 2 (R&D and education)	U.S. (N = 56) Norway (N = 35)	.066 -.105	.631	.429
Manager characteristics Component 3 (Manufacturing)	U.S. (N = 56) Norway (N = 35)	-.053 .085	.410	.524
Risk taking propensity	U.S. (N = 68) Norway (N = 42)	3.216 3.778	6.880	.010
Strategic fit	U.S. (N = 68) Norway (N = 42)	5.603 5.167	3.852	.052
Organizational fit	U.S. (N = 68) Norway (N = 42)	3.399 3.583	1.807	.182
Market attractiveness	U.S. (N = 68) Norway (N = 42)	5.140 5.691	8.307	.005
Portfolio management	U.S. (N = 68) Norway (N = 42)	4.235 4.052	1.259	.264
NPD process support	U.S. (N = 68) Norway (N = 42)	1.857 1.778	.147	.702
Cross functional team management	U.S. (N = 68) Norway (N = 42)	3.478 3.417	.170	.681
Turbulence	U.S. (N = 68) Norway (N = 42)	2.726 2.691	.137	.712
Project innovativeness	U.S. (N = 68) Norway (N = 42)	3.630 4.210	5.369	.022
Organization size	U.S. (N = 68) Norway (N = 42)	3.180 2.050	19.656	.000

TABLE 3

Regression results-Dependent variable

	Market attractiveness	Strategic fit	Organizational fit	Portfolio management	NPD process support	Cross functional team management
Constant	2.855** (.695)	4.946** (.952)	3.507** (.565)	3.239** (.418)	2.672** (.798)	2.099** (.415)
Manager characteristics (Component 1- Experience and age)	-.130 (.094) -.131	.094 (.129) .081	.035 (.077) .049	-.022 (.057) -.040	.054 (.108) .051	-.081 (.056) -.128
Manager characteristics (Component 2 – R&D and education)	-.007 (.094) -.007	-.081 (.129) -.069	.038 (.076) .053	.020 (.056) .036	-.282* (.108) -.267	-.041 (.056) -.065
Manager characteristics (Component 3 – Manufacturing)	.073 (.092) .073	.058 (.126) .050	-.088 (.075) -.124	-.046 (.055) -.083	.182 [†] (.106) .172	.169** (.055) .269
Risk taking propensity	.053 (.094) .060	.079 (.128) .075	.130 [†] (.076) .203	.134* (.056) .271	-.233* (.107) -.245	.282** (.056) .498
<u>Controls</u>						
Country of operation	.548* (.220) .270	-.193 (.302) -.081	.225 (.179) -.187	.007 (.132) .007	.133 (.253) .061	-.029 (.132) -.023
Environmental turbulence	.512* (.220) .222	-3.1 x 10 ⁻⁴ (.302) .000	-.310 [†] (.179) -.187	-.009 (.132) -.007	-.163 (.253) -.066	-.047 (.132) -.032
Organization size	-.069 (.078) -.093	.162 (.107) .187	.081 (.063) .153	.132** (.047) .323	.087 (.090) .110	.163** (.047) .350
Project innovativeness	.203** (.076) .260	-.046 (.105) -.050	.012 (.062) .022	.063 (.046) .145	.029 (.088) .035	.045 (.046) .091
R-square	.310	.060	.115	.191	.196	.385
N	91	91	91	91	91	91
F	4.610**	.659	1.326	2.428*	2.507*	6.404**

Regression coefficient is above the standard error (in parentheses), followed by the standardized coefficient. [†]p < .10, *p < .05, **p < .01.